



Implementation Plan

Version 1.0

February 29, 2024

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Brewery Energy Efficiency and heat Recovery (BEER) Program

Program Implementer: Frontier Energy, Inc.

Portfolio Administrator: Southern California Gas Company



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SoCalGas Brewery Energy Efficiency and heat Recovery (BEER) Program
Implementation Plan

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SoCalGas Brewery Energy Efficiency and heat Recovery (BEER) Program Implementation Plan

Introduction

The Brewery Energy Efficiency and Heat Recovery (BEER) Program is set to run from the first quarter of 2024 until the end of 2025. Frontier Energy will implement the BEER Program with The Culinary Advisor, a subcontractor who will actively recruit purposeful customers into the program. The Frontier Energy (Frontier or the Team) will coordinate with the Portfolio Administrator, SoCalGas, as required to ensure streamlined program implementation.

Program Budget and Savings

1. Program Name

Brewery Energy Efficiency and heat Recovery (BEER) Program

2. Program ID

SCG3957

3. Program Budget

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

4. Program ID

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

5. Program TRC

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

6. Program PAC

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

7. Type of Program

Third Party-Delivered

8. Market Sector

Commercial

9. Program Type

Resource Acquisition

10. Market Channel and Intervention Strategies

Customer Incentives, energy audit

Implementation Plan Narrative

1. Program Description

This program aims to provide microbreweries with energy efficiency and decarbonization solutions by installing energy-efficient boiler upgrades, carbon capture technologies, and energy audits. The program will leverage other SoCalGas local and statewide energy efficiency (EE) programs, such as the Statewide

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Foodservice Instant Rebates program, to drive participation and capture additional energy savings for those programs.

2. Program Delivery and Customer Services

Frontier Energy will partner with subcontractor “The Culinary Advisor,” a California-certified diverse business enterprise, to recruit customers to the BEER Program, with a focus on smaller breweries with operations production <30 BBL and integrated commercial kitchens. Recruited sites will receive a free energy assessment to verify the feasibility of implementing the CarbinX carbon capture technology and efficient boiler system improvements. Eligible sites will enter a participation agreement, providing access for the BEER Team to install pre-installation monitoring equipment for 2-4 weeks while the custom upgrades undergo engineering review. During the analysis period, the BEER Team will provide tools and recommendations for reducing energy and water use in the operation and information on connecting to the appropriate local and statewide EE programs. Frontier will offer an incentive of \$5,000 per technology (i.e., efficient boiler and CarbinX system) adopted by participating sites. Once installed, the BEER Team will monitor the upgraded boiler system for 2-4 weeks to verify the energy savings against the baseline period. The carbon capture technology will be sized for the customer’s operation. The measurement and verification will provide a body of research that Frontier will use to generate the marketing materials and seminar outreach activities, directly driving further market adoption of the selected technologies.

The program will develop case studies based on the results from the participating craft breweries to provide operator confidence in the technology upgrades. The BEER pilot provides a necessary step between market introduction and widespread adoption by demonstrating these emerging energy efficiency technologies to encourage other operations to adopt energy-efficient boiler retrofits with carbon capture technology.

Because this program is focused on an emerging customer group that is largely new to energy efficiency programs, one of the main innovations is that through facility audits, the program will allow researchers to identify further EE opportunities and generate new program ideas, especially ones focused on facility growth. It will also enable researchers to identify opportunities focused on facilities looking to transition from commercial to industrial brewing and may generate future custom energy savings projects for sustainable growth. In effect, the program will lay the groundwork for embedding combined energy and carbon reduction technology applications into smaller operations to realize future benefits to these customers and SoCalGas as the customer’s operations scale up.

3. Program Design and Best Practices:

Customer Targeting

The program outreach will include initial and ongoing customer engagement phases for participating sites. The Implementer will create an eligible SoCalGas commercial brewery outreach list during the outreach phase. The list will focus on smaller breweries (<30 BBLs/day) considered hard-to-reach and/or located in disadvantaged communities with 200 commercial brewery locations. In-person outreach will engage 75 sites within the first 90 days of the program implementation period. The program expects to enroll 25 commercial breweries. Frontier Energy and The Culinary Advisor will also participate in brewery trade show events to promote the program and its technologies. While the program is underway, the project team, including The Culinary Advisor, will work with enrolled customers and

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equipment manufacturers to increase the adoption of energy-efficient boilers and carbon capture technologies. The team will also work with customers to identify opportunities to replace inefficient equipment through other SoCalGas energy efficiency programs.

