SoCalGas®

Agriculture Energy Efficiency Program Implementation Plan

ICF

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Contents

Appendix A: Implementation Plan Template (2.0)

The following Implementation Plan is located on the California Public Utilities Commission ("CPUC")-maintained website, the California Energy Data and Reporting System ("CEDARS")[1], in accordance with applicable CPUC decisions and Energy Division guidance.

Program Overview

AgEE drives installation of cost-effective solutions primarily through a combination of strategic measure focus and providing relevant technical assistance to drive customer awareness of both energy efficiency (EE) and non-EE measure benefits. For each agricultural customer segment, AgEE will emphasize adoption of measures that generally have long useful life and high TRCs. In some cases, measures with high cost-effectiveness are relatively unknown to the target customers and face significant adoption barriers, such as with infrared heating for Controlled Environment Agriculture (CEA). For these measures, additional emphasis will be placed on creating compelling marketing collateral, case studies, and training curriculum for growers and equipment vendors. This effort will be supplemented by current and anticipated non-EE funding, including USDA grants. These grants will provide significant additional resources to promote measures and overcome trust barriers, and specific funding will be pursued to achieve savings cost-effectively for underserved communities. Additionally, AgEE recognizes the importance of water savings within California's agricultural sector and will identify new partnership and funding opportunities targeting the water-energy nexus. AgEE will work collaboratively with SoCalGas to evaluate and qualify opportunities to pursue grants to drive customer awareness and adoption of new and underutilized technologies that simultaneously achieve energy and water savings.

Campaign Goals and Timeline: In addition to financial goals (please refer to CEDARS) AgEE has campaign delivery goals outlined below:

Phase	*Deliverables*	*Dates*
Launch Preparation	Kickoff Meeting Program Implementation Plan Program Management Plan Program Marketing Plan Set up IT Infrastructure Develop Program Materials	04/07/2021–05/31/2021
Program Launch and Ramp Up	Provide Program training Implement marketing campaign Begin Customer enrollment Deliver preliminary Program services	06/01/2021–06/07/2021
Perform Program Services	Deliver Program services Conduct inspections and verifications Payment of Incentives/Rebates	06/07/2021– 12/31/2024
Program Shutdown	Shutdown Plan Inform Stakeholders Resolve outstanding items Final Program Report	As determined by Shutdown Plan

[1] California Energy Data and Reporting System (CEDARS), https://cedars.sound-data.com/

Program Budget and Savings

1. **Program Name:** SoCalGas Agriculture Energy Efficiency (AgEE) Program
2. **Program ID:** SCG3890

Please refer to the California Energy Data and Reporting System (CEDARS) for the following program details:

3. **Program Budget Table**
4. Program Gross Impacts Table
5. Program Cost-Effectiveness (TRC)
6. Program Cost-Effectiveness (PAC)
7. Type of Program Implementer
8. Market Sector
9. Program
10. Market channel(s) & Intervention Strategies

Implementation Plan Narrative

1. Program Description:

The Agriculture Energy Efficiency Program (AgEE or Program) cost-effectively serves SoCalGas' small to very large agricultural customers by delivering relevant energy efficiency solutions that meet the diverse needs of the sector. The Program objective aligns with the SoCalGas Business Plan to increase customer participation and achieve greater savings within the agriculture segment by maximizing energy savings through customized solution sets that provide quantifiable operating cost reductions.

AgEE identifies and works with SoCalGas agriculture industry customers to help them understand the benefits of implementing energy saving projects and measures; provides technical and project development assistance as needed; offers financial incentives and financing options; and for small/medium Disadvantaged Communities ("DAC") and Hard-to-Reach ("HTR") customers, direct installation of certain energy saving measures. The following activities will be conducted in support of achieving Program goals:

- Offer the AgEE program to all sizes and types of customers that are engaged in growing, producing, and processing various on-farm crops and animal products.
- Employ a multi-level outreach strategy that leverages the Program's account management team, local contractors, equipment vendors, key industry associations including universities, and other types of trade allies and service providers that engage the agricultural community.
- Utilize analytics-based customer targeting to identify and engage HTR customers and DAC regions to assist them in saving energy.
- Provide in-language sales and promotion materials (including Spanish and Hmong), and establish strategic partnerships aligned with unique Ag customer segments. Direct installation measures and higher incentive levels will be offered exclusively to DAC/HTR customers to make participation easy and ensure specific barriers are addressed.
- Provide Ag customers with access to an AgEE Program information hotline and Program website.
- Offer a variety of incentive payments and direct install services suitable for the customer size, project size, HTR or DAC classification, and project complexity/scale.
- Identify and evaluate partnership and funding opportunities to increase adoption of new and underutilized technologies that achieve both water and energy savings and develop full funding applications for any such opportunities that SoCalGas approves pursuing.

Customer Segments

AgEE targets specific segments within the agricultural sector that have high natural gas savings potential and includes CEA, Non-Dairy Animal Production, Post-Harvest Processing, Wineries, and Dairies. These customers comprise the majority of SoCalGas' agricultural market sector.

Geographic Location of Offering

Customers are primarily located in the heavily concentrated agricultural regions of the San Joaquin Valley (CTZ 13) and the Central Coast (CTZ 5) and will be targeted with a combination of direct customer outreach with additional support from trade allies such as agricultural engineering firms and farm equipment suppliers. Although agricultural regions are concentrated in climate zones 13 and 5, customers outside of these climate zones are eligible to receive AgEE Program services.

Eligible Customers
All agricultural customers who have a valid SoCalGas service account are eligible to participate in the AgEE program. Agriculture customers are defined by two-digit North American Industry Classification System (NAICS) Code 11. Post-harvest production (e.g., wine production, nut drying, etc.) is eligible when performed directly on-farm as defined by NAICS Code 11. Agriculture sub-segments further defined by four-digit NAICS Codes 1111, 1112, 1113, 1114 (including cannabis production which does not have a specific NAICS Code), 1119, 1121, 1122, 1123, 1124, 1125, 1129, 1151 and 1152.

Measures
The AgEE program features a comprehensive suite of measures that are designed to engage agricultural customers of all sizes within each customer segment. In addition to measures that have been historically featured in SoCalGas agricultural programs, AgEE emphasizes several underutilized measures that have high savings potential but low levels of customer adoption and awareness. A brief overview of AgEE program measures is described below:

- *Direct Contact Water Heating.* Direct contact water heaters allow flue gases to come in direct contact with water that they heat, achieving up to 99.7% efficiency. They are used in various on-farm applications including process heat, wash-down, and hydronic heat.
- *Greenhouse Heat Curtain.* Thermal curtains are special fabrics that provide a thermal barrier between the plant and greenhouse roof/walls to prevent heat loss during cold nighttime temperatures.
- *IR Heating.* Low-intensity infrared energy is used for heating plants grown in greenhouses. IR heaters heat plants directly rather than heating the ambient environment, thereby reducing energy use intensity, and offering additional benefits to plant growth.
- *Greenhouse RCx*. Retrocommissioning (RCx) of greenhouses involves calibrating and optimizing HVAC setpoints to reduce natural gas use by coordinating equipment and strategically manage solar heat gain. This can involve the addition of dynamic feedback controls or updates to algorithms in existing climate controllers.
- *Boiler system improvements*. Several custom measures are offered to optimize the performance of boiler systems including blowdown recovery, combustion fan VFD, and stack economizer. Each of these measures offers gas savings by more effectively utilizing waste heat.
- *Condensing unit heaters and boilers*. Condensing unit heaters and boilers offer significantly higher efficiency than their non-condensing counterparts by more effectively utilizing heat from the combustion process. Efficiency ratings of 90% to 93% are typical but can be higher with certain technologies or applications.
- *Steam traps.* Facilities with steam boilers commonly have failed steam trap, often due to leaking. Replacement steam traps (including thermostatic, mechanical, thermodynamic, or fixed orifice) provide significant gas savings, particularly where leak rates and operating hours are high.
- *Insulation*. Pipe insulation, tank insulation, and fitting insulation for hot water and steam systems apply to a variety of agricultural customer operations and provide opportunities for both gas and electric savings. Insultation measures will be offered as deemed, custom, and direct install.
- *Greenhouse infrared film.* Infrared film enables more effective utilization of heat in greenhouses by reducing radiation losses at night through the greenhouse envelope. Annual gas savings typically ranges from 10% to 20%.
- *Environmental control systems.* Environmental control systems enable automated coordination of equipment within the greenhouse, such as heaters, ventilation fans, and lighting systems. Additionally, they can enable advanced climate control strategies that enable greenhouses to utilize solar radiation more effectively and dynamically calibrate setpoints based on weather predictions.

- *Heat recovery.* Heat recovery applies to processes at a variety of agricultural facilities including dairy farms, CEA, and food processing. Custom heat recovery measures include compressor heat recovery for pre-heating water and dehumidification air reheat using site-recovered energy. These technologies enable customers to more efficiency utilize waste heat to reduce gas use.
- *Greenhouse under-bench heating.* Under-bench heating is used by greenhouse growers to more efficiently delivery heat to the plant root zone. By delivering heat in this way, the greenhouse air temperature can be reduced, thereby saving gas. Savings of 10% or more is typical.
- *Energy efficient storage water heaters.* Relative to standard storage water heaters, high efficiency models include features such as larger heat exchange surfaces and/or additional tank insulation. This measure will be offered as a direct install option.

  Details of all measures, including eligibility criteria, DAC/HTR applicability, and incentive amounts can be found in the supporting documents.

2. Program Delivery and Customer Services:

The AgEE program is designed to achieve the agricultural sector vision and goals outlined in the SoCalGas Business Plan. The Program brings a comprehensive suite of tested strategies to drive customer participation and overcome the unique barriers faced by California's agricultural sector:

- **Education:** Promotion of the benefits of EE upgrades beyond utility cost savings considering crop/product quality improvement and building long-term relationships with the Ag customer as part of the education process.
- **Assessment:** Evaluation of facilities and processes directly with Ag customers and advising them on EE solutions that best meet their needs allowing for multiple paths and a layered approach to making EE upgrades over time and at the right time in the growing cycle.
- **Measure Installation:** Depending on the size and type of customer and project, Program measures will be installed via direct installation, through trade allies, or by the customer.
- **Verification/Commissioning:** AgEE will verify completion of work to ensure all measures are installed and operational before payment of incentive to customer or trade ally.
- **Incentive Payment:** AgEE will follow necessary Company procedures to ensure timely and accurate payment of incentives to Customer/trade ally.

The application process is described for direct install, deemed, custom, and NMEC projects in Table 1 in more detail.

Table 1: Project Process

	Direct Install	Deemed	Custom	NMEC
Step 1 Marketing & Outreach		AgEE creates market awareness though digital marketing. Partnerships will be leveraged to identify customers and to run trainings/webinars. During this phase, DAC and HTR customers will be identified. Marketing materials will be translated to the languages spoken in DAC and HTR regions.		
Step 2 Customer Enrollment		AgEE assists interested participants with completing the application and submitting the supporting documents. Account Managers work with vendors and customers to bring in engineering support. At this stage, Program staff will identify whether the participant is classified as DAC or HTR based on the zip code of the facility.		
Step 3 Pre-Application/ Technical Review/ CMPA Review/ Reservation	Direct Install contractors that are enrolled in the program will handle these steps.	Customer will purchase the qualifying high efficiency equipment. AgEE will provide support and guidance where needed to ensure the eligibility requirements from the workpapers are met.	**Pre-Application -** Each site will be pre-screened by the implementer's engineers to identify potential measures. For NMEC projects, estimated achievable savings must be ≥10% and it must be possible to produce a model with adequate confidence levels. Implementer will submit a Pre-App Review request to SoCalGas Custom Engineering Services (ES) so that Program and SoCalGas engineers can collaborate in the project development phase. This will ensure that the Program is always adhering to current CPUC policies regarding NMEC and Custom projects. A project site visit will be conducted by implementer and ES unless ES waives it due to sufficient data and supporting documentation. **Technical Review -** If the facility passes pre-screening, a Project Feasibility Study (PFS) will be generated with savings estimates, cost-benefit analyses, and a site-specific M&V plan. Implementer will submit the PFS to ES to obtain a Pre-Agreement Review. **CMPA Review -** If project meets the Technical Review requirements, it will be submitted to the Custom Measure and Project Archive (CMPA) project list. The CPUC could select the project for in-depth review and would require the implementer, ES, and program advisor to respond to project-related data requests. The CPUC will decide if the project is approved or rejected at this stage. **Reservation –** If project is approved, implementer will obtain the customer's signature on a Conditional Incentive Reservation (CIR). This will reserve program funds for the project.	
Step 4 Project Installation		The installation will be carried out following the guidance in the workpapers. Account Managers will help ensure the completion of this step.	The installation will be carried out by a licensed HVAC contractor.	
Step 5 Post-Installation Review/ Inspection/ Incentive Approval	Site inspections for 10% of projects will take place (randomly selected facilities for site inspections).	Paid itemized invoices, photos of pre-existing and new equipment, specification sheets, project application, and any supplemental measure-specific information will be supplied and checked by program staff. Site inspections for 10% of projects will take place (randomly selected facilities for site inspections).	M&V will be carried out based on the IPMVP option chosen in the project feasibility study phase of Step 3. Engineering calculations will be finalized for the measures. Installation will be verified through site inspections or pictures provided by the customer for all custom projects. Invoices for the project will also be checked. The project's Post Installation Report (PIR) will be sent to ES for an Installation Review. The report will note DI or Deemed measures if applicable. ES will conduct a site visit unless it waives it due to sufficient data and supporting documentation.	Facility performance will be metered and checked throughout the measurement period (no less than 1 year in accordance with CPUC guidelines). At the end of the metering period, energy use data will be collected, and a savings analysis will be performed using nmecr software. Non-routine events (NREs) will be identified and investigated; adjustments for NREs will be made to the model to generate a finalized pre and post project model. Invoices for the project will also be checked. If the project included custom measures, the project's Post Installation Report (PIR) will be sent to ES for an Installation Review. The report will note DI or Deemed measures if applicable. ES will

	Direct Install	Deemed	Custom	NMEC
			If all requirements are met, ES will review savings achieved by the project and, if needed, will adjust the project savings claim. ES will generate an Installation Review report based on their approved savings analysis. If specified on the initial CMPA review disposition, the project will be re-uploaded to the CMPA for a CPUC post-M&V review.	conduct a site visit unless it waives it due to sufficient data and supporting documentation. If all requirements are met, ES will review savings achieved by the project and, if needed, will adjust the project savings claim. ES will generate an Installation Review report based on their approved savings analysis. The report will note DI or Deemed measures if applicable. If specified on the initial CMPA review disposition, the project will be re-uploaded to the CMPA for a CPUC post-M&V review.
Step 6 **Incentive Payment**	The contractor will receive payment to offer qualifying products at a reduced cost.	Customers will receive one incentive payment once installation and M&V is complete. It will be paid in accordance with the workpapers.	Customers will receive one incentive payment once installation and M&V is complete. It will be based on the energy saved. The incentive will be higher for DAC/HTR participants.	Customers will receive three incentive payments. The first payment will be used to offset a portion of the upfront purchase cost. The second payment will occur at the end of Year 1 and will reflect the savings achieved to date. The remaining incentive will be paid at the end of Year 2 and will be used to true-up the total incentive based on verified savings. Customer incentives will be capped at 50% of the project costs. The incentive will be higher for DAC/HTR participants.

