

2nd DRAFT

BayREN Energy Efficiency

Business Plan

2018-2028



BAY AREA Regional Energy Network

Bay Area communities working together for a sustainable energy future

November 14, 2016

This updated draft includes changes to the Overview Chapter only. Updates to other Chapters will be made in the final draft in consideration of Stakeholder feedback.

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Section 1
OVERVIEW

Overview and Purpose of the BayREN

The BayREN fills an important gap in the provision of energy efficiency services. The BayREN provides a **regional solution** that better connects to local communities and conditions than is typically possible from a large utility. In addition, the BayREN provides services across jurisdictions that municipal only programs cannot achieve.

- The BayREN, by its public nature, is accountable to community needs and ensuring that all rate payers and citizens are included in services.
- The BayREN is led by local governments committed to greenhouse gas reductions and who use energy efficiency (EE) and integrated demand side management (IDSM) as essential tools to achieve climate goals in alignment with local and state policy.
- The BayREN coordinates activities with a variety of related local government programs, such as housing renovation, water conservation, economic and job development and training so that program activities can serve multiple community needs.
- Coordination among the local governments through the BayREN allows the programs to benefit from economies of scale, increased capacity and focused administrative coordination with utilities and state government, as well as potential foundation support and available federal funding that can expand and enhance program services.

Regulatory Requirements

In 2012, the [California Public Utilities Commission \(CPUC\)](#) approved a unique and important new mechanism to help achieve the State of California’s energy efficiency and climate goals - Regional Energy Networks or RENs.¹ These new entities would receive ratepayer funding, and be able to design and implement programs like a utility - all while demonstrating new approaches that are unlike a utility. The first RENs, including the Bay Area Regional Energy Network (“BayREN”), harnessed existing local government capacities and infrastructures that had been expanded by ARRA (American Recovery and Reinvestment Act)-era funding to use local governments to engage new audiences in regional energy efficiency programs. Based on this Decision, the BayREN began as a pilot, delivering programs within the nine Bay Area counties,² in the third quarter of 2013.

The BayREN is designed to be flexible, innovative and in touch with local communities and municipal governments to achieve higher levels of success in historically hard to reach markets³. This includes

¹ CPUC D.12-05-015 invited REN proposals, and D.12-11-015 approved the REN proposals.

² [Counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma](#)

³ Definition of Hard-to-reach, “Hard to reach residential customers are defined as “those customers who do not have easy access to program information or generally do not participate in energy efficiency programs due to a language, income, housing type, geographic, or home ownership (split incentives) barrier.” Hard to reach business customers also include factors such as business size and lease (split incentive) barriers.” CPUC Energy Efficiency Policy Manual, July 2013.

moderate⁴ income residential, multifamily properties, and small and medium commercial property owners. Specifically, the 12-05-015 CPUC Decision, and followed in more recent Decisions, direct the RENs to deliver ~~programs and activities that:~~

1. *Activities that utilities cannot or do not intend to undertake.*
2. *~~APilot~~ activities where there is no current utility program offering, and where there is potential for scalability to a broader geographic reach, if successful.*
3. *~~APilot~~ activities in hard to reach markets, whether or not there is a current utility program that may overlap.*

~~The BayREN RENs fill an important gap in the provision of energy efficiency services. The BayREN provides a regional solution that better connects to local communities and conditions than is typically possible from a large utility. In addition, the BayREN they provides services across jurisdictions that municipal programs cannot achieve.¶~~

- ~~● The BayREN RENs, by its their public nature, isare accountable to community needs and ensuring that all rate payers and citizens are included in services.¶~~
- ~~● The BayREN is RENs are led by local governments committed to greenhouse gas reductions and using energy efficiency (EE) and integrated demand side management (IDSM) as essential tools to achieve climate goals in alignment with local and state policy.¶~~
- ~~● The BayREN RENs can coordinates activities with a variety of related local government programs, such as housing renovation, water conservation, economic development and job development and training so that program activities can serve multiple community needs.¶~~
- ~~● Coordination among the local governments through the REN allows the programs to benefit from economies of scale and focused administrative coordination with utilities and state government, as well as potential foundation support and available federal funding that can expand and enhance program services.~~

California's Energy Needs

Working with Hard-to-Reach Communities

A critical reason for the development of the BayREN is the historic underserving of many members of urban communities with efficiency services from utility programs.⁵ These communities include low to moderate income households, minority populations, small businesses - especially within minority and ethnic neighborhoods, multifamily housing that serve lower income communities and non-profit and government agencies that provide critical services such as job training, homeless shelters, housing related services, and ~~physical~~health and mental health care clinics. All of these populations pay for utility services, either directly or indirectly, yet because they are more difficult to reach and have fewer resources for cost sharing, they are significantly underrepresented. Critical additional barriers include

⁴ Low-income programs are not covered in the CPUC's Rolling Portfolio Business Planning. The BayREN currently does not have a low-income program but is exploring considering an application in the future.

⁵ CEC, "Draft Report - A Study of Barriers and Solutions to Energy Efficiency, Renewables and Contracting Opportunities Among Low-Income Customer and Disadvantaged Communities", September 2016, page 26.

language, education, lack of trust, lack of mobility and inability to afford even some basic daily essentials.