Technical Assistance

Frontier Energy will provide technical assistance with the retrofit technologies while the program is underway.

Customer Incentives

The BEER program will provide participating customers with a \$5,000 incentive per technology upgrade to offset the equipment installation costs. The number of participants will partially depend on the number of upgrades each site selects. This program has set \$200,000 aside for incentives and to deliver program services (CarbinX system services). The program will target 15 installations. The incentives are tied to installing the CarbinX and modular boiler technologies with the highest degree of efficiency and quality possible.

Direct Install

Frontier Energy will coordinate the installation of the retrofit technologies with the customer through the appropriate vendors.

Financing

On-bill financing is available to participating sites.

4. Innovation

The craft brewing industry is a robust market that has experienced substantial growth in SoCalGas' service territory over the past decade. Small breweries lack the resources of larger breweries and can be unaware of opportunities to reduce energy consumption in their day-to-day operations. Furthermore, as small businesses, these breweries are frequently unaware of available utility programs and resources. The opportunities to improve the energy efficiency of craft breweries are not well understood, and this pilot program presents an opportunity to stimulate the developing body of research attempting to meet this need. By targeting breweries with current brewhouses under 30 Barrel (BBL), this program will begin to fill a gap in the existing program offerings. It will provide publicly available data to increase understanding of small brewery energy efficiency.

CleanO2's CarbinX technology provides a simple, cost-effective solution to carbon capture for small- and medium-sized businesses. The CarbinX technology utilizes waste process heat to encapsulate carbon in potassium carbonate, which can then be processed into consumer goods (such as soaps and cleaning products) for a circular economy. The resulting energy saved by reducing waste heat reduces energy consumption and can realize a 5-year simple payback time.

The steam boiler upgrade is a proven efficiency upgrade repurposed from other industries. Conventional brewery boilers feature single-speed, low-efficiency jet burners. The burners typically shoot flame into a firebox underneath the brewing kettle. Generally, breweries use inefficient boilers because of the quick pre-heating time, relatively simple equipment, and lower maintenance. These boilers are also low-cost, so when small business owners want to invest in their first set of brewhouse equipment, using direct-fire kettles is often a budgetary decision.

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Efficient boiler’s high-pressure steam captures the burner’s heat more than conventional boilers but is usually more expensive. The added innovation of modular boilers and the ability of the new system allow a brewery to grow while preserving the energy efficiency gains. The customer can also use the high-pressure steam to implement clean-in-place protocols and equipment washdowns, so modular boilers offer some added functionality to address concerns that become more important as breweries expand. Both technologies are commercially available but severely underutilized due to a lack of awareness and operator trust in the energy savings claims. By including pre- and post-field monitoring to substantiate the claims, the program will develop supporting case studies to provide operator confidence in the upgrades. The BEER program provides a necessary step between market introduction and widespread adoption by focusing on these emerging technologies as an energy efficiency demonstration.

The program's goals are to save energy through the pilot and drive participation in complimentary energy efficiency programs. The most valuable element of the BEER program will be building awareness within the craft brewing industry of the opportunities to reduce energy use and carbon production in their operations. The outreach and recruitment will provide a much clearer understanding of the challenges faced by operators and businesses in this industry. The program will provide customers with a list of energy efficiency programs and potential EE opportunities they could pursue in the future. Also, by focusing on breweries with food service operations, The BEER pilot will be able to drive participation in existing SoCalGas programs and capitalize on otherwise stranded energy savings opportunities.