*Note 1: For behavioral, RCx, and operational measures, a repair and maintenance plan that adheres to CPUC rules will be formulated. The participant must agree to carry out the plan for a minimum of three years via a signed customer agreement

3. Program Design and Best Practices:

Collaboration with Trusted Industry Partners: Agricultural customers are known to approach energy efficiency improvement projects cautiously even when there is a compelling value proposition. To overcome this barrier, it is critical to work through trusted industry partners and communication channels. The AgEE program leverages trade associations, agricultural cooperatives, university extension offices, equipment vendors, manufacturers, and other relevant stakeholders to connect with customers on a more personal level.

Specialized Technical Assistance and Facility Energy Audits: Each agricultural segment requires a unique approach and an understanding of specific processes, policies, and technologies relevant to that segment. Emphasis will be placed on providing comprehensive facility energy audits to the largest customers to identify opportunities for retrofits and RCx. Facility audits will provide a platform for engaging large customers through other means, including ongoing benchmark monitoring and strategic energy management (SEM). Participating customers will have access to local engineers and subject matter experts to quickly provide decision support, answer technical questions, and provide basic analysis.

Customer Incentives and Financing: Overcoming the first-cost barrier is a fundamental strategy of the AgEE program. Recognizing that agricultural customers are hard-to-reach and face numerous challenges that take precedence over energy, the availability of substantial incentives and convenient financing is paramount to a successful program. Customer incentives are limited to $1,000,000 and are capped at the lesser of the following: 1) calculated natural gas energy savings multiplied by the measure incentive rate ($1.50 per therm for Add-on Equipment (AOE), Accelerated Replacement (AR), Normalized Consumption (NC), and Normal Replacement (NR); $0.75 per therm for behavioral, retrocommissioning, and operational (BRO) measures or 2) the applicable

Measure Application Type (MAT) cost. MAT cost is calculated at 50 percent of Full Measure Cost (FMC) for AOE and BRO measures (80% for partnerships); 100 percent of Incremental Measure Cost (IMC) for NC and NR; and 100 percent of Accelerated Replacement Cost (ARC) for AR. Market demands may require modifications to these incentives from time to time. The AgEE program promotes on-bill financing and on-bill repayment as an intervention strategy to further overcome the high first-cost barrier. These financial levers are used to structure energy efficiency projects that are cash flow positive. The AgEE program also coordinates efforts through water districts, Groundwater Sustainability Agencies (GSAs), municipalities, and other relevant state and federal agencies that influence energy, water, and/or renewable solutions. Examples of these coordination efforts include jointly hosted workshops on Sustainable Groundwater Management Act (SGMA) regulations and agricultural case studies highlighting efficiency projects that reduce both water and energy use, and co-development and co-branding of best practices guides and other technical resources that will be distributed to a shared customer base. AgEE will identify and evaluate opportunities to pursue funding that support these water-energy nexus efforts.

The AgEE program engages both downstream and midstream market channels. The primary channel is the end-use (downstream) customer, but the local vendor community (midstream) will be leveraged as an outreach channel to connect with their existing customer base. Customers are provided technical expertise devoted to identifying efficiency solutions that maintain current production at a lower operating cost. Incentives and financing are then used to facilitate project implementation by reducing first-cost barriers. The agricultural sector is relationship-driven and requires the old-fashioned tactic of direct, one-on-one interactions. Agriculture programs often fail because they underestimate the level of support needed by customers and assume that they operate similar to commercial or industrial programs. Agriculture customers approach efficiency very cautiously and are reluctant to adopt unfamiliar technologies. The Program's role is to work closely with the customer to overcome this reluctance. The level of support provided is the primary tactic used to drive higher levels of participation.

Due to the relationship-driven nature of the Ag customer base, the Program utilizes SoCalGas support services to make customer introductions, identify known project plans, identify potential projects that need follow-up to move forward, etc. After an initial Program overview meeting, a more focused meeting will be held with key account representatives of Agricultural customers to identify known projects, identify potential projects that need follow-up to move forward, etc.

SoCalGas support services provided to the Program prior to launch to facilitate outreach and promotion include:

- List of all eligible agriculture customers with contact information (business name, contact name, phone, email if available), annual gas usage, and NAICS code/market segment
- Initial customer target list (this will be particularly helpful for cannabis and eligible food processing customers)
- Knowledge of past EE program participation and facility equipment for ag customers
- Quarterly updates of customer target list to identify new accounts

AgEE will collaborate with AEs to gain introductions to key customers and other Program stakeholders, such as vendors, trade allies, and manufacturers. AEs will be provided marketing collateral and contact information for outreach staff. Program staff will contact AEs upon finding a customer to determine if an introduction can be made. Key account project status updates will be provided to AEs quarterly.

4. Innovation:

AgEE leverages several innovative program elements to achieve higher customer penetration rates and deliver a higher level of savings per customer. These innovative elements include:

Segment-oriented solutions. AgEE emphasizes market strategies that resonate with growers including performance benchmarking and a focus on measure benefits related to crop performance and yield.

Developing the adoption of new technologies in the market.
AgEE will drive customer awareness and adoption of innovative technologies including greenhouse dynamic climate control, infrared heating, condensing unit heaters, and direct contact water heaters; each of these technologies provide energy savings opportunities but have a largely untapped market. Advanced technologies that utilize infrared, microwave, ultraviolet, and radio wave frequencies to simultaneously achieve energy and water savings in food processing and sanitizing processes will be evaluated and presented to SoCalGas as opportunities for seeking external grant funding.

New software strategies. The AgEE Program plans to develop web-based dashboarding of CEA customer smart meter data and utilize with a small customer base to determine the efficacy of this approach for driving increased measure adoption.

Leveraging additional funding sources. The AgEE Program plans to pursue external grant opportunities through USDA programs enabling the introduction of an additional, non-IOU funding source to SoCalGas customers. This effort will include identifying, evaluating, and presenting funding opportunities to drive adoption of water saving technologies, including the development of full funding proposals to secure such funds where SoCalGas provides approval.

5. Metrics:

AgEE will include Key Performance Indicators (KPIs) to measure and track Program success. All project data is recorded in the Program's project and customer tracing systems. Program performance will be tracked and measured by the following Key Performance Indicators (KPIs):

KPI	SoCalGas Metric	Description
Performance: Goal Accomplishment (net therm savings)	S1: Energy Savings	Percentage of net annual energy savings achieved vs forecasted
Performance: Goal Accomplishment (net therm savings)	S1: Energy Savings	Percentage of net lifecycle energy savings achieved vs forecasted
Cost Effectiveness Alignment: TRC Calculation	LC: Cost Per Unit Saved	TRC – Actual vs. forecasted Difference: Actual Minus Forecasted
Cost Effectiveness: External Funding	LC: Project Cost offset with External Funding	Additional funding brought to the program through partnerships and/or grant opportunities
Performance: Program Incentive	P1: Incentive Mix	Actual vs. forecasted project, by savings calculation type (Deemed, Custom, NMEC).

Performance: Cost Per Unit Saved	LC: Cost Per Unit Saved	Levelized PAC Cost -Actual vs. forecasted Difference: Actual Minus Forecasted
Performance Goal: Number of Projects	P1: Penetration of EE programs	Percentage of customer projects achieved vs. forecasted
Performance Goal: Conversion Rate	P1: Penetration of EE programs	Percentage of customer enrollments that convert to completed project installations
Performance Goal: Knowledge Transfer	P1: Market knowledge of program measures	Overall satisfaction score by workshop attendees on a 5-point scale
Performance: Disadvantaged Communities	P1: Penetration of EE programs	Percentage of customers in disadvantaged communities
Performance: Hard-to-Reach	P1: Penetration of EE programs	Percentage of customers meeting HTR definition
Customer Satisfaction	N/A	Scale from 0-4 rating enrolled participant satisfaction with program.
Service Delivery	N/A	Program Advisor-determined rating of 0 – 4, based on: - Timely response for out-of-scope requests - Proactive in continuous program delivery - On-time invoice and Monthly report - Quality of Deliverables - Willingness to partner - Communication
Supply Chain Responsibility: DBE Spend		To date DBE spending as percent of total spend / DBE % commitment compared to agreed goal

6. For Programs claiming to-code savings:

To-code savings are not applicable for the AgEE Program.

7. Pilots:

Pilot projects are not applicable for the AgEE Program.

8. Workforce Education and Training[2]:

AgEE will comply with, and shall cause its employees, agents, representatives, subcontractors, independent contractors, and all other persons performing Program services to comply with workforce qualifications, certifications, standards, and requirements.

The Program will ensure qualified candidates are hired from a broad pool of candidates using fair hiring practices. Program representatives will ensure qualified candidates have all required certifications.

[2] D.18-05-041, page 20-21 and Ordering Paragraph 7.

AgEE will also use local representatives to support the program and execute services as well as onboard contractors/trade allies onto the program. These account managers will live in the communities the Program serves and through program training will become skilled agricultural auditors and will develop valuable sales skills. The Program will also use a diverse supplier to provide additional local support to the program, and this staff will receive the same training benefits.

The implementer will provide technical training on measures such as IR Heating and Dynamic Climate Control to ensure that mechanical contractors are able to support program delivery of new or underutilized technologies. Training will be coordinated with equipment suppliers and delivered through several channels including online webinars and in-person workshops.

9. Workforce Standards:

The AgEE implementer will work closely with greenhouse solution providers who provide design and engineering services for the CEA segment. These providers typically contract to specialty trades for actual installation. To the extent possible, compliance with CPUC HVAC Workforce Standards will be ensured by identifying local contractors that meet the following minimum requirements:

- Completed a California or federal accredited HVAC apprenticeship.
- Be enrolled in a California or federal accredited HVAC apprenticeship.
- Completed at least five years of work experience at the journey level as defined by the California Department of Industrial Relations and passed a practical and written HVAC system installation competency test and received credentialed training specific to the installation of the technology being installed.
- Has a C-20 HVAC contractor license from the California State Contractor's Licensing Board.

There are no lighting measures included with AgEE, so the Lighting Workforce Standards are not applicable.

10. Disadvantaged Worker Plan[3]:

As outlined in CPUC Decision D.18-05-041, the workforce diversity metric is measured by "the percentage of incentive dollars spent on measures verified to have been installed by contractors with a demonstrated commitment to provide career pathways to disadvantaged workers." AgEE manages project installations through trade allies. These trade allies are selected through a thorough evaluation process that includes a documented commitment to providing job access to disadvantaged workers measured by six unique criteria including: 1) workforce training programs; 2) hiring from high unemployment areas; 3) paying family-supporting wages; 4) hiring from designated training providers; 5) providing health care insurance to employees; and 6) employing a diverse workforce.

Trade Professionals that satisfy the Disadvantaged Worker requirements will be identified and the percent of incentive dollars installed by trade allies that provide career pathways to disadvantaged workers will be reported annually.

[3] D.18-10-008, Attachment B, Section D, page B-9.

11. Additional information:

No additional information is applicable.

Supporting Documents

1. Program Manuals and Program Rules

Introduction

AgEE identifies and works with SoCalGas agriculture industry customers to help them understand the benefits of implementing energy saving projects and measures; provides technical and project development assistance as needed; offers financial incentives and financing options; and for small/medium Disadvantaged Communities (DAC) and Hard-to-Reach (HTR) customers, direct installation of certain energy saving measures.

AgEE is administered by SoCalGas under the auspices of the California Public Utilities Commission (CPUC) and is implemented by ICF. AgEE will be available from June 7, 2021 through December 31, 2024. Incentive applications cannot be submitted prior to June 7, 2021. All project measures must be completed by the date specified in the most current Program application terms and conditions. The Program budget is limited, and incentives will be paid to qualifying customers on a first-come, first-served basis until funds have been exhausted, or until December 31, 2024, whichever comes first. Date of complete application and supporting documentation will determine the priority of incentive payments.

