BayREN Refrigerant Replacement Program

Implementation Plan

Revision 05 / 07-24-2024

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Program Overview

The BayREN Refrigerant Replacement Program (BRRR or the Program) will provide refrigerant and refrigeration component replacement and system optimization to the Bay Area's food service, food retail, food warehouses, and floral sectors. The food service sector is exemplified by restaurants and bars. The food retail sector is exemplified by grocery and convenience stores. Food-storage or warehousing are exemplified by commercial kitchens or commissaries. The floral sector includes both retailers and wholesalers. The success of these sectors relies on well-performing, efficient refrigeration systems.

Refrigerants in these systems have an outsized impact on greenhouse gas emissions (GHG). Most refrigerants have a negative effect on climate change because they contribute to global warming through a high global warming potential (GWP) and ozone layer depletion. For instance, a molecule of refrigerant (R) 22 has 1,810 times more GWP than a molecule of carbon dioxide. Therefore, replacing high GWP refrigerants with climate-friendly alternatives and managing their leaks are tops ways to reduce GHG emissions.[1]

Business owners simply don't have the time, expertise, and resources to manage these systems. As a result, many have the fixed mindset: "If it isn't broken, don't fix it." Despite being the heart of the food and floral sectors, refrigeration systems are often neglected. As a consequence, refrigerant leaks go undetected and defective components cause excessive energy consumption and low system performance. Left unchecked, these issues eventually lead to complete system failure – losing inventory and closing businesses.

Neglected systems also obstruct energy efficiency upgrades. Efficiency contractors are afraid to install more efficient compressor motors on neglected systems, fearful of future liabilities and unrealized energy savings. Some systems are in such poor shape that simply repairing defects and replacing broken parts are the priorities – not energy efficiency retrofits. To improve efficiency, the system must be performing properly first.

BRRR will fix refrigerants leaks, replace high GWP refrigerants with environmentally friendly alternatives, and replace defective components at low to no cost to participants. BRRR will integrate as-needed repairs to refrigeration systems to prevent future refrigerant leaks. BRRR will also optimize system performance in preparation for energy efficiency retrofits. BRRR staff will also raise awareness about the importance of routine maintenance, and participants are required to sign a 2-year maintenance contract to sustain optimal system performance.

Program Budget and Savings

Program and/or Sub-Program Name:

[1] Drawdown, the Most Comprehensive Plan to Reverse Global Warming, Paul Hawkins, Refrigeration Management

BayREN Refrigerant Replacement (BRRR)

Program / Sub-Program ID number

BayREN10

Program / Sub-program Budget Table

	2024	2025	2026	2027
Administration	$75,916	$76,604	$83,271	$78,737
Marketing & Outreach	$217,120	$224,126	$335,902	$363,324
Implementation	$797,528	$1,316,884	$1,307,178	$1,351,652
Incentives	$750,000	$3,000,000	$3,000,000	$3,000,000
Total	$1,840,564	$4,617,614	$4,726,351	$4,690,513

Program / Sub-program Gross Impacts Table

Not applicable to this Program.

Program / Sub-Program Cost Effectiveness (TRC)

Not applicable to this Program.

Program / Sub-Program Cost Effectiveness (PAC)

Not applicable to this Program.

Type of Program / Sub-Program Implementer

Third Party-Delivered

Market Sector(s)

Commercial

Program / Sub-program Type

Non-resource (Equity)

Market Channel(s)

Downstream and direct install

Implementation Plan Narrative

Program Description

BRRR will provide the following program services for eligible businesses in the food service, food retail, food warehousing, and floral sectors as determined by the North American Industrial Classification System (NAICS):

- Conduct no-cost assessment of existing, operational refrigeration systems, identify global warming potential (GWP) of existing refrigerants, and evaluate the systems for performance and greenhouse gas (GHG) emissions reduction potentials.