5. Metrics

Key Performance Indicators (KPIs)			
#	Category	Company Metric	KPI Definition
1	Program Performance	Program Participation	Number of Customers Participating versus Forecasted Annually
2	Program Performance	Energy Savings	Percentage of Net therm savings achieved versus forecasted (boiler only)
3	Program Performance	Program Participation	Number of Breweries enrolled in Business My Account because of Participating in BEER Program
4	Program Performance	Program Participation	Participation in program classes, twice a year.
5	Program Performance	Program Participation	Number of breweries contact information collected at conferences located in SoCalGas Territory (2 conferences per year)
6	Program Performance	Measurement and Verification	Number of pounds of CO ₂ offset post-retrofit (Carbon Displacement) annually
7	Program Performance	Program Participation	Number of breweries participating in other SoCalGas and Statewide Programs because of participating in the BEER program, annually.
8	Supply Chain Responsibility	N/A	Diverse Business Enterprise Spend*
9	Service Delivery	N/A	Program Administration and Implementation

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6. Workforce Education and Training

Frontier will develop an hour-long seminar to cover lessons learned from this project and deliver the presentation at two brewing industry events/conferences and SoCalGas. Frontier will also publish a case study summarizing program findings.

Supporting Documents

Program Manual

Program Overview

The BEER Program offers incentives to SoCalGas microbrewery customers to encourage boiler upgrades and implementation of carbon capture technologies. The program will leverage other energy efficiency programs to drive participation and capture additional energy savings.

The program will focus on building strong relationships with growing craft breweries, demonstrating the benefits of carbon capture and more efficient gas boiler systems, and establishing a strong business case for adopting energy-efficient gas equipment in other parts of their operations. Participating customers will act as real examples of energy and cost savings for other craft breweries, helping to foster a culture of efficiency within the industry. Case studies and outreach efforts will allow early adopters to serve as advocates for other potential participants and will help expand the pilot's reach.

Eligible Measures and Measure Eligibility

Eligible measures include the CarbinX system (a carbon-capture technology) and modular process boilers.

Customer Eligibility Requirements

The BEER Program will be open to 20-30 commercial craft breweries within the utility's service territory. Customers must be in good standing with their account and not have received incentives for proposed measures in the last five years.

Contractor Eligibility Requirements

CleanO2 produces the CarbinX system and will provide this technology for customers of the BEER Program. TRAP Energy Solutions will be the distributor providing the retrofit boilers.

Additional Services

The program team will invest in improving the energy and water efficiency of the brewery operations through engineering support and building awareness of complimentary programs that offer additional benefits to operators. The pilot program marketing plan will include promotional materials, seminars, and participation at craft brewing industry trade shows and conferences. This multi-pronged approach will help drive the adoption of the pilot technologies and solidify SoCalGas' reputation as a leader in carbon reduction efforts for the craft brew community. The program team will assess whole-building and process systems for the target operations. It will identify energy savings measures and connect operators to complimentary SoCalGas EE programs to assist with other energy saving upgrades.

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Audits

After enrollment, all customers will receive on-site audits from the Frontier Energy team to validate eligibility for recommended boiler and carbon capture technologies and find opportunities for additional energy efficiency upgrades with enrolled facilities.