1. Eligible Measures

The below table summarizes all deemed measures eligible through AgEE. Additional custom measures are eligible and will be selected on a case-by-case basis through the energy assessment process. A comprehensive listing of measures is including in the Supporting Documentation section of this document.

Measure	Requirements	Customer Segment	DAC/HTR Eligible?
Boilers and Water Heating			
Steam Traps	>= 12 hours of average daily use Any pipe size	All	Yes
Storage Water Heaters	40 Gallon .64–.68 UEF	All	Yes
Condensing Water Boiler	>= 90% CE Must replace standard efficiency process boiler Input rating <=20,000 kBtu/hr	All	Yes
Insulation			
Tank Insulation	1" temperature application 120-170 degrees F solution 2" temperature application 170-200 degrees F solution	All	Yes

Fitting Insulation	1” minimum insulation thickness <= 1 inch pipe, <=15 and >15 PSIG Steam, Hot Water, Indoor and Outdoor - ½” minimum pipe diameter 1” - > 4 inch, <=15 and > 15 PSIG Steam, Hot Water, Indoor, and Outdoor	All	Yes
Pipe Insulation	One inch minimum insulation thickness <= 1” inch pipe, <=15 and >15 PSIG Steam, Hot Water, Indoor, and Outdoor - ½” minimum pipe diameter 1 inch - > 4 inch, <=15 and > 15 PSIG Steam, Hot Water, Indoor, and Outdoor	All	Yes
Greenhouse			
Greenhouse Heat Curtain	Natural gas savings rating >=40% Single layer interior curtain Must be installed in an existing gas-heated greenhouse facility	CEA	Yes
Greenhouse Infrared Film	Must be infrared, anti-condensate, polyethylene plastic Minimum thickness of six thousandths of an inch Cannot be installed on greenhouse walls	CEA	Yes
Faucet Aerators			
Faucet Aerators	.5 GPM to 1 GPM flow rate Private or public lavatory	All	Yes

2. Customer Eligibility Requirements

AgEE provides services and incentives to agricultural customers in SoCalGas territory. The utility accounts and rate codes of all applicants will be verified to ensure eligibility.

All agricultural customers who have a valid SoCalGas service account are eligible to participate in the AgEE program. Agriculture customers are defined by two-digit North American Industry Classification System (NAICS) Code 11. Post-harvest production (e.g., wine production, nut drying, etc.) is eligible when performed directly on farm as defined by NAICS Code 11. Agriculture sub-segments further defined by four-digit NAICS Codes 1111, 1112, 1113, 1114 (including cannabis production which does not have a specific NAICS Code), 1119, 1121, 1122, 1123, 1124, 1125, 1129, 1151, and 1152.

3. Contractor Eligibility Requirements

AgEE will develop a network of qualified, trained trade allies who will serve as Program ambassadors. This trade ally network will be available to contractors and vendors who provide services and products to assist SoCalGas customers with the implementation of Program energy efficiency measures. Customers will not be required to use a network trade ally to qualify for Program incentives. Trade allies who complete the following will be eligible to enroll in the network:

- Complete a trade ally network application
- Provide documentation outlined in the application including W9, proof of insurance, etc.
- Complete Program training
- Observe and abide by all Program rules as detailed in the trade ally network application and the Customer application Terms & Conditions.

The AgEE implementer will also work closely with greenhouse solution providers who provide design and engineering services for the Controlled Environment Agriculture (CEA) segment. These providers typically contract to specialty trades for actual installation. To the extent possible, compliance with CPUC HVAC Workforce Standards will be ensured by identifying local contractors that meet the following minimum requirements:

- Completed a California or federal accredited HVAC apprenticeship.
- Be enrolled in a California or federal accredited HVAC apprenticeship.
- Completed at least five years of work experience at the journey level as defined by the California Department of Industrial Relations and passed a practical and written HVAC system installation competency test and received credentialed training specific to the installation of the technology being installed.
- Has a C-20 HVAC contractor license from the Contractors State License Board (CSLB).

4. Participating Contractors, Manufacturers, Retailers, Distributors, and Partners

AgEE is a downstream program. This section is not applicable.

5. Additional Services

The AgEE program is designed to achieve the agricultural sector vision and goals outlined in the SoCalGas Business Plan. The Program brings a comprehensive suite of tested strategies to drive customer participation and overcome the unique barriers faced by California's agricultural sector:

- **Education:** Promotion of the benefits of energy efficiency (EE) upgrades beyond utility cost savings considering crop/product quality improvement and building long-term relationships with the Ag customer as part of the education process.
- **Assessment:** Evaluation of facilities and processes directly with AgEE customers and advising them on EE solutions that best meet their needs allowing for multiple paths and a layered approach to making EE upgrades over time and at the right time in the growing cycle.
- **Project finance:** To overcome the first cost barrier, AgEE will facilitate customer project on-bill financing and on-bill repayment to achieve immediate positive cash flow when possible.
- **Measure Installation:** Depending on the size and type of customer and project, Program measures will be installed via direct installation, through trade allies, or by the customer.
- **Verification/Commissioning:** AgEE will verify completion of work to ensure all measures are installed and operational before payment of incentive to customer or trade ally.
- **Incentive Payment**: AgEE will follow necessary Company procedures to ensure timely and accurate payment of incentives to Customer/trade ally.
- **Additional Funding Offerings:** The AgEE program will leverage grants and incentives available through various sources such as the USDA's Renewable Energy for Agriculture Program (REAP), the Environmental Quality Incentives Program (EQIP)California Energy Commission's (CEC's) Food Production Investment Program.
- **Agricultural Energy Efficiency and Water Efficiency Grant Support:** Innovation in water-energy nexus in the Agricultural customer segment is an important objective of Company, CPUC and the State of California. While implementing comprehensive energy saving program activities in the Agricultural segment, Contractor has an opportunity to also drive significant and innovative approaches to both water and energy savings. Consistent with Company's objective of building partnerships that can leverage common objectives and bring additional funding to the program, Contractor will seek out, evaluate, and develop funding applications or proposals for new partnerships and sources of funding according to the following Scope of Work.

6. Audits

Specialized Technical Assistance and Facility Energy Pre-Audits: Each agricultural segment requires a unique approach and an understanding of specific processes, policies, and technologies relevant to that segment. Emphasis will be placed on providing comprehensive facility energy audits to the largest customers to identify opportunities for retrofits and RCx. Facility audits will provide a platform for engaging large customers through other means, including ongoing benchmark monitoring and strategic energy management (SEM). Participating customers will have access to local engineers and subject matter experts to quickly provide decision support, answer technical questions, and provide basic analysis.

Audits will involve interviewing key operations personnel to gain a picture of facility operations. Facility utility bills and BAS controls will be reviewed and information on the age and specs of existing equipment will be collected. Auditors will also be looking for under-performing systems; these issues can often come to light through discussions with the customer.

Verification/Commissioning Post-Audits: AgEE will verify completion of work to ensure all measures are installed and operational before payment of incentive to customer or trade ally. Where applicable, equipment model numbers are verified to ensure they match what was supposed to be installed. Operational procedures are also confirmed through discussions with facility managers. If the measures are related to the building controls,

pictures of the BAS screens will be used where possible to verify the project goals have been met. If the post-audit reveals any significant discrepancies (i.e., 10% change in savings or more) from the initial analysis, the saving analysis and incentive will be revised to capture the changes. All changes in scope should be brought to the attention of the program implementer and any increases in incentive will be subject to Program approval. The differences and analysis revisions will all be thoroughly documented in the final report.

7. Sub-Program Quality Assurance Provisions

AgEE has no sub-programs.

8. Other Program Metrics

All project data is recorded in the Program's project and customer tracing systems. Program performance will be tracked and measured by the following Key Performance Indicators (KPIs):

Program Performance

- Net annual therm savings
- Net lifecycle therm savings
- Accomplishment of incentive mix
- Levelized PAC Cost
- Program penetration
- Customer enrollment conversions

Cost-Effectiveness

- TRC
- Additional funding through partnerships and/or grant opportunities

Customer Satisfaction

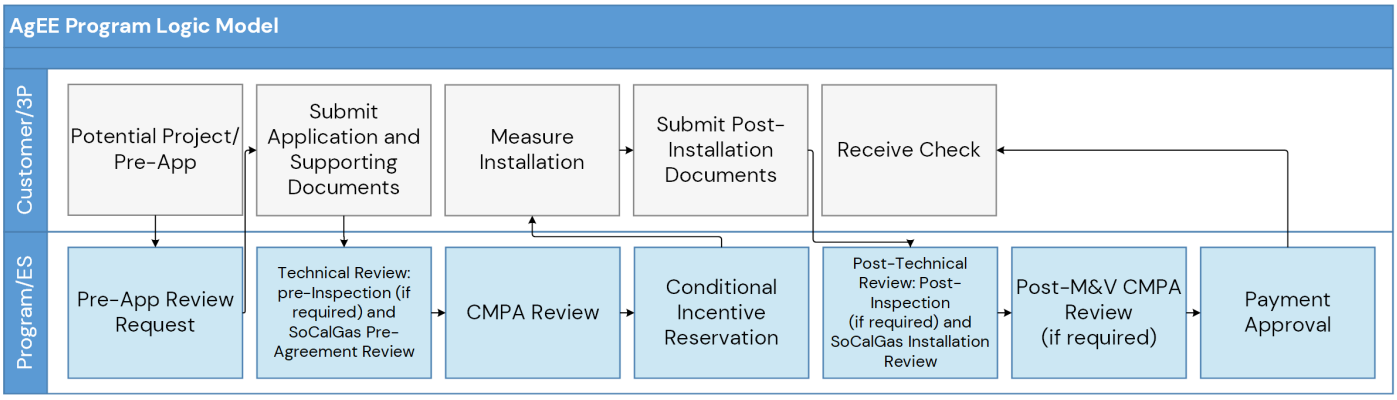
- Participant satisfaction
- Workshop attendee satisfaction

Program Delivery and Compliance

- DAC and HTR customer penetration
- Quality of delivery
- DBE Spending compared to goal

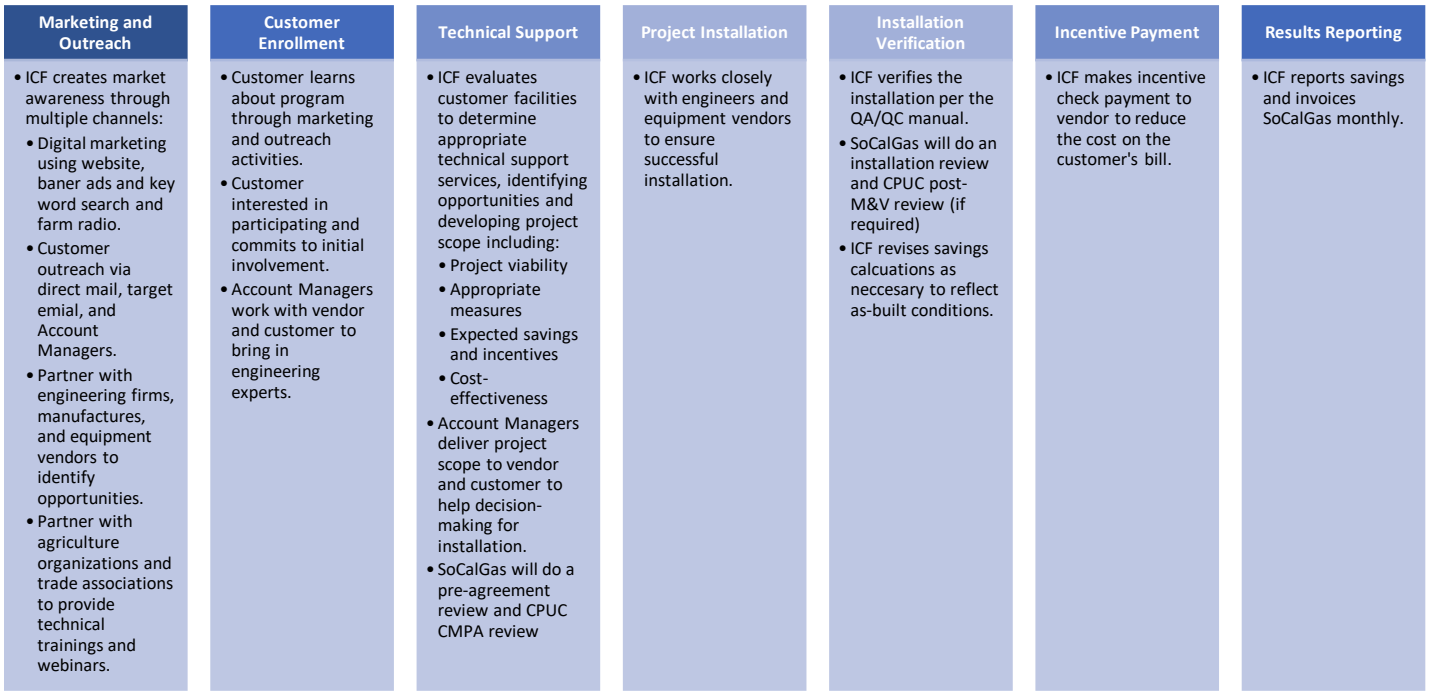
2. Program Theory and Program Logic

The figure below outlines the high-level steps involved with a project from start to finish. These steps are described in more detail in Table 1.



3. Process Flow Chart

The following is a visual flowchart of the Program processes.