- Conduct no-cost, basic refrigeration system tune-up including:

    - ✓ Conduct pressure checks to detect signs of low refrigerant charge. Identify source(s) of refrigerant leak(s) and make recommendation to participants and the BayREN Building Performance Advisor (BPA).[2]
    - ✓ If the system is performing well with no refrigerant leak detected, evacuate high GWP refrigerant and recharge with low or moderate GWP refrigerants up to 300-lbs.
    - ✓ Perform system check including thermostats settings and calibration, inspect anti-sweat heaters, check and set defrost timer, inspect refrigerant line insulation, inspect condensate drain lines for obstruction, inspect automatic door closers, strip curtains, and door gaskets.
    - ✓ Verify operation and safety of pressure relief valves.
    - ✓ Remove obstructions to airflow over and around condenser and evaporator coils.
    - ✓ Provide recommendations in easy-to-read report format to participants for energy efficiency and reliability improvement.

- Up to the project incentive cap[3], provide no-cost refrigerant leak repair, evacuation and recycling of environmentally harmful refrigerant, and refill of mid- or low-GWP refrigerant.

- Up to the project incentive cap, provide no-cost installation of deemed measures such as new door gaskets, strip curtains, anti-condensation controllers, automatic door closers, and media filter to slow future build-up on condenser coils and insulation.

- Up to the project incentive cap, provide new refrigeration components including energy efficient compressors, electrical motors, condenser coils, evaporative coils and drains, fan motors, fan speed controller, refrigerant lines and fittings, valves, defrost timers, thermostat, refrigerant leak detection and repair, pressure and temperature controls, refrigeration temperature controls and whole condensing equipment.

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[2] The BayREN BPA is a refrigeration and building science specialist that provides businesses with rebate program referrals, technical assistance, and project management to upgrade their refrigeration systems. More information about this role can be found in the latest BRRR Program Manual saved here: https://cedars.sound-data.com/

[3] The project incentive cap amount is found in the latest BRRR Program Manual saved here: https://cedars.sound-data.com/

- Up to the project incentive cap, provide replacements for qualifying stand-alone commercial refrigerators and reach-in coolers/freezers, display glass door walk –in coolers and freezers, walk-in coolers – freezers and evaporator fan with two or three motors.

- Provide no-cost trainings to business owners and operators on simple maintenance they can do regularly.

- To further demonstrate the value of maintenance, each program participant must contract for annual maintenance for a period of two years.

Rationale

Typically, energy efficiency programs have claimed only the electricity savings (kWh) associated with retrofits to refrigeration systems. Therefore, these programs have dramatically *undervalued* GHG emission reductions and their impact. The undervalue of GHG emission reductions is especially acute with refrigerant exchanges. By tracking GHG emission reductions associated with the re-charge of lower GWP refrigerants, BRRR will clearly quantify this non-energy benefit.

While the available deemed measure list for the food and floral sectors has decreased, it has also become clear that the refrigerant itself, separate from the utility bill savings attributed to the efficiency upgrades, is extremely impactful in terms of reducing GHG emissions. The notable and unique design element of the BRRR Program is the **tracking of reduced GHG emissions associated with removal of high GWP refrigerants**. This element consists of replacing high GWP refrigerant with a lower GWP alternative, in the case of relatively new and well-functioning systems. Alternatively, in older (> 5 years old) and defective systems, system component(s) will be replaced with more efficient alternative(s) which reduces overall energy consumption and reduces the possibility of refrigerant leaks.

Furthermore, BRRR will address maintenance challenges by providing no-cost tune-ups and minor, low-cost repairs. BRRR will refresh existing systems with simple refrigeration measures (including several formerly deemed measures), component replacement, and preventative maintenance. Depending on the system need, the participant co-pay will be minimal or free. To highlight the benefits of preventative maintenance, each participant must sign up for an annual maintenance contract for two years.

Program Deliverables

BRRR delivers comprehensive technical assistance and project management to target sector including:

- **Easy-to-read reports to business decision-maker** on current system condition, recommendations, and estimated costs with incentives

- **Project facilitation and management** provided by program staff to reduce burden on business decision-makers

- New **no, low, or moderate GWP refrigerants** to replace high-GWP refrigerants

- New, **energy efficient refrigeration equipment** (standalone coolers, display walk-in cooler or freezer, refrigerators) and/or refrigeration system components (condensers, coil, compressors, etc.)