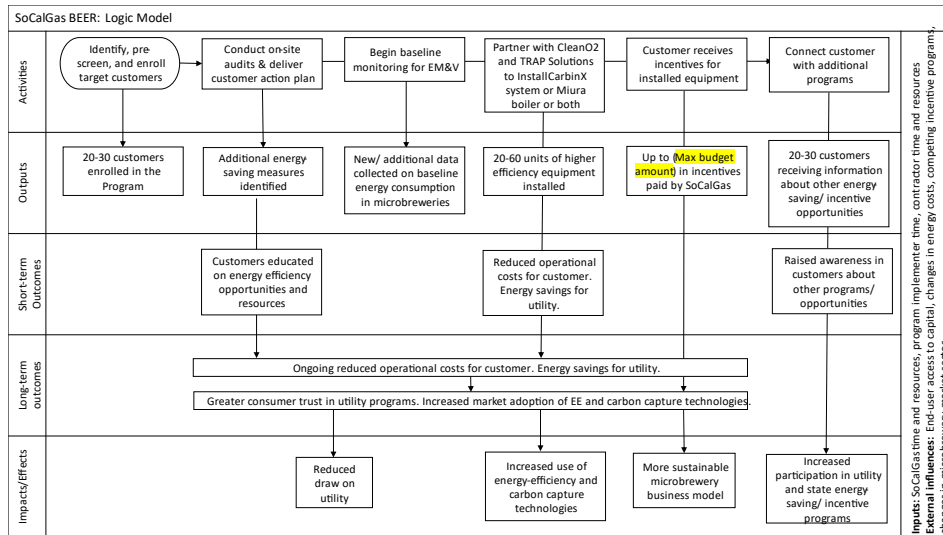
Quality Assurance Provisions

Qualified service professionals will perform the retrofits. The CarbinX system will be installed by representatives from CleanO2 and serviced by a contractor who has completed training specific to the CarbinX system. Many qualified plumbers in SoCalGas' service territory can install the modular boiler system. Qualified and certified plumbers will install the gas meters. Engineers at Frontier Energy will handle the data.

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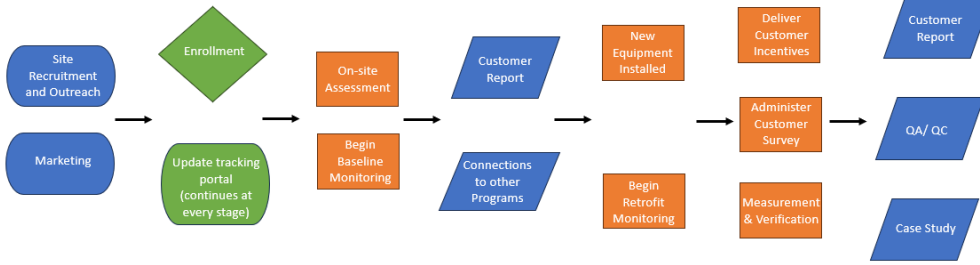
Program Logic Model



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Process Flow Chart



Incentive Tables

Incentives per Customer	2024	2025
Installation of Process Boiler	\$5,000	\$5,000
Installation of CarbinX System	\$5,000	\$5,000

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Quantitative Program Targets

Across the program duration, the program will aspire to achieve the below quantitative goals:

Brewery Size	No. of Participants	No. of DAC	No. of HTR
Small (less than 10 barrels)	15	10	5
Medium (less than 30 barrels)	10	7	4
Total	25	17	9

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The program also aims to achieve the following qualitative goals:

- Encourage other SoCalGas and statewide energy programs to drive program participation and capture additional therm savings.
- Foster a culture of energy efficiency in the craft brewery industry
- Drive adoption of newer technologies and help solidify SoCalGas' reputation as a leader in carbon reduction efforts.

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Diagram of Program

Please see Program Process Flow on the previous page.

Disadvantaged Worker Plan

Frontier Energy did not design the BEER program to directly provide jobs to disadvantaged workers. However, by helping local breweries in disadvantaged zip codes to expand, the program will stimulate job growth in these communities. Outreach efforts will begin by focusing on hard-to-reach and disadvantaged communities to create a list of commercial brewery candidates to be targeted by the program. Frontier will track and report workers and equipment installers who reside in disadvantaged communities.

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M&V Plan

ECM Intent

This program has two ECMs: the carbon capture module and the process boiler upgrade. The carbon capture module intends to save 20% of the energy at the process boiler and to offset 27% of the carbon. The boiler upgrade intends to save 25% of the energy at the process boiler.

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Selected IPMVP Option and Measurement Boundary

IPMVP option B: Retrofit Isolation. The measurement boundary will be drawn at the process boiler.

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Baseline: Period, Energy and Conditions

Frontier Energy will install a diaphragm-type gas meter on the boiler for each participating brewery prior to the retrofit to directly measure the baseline gas usage. The gas meter will be appropriately sized based on the input rate to the boiler and the pipe diameter. Data will be collected with a Campbell Scientific Data Logger at a sampling rate of five seconds. Where possible, this data will be made remotely accessible via the brewery's wi-fi network. Otherwise, it will be manually downloaded by a Frontier Energy technician. Baseline data will be collected for at least one month to obtain a representative sample of the boiler's energy usage. During this period, the brewery must be in operation. The number of barrels of beer brewed will be reported for each day to normalize the baseline data to a therm-per-barrel basis for ease of comparison to the retrofit.