4. Incentive Tables, Workpapers, Software Tools

Measure	Available to DAC/HTR	Minimum Requirements	Additional Requirements	Workpaper
Custom Measures				
Boiler blowdown recovery	DAC			N/A- Custom measure
Boiler combustion fan VFD	DAC			N/A- Custom measure
Condensing Unit Heater	DAC			N/A- Custom measure
Direct Contact Water Heater	DAC			N/A- Custom measure
Greenhouse environmental controller	DAC			N/A- Custom measure
Greenhouse Low-Intensity IR Space Heating (gas-fired)	DAC			N/A- Custom measure
Greenhouse Under-Bench Heating	DAC			N/A- Custom measure
Heat recovery for dehumidification air reheat	DAC			N/A- Custom measure
Livestock Low-Intensity IR Space Heating (gas-fired)	DAC			N/A- Custom measure
Process boiler controls	DAC			N/A- Custom measure
Process boiler stack economizer	DAC			N/A- Custom measure
Process Heat Recovery	DAC			N/A- Custom measure
Process Pump VFD	DAC			N/A- Custom measure
Retrocommissioning	DAC			N/A- Custom measure
Steam Process Boiler	DAC			N/A- Custom measure
Steam Process Boiler- Other	DAC			N/A- Custom measure
Steam system insulation	DAC			N/A- Custom measure
Deemed Measures				
Condensing Water Boiler (≥90% CE)	DAC HTR	90% CE	The measure case is defined as the replacement of standard	SWWH008-01

Measure	Available to DAC/HTR	Minimum Requirements	Additional Requirements	Workpaper
			efficiency process boiler with a high-efficiency process boiler with an input rating ≤ 20,000 kBtu/hr	
Faucet Aerator, 0.5 GPM, Private Lavatory	DAC HTR	0.5 gpm flow rate	A private lavatory faucet is located in an individual dwelling unit such as a hotel/motel guest room, dorm room, or nursing home room	SWWH019-02
Faucet Aerator, 0.5 GPM, Public Lavatory	DAC HTR	0.5 gpm flow rate	A public lavatory faucet is located in a bathroom shared by a communal area, such as a school, restaurant, hotel lobby, or office building	SWWH019-02
Faucet Aerator, 1.0 GPM, Private Lavatory	DAC HTR	1.0 gpm flow rate	A private lavatory faucet is located in an individual dwelling unit such as a hotel/motel guest room, dorm room, or nursing home room	SWWH019-02
Faucet Aerator, 1.0 GPM, Public Lavatory	DAC HTR	1.0 gpm flow rate	A public lavatory faucet is located in a bathroom shared by a communal area, such as a school, restaurant, hotel lobby, or office building	SWWH019-02
Fitting Insulation 1", > 4" Pipe, <=15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Fitting Insulation 1", > 4" Pipe, <=15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Fitting Insulation 1", > 4" Pipe, >15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Fitting Insulation 1", > 4" Pipe, >15	DAC HTR	1" minimum insulation thickness		SWWH017 R1

Measure	Available to DAC/HTR	Minimum Requirements	Additional Requirements	Workpaper
psig Steam, Outdoor				
Fitting Insulation 1", > 4" Pipe, Hot Water, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Fitting Insulation 1", > 4" Pipe, Hot Water, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Fitting Insulation 1", ≤ 1" Pipe, <=15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Fitting Insulation 1", ≤ 1" Pipe, <=15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Fitting Insulation 1", ≤ 1" Pipe, >15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Fitting Insulation 1", ≤ 1" Pipe, >15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Fitting Insulation 1", ≤ 1" Pipe, Hot Water, Indoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Fitting Insulation 1", ≤ 1" Pipe, Hot Water, Outdoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Fitting Insulation 1", 1"-4" Pipe, <=15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Fitting Insulation 1", 1"-4" Pipe, <=15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Fitting Insulation 1", 1"-4" Pipe, >15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Fitting Insulation 1", 1"-4" Pipe, >15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Fitting Insulation 1", 1"-4" Pipe, Hot Water, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Fitting Insulation 1", 1"-4" Pipe, Hot Water, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Greenhouse Heat Curtain	DAC HTR	The heat curtain must have a natural gas savings rating that	Must be a single-layer interior curtain installed for heat retention, Must be installed	SWBE001-01

Measure	Available to DAC/HTR	Minimum Requirements	Additional Requirements	Workpaper
		meets or exceeds 40%	in an existing gas-heated greenhouse facility	
Greenhouse Infrared Film	DAC HTR	The film must be infrared, anti-condensate, polyethylene plastic with a minimum thickness of six thousandths of an inch	The IR film shall not be installed on the walls of the greenhouse.	SWBE002-01
Pipe Insulation 1", > 4" Pipe, <=15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Pipe Insulation 1", > 4" Pipe, <=15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Pipe Insulation 1", > 4" Pipe, >15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Pipe Insulation 1", > 4" Pipe, >15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Pipe Insulation 1", > 4" Pipe, Hot Water, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Pipe Insulation 1", > 4" Pipe, Hot Water, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Pipe Insulation 1", ≤ 1" Pipe, <=15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Pipe Insulation 1", ≤ 1" Pipe, <=15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Pipe Insulation 1", ≤ 1" Pipe, >15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Pipe Insulation 1", ≤ 1" Pipe, >15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Pipe Insulation 1", ≤ 1" Pipe, Hot Water, Indoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Pipe Insulation 1", ≤ 1" Pipe, Hot Water, Outdoor	DAC HTR	1" minimum insulation thickness	1/2" minimum pipe diameter.	SWWH017 R1
Pipe Insulation 1", 1"-4" Pipe, <=15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1

Measure	Available to DAC/HTR	Minimum Requirements	Additional Requirements	Workpaper
Pipe Insulation 1", 1"-4" Pipe, <=15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Pipe Insulation 1", 1"-4" Pipe, >15 psig Steam, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Pipe Insulation 1", 1"-4" Pipe, >15 psig Steam, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Pipe Insulation 1", 1"-4" Pipe, Hot Water, Indoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Pipe Insulation 1", 1"-4" Pipe, Hot Water, Outdoor	DAC HTR	1" minimum insulation thickness		SWWH017 R1
Steam Trap	DAC HTR	Steam traps designed for any pipe size are eligible	Must be located in a facility with a steam plant operating a steam boiler for 12 to 24 hours per day.	SWPR003-01
Storage Water Heater, 40 gal, High Draw	DAC HTR	0.68 UEF	<= 75 kBtu/hr, 40 gal, high draw	SWWH007-03
Storage Water Heater, 40 gal, Low Draw	DAC HTR	0.64 UEF	<= 75 kBtu/hr, 40 gal, med. Draw	SWWH007-03
Tank Insulation, 1", High Temp, High Usage, Indoor	DAC HTR	1" minimum insulation thickness	High-temperature application: 170-200 degrees F solution	SWWH018-01
Tank Insulation, 1", High Temp, High Usage, Outdoor	DAC HTR	1" minimum insulation thickness	High-temperature application: 170-200 degrees F solution	SWWH018-01
Tank Insulation, 1", High Temp, Low Usage, Indoor	DAC HTR	1" minimum insulation thickness	High-temperature application: 170-200 degrees F solution	SWWH018-01
Tank Insulation, 1", High Temp, Low Usage, Outdoor	DAC HTR	1" minimum insulation thickness	High-temperature application: 170-200 degrees F solution	SWWH018-01
Tank Insulation, 1", Low Temp, High Usage, Indoor	DAC HTR	1" minimum insulation thickness	Low-temperature application: 120-170 degrees F solution	SWWH018-01
Tank Insulation, 1", Low Temp, High Usage, Outdoor	DAC HTR	1" minimum insulation thickness	Low-temperature application: 120-170 degrees F solution	SWWH018-01

Measure	Available to DAC/HTR	Minimum Requirements	Additional Requirements	Workpaper
Tank Insulation, 1", Low Temp, Low Usage, Indoor	DAC HTR	1" minimum insulation thickness	Low-temperature application: 120-170 degrees F solution	SWWH018-01
Tank Insulation, 1", Low Temp, Low Usage, Outdoor	DAC HTR	1" minimum insulation thickness	Low-temperature application: 120-170 degrees F solution	SWWH018-01
Tank Insulation, 2", High Temp, High Usage, Indoor	DAC HTR	2" minimum insulation thickness	High-temperature application: 170-200 degrees F solution	SWWH018-01
Tank Insulation, 2", High Temp, High Usage, Outdoor	DAC HTR	2" minimum insulation thickness	High-temperature application: 170-200 degrees F solution	SWWH018-01
Tank Insulation, 2", Low Temp, High Usage, Indoor	DAC HTR	2" minimum insulation thickness	Low-temperature application: 120-170 degrees F solution	SWWH018-01
Tank Insulation, 2", Low Temp, High Usage, Outdoor	DAC HTR	2" minimum insulation thickness	Low-temperature application: 120-170 degrees F solution	SWWH018-01

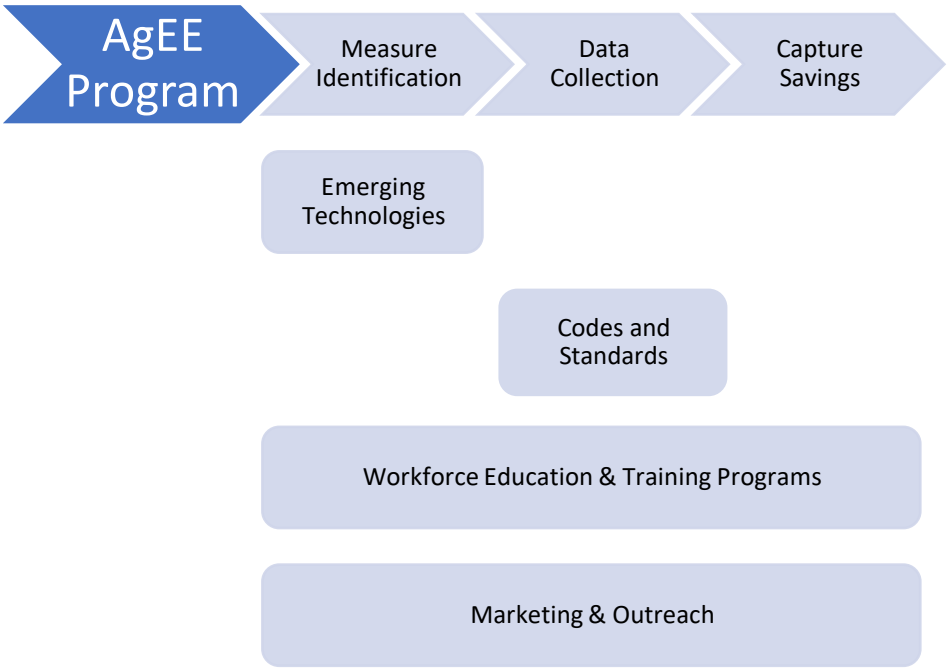
5. **Quantitative Program Targets**

AgEE is targeting Program participation as follows:

Customer Size	No. of Participants	No. of DAC	No. of HTR
Small	35	13	16
Medium	25	10	0
Large	15	3	0
Total	**75**	**26**	**16**

6. Diagram of Program

The following figure is a diagram of the overarching program activities. The relevant items noted in the CPUC IP Template (Marketing and Outreach, Workforces Education and Training Programs, and Emerging Technologies) are located in the diagram where they take place within the program.



7. Evaluation, Measurement & Verification (EM&V)

Section 1. Overview

The SoCalGas AgEE Program is a third-party designed and implemented program that will be implemented by ICF, EnSave, and ERI starting June 7, 2021. The Program will generate energy savings through a mixture of deemed, custom, and normalized metered energy consumption (NMEC) offerings. Savings for these offerings will be verified using the industry standard International Performance Measurement and Verification Protocol (IPMVP) protocols and will meet all CPUC guidelines.

There are three different measure streams in the AgEE program, each with unique Measurement and Verification (M&V) protocols:

1. Deemed
2. Custom
3. Meter-based

- ICF will inspect up to 100% of the measures receiving incentives for the Program utilizing both virtual and in person inspections. Inspections will include verification of equipment, operation, and eligibility .The level of rigor of the inspections will be based on the value of the incentive and tiers will be structured as is approved in E-4818 and E-5115: >$100,000 for high rigor
- $25,000 - $100,000 for medium rigor
- $7,500 - $25,000 for low rigor
- <$7,500 for very low rigor

ICF employs a team of experienced engineers who will create project specific M&V plans that will be developed and tailored for each project based on the specific measure(s) being verified. A percentage of the deemed measures will be inspected to verify installation. Any M&V specifications from deemed workpapers will be followed. Custom measures will use the most appropriate IPMVP option for each measure to verify savings and will also include additional verification (i.e., photos of installed equipment) depending on the level of rigor required for the project (see rigor tiers above). When determining which IPMVP approach to take, ICF will ensure that the level of M&V effort is proportional to the expected energy savings and that efforts are invested in filling critical knowledge gaps.

NMEC savings will be determined using IPMVP option C and follow CPUC guidelines. All M&V plans will be submitted to SoCalGas for review for each NMEC project. Any changes found during the M&V process will be either corrected to match the original intent or savings will be updated as necessary based on actual findings.

1. M&V Philosophy

The measure streams listed above are ordered from least to most complex in terms of time and level of effort need to fulfill M&V requirements. This document addresses Deemed and Custom measures. The Meter-based M&V plan is laid out in a separate document and CPUC guidelines for NMEC M&V. Deemed measure savings estimations will follow guidance provided in CPUC-approved workpapers. Where appropriate, pre-installation site visits will be conducted by in-house engineering staff to verify customer-supplied baseline data, and documentation of any discrepancies between customer-supplied information and data collected on site.