- New **ancillary refrigeration components** (door gaskets, automatic door closers, media filter, and strip curtains) to improve energy efficiency

- **Tune-ups and refrigerant leak repairs** to optimize refrigeration equipment operation

- **Onsite hands-on demonstrations** of basic refrigeration maintenance, such as regular coil cleaning and temperature checks, to each program participant

- **Referrals to up to three Program-vetted refrigeration maintenance contractors** to participating businesses to discuss establishing annual maintenance contracts

Program Goals

- Reduce GHG-emissions by recycling environmentally harmful refrigerant from small- and medium-sized businesses in the food and floral sectors.

- Catch up on all deferred maintenance on refrigeration systems so businesses can participate in future energy efficiency programs.

- Instruct business owners, managers, and employees on how and when to maintain their refrigeration systems.

- Create behavior change by providing best practices training to business owners to prolong the maintenance and reliability of their equipment.

- Highlight the benefits of annual refrigeration maintenance contracts.

Program Delivery and Customer Services

Program Outreach

The Program will recruit Program Participants via County outreach.

Program staff and BayREN members (County staff) will outreach to businesses based on geographic eligibility and direct leads to fill out an online interest form to determine eligibility.

Program staff will coordinate with BayREN members who are county officials to send mailers and conduct various in-person events, including door-to-door campaigns. As credible members of their communities, county staffers have broad voices and reach into their local businesses. All inbound prospects and leads will be directed toward the BayREN BPA. Outreach to restaurant and entertainment associations, small business associations, other community-based organizations, and local chambers of commerce will also be conducted.

Program Delivery Process

The BPA is the primary implementer of program services. After the initial outreach, the BPA will verify eligibility using a questionnaire. At that time, the BPA will also determine if the interested business has an existing maintenance contract. Upon verification, the BPA will coordinate with a licensed refrigeration contractor to conduct on-site assessments of the business' refrigeration systems and evaluate them for opportunities for refrigerant change-outs and component replacement. If applicable, the refrigeration contractors will evaluate standalone and display coolers and commercial refrigerators.

After each assessment, the refrigeration contractor submits findings and recommendations to the BPA. The BPA compiles the field notes and information into easy-to-read summary reports for the business decision-maker. Each report includes recommendations and their costs, estimated electricity savings and GHG-emission reduction estimates, incentive amounts, and next steps. The BPA will formally present the report to each participant and conduct any necessary follow-ups.

If the participant decides to advance the project, the BPA will coordinate the installation schedule with the refrigeration contractor. After installation, the BPA will conduct a quality control check and provide hands-on training on system maintenance and optimization. If necessary, the BPA will coordinate with contractors to remediate any defects. The BPA issues incentive payments to the contractors, conducts the project closeout, and initiates the two-year maintenance contract.

Program Design and Best Practices

BRRR will track reductions in electricity usage and GHG emissions using established methods. Knowing that custom-built, remote refrigeration systems are complex, and the electricity savings associated with retrofits are poorly approximated by deemed workpapers, previous energy efficiency programs included system monitoring to account for the project energy savings.

While useful, the installation of monitoring equipment and the long-term subscription fee are costly to programs and the benefits are negligible, especially with the advent of advanced metering infrastructure.

BRRR will claim both GHG emissions reduction and energy efficiency using regulator-approved methods. The direct GHG emissions reduction (from the use of lower GWP refrigerant and

avoided leaks over the life of the old equipment) will be calculated using the CPUC's latest Refrigerant Avoided Cost and Fuel-Substitution Calculators (RACC-FSC). Energy efficiency savings will be calculated and reported using the latest deemed values in California's depository for deemed values, the Electronic Technical Reference Manual.[4]

BRRR design is informed by decades of implementation experience. Over the course of administering and implementing energy efficiency programs, staff from the San Francisco Environment Department (SFE) have seen the consequences from deferred maintenance in refrigeration systems serving the food and floral sectors. Deferred maintenance adversely impacts businesses by raising operating costs and further hindering energy efficiency uptake.