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Baseline: Period, Energy and Conditions

The gas measurement system will be kept in place after the retrofit to track the energy usage post-retrofit. For sites that install the CarbinX system, the weight of carbon captured will be reported by Clean O2's technicians, who will essentially weigh the filters before and after the monitoring period. The brewery's production schedule will be obtained from the brewery via survey, so the boiler gas usage can be normalized to a barrel of beer produced. This normalization will be performed on the pre-retrofit and post-retrofit energy usage data, and energy savings will be calculated and reported on a per-barrel-produced basis for each participating brewery.

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Reporting Period

The reporting period for this project will be on a rolling basis throughout the project timeline.

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Basis for Adjustment

Data will be normalized to a therm-per-barrel-brewed basis.

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Analysis Procedure

The raw data will be a .csv file with a column of timestamps and a column of gas usage per 5 seconds in cubic feet. For each day during each period, the following parameters will be calculated:

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- Total daily energy consumption (therm/day)
- Peak energy consumption (Btu/hr)
 - This will be compared to the boiler's input rate to ensure data quality
- Significant events will be tracked using the timestamps
 - E.g. if the boiler runs at full blast for a long period of time, this will be identified as a start-up, if the boiler consumes energy in short bursts over a long period of time, this will be identified as an idle period, etc.

Volumetric gas consumption data will be converted to energy use data using the higher heating value provided for the pipeline area for the monitoring period as listed on Company's website.

Energy Prices

Energy prices will be assumed to be the 2024-2025 SCG service territory average natural gas rate for commercial buildings for each site so that the financial impact of the retrofits can be analyzed without accounting for differences in specific customers' rate plans.

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Meter Specifications

The gas meter will have a resolution of at least 0.1 cubic foot with an accuracy within 1%. This will be a Sensus 275 accuWAVE diaphragm gas meter or an equivalent.

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The scale used to measure the carbon capture will have a resolution of at least 0.1 pound with an accuracy within 1%.

Monitoring Responsibilities

The Frontier team will track and manage program data using a customized internal platform, which will allow the team to organize and store energy monitoring data as well as the results from the site assessment, survey results, customer contact information, participation by measure and customer satisfaction scores. This internal platform is secure and prevents unauthorized access.

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Expected Accuracy

The energy monitoring results are expected to be accurate to within 2%.

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Budget

The M&V budget for this project is \$105,000, which includes labor and materials.

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Report Format

Energy monitoring results and salient customer data will be reported to Company in regular monthly reports. Company will be supplied with a Baseline Monitoring Data Summary. This will include photos of the metering installation and an analysis of the baseline energy usage, including total daily energy, energy use per barrel brewed and pre-retrofit survey results. It will also include information on each

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process boiler's make, model and age. Company will be supplied with a retrofit monitoring data summary report, which includes the information listed for the Baseline Monitoring Data Summary and the retrofit details and photos of the retrofit from each site.

Company will also receive a final report detailing everything in the project. The chapters for this report will be as follows:

1. Executive Summary
2. Abstract
3. Introduction and Background
4. Baseline Monitoring Data Summary
5. Retrofit Monitoring Data Summary
6. Energy Savings Comparison
7. Conclusion and Recommendations

Quality Assurance

All metering equipment will be validated at Frontier Energy's Food Service Technology Center using accredited third-party calibrated instrumentation. The verification process will involve a three-point check: each meter will be checked at a value near the minimum value expected to be measured, a value roughly 25% higher than the maximum value expected to be measured, and one value in the middle of the expected measurement range. This will ensure the meters are accurate and precise throughout the measurement range. Multiple engineers will check the data analysis before submitting it to the Company to ensure it is free of any calculation errors and that the conclusions drawn are reasonable.

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Figure 1: Sensus R-275 Diaphragm Gas Meter



Figure 2: Campbell Scientific CR1000 Data Logger

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