The level of complexity of the measure, total savings potential, measure cost, measure incentive level will determine which M&V method is employed for Custom (the methods are described below in Section 3. Custom

Project M&V Guidelines). While each measure stream has a unique approach to M&V, the M&V requirements for all project types are formulated through the same lens and will be guided by the IPMVP.4 This lens is bounded by the following guiding principles:

1. Serve the Overarching Goal: M&V shall be performed with the goal of understanding the parameters of a project which are otherwise unknown and/or have a high degree of uncertainty. In other words, resources should not be spent on verifying that which is already known with a high degree of certainty.
2. Maintain a Reasonable Level of Effort:
    - Delegate time and effort in proportion to the level of expected savings. In general, the costs spent on M&V should not exceed 10% of the annual savings achieved for the customer.
    - The M&V approach needs to fill in critical knowledge gaps to estimate savings with a high degree of certainty, however it will be bounded by time and financial resources.
    - Where possible, leverage existing equipment to obtain data.

Section 2. Project Process

This section serves to provide a high-level description of the Deemed and Custom M&V approach to be taken for the AgEE program; in practice custom projects will receive a site-specific M&V plan, tailored to the specifics of the unique project while also adhering to the guidelines laid out in this document. Deemed projects will follow all procedures from the workpaper.

Deemed Projects

Deemed projects are often much less rigorous than custom projects in terms of M&V. All M&V protocol specified in the workpaper will be followed for deemed projects. Verification requirements include paid itemized invoices from the project, photos of both pre-existing and new equipment, specification sheets, project application, and any supplemental measure-specific information. Inspections for 10% of deemed projects will take place.

Custom Projects

There are four overarching phases to a custom project:

1. **Pre-screening phase (Baseline Period):** Each site will be pre-screened with a site-visit to assess potential for energy savings. Data on equipment, energy use and weather for one year will be gathered to execute a high-level analysis to estimate the savings potential and confirm that they are cost effective. Implementer will notify SoCalGas Custom Engineering Services (ES) of the potential project so that pre-screening activities and site visits can be conducted in collaborative manner. ES will ensure that feasibility customer account and feasibility studies adhere to current CPUC policies.

2. **Project Feasibility Study (Baseline Period):** If a site passes the pre-screening phase it will receive a more detailed assessment in the pre-feasibility phase. This phase involves completion of a Project

[4] The following document will be utilized to refer to IPMVP guidance: this document: International Performance Measurement and Verification Protocol, Efficiency Valuation Organization, 'Concepts and Options for Determining Energy and Water Savings, Vol 1, 2012

Feasibility Study (PFS). The Statewide Project Feasibility Study Template from the CPUC website will be filled out for each potential Custom project.[5]At a high-level, the PFS consists of the following elements:

a. Baseline information (equipment age and specs, operations, upgrades, underperforming systems, any failing systems, and all static factors)
b. Individual Energy Conservation Measures (ECM) savings, expected useful life (EUL), and costs.
c. Risk potential and a plan to mitigate risk
d. Site-specific M&V plan will be drafted for each project. The IPMVP option choice will be selected by applying the guidance laid out in the M&V Philosophy section. Each project-specific M&V plan will be crafted in accordance with the template in Appendix A.

Pre-feasibility savings estimations will be based on engineering calculations and judgment and any data that is available at the time, rather than logged data. These estimations will inform forecasting of facility energy use for the baseline and post-installation period.

3. **SoCalGas Technical Pre-Agreement Review:** Implementer will submit the PFS to SoCalGas ES for a thorough technical review. Pre-Agreement Review (PA Review) is a formal review of ECMs before the installation of any ECMs where the PFS acts as the submission package. The PA Review verifies each ECM to comply with SoCalGas EECIP Program rules, Standard Practices (SPs), CPUC guidelines, and CPUC dispositions and documents the review results. The PA Review locks-in the baseline, calculation methodology, and lists prerequisite data for projects requiring an Installation Review (IR).

4. **CMPA Review:** If project's technical PA Review is approved to proceed, the project will be uploaded to the CMPA list. The project could be selected for CPUC review within 10 business days of being uploaded. If the project is not selected for review within 10 business days, the project is allowed to move forward. If the projected is selected, the CPUC will then have 30 business days to review aside from supplemental data requests (SDRs). Implementer, program advisor, and ES will respond to these SDRs. The CPUC will provide a disposition at the end of the review. CPUC review timeline is pursuant to Senate Bill 1131 and details are provided in the CPUC's Timing Protocol document.[6]

5. **Installation Verification:** Installation of ECMs will be verified through site inspections or pictures provided by the customer for all custom projects. Invoices for the installation will also be collected. For very low and low rigor projects, photos and remote data gathering will be sufficient in lieu of an on-site inspection. For medium to high rigor projects (i.e. when incentive is $25,000 or higher), on-site verification will be done in accordance with the installation review parameters listed in the Pre-Agreement Review.

6. **Measure Verification & Reporting:** After sufficient data is collected, and the M&V activities and analysis is complete, a Post-Installation Report (PIR) will be completed in accordance with the Statewide Post Installation Report Template on the CPUC website.[5] The report will present and compare the post-installation savings and savings analysis to the pre-installation savings and savings analysis. Changes to

[5] The CPUC Statewide Project Feasibility Study and Post Installation Report Templates can be accessed here: https://www.cpuc.ca.gov/General.aspx?id=4133

[6] The CPUC Staff Selection and Response Timing Protocol for Energy Efficiency Custom Projects Review document can be accessed here: https://www.cpuc.ca.gov/General.aspx?id=4133

the baseline, modeling methodology employed, and the measurement period will be noted, if applicable. If deviations from the original proposed M&V plan occurred, this will be documented and substantiated. For behavioral, retro-commissioning, and operational measures, a repair and maintenance plan that adheres to CPUC rules will be formulated. The participant must agree to carry out the plan for a minimum of three years via a signed customer agreement.[7]

7. **SoCalGas Post-Technical Installation Review:** Implementer will submit the PIR to SoCalGas ES for a technical post-installation review. ES will conduct a site visit unless it waives it due to sufficient project data and supporting documentation. ES will verify and approve the final project energy savings.

8. **Post-Measurement CMPA Review:** If required by the CPUC, the project will be uploaded to the CMPA list for a post-M&V review. The CPUC post-M&V review timeline is pursuant to Senate Bill 1131 and will still follow the details in the CPUC's Timing Protocol document.[8]

Tracking/recording

Data gathered through site inspections and M&V activities will be documented for future use by Program Administrators and evaluation teams. This data will also prove useful in helping inform future program design to improve overall cost-effectiveness.

Section 3. Custom Project M&V Guidelines

Custom measures will follow the IPMVP. At a high-level, M&V can be executed in through the following options[9]:

1. Engineering Calculations (IPMVP Option A): Inputs are sourced from known specs and/or measurements. This method is ideal for straightforward ECMs that have a high level of certainty around the load profile and equipment specifications.
2. Metering and Monitoring (IPMVP Option B): Measurements are used to fill in knowledge gaps around the ECM. Spot measurements are sufficient for constant load profiles and continuous measurements can be taken when the load is quite variable. Most ECM savings can be determined with Option but the difficulty and costs can be great if metering requirements are complex and are not already in place for other purposes. In general, it is harder and more costly than Option A but more certain.

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[7] California Public Utilities Commission, 'Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption', Version 2.0 2020, see Section II.1.B. & Section II.1.C , pg 10

[8] The CPUC Staff Selection and Response Timing Protocol for Energy Efficiency Custom Projects Review document can be accessed here: https://www.cpuc.ca.gov/General.aspx?id=4133

[9] The various IPMVP options are discussed thoroughly throughout this document: International Performance Measurement and Verification Protocol, Efficiency Valuation Organization, 'Concepts and Options for Determining Energy and Water Savings, Vol 1, 2012

3. Utility Bill Analysis (IPMVP Option C): This method is exclusive to the facility level which poses challenges regarding understanding how a specific ECM is contributing to differences in utility data before and after the project. There are risks that factors unrelated to the ECM (i.e., weather, occupancy, system failures, etc.) that can cause changes to the utility data post-project. These changes from unrelated factors could be significant and eliminate the ability to see the effects of the ECM. Ideally, this option will only be employed for NMEC projects with advanced metering infrastructure.
4. Calibrated Computer Simulation (IPMVP Option D): In this approach, a simulation is built and calibrated to metered data. The calibrated model provides the baseline and then it is used to model the facility with the ECMs. This method provides the ability to look at the impact of all ECMs together (which is great for capturing interactive effects) or at individual ECMs in isolation. A unique challenge of this option is that the system's energy use needs to be isolated from the rest of the facility by appropriate meter. This option is a good choice if the savings associated with individual ECMs is desired, but the requirements of Options A and B are too difficult or costly.

As described in the M&V Philosophy section, project specifics will dictate which IPMVP is chosen for each custom project. For projects scopes where the measurement or calculation boundary would encompass all or almost all the facility, Option D would be preferred. Option C would be applicable for these types of projects but is not preferred for the reasons described above; it will be reserved for NMEC projects. For standalone equipment upgrades or replacements, Option A or B will be used. Existing metering equipment will be leveraged where possible. If spec sheets and information provided from the customer can sufficiently answer all questions that the engineering team needs to calculate the estimated savings from the project, Option A will be used. If more information is needed and the savings are significant enough, metering will be done under Option B.

Section 4. Data Collection Plan

The following data will be collected:

- **Baseline:** Baseline conditions will be fully documented in the M&V plan for the specific project. All static factors relevant to the ECMs will be recorded (e.g., equipment types, production data, daily, operational hours by day, week, and season.). Specification sheets and information from the customer (i.e. production details, operational schedules). This data will serve to create a reasonable baseline model to which savings can be reliably derived from.
- **Metered Energy Use Data:** Metered data, if it is needed, will be obtained through customer-owned logging equipment where possible. If measurements are needed and it is financially feasible to do so, temporary metering equipment will be installed. The program implementors will verify that they have been recently calibrated and that the specifications meet the CPUC requirements (minimum accuracy of +/- 2%, and positive displacement meter type). Ideally, the time interval will be at least as granular as hourly, but more likely will be 15 minutes or less. A year's worth of utility data will be collected; 12 months of data from submeters on site will be collected if utility data is unavailable if it is available and helpful to the saving analysis. If there are gaps in the data, the technical reviewers will interpolate.
- **Weather Data:** The latest long-term average weather data will be used. This data will be sourced from CA Climate Zone 2022 weather files.
- **Production Data:** Production data (volume, type, seasonality differences) will be collected from the customer as needed.

Section 5. Savings Calculation

The gross savings will be calculated after the measurement period is over and the site-level M&V requirements are satisfied. The gross savings calculation is as follows:

$$Energy\ Savings = Baseline\ Model\ Predicted\ Energy\ Use - Calculated\ Energy\ Use$$

The savings will be documented in the final report along with EUL and ECM costs. If deviations from the original proposed M&V plan occurred, this will be documented and substantiated. If the customer is participating in other energy efficiency programs, the gross energy savings will be adjusted to ensure that incentivized measures from other offerings are not included in the scope of the custom savings analysis. [43]

Section 6. Expected Useful Life

The project lifecycle savings will be based on a weighted average EUL method. [10] The weighted EUL for the recommended ECMs will be determined in the feasibility study and will be updated as needed for the final report, after installation. EULs for the ECMs will be sourced from the Database for Energy Efficient Resources (DEER).

Section 7. Key Sources

As discussed in the M&V plan, M&V for Deemed measures will be guided by workpapers and Custom measures will be guided by the IPMVP. The following sources will be key for the Custom M&V approach:

- International Performance Measurement and Verification Protocol, Efficiency Valuation Organization, 'Concepts and Options for Determining Energy and Water Savings, Vol 1, 2012
- U.S. Department of Energy, 'M&V Guidelines: Measurement and Verification for Performance-Based Contracts', version 4.0,2015

Appendix A

The document above provides the high-level guidelines for performing Deemed and Custom M&V. During program implementation, project-specific M&V plans will be generated for each Custom project and they will be unique to each project. Measure type, facility characteristics, and the level of savings will dictate the most central component of the M&V plan (the IPMVP Option of choice). Table 2 is the template that will be completed for each project-specific M&V plan;[11] it is consistent with standard IPMVP guidelines.[12]

Table 2 M&V Template

M&V Plan for SoCalGas AgEE Project Number xxxxxx
1. Executive Summary
Briefly describe the project in a few sentences (i.e. what are the measures, existing equipment age and specs, use case, and any other important details).
2. Facility Description
Describe the following details about the facility: • Facility name • Facility address • Facility type (Dairy Production, Non-Dairy Animal Production, CEA (Vegetable, Horticulture, Cannabis, etc.), or Winery) • Production (type and volume)
3. Operations
Describe the hours of operation and discuss any seasonal differences, holidays, and any other details regarding the hours of operation that are important to energy use.
4. Measure Description
Describe the following items for each measure: • Measure type • Relevant specifications • EUL • RUL (remaining useful life) Specification sheets, nameplate data, NREL and DEER literature can be used to help obtain this information.
5. IPMVP Option
Note which of the following options will be carried out for the project: • IPMVP Option A, Engineering Calculations

[11] For lower rigor projects, not all sections in this template will be needed or included in the project-specific M&V Plan.