In 2016, SFE received funding through PG&E's Strategic Energy Resources program to launch the pilot "Keep It Tuned" to address deferred refrigeration maintenance. It subsequently received additional funding from the Bay Area Air Quality Management District (BAAQMD) to assess the connection between energy efficiency and high GWP refrigerants. Through implementation of the BAAQMD scope, the SFE team identified these common refrigeration maintenance problems:

- Electrical issues: failure of compressor starter solenoid, capacitor, and contacts.
- Non-electrical issues: refrigerant leaks, ice buildup on evaporators, obstructed evaporators and condensers, and system performance degradation due to age.
- Business owners act when the equipment completely fails; few see the benefits of continuous system monitoring and energy efficiency.

The SFE team partnered with Frontier Energy's Food Service Technology Center to solve these problems by testing several interventions for their ability to achieve long-term energy savings, improve system maintenance, and reduce GHG emissions. The tested interventions were:

- Maintenance trainings
- System monitoring and alerts
- Tune ups and preventive maintenance, and
- Refrigerant change out and system/component replacement.

These interventions were free or heavily subsidized. Ultimately, the intervention that was the most effective was to buydown the cost of system upgrades and follow up with preventive maintenance. Other findings from Keep It Tuned were:

[4] The eTRM is accessed here: https://www.caetrm.com/login/?next=/

- High incentives, 50% to 75% buydowns, are necessary to move projects.
- Replacing entire remote condensers vs individual components makes economic sense in many project applications.
- Participants from large grocery stores, hotels and produce warehouses are more diligent in maintenance because they have dedicated engineering staff.
- Participants benefited from receiving basic maintenance training and ongoing maintenance contracts.
- Participants from small grocery stores and restaurants do not see the benefits of continuous monitoring of their refrigeration systems.

Through the Keep It Tuned Pilot, SFE team learned that programs like BRRR bring benefits to both municipalities and local businesses. Replacing refrigerants and upgrading systems, as well as performing preventive maintenance, are additional tools to help municipalities meet their climate goals. On the other hand, these interventions lower operating costs and improve reliability for participants.

Challenges	Strategies
No agency is regulating small refrigeration systems, so leaks go undetected.	Conduct no-cost leak detection and repair.
Many existing refrigeration systems are more than 5 years old, and most are in various states of disrepair.	Replace entire condensing units.
Business decision-makers don't know who to call for refrigeration service, repairs, and maintenance.	Proactively engage with local refrigeration contractors.
Refrigeration contractors aren't interested in participating in programs.	Simplify the program enrollment process for refrigeration contractors
Business decision-makers have a "If it isn't broken, don't fix it" mindset that leads to deferred maintenance.	Demonstrate the value of routine maintenance and long-term maintenance contractors to participants.
Energy efficiency or maintenance programs often are not a priority for business decision-makers.	Engage businesses from a business perspective.
	High incentives, 50% to 75% buydowns, are necessary to move projects.

Innovation:

Innovation will come from the BRRR's ability to track, report, and claim GHG emissions reductions from completed projects. Specifically, BRRR intends to claim most of its direct GHG emissions reductions associated with preventing and repairing refrigerant leakage.

Another element of innovation lies in the exploration of the use of advanced, low or no GWP refrigerants, CO_2 (R774) being one of the most popular. Most retrofits are expected to utilize the current "best-practice," moderate-GWP refrigerant for these small systems, R448A (1,387 GWP). However, BRRR will affirmatively recruit customers with compatible systems to test advanced, no GWP refrigerants.

In the first year, BRRR and its contractor pool will seek out and work with local refrigeration contractors willing to explore feasibility of no-GWP refrigerant alternatives in these smaller systems (listed from lower to higher GWP), such as:

- R717 (ammonia)
- R744 (CO_2)
- R514A (Opteon XP30®)
- R290 (propane)
- R600A (isobutane)

BRRR will reserve a portion of the incentive budget for these refrigerants. Currently, no-GWP refrigerant options are mostly compatible with larger systems (>50-lbs of total refrigerant charge), so it is not yet practical for the typical food and floral business participants (small grocery, restaurants, corner store etc.). But marketing will undoubtedly reach some medium-sized grocery stores with the potential for these refrigerants. The significantly higher costs of these systems will deter many, but the resultant GHG emissions savings will be significantly higher, with impressive cost/avoided ton CO_2 equivalent.

Metrics:

BRRR will report the following Value Metrics each quarter:

- Number of participating customers (total, HTR, and DAC)
- Annual kWh savings (total, HTR, and DAC)
- Annual kW savings (total, HTR, and DAC)
- Annual therm savings (total, HTR, and DAC)
- Lifecycle net kWh savings (HTR or Underserved SMB)
- Lifecycle net kW savings (HTR or Underserved SMB)
- Lifecycle net therm savings (HTR or Underserved SMB)
- Lifecycle net GHG savings (HTR or Underserved SMB)

- HTR SMB utility bill savings and/or NEBs

In addition, BRRR will report the following metrics monthly:

- Year-to-date (YTD) Committed Funds
- YTD Gross kWh
- Month Gross kWh
- YTD Committed Gross kWh
- YTD Gross kW
- Month Gross kW
- YTD Committed Gross kW
- YTD Gross Therm
- Month Gross Therm
- YTD Committed Gross Therm
- YTD Net kWh
- Month Net kWh
- YTD Committed Net kWh
- YTD Net kW
- Month Net kW
- YTD Committed Net kW
- YTD Net Therm
- Month Net Therm
- YTD Committed Net Therm

Proposed Outcomes

- GHG emissions ($MTeCO_2$) and electricity (net peak kWh & kWh) usage reductions
- Pounds of high GWP refrigerants recycled

- Number of persons trained to conduct basic maintenance
- Number of vetted, participating refrigeration contractors
- Number of businesses served with:
    a. site audits
    b. tune-ups
    c. self-service maintenance training
    d. preventative maintenance
    e. equipment and refrigerant replacement

Pilot:

This section is not applicable to BRRR.

Workforce Education and Training:

While BRRR does not include funding for workforce training, BayREN will make every effort to connect contractors with continuing education and professional development resources.

Workforce Standards:

This section is not applicable to BRRR.

Disadvantaged Worker Plan:

BRRR is not designed to directly address needs and desired outcomes related to disadvantaged workers. However, BRRR will increase service demand for the region's refrigeration contractors. As a result, BRRR and its contractor pool could lead to a buildup of apprentices, some of which could be considered disadvantaged workers.

Supporting Documents

Attach the following documents (in PDF format):

1. ***Program Manuals and Program Rules***
    a. BRRR will maintain a "Program Manual" that outlines policies and procedures and serves as a guideline for program implementation.

2. ***Program Theory and Program Logic Model*:**
    a. The Program Theory and Logic Model below provides a visual depiction of the underlying BRRR theory and approach.