[12] See this document for comprehensive IPMVP guidelines: International Performance Measurement and Verification Protocol, Efficiency Valuation Organization, 'Concepts and Options for Determining Energy and Water Savings, Vol 1, 2012

M&V Plan for SoCalGas AgEE Project Number xxxxxx
• IPMVP Option B, Metering and Monitoring • IPMVP Option C, Utility Bill Analysis[13] • IPMVP Option D, Calibrated Computer Simulation[14]
6. Measurement Boundaries
Provide a brief description and/or diagram of the measurement scope (whole facility, measure only, isolated system, etc.) if measurements are being taken.
7. Meter Specifications
Describe what will be metered and in what units (e.g. I, V, GPM, kW, etc.). If a non-utility meter is being used, specify the meter type, meter accuracy, routine calibration processes, and how lost data will be dealt with.
8. Sampling
Describe the frequency of data collection and briefly note how it is sufficient.
9. Monitoring Responsibility
Note who will be responsible for recording the independent variables and static factors within the measurement boundary during the reporting period.
10. Baseline Energy and Conditions
The facility's baseline energy data and conditions within the measurement boundary must be documented. These details will be gained from the site-assessment in the pre-feasibility phase of the project. The following baseline characteristics should be documented: • Baseline period • Baseline energy demand and consumption • All independent variable relevant to energy use (production details, indoor air temp.) • All static factors relevant to energy use (e.g. occupancy, operational details) • Any deficiencies in existing system (e.g. under or over -sized equipment) • Building envelope characteristics • Equipment details (specs, quantities, location, condition, age, operating practices, and any outages during baseline period)
11. Baseline Period & Reporting Period
Define the baseline and reporting (i.e. after installation) period length and briefly note how the periods were selected. Also note which year will be used for the baseline. The duration of the periods should span through a full operating cycle or profile. A typical operating cycle should reflect the highest and lowest consumption and capture various operating points in between. Since this is an agricultural program, capturing seasonality differences will be important.
12. Basis for Adjustment
Note any routine or non-routine adjustments made to the savings calculations and explain how and why they were made. Adjustments to the savings calculations should be made to ensure the savings predictions are representative of the typical operations. If non-routine events (NREs) occur during measurement periods, the savings model should be adjusted to ensure the NREs are not affecting the savings calculations. Routine adjustments will be made for any energy-governing factors that are expected to routinely change during the reporting period (e.g. production type or volume, weather). Baseline adjustments will also be needed if the baseline equipment is not currently performing as it will in the reporting period (e.g. if the space is under-heated). Valid techniques must be used to make adjustments and IPMVP literature will be used to help ensure that.[15] Given that this program is beginning in 2021, we anticipate that adjustments will need to be made due to the impact of COVID-19 on facility energy use. Adjustments will be made accordingly to ensure that the pre and post project models are reasonably representative of typical facility energy use patterns.
13. Analysis Methodology
Briefly describe the methodology used to estimate savings: • If Excel calculations are used, note the engineering principle(s) employed to do the calculations. • If a building performance simulation tool was used, note which one. Describe high-level modeling methodology. • Describe any calibration done.

[13] We anticipate Option C will only be used for NMEC projects. Regression models will only be used for NMEC projects and will meet the statistical metrics outlined in the NMEC M&V plan for CV(RMSE), NMBE, and R^2.

[14] For Option D, we will use a USDA approved tool for greenhouses called Virtual Grower to model performance. For non-greenhouse projects under Option D, we will use standard simulation tools like eQuest.

[15] International Performance Measurement and Verification Protocol, Efficiency Valuation Organization, 'Concepts and Options for Determining Energy and Water Savings, Vol 1, 2012 provided guidance for assessing validity of mathematical methods (Appendix B) and for making non-routine adjustments (Chapter 8.2)

M&V Plan for SoCalGas AgEE Project Number xxxxxx
• State all assumptions. • State the variables and the units used in the calculations.
14. Energy Savings Calculation
$kWh_{Savings} = (kWh_{Baseline} - kWh_{Retrofit}) \pm$ Routine Adjustment(s) $\pm$ Non-Routine Adjustment(s)
15. Responsibility and Risk matrix
M&V activities seek to reduce the risk of measures not performing as desired and help to ensure savings predictions are reasonable. In M&V, the work "risk" refers to the uncertainty that the expected savings will be realized, including the potential monetary consequences.[16] The DOE has developed a "Risk, Responsibility, and Performance Matrix Template" which will be filled out for each Custom project. This template is attached in Appendix B.

Appendix B

The U.S. Department of Energy developed a "Risk, Responsibility, and Performance Matrix Template" in 'M&V Guidelines: Measurement and Verification for Performance-Based Contracts', version 4.0, 2015. This template is included in Table 2 and shall be completed for each Custom project.

[16] U.S. Department of Energy, 'M&V Guidelines: Measurement and Verification for Performance-Based Contracts', version 4.0, 2015

Responsibility/Description	Contractor-Proposed Approach
1. Financial	
a. Interest rates: Neither the contractor nor the customer has significant control over prevailing interest rates. Higher interest rates will increase project cost, financing/project term, or both. The timing of the task order (TO) signing may impact the available interest rate and project cost.	
b. Energy Prices: Neither the contractor nor the customer has significant control over actual energy prices. For calculating savings, the value of the saved energy may either be constant, change at a fixed inflation rate, or float with market conditions. If the value changes with the market, falling energy prices place the contractor at risk of failing to meet cost savings guarantees. If energy prices rise, there is a small risk to the customer that energy saving goals might not be met while the financial goals are. If the value of saved energy is fixed (either constant or escalated), the customer risks making payments in excess of actual energy cost savings.	
c. Construction costs: The contractor is responsible for determining construction costs and defining a budget. In a fixed-price design/build contract, the customer assumes little responsibility for cost overruns. However, if construction estimates are significantly greater than originally assumed, the contractor may find that the project or measure is no longer viable and drop it before TO award. In any design/build contract, the customer loses some design control. **Clarify design standards and the design approval process (including changes) and how costs will be reviewed.**	
d. Measurement and verification (M&V) confidence: The customer assumes the responsibility of determining the level confidence that it desires to have in the M&V program and energy savings determinations. The desired confidence will be reflected in the resources required for the M&V program, and the ESCO must consider the requirement before submitting the final proposal. **Clarify how project savings are being verified (e.g., equipment performance, operational factors, energy use) and the impact on M&V costs.**	
e. Energy-Related Cost Savings: The customer and the contractor may agree that the project will include savings from recurring and/or one-time costs. This may include one-time savings from avoided expenditures for projects that were appropriated but will no longer be necessary. Including one-time cost savings before the money has been appropriated may involve some risk to the customer. Recurring savings generally result from reduced operations and maintenance (O&M) expenses or reduced water consumption. These O&M and water savings must be based on actual spending reductions. **Clarify sources of non-energy cost savings and how they will be verified.**	
f Delays: Both the contractor and the customer can cause delays. Failure to implement a viable project in a timely manner costs the customer in the form of lost savings and can add cost to the project (e.g., construction interest, remobilization). **Clarify schedule and how delays will be handled.**	
g. Major changes in facility: customer controls major changes in facility use, including closure. **Clarify responsibilities in the event of a premature facility closure, loss of funding, or other major change.**	
2. Operational	
a. Operating hours: The customer generally has control over operating hours. Increases and decreases in operating hours can show up as increases or decreases in savings depending on the M&V method (e.g., operating hours multiplied by improved efficiency of equipment vs. whole facility/utility bill analysis). **Clarify whether operating hours are to be measured or stipulated and what the impact will be if they change.** If the operating hours are stipulated, the baseline should be carefully documented and agreed to by both parties.	

Responsibility/Description	Contractor-Proposed Approach
b. Load: Equipment loads can change over time. The customer generally has control over hours of operation, conditioned floor area, intensity of use (e.g., changes in occupancy or level of automation). Changes in load can show up as increases or decreases in "savings" depending on the M&V method. **Clarify whether equipment loads are to be measured or stipulated and what the impact will be if they change**. If the equipment loads are stipulated, the baseline should be carefully documented and agreed to by both parties.	
c. Weather: A number of energy and water conservation measures are affected by weather, which neither the contractor nor the customer has control over. Should the customer agree to accept risk for weather fluctuations, it will be contingent upon aggregate payments not exceeding aggregate savings. **Clearly specify how weather corrections will be performed.**	
d. User participation: Many energy conservation measures require user participation to generate savings (e.g., control settings). The savings can be variable, and the contractor may be unwilling to invest in these measures. **Clarify what degree of user participation is needed and use monitoring and training to mitigate risk.** If performance is stipulated, document and review assumptions carefully and consider M&V to confirm the capacity to save (e.g., confirm that the controls are functioning properly).	
3. Performance	
a. Equipment performance: The contractor has control over the selection of equipment and is responsible for its proper installation, commissioning, and performance. The contractor has the responsibility to demonstrate that the new improvements meet expected performance levels, including specified equipment capacity, standards of service, and efficiency. **Clarify who is responsible for initial and long-term performance, how it will be verified, and what will be done if performance does not meet expectations.**	
b. Operations: Performance of the day-to-day operations activities is negotiable and can impact performance. However, the contractor bears the ultimate risk regardless of which party performs the activity. **Clarify which party will perform equipment operations, the implications of equipment control, how changes in operating procedures will be handled, and how proper operations will be assured.**	
c. Preventive Maintenance: Performance of day-to-day maintenance activities is negotiable and can impact performance. However, the contractor bears the ultimate responsibly regardless of which party performs the activity. **Clarify how long-term preventive maintenance will be ensured, especially if the party responsible for long-term performance is not responsible for maintenance (e.g., contractor provides maintenance checklist and reporting frequency). Clarify who is responsible for performing long-term preventive maintenance to maintain operational performance throughout the contract term. Clarify what will be done if inadequate preventive maintenance impacts performance.**	
d. Equipment Repair and Replacement: Performance of day-to-day repair and replacement of contractor-installed equipment is negotiable; however it is often tied to project performance. The contractor bears the ultimate risk regardless of which party performs the activity. **Clarify who is responsible for performing replacement of failed components or equipment replacement throughout the term of the contract. Specifically address potential impacts on performance due to equipment failure. Specify expected equipment life and warranties for all installed equipment. Discuss replacement responsibility when equipment life is shorter than the term of the contract.**	

8. Normalized Metered Energy Consumption (NMEC)

Section 1. Background

The Agriculture Energy Efficiency program serves SoCalGas' small to very large agricultural customers by delivering key measures relevant to these customers. This program, implemented by ICF, EnSave and ERI and will focus on key customer segments such as Controlled Environment Agriculture, Dairy and Non-dairy Animal production, Post-Harvest, and Wineries.

The AgEE program will evaluate the savings of a subset of projects using the site-level Normalized Metered Energy Consumption (NMEC) methodology following the guidelines laid out in the CPUC Rulebook[17]. For each site-level NMEC project, site-level M&V plans will be created. This document fulfills the CPUC requirement of a program-level M&V plan which is required for site-level M&V programs[18] and sets the overarching vision and guidelines for executing site-specific NMEC determined energy savings.

Section 2. NMEC M&V Overview

Determining M&V Approach

It is standard practice to follow the International Performance Measurement and Verification Protocol (IPMVP) when implementing M&V. The Agriculture Energy Efficiency Program (AgEE) will follow IPMVP guidelines and conform to the latest version of the Meter-Based NMEC Rulebook (currently ver.2.0) when NMEC M&V is implemented. The IPMVP includes four methods of approaching M&V:

Table 3: Overview of IPMVP Options

IPMVP Option	Scope	Method
A	Measure Level	Engineering calculations (can include measurements)
B	Measure Level	Metering and Monitoring
C	Whole Building Level	Utility Bill Analysis
D	Whole Building or Measure Level	Calibrated Computer Simulation

These methods require varied levels of effort and there are pros and cons to each approach which are specific to the measure type, facility, and expected savings. When determining which IPMVP approach to take, it is important to ensure that the level of M&V effort is proportional to the expected energy savings and that efforts are invested in filling critical knowledge gaps, avoiding resource spend on verifying parameters that are known to a reasonably high degree of certainty. The AgEE program implementors will apply this lens to each project to determine which IPMVP approach is appropriate.

Site-level NMEC M&V falls under the IPMVP Option C category and employs more granular data (with advanced metering infrastructure (AMI)) in tandem with advanced analytics and automated processing. This approach helps to

[17] CPUC, "Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption", version 2.0. Updated 1/7/2020. Available at https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442463694.

[18] CPUC, "Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption", version 2.0. Updated 1/7/2020. Available at https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442463694. Pg.7

overcome limitations associated with traditional Option C M&V utility bill analysis and provides more accurate savings predictions.

NMEC is playing an exciting role in the energy efficiency space and contributing to the larger carbon goals California is striving towards. With smart meters becoming more prevalent, we now have increasing access to higher resolution consumption data to better execute whole building M&V. Several key features of NMEC include:

- Quantifying the savings at the meter which; a form familiar to the customer.
- It gives fast and granular feedback on the facility's performance to better ensure measures are achieving their full potential over the course of the measure life. [19]
- The increased granularity in data is important for grid management as system operator adapt to a changing landscape of energy sources (e.g., increased renewables on-line). Knowing hourly energy use profiles are important in the working towards decarbonization goals in the energy sector. NMEC can play a part in better understanding the demand side to make better decisions for the future.

Target Population & Eligibility Criteria

All agricultural customers that have a valid SoCalGas service account and adhere to the guidelines of the CPUC and IPMVP are eligible to participate in the AgEE NMEC savings platform. All projects must be for existing buildings projects. It is expected that NMEC will be exclusive to greenhouse RCx. Other customer types may be targeted over the course of the AgEE program.