BayREN Refrigerant Replacement (BRRR) Program Logic Model

Inputs (What we invest)	Outputs (What we do and who we do it to)		Outcomes – Impact (The incremental events/changes that occur as a result of the outputs)		
	Activities	Participation	Short (2024)	Medium (2024-25)	Long (2026-27)
• Screening via NAICS codes in utility accounts and/or business license and energy usage data. • Buydown costs for refrigerant changeouts, recycling, and refrigeration efficiency projects. • BayREN Building Performance Advisor (BPA) – primary implmenter to deliver Program services. • Local government as a "trusted messenger" that promote the program by reaching out to food service customers in the regions's nine counties. • Referral to Program-vetted refrigeration maintenance contractors to establish annual maintenance contracts with Program participants.	• Promote Program through outreach and targeted marketing with in-language materials • Conduct no-cost assessment of refrigeration systems, evaluating energy efficiency and greenhouse gas-emissions reduction potential • Replace high global warming potential refrigerants and improve efficiency of refrigeration equipment • Provide in-language, hands-on training on refrigeration system maintenance and optimization • Identify challenges, barriers, make continuous improvements to Program	• Customers in the food-service sector • Local government staff and elected officials • Local refrigeration contractors	• Bay Area food service businesses improve efficiency of refrigeration systems and lower the global warming potential of refrigerants in use. • Bay Area food service business owners/managers become educated on how to maintain optimal performance of their refrigeration systems. • BayREN learns from early experience and improves outreach and marketing efforts and coordination with refrigeration contractors and community-based organizations. • Identify local refrigration contractors willing to expolore feasibility of low to zero global warming potential refrigerant alternative in smaller refrigeration systems. • Identify and recruit customers with compatible refrigeration systems to test out lowest or no global warming potential refrigerants. • Data collected on customer sites to inform program optimization and targeting.	• Bay Area food service businesses improve efficiency of refrigeration systems and lower the global warming potential of refrigerants in use. • Bay Area food service business owners/managers become educated on how to maintain optimal performance of their refrigeration systems. • BayREN meets or exceeds projected annual energy savings and greenhouse gas emissions reduction goals. • Identify challenges, barriers and make improvements. • BRRR Program becomes more streamlined and projects flow more smoothly. • Completing more projects each year.	• Bay Area food services businesses improve efficiency of refrigeration systems and lower the global warming potential of refrigerants in use • Bay Area food service business owners/managers become educated on how to maintain optimal performance of their refrigeration systems. • Greenhouse gas emissions reduced by ### MTCO₂E of environmentally harmful refrigerants. • BaryREN meets or exceeds projected annual energy savings and greenhouse gas emissions reduction goals. • Identify challenges, barriers and make improvements.
Program evaluation would assess (thru analysis, metrics, evaluation, interviews, etc.) the effectiveness of these inputs in helping to accomplish the long term goal. For example: • Did the participation track meet the needs of the program participants? • What was the response rate from the Program Outreach?	Program evaluation would assess the effectiveness of these outputs in helping to accomplish long-term goal. For example: • Was the outreach to customers effective in promoting Program?	Program evaluation would assess participation levels and related metrics in helping to accomplish the long term goal. For example: • Did the Program target the right participants? • Were messages and communications effective? • Did stakeholders/ advocates fulfill their roles?			
BRRR Program tracking data can serve as indicators.	BRRR Program tracking data can serve as indicators.	BRRR tracking data, plus surverys and interviews, can serve as indicators.			