Guidance from IPMVP[20] and the CPUC NMEC Rulebook[21] will help determine when NMEC will be appropriate for an AgEE project. NMEC is a favorable approach when:

- Interactive effects will be presented because of the Energy Conservation Measures (ECMs)
- An existing condition's baseline is suitable to model the savings from the ECMs
- There is an ability to produce a baseline energy model that reasonably represents the performance of the facility. Goodness of fit will be assessed using industry standard metrics. The LBNL denotes these metrics in their technical guidance documents to be as follows [24]:
    - coefficient of variation of the root mean squared error (CV(RMSE)) < 25%
    - normalized mean bias error NMBE between -0.5% and +0.5%
    - coefficient of determination $R^2 > 0.7$
- The expected savings are large compared to the random or unexplained energy variations occurring at the facility level. If variations in energy use that are unrelated to the ECMs are too large, they can drown out the impact of the ECMs. IPMVP's rule of thumb is that savings should be 10% of total baseline energy or greater. [20]

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[19] J. Barnes, C, Best, D, Jump, 'Normalized Metered Energy Consumption (NMEC) Explained', AESP California Chapter, Recurve, kW Engineering, 2020. Available at: https://cdn.ymaws.com/www.aesp.org/resource/resmgr/chapters/cachap/aesp_ca_chapter_nmec_webinar.pdf

[20] International Performance Measurement and Verification Protocol, Efficiency Valuation Organization, 'Concepts and Options for Determining Energy and Water Savings, Vol 1, 2012

[21] California Public Utilities Commission, 'Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption', Version 2.0 2020, see Section II.1.B. & Section II.1.C , pg. 8-9

- There are a minimal number of expected non-routine events (NREs) and they can be characterized and accounted for to a reasonable extent. NREs with the potential to have a significant effect on the data can eliminate the ability to see the effects of the ECMs making the computation of non-routine adjustments extremely difficult. LBNL Technical Guidelines propose a 25 % threshold for NREs.[22]If a facility's suspected NREs will affect more than 25% of the data, it will not be an ideal candidate for NMEC.

Section 3. Project Process

This section serves to provide a high-level description of the NMEC M&V approach to be taken for the AgEE program; in practice each site will receive a site-specific M&V plan, tailored to the specifics of the unique project while also adhering to the guidelines laid out in this document.

There are four overarching phases to an NMEC project:

9. **Pre-screening phase (Baseline Period):** Each site will be pre-screened with a site-visit to assess whether there is an adequate savings potential (i.e., the ECM savings are likely to exceed 10% of the total baseline energy; this aligns with IPMVP's guidance for Option C[23]) and if it is achievable to produce a good model of the facility's performance. Data on energy use and weather for one year will be gathered to execute a high-level analysis to estimate the savings potential and confirm that they are significant enough to produce a NMEC analysis with a reasonable level of confidence. Sites that would not be good NMEC candidates will be filtered out. See the Target Population & Eligibility Criteria section for mor detail on screening criteria.
10. **Project Feasibility Study (Baseline Period):** If a site passes the pre-screening phase it will receive a more detailed assessment in the pre-feasibility phase. This phase involves completion of a study with the following elements:
    a. Baseline information (equipment, operations, and all static factors)
    b. Individual ECM savings, expected useful life (EUL), and costs.
    c. Risk potential and a plan to mitigate risk
    d. Site-specific M&V plan will be drafted for each NMEC project. It will adhere to LBNL NMEC Technical Guidance.[24]

    Pre-feasibility savings estimations will be based on engineering calculations and judgment and any data that is available at the time, rather than logged data. These estimations will inform forecasting of facility energy use for the baseline and post-installation period.

11. **Installation Check:** Installation of ECMs will be verified through site inspections or pictures provided by the customer. Invoices for the installation will also be checked.

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[22] J. Granderson, P.Gruendling, C.Torok, P.Jacobs, N.Gandhi, 'Site-Level NMEC Technical Guidance: Program M&V Plans Utilizing Normalized Metered Energy Consumption Savings Estimation', Lawrence Berkeley National Laboratory, California Public Utility Commission, Building Metrics Inc., Strategic Energy Technologies Inc., Version 2.0, 2019, pg.7

[23] International Performance Measurement and Verification Protocol, Efficiency Valuation Organization, 'Concepts and Options for Determining Energy and Water Savings, Vol 1, 2012, section 4.8, pg.25.

[24] J. Granderson, P.Gruendling, C.Torok, P.Jacobs, N.Gandhi, 'Site-Level NMEC Technical Guidance: Program M&V Plans Utilizing Normalized Metered Energy Consumption Savings Estimation', Lawrence Berkeley National Laboratory, California Public Utility Commission, Building Metrics Inc., Strategic Energy Technologies Inc., Version 2.0, 2019

12. **Measure Verification & Reporting:** Facility performance will be metered and checked throughout the measurement period (no less than 1 year in accordance with CPUC guidelines[25]). At the end of the metering period, energy use data will be collected, and a savings analysis will be performed. Non-routine events will be identified and investigated if applicable to inform forecasting. After sufficient data is collected, a report will be completed. The report will present the savings and savings analysis and will describe the baseline, modeling methodology employed, measurement period, calibration, and adjustments for non-routine events. The report will address abnormalities and uncertainty in collected data, along with proposed remediation solutions. For behavioral, retro-commissioning, and operational measures, a repair and maintenance plan that adheres to CPUC rules will be formulated. The participant must agree to carry out the plan for a minimum of three years via a signed customer agreement.[26]

Section 4. Modeling

Overview

The overall process of site-level NMEC savings derivations involves the analysis of metered data before and after the installation of ECMs. Modelling methods are employed to establish a reliable and reasonable representation of the baseline for the facility (i.e., 'what would have happened' without intervention). The model is fit to energy usage of a baseline year and the associated outdoor air temperature data. The model's performance is evaluated to ensure it meets the goodness-of-fit criteria (see Target Population & Eligibility Criteria). The figure below gives a snapshot of the NMEC saving modeling process:

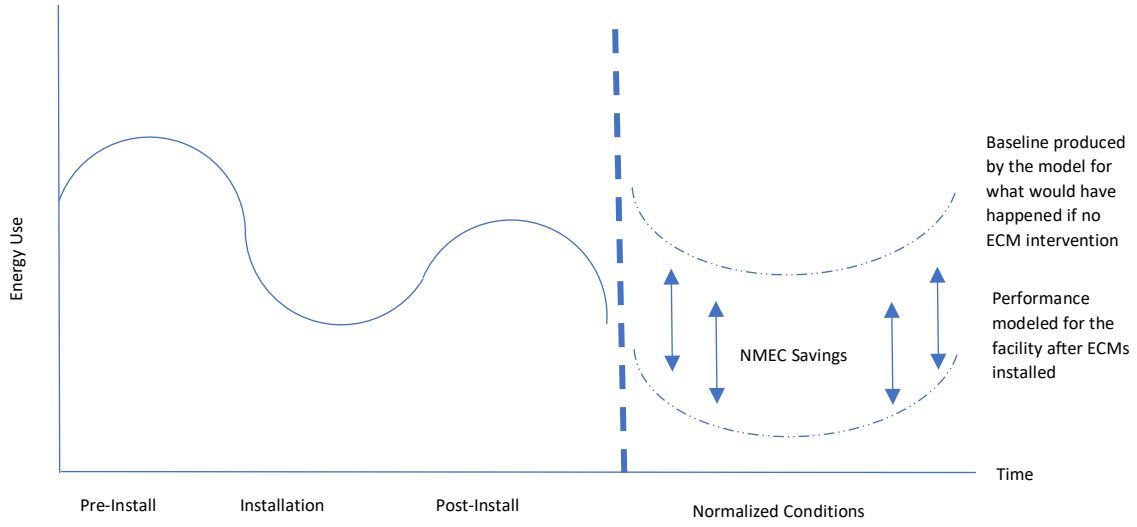

Figure 1 Modeling Savings with NMEC

[25] California Public Utilities Commission, 'Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption', Version 2.0 2020, see Section II.1.B. & Section II.1.C , pg. 15

[26] California Public Utilities Commission, 'Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption', Version 2.0 2020, see Section II.1.B. & Section II.1.C , pg. 10

The savings calculation is based on the type of model used, the interval of the energy data that is used in the analysis, the independent variables, and adjustments made for things like NREs. The independent and dependent variables in the analysis are as follows:

Variable Type	Variable
Independent	Weather (dry bulb temperature), operating schedule, shifts worked, seasonal distinctions, occupancy, production rate and type
Dependent	Energy consumption

In the spirit of following best practices, the AgEE program implementors will ensure that the model is developed and reported on so that it is repeatable, transparent and uses assumptions widely accepted in the energy efficiency industry amongst M&V practitioners.

Software

To execute the goals stated above, the AgEE program will utilize the open-source, peer-reviewed tools that are commonly used in the M&V space to model building energy use profiles. The AgEE program will use KW Engineering's open-source, R package, nmecr. This tool is hosted on github and is accessible for critical review and continuous improvement. KW engineering posts the outcomes of the regular testing they conduct against the Efficiency Valuation Organization's Advanced M&V Testing Portal.[27]

nmecr can perform site-level, whole-building energy use analysis[28]; it is a M&V practitioner's toolbox which builds upon existing work in the energy efficiency community to better model building performance and handle the growing complexities associated with tackling this challenge. The equations of the model are visible to the nmecr user which is preferred; it will enable the M&V practitioner to apply good judgement and to make appropriate modeling decisions. This tool calculates avoided energy (which will be helpful in the monitoring period) and normalized energy (for final reporting) and it accepts multiple types of interval data (hourly, daily, monthly).[29]

[27] See this link for NMEC R Code Updates: https://www.kw-engineering.com/nmec-normalized-metered-energy-consumption-r-package-energy-efficiency-project-analysis-nmecr-1-0-2/

[28] See this link for a brief description of NMECr: https://www.kw-engineering.com/2020-aeee-summer-study-virtual-sessions-papers-energy-efficiency/

[29] Efficiency Valuation Organization, 'IPMVP's Snapshot on Advanced Measurement & Verification' , January 2020, pg.34, Available here: https://evo-world.org/images/corporate_documents/NRE-NRA_White_Paper_Final_2701.pdf

[29] https://github.com/kW-Labs/nmecr

While nmecr was originally designed for use in the commercial and institutional sectors, its functionality can be extended to model energy use profiles of industrial systems.[30] We believe that it will also be able to handle the energy use profiles that will be encountered in AgEE NMEC projects. The nmecr tool is coded in R; an open source programming language with the capability to efficiently execute complex statistical analysis and visualize data in a straightforward way. It is a popular programming language for performing data analysis.

Algorithms

There are a range of algorithms available to model energy use and perform NMEC savings calculations. The IPMVP's recent white paper on advanced M&V notes that while different results will be produced based on the type of empirical model used, the variances are expected to be low. This is notion is informed from findings of a pilot program.[31] NMEC models are based on linear regressions of energy use to outdoor air temperature [14]. Overall, these models fall into one of three categories:

1. Change-point: This method is more advanced than linear ordinary least squares regression and was developed under the ASHRAE Research Project 1050-RP[32]. It uses a piece-wise linear approach to model of energy use for segments of outdoor air temperature. Depending on the facility's individual load shapes the number of parameters needed in the model will be determined; caution is needed to avoid 'overfitting' by using too many parameters. [31]
2. Time of Week and Temperature (TOWT) models: This model was developed by Lawrence Berkeley National Laboratory (LBNL) and uses a series of piece-wise linear and continuous temperature relationships using temperature bins. It uses hourly data to calculate energy savings by hour. [33] This is also more advanced than linear ordinary least squares regression methods.
3. Heating and Cooling Degree Day Models: These models only use monthly time interval data. This method is less preferred.

There are ten modeling algorithms for energy savings analysis available for use in the nmecr tool. These algorithms differ from each other largely in terms in their ability to handle data sets with different intervals project (see the nmecr github web page[34] for a full listing of the algorithms available in nmecr). These modeling algorithms cover all three of the above categories. The wide range of available model types will be beneficial for accommodating different facility types and varying levels of energy data granularity available. The AgEE team will choose the algorithm best suited for each site-level NMEC project; the time interval of the data will be a key factor in deciding. The following sources provide some more guidance for choosing an appropriate model:

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[30] KW labs nmecr is available on github here: https://github.com/kW-Labs/nmecr. More detail on nmecr is available on the github link.

[31] Efficiency Valuation Organization, 'IPMVP's Snapshot on Advanced Measurement & Verification' , January 2020, Pg.14, Available here: https://evo-world.org/images/corporate_documents/NRE-NRA_White_Paper_Final_2701.pdf

[32] The paper for the ASHRAE Research Project 1050-RP can be accessed here: https://oaktrust.library.tamu.edu/handle/1969.1/2847

[33] Efficiency Valuation Organization, 'IPMVP's Snapshot on Advanced Measurement & Verification' , January 2020, Pg.14, Available here: https://evo-world.org/images/corporate_documents/NRE-NRA_White_Paper_Final_2701.pdf

[34] https://github.com/kW-Labs/nmecr

- Efficiency Valuation Organization, 'IPMVP's Snapshot on Advanced Measurement & Verification' which is available here: https://evo-world.org/images/corporate_documents/NRE-NRA_White_Paper_Final_2701.pdf
- CALTRCK's article on the strengths and weaknesses of TWOT which is available here: https://www.caltrack.org/project-updates/week-fourteen-caltrack-update
- KW Labs github which links to relate papers. (see this link: https://rdrr.io/github/kW-Labs/nmecr/#google_vignette)

The specific algorithm employed to model the savings will be recorded in the final report. The rational for employing the particular algorithm will also be discussed in the report.