Assumptions

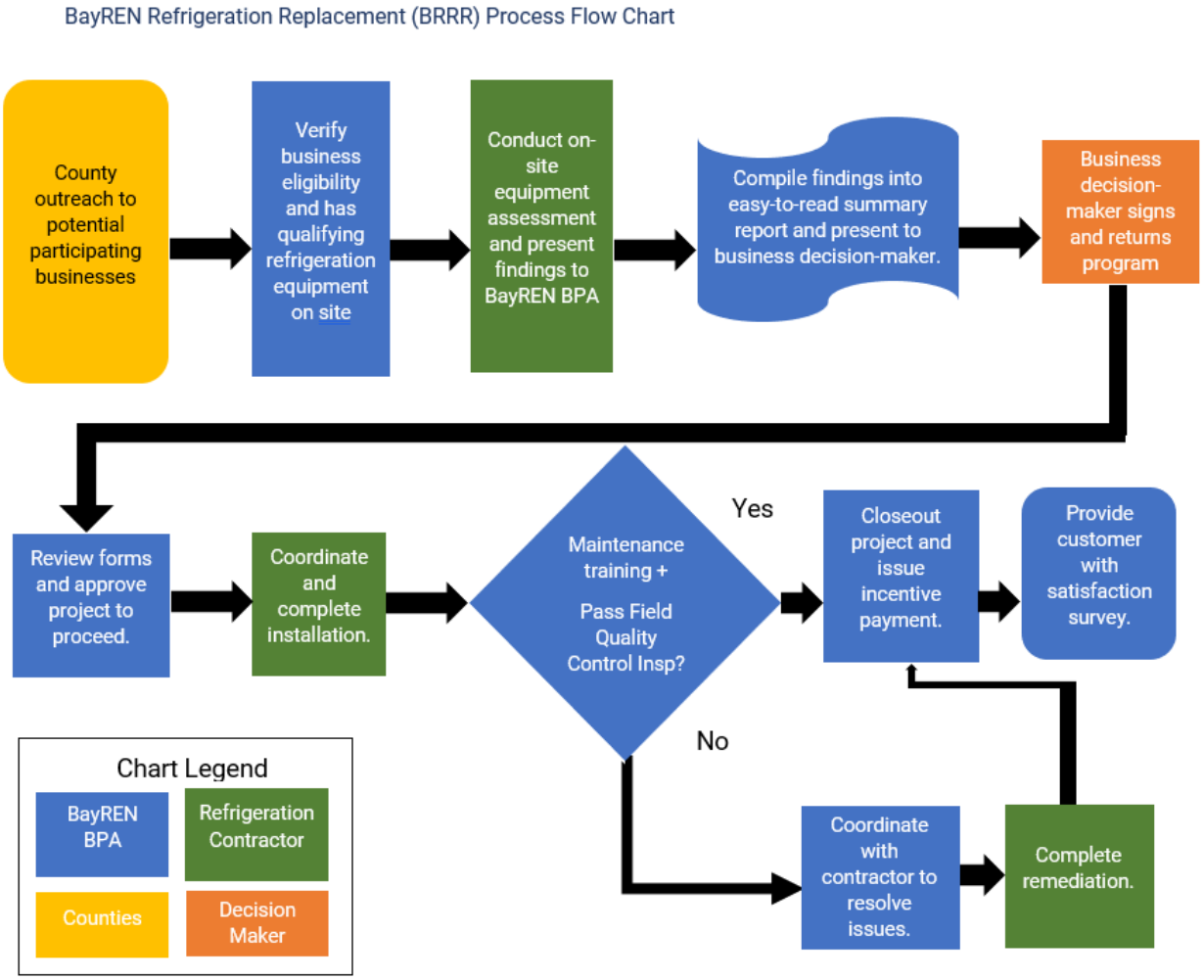
- BayREN successfully identifies local refrigeration contractors to perform refrigeration retrofits and refrigerant replacement.

External Factors

- An economic recession will reduce business interest in energy efficiency and refrigeration retrofits

3. *Process Flow Chart:*

    a. The process flow chart below visualizes the components of program participant entry through implementation.



4. *Incentive Tables, Workpapers, Software Tools:*

    Refer to the Program Manual for incentive tables.

5. *Quantitative Program Targets:*

    a. The following table provides a high-level overview of quantitative annual performance targets over the five-year program cycle.

Target Description	2024	2025	2026	2027
Number of Projects	20	100	120	150
Metric Tons of CO_{2}-	247	1,236	1,482	2,317

equivalent Reduced				
Pounds of Refrigerants Reclaimed	458	2,290	2,748	4,294
Incentive $/MTCO2e Reduced	$368	$313	$268	$250
Number of Projects w/ Advanced, No-GWP Refrigerants	1	4	6	8

6. ***Diagram of Program:***
    a. This section is not applicable to BRRR.

7. ***Evaluation, Measurement & Verification (EM&V):***
    a. BRRR will comply with all CPUC and BayREN directives, activities, and requests regarding the Program and project evaluation, measurement, and verification (EM&V). The following describes the approaches and data that will be collected for ongoing program evaluation. A more detailed summary of EM&V efforts can be seen in the BRRR Program Manual.

       Project information will be gathered through a series of discussions and verification checks with each participant and refrigeration contractor. A database within BayREN's customer relationship management system will be used to track information about the participant, project, energy savings claims, and other details that will help show the impact of this program. Once information is gathered, it will be entered in the database and then used to generate reports. Data will be shared on a quarterly basis or ad-hoc as requested.

8. ***Normalized Metered Energy Consumption (NMEC):***
    a. This section is not applicable to BRRR.