Dealing with Uncertainty

Errors in meter-based savings calculations occur from modeling, sampling, and measurement.[35] With meter-based M&V methods, the error from the empirical model is typically the only error that is quantified. Measurement errors are usually not quantified to NMEC projects because the meters are revenue-grade. [36] Modeling errors are errors in the mathematical modeling due to inappropriate function form, inclusion of irrelevant variable(s), and exclusion of relevant ones. The model may be based on insufficient or under-representative data. [37] Pre-screening will help assess whether there is potential to produce a good model with a high enough confidence (see discussion on goodness of fit in subsection: Target Population & Eligibility Criteria).

For cases where the baseline models are expected to use monthly data, the proposed M&V plan should demonstrate that the proposed modeling approach is likely to produce results with acceptable levels of precision (can be express in terms of uncertainty due to model error) the goodness-of-fit analysis described in Target Population & Eligibility Criteria, should be expanded to also conduct an uncertainty scenario analysis as described in ASHRAE Guideline 14 (see LBNL Technical Guidelines Section 3 for further description about this analysis).[38]

Section 5. Data Collection Plan

The following data will be collected:

- **Baseline:** Baseline conditions will be fully documented in the M&V plan. All static factors will be recorded (e.g., equipment types, production, daily, operational hours by day, week, and season.). This data will serve to create a reasonable baseline model to which savings can be reliably derived from. As

[35] Efficiency Valuation Organization, 'IPMVP's Snapshot on Advanced Measurement & Verification' , January 2020, Pg.87, Available here: https://evo-world.org/images/corporate_documents/NRE-NRA_White_Paper_Final_2701.pdf

[36] Efficiency Valuation Organization, 'IPMVP's Snapshot on Advanced Measurement & Verification' , January 2020, Pg.18-19, Available here: https://evo-world.org/images/corporate_documents/NRE-NRA_White_Paper_Final_2701.pdf

[37] Efficiency Valuation Organization, 'IPMVP's Snapshot on Advanced Measurement & Verification' , January 2020, Pg.93, Available here: https://evo-world.org/images/corporate_documents/NRE-NRA_White_Paper_Final_2701.pdf

[38] J. Granderson, P.Gruendling, C.Torok, P.Jacobs, N.Gandhi, 'Site-Level NMEC Technical Guidance: Program M&V Plans Utilizing Normalized Metered Energy Consumption Savings Estimation', Lawrence Berkeley National Laboratory, California Public Utility Commission, Building Metrics Inc., Strategic Energy Technologies Inc., Version 2.0, 2019, pg.9

IPMVP guidance notes, a key element of this data is that it will serve to allow NREs to be identified so the appropriate adjustments can be made for determining the NMEC savings.

- **Metered Energy Use Data:** Metered data will be obtained through customer-owned submeters. The program implementors will verify that they have been recently calibrated and that the specifications meet the CPUC requirements (minimum accuracy of +/- 2%, and positive displacement meter type). Ideally, the time interval will be at least as granular as hourly. A year's worth of utility data will be collected; 12 months of data from submeters on site will be collected if utility data is unavailable. If there are gaps in the data, the technical reviewers will interpolate.
- **Weather Data:** The latest long-term average weather data will be used. This data will be sourced from CA Climate Zone 2022 weather files.

Section 6. Monitoring

Throughout the measurement period, the AgEE program implementers will monitor the metering in accordance with the guidelines set by the CPUC.[39] The key action items that will be completed in the monitoring period are as follows:

- Ensure proper function of metering equipment: The program implementers will check that the data that is being properly collected in the early stages (1 -2 months after installation), ensuring that the metering equipment is functioning properly. Technical reviewers will check to make sure that the independent variables are reasonable. Anomalies in the data will be investigated and excluded if they are erroneous.
- Check for Non-Routine Events (NREs): The program implementers will periodically check for NREs at the facility. If any are identified, they will be recorded and adjustments to the baseline model will be made. Visual checks, communication with the customer, and intermittent assessments of the data throughout the measurement period will help identify NREs (i.e., outliers in the data for independent variables which deviate +/- 3σ from the baseline mean; the 'three-sigma rule'.)
- Verify Savings: The program implementers will periodically report on energy savings throughout the measurement period to ensure the ECMs are performing as expected by calculating the avoided energy use (final savings will be reported as normalized savings). Avoided energy use is the reduction in energy that occurred in the reporting period relative to what would have happened if the facility had been equipped as it was in the baseline period but under reporting period operating conditions.[40] This information will be shared with the customer and will be an important component of delivering customer care.

The actions taken in the categories listed here will be documented and reported on in the final report.

Section 7. Adjusting for Non-Routine Events (NREs)

Non-routine events that influence the facility energy use will be monitored for and recorded so that adjustments to the data can be made. These events are not related to the ECMs. The impact of NREs should be minimal. Facilities with expected, significant NREs will not be considered for NMEC; this risk is assessed in the pre-

[39] California Public Utilities Commission, 'Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption', Version 2.0 2020, see Section II.1.B. & Section II.1.C , pg. 15

[40] International Performance Measurement and Verification Protocol, Efficiency Valuation Organization, 'Concepts and Options for Determining Energy and Water Savings, Vol 1, 2012, section 4.5.3, pg.55.

screening phase. IPMVP guidelines discuss the following examples of static factors that should be monitored for change [41] and they will be relevant to the AgEE program:

- Amount of space being heated or cooled
- Production (type and number of shifts per day)
- Building envelope characteristics
- Equipment changes
- Indoor environmental standard (e.g., light levels, temperature, ventilation rate)
- Occupancy type or schedule

If changes occur in these areas, adjustments will be made to the savings model. LBNL Technical Guidance will be followed for making the adjustments. Simple calculations may suffice for many adjustments. If the NREs create more complexity and interactive effects, a simulation is preferred. Measured data from a temporary period where a NRE occurred can be removed from the data set, keeping in mind that no more than 25% of the measured data should be removed (this is in accordance with ASHRAE Guideline 14).[42]

Section 8. Savings Calculation

The gross savings will be calculated after the measurement period is over and the site-level M&V requirements are satisfied. The gross savings calculation is as follows:

$$Energy\ Savings = Baseline\ Model\ Predicted\ Energy\ Use - Actual\ Metered\ Energy\ Use \mp NRE\ Adjustments$$

Final project savings claims will be determined and reported on in accordance with CPUC rules[43] which denotes that final savings claims must be normalized. Normalized savings are the reduction in energy use that occurred in the reporting period relative to what would have happened without the ECMs under a normal set of conditions. [44] Final savings will be normalized based on long-term weather using the most up-to-date weather files (e.g., CALEE 2018).

The savings will be documented in the final report along with EUL and ECM costs. If deviations from the original proposed M&V plan occurred, this will be documented and substantiated. If the customer is participating in other energy efficiency programs, the gross energy savings will be adjusted to ensure that incentivized measures from other offerings are not included in the scope of the NMEC savings analysis. [43]

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[41] International Performance Measurement and Verification Protocol, Efficiency Valuation Organization, 'Concepts and Options for Determining Energy and Water Savings, Vol 1, 2012, section 4.5.3, pg.13.

[42] J. Granderson, P.Gruendling, C.Torok, P.Jacobs, N.Gandhi, 'Site-Level NMEC Technical Guidance: Program M&V Plans Utilizing Normalized Metered Energy Consumption Savings Estimation', Lawrence Berkeley National Laboratory, California Public Utility Commission, Building Metrics Inc., Strategic Energy Technologies Inc., Version 2.0, 2019, pg 12 & 19

43 J. Granderson, P.Gruendling, C.Torok, P.Jacobs, N.Gandhi, 'Site-Level NMEC Technical Guidance: Program M&V Plans Utilizing Normalized Metered Energy Consumption Savings Estimation', Lawrence Berkeley National Laboratory, California Public Utility Commission, Building Metrics Inc., Strategic Energy Technologies Inc., Version 2.0, 2019, pg 16

[44] International Performance Measurement and Verification Protocol, Efficiency Valuation Organization, 'Concepts and Options for Determining Energy and Water Savings, Vol 1, 2012, section 4.5.3, pg.57.

Section 9. Expected Useful Life

The project lifecycle savings will be based on a weighted average EUL method. [45] The weighted EUL for the recommended ECMs will be determined in the feasibility study and will be updated as needed for the final report, after installation. EULs for the ECMs will be sourced from the Database for Energy Efficient Resources (DEER).

Section 10. Determining Program Influence

A program's influence is defined by the comparison between what would have happened without the intervention and what did happen. To answer this question, it is important to eliminate free ridership to the greatest extent possible. The following measures will be taken in efforts to avoid free ridership:

- Project start date will be verified to ensure that the project did not start before the participant was enrolled in the program.
- Baseline equipment for the ECM will be assessed to ensure it is still functional, that it's age does not exceed the EUL.
- The net savings realized when free ridership is accounted for will be calculated by multiplying gross savings by the net-to-gross (NTG) ratio.[46] The NTG applicable to AgEE is 0.95 (specified in the CPUC Resolution E-4952 for non-residential NMEC projects).

Section 11. Incentive Structure

The incentive structure will be flexible, and the amount paid will be based on the nature of the project. Customers will receive three incentive payments. The first payment will be used to offset a portion of the upfront purchase cost. The second payment will occur at the end of Year 1 and will reflect the savings achieved to date. The remaining incentive will be paid at the end of Year 2 and will be used to true-up the total incentive based on verified savings. Customer incentives will be capped at 50% of the project costs.

Section 12. Copy of Bid M&V Plan

The M&V Plan submitted with the bid is included here:

Bidder Response:

2. Embedded Data Collection Strategies

The AgEE program design incorporates several embedded data collection strategies to streamline reporting and evaluation. For most participating customers, an "intake interview" will be conducted to collect pertinent information on baseline conditions (facility footprint and age, inventory of primary gas-powered equipment, operational schedules, etc.). Intake interviews typically take place over the phone by an experienced agricultural program representative, and information relevant to M&V will be recorded in a secure database. Pre-installation walkthrough visits will be conducted by in-house staff in cases where data collection is necessary to validate customer-supplied information.

At the post-install stage, data will need to be collected that aligns with the timing of the pre-install collection period based on weather, seasonality, or production. This is a concern for agriculture processes that tend to be

[46] . Granderson, P.Gruendling, C.Torok, P.Jacobs, N.Gandhi, 'Site-Level NMEC Technical Guidance: Program M&V Plans Utilizing Normalized Metered Energy Consumption Savings Estimation', Lawrence Berkeley National Laboratory, California Public Utility Commission, Building Metrics Inc., Strategic Energy Technologies Inc., Version 2.0, 2019, pg.22

heavily season-dependent, based on harvest and other operations. Any non-routine events will need to be documented and either accounted for in the model, or the measurement period extended to obtain more reliable data. Post-installation visits to verify the quantity, type, and correct application of incentivized efficiency projects. At a minimum, post-installation site visits will include photographic documentation of installed equipment, and nameplate information.

3. Savings Estimation Approach

Deemed measures: For deemed measures, savings estimation will follow guidance provided in CPUC-approved workpapers. Where appropriate, pre-installation site visits will be conducted by in-house engineering staff to verify customer-supplied baseline data, and documentation of any discrepancies between customer-supplied information and data collected on site.

Custom Measures: Savings estimation for custom projects will be conducted by in-house engineers using energy modeling software such as EnergyPlus or eQUEST. M&V for custom projects will be carried out to estimate and/or validate savings for projects where a high degree of uncertainty is present. In these cases, in-house engineering staff will follow the International Performance Measurement and Verification Protocol (IPMVP) guidance for *calibrated simulations* (Option D) or a similar process approved by SoCalGas.

Meter-based measures: Meter-based projects represent a minor proportion of projected energy savings (approximately 1.6%) and are associated with steam traps and greenhouse RCx. M&V for meter-based projects will follow the most current version of the *Rulebook for Programs and Projected Based on Normalized Meter Energy Consumption* (NMEC). Details of the savings estimation approach for meter-based projects will be outlined in the required project-level M&V plan.

4. Internal Performance Analysis

Internal performance expectations are established within the program team through our QA/QC process. Program processes are managed in our Sightline™ platform. Sightline provides a complete digital experience and actionable lines of sight that optimize program tactics, improve results, and enhance participants' experiences by making participation easier. Sightline incorporates defined rulesets that do not allow projects to progress from one stage to next without all requirements being met. One such ruleset is engineering review that requires a QC review of any engineering analyses by engineering management to ensure that all savings calculations are accurate and meet all current regulatory guidance. Our performance against program quality standards (e.g., number of errors/savings calculations corrections) are monitored throughout program delivery to inform any necessary process or personnel improvements.

5. Eligibility Criteria

Eligible customers include agricultural customers that receive natural gas service. These customers are broadly defined under NAICS code 11 (Agriculture, Forestry, Fishing and Hunting). All size classifications are eligible including very small (<2,000 therms per year) through very large (>250,000 therms per year). This consists of approximately 2,000 customers.

6. Performance Metrics

Customer projects are managed with strict Service Level Agreements (SLAs) to ensure that projects progress towards a construction completion date. At the commitment stage, the AgEE team works with the customer on an agreeable schedule based on the scope of the project. Typical project stages consist of Enrollment, Assessment, Project Scope, Commitment, Construction, QA/QC, Installation Approved. The time within each stage is measured for each project so we can view the average time across the portfolio and identify outliers so we can mitigate project delays and meet performance expectations.