While some efforts have been made by utilities to reach these historically underserved populations, continued pressure on utilities to improve cost effectiveness and meet increased annual kWh savings goals have meant more emphasis on targeted markets that have abundant and scalable cost effective savings potential, such as commercial lighting, and less emphasis on hard to reach markets with plenty of savings opportunities, but also more difficult outreach, limited ability to cost share and smaller savings per customer. In many states, cost effectiveness is applied to every measure, sometimes even including prorated administrative costs. In California, cost effectiveness is measured across the entire portfolio of ratepayer funded programs rather than measure-by-measure or program-by-program. Still, rising kWh goals and relatively stable annual efficiency budgets have meant that less cost effective measures and programs receive smaller budgets, or are cut from the utility's portfolio.

BayREN develops improved approaches and better coordination of services to enhance services to these markets and correct the current imbalance of participation and encourage the expansion of non-energy benefits to the residential, commercial and public sectors.

Climate Change and Resiliency as Drivers

The second critical focal point of BayREN activities is the creation of a pathway to achieve climate goals aligned with state and local government policy. Meeting these goals requires very deep reductions in building energy use and expansions of the use of renewable energy. Substantial cost reductions in distributed energy resources and storage have created opportunities for communities to have a strong role in the development of Zero Net Energy Buildings and Zero Energy Community projects, and to use these projects not only to impact carbon reduction, but also to enhance the resilience of communities. The communities involved in BayREN are at risk from rising sea levels and other climate change impacts, including an increased number of earthquakes, threatening both the economic viability of our communities and at-risk citizens.⁶

Proactively addressing climate threats is beyond the utility program scope, but very much aligned with state and local government policy. BayREN will be implementing programs that move communities to deep energy savings and distributed renewables in order to reduce costs, reduce carbon, improve resiliency and help transform local economies. These efforts will be guided by a long-term market transformation strategy structured to further reduce the costs of deep efficiency and distributed energy resources over time, and to coordinate with grid constrained areas to reduce the investments needed to maintain energy services at the lowest costs.

Local governments are at the center of other critical activities to reduce carbon, such as land use and development planning, regulation and electrification of transportation systems, as well as resilience planning including emergency response and ensuring citizen welfare during climate related events. Better coordination of these activities with deep efficiency and distributed energy resources will improve

⁶ MTC, Caltrans et al, "Climate Change and Extreme Weather Adaptation Options", December, 2014, page ES-1.

community resilience by assuring that critical government services, communications and medical treatment are available during grid outages.

BayREN Governance and Composition

BayREN's governance is through the "Coordinating Circle" which includes representation from ABAG and all nine Bay Area counties. This body makes decisions regarding overall policy, high-level programmatic issues, and sector-level budgets. ABAG and each county agency receives one vote. Each BayREN member agency designates a voting member to the Coordinating Circle, which decides on overall strategy and budget for BayREN. The Coordinating Circle elects a Lead for each program, who assigns resources, roles and priorities.

Individual programs are managed by "Lead Agencies" that have expertise in the particular sector and the management breadth to lead the program on behalf of the whole region. The Lead Agency is responsible for directly managing region-wide activities, as well as coordinating activities that are conducted at the individual county level by the individual BayREN member agencies. Collaboration among the Lead and individual counties takes place through individual program committees, in addition to the BayREN Coordinating Circle. This method of coordination and collaboration allows agencies with less experience and resources to both take advantage of a program that is operated regionally, as well as gain experience (and mentoring) with implementing the program activities from the other agencies.

The BayREN formation allows for expansion of programs and reasonable scaling capacity utilizing internal county resources, ABAG resources, collective resources as well as consultants.

BayREN Positioning for the 2017-2027 Business Plan

The BayREN Business Plan includes goals and strategies to address focused portions of the Residential Sector, Commercial Sector, Public Sector, as well as the cross-cutting **programs**:-Codes and Standards and Water Bill Savings ~~sectors~~. The BayREN recognizes that due to its relative size to the market in the Bay Area and in comparison to PG&E's scope that its potential impact and influence must be focused. To that end, the BayREN sees high value to position itself at the early stages of Market Transformation, incubating and testing out new and different approaches to successful energy efficiency programs within the residential, commercial and public sectors. Ultimately, the primary objective of the strategic interventions laid out in this Business Plan are to identify, test and scale successful approaches to the hard-to-reach markets by its varied partners, including PG&E, other local governments, Community Choice Aggregators (CCAs) and if appropriate the BayREN itself. ~~To date, the BayREN has been begun to scale it work successful within the Multifamily market and with its PAYS® program to scale.~~ Equally, its work ~~in the public sector~~ with Property Assessed Clean Energy (PACE) and Codes and Standards have seen promising results **that will be expanded in the business plan.**

Future Opportunities

The future of the BayREN is to transition knowledge, relationships and experience into the development of more integrated programs that go beyond sector specific programs.

- Partnering with state (e.g. CSD - Neighborhood Approaches, CEC- Advance Energy Communities via EPIC, DWR via Water Energy Grants) and federal (e.g. DOE, EPA) organizations to develop community-scale efficiency programs with integrated solar and water efficiency, targeting moderate income communities. These “communities” would incorporate small commercial, residential, mix-use and multifamily buildings within a single program area.
- Develop zero net energy or zero net carbon communities to advance state goals, integrating new and existing buildings across sectors.
- Provide regional support and coordination of CCAs development and programs to advance energy efficiency and demand side management resources, and to avoid duplication of services.

CPUC Guidance, Strategic Plan and Legislation

The BayREN Business Plan cites and takes into account a number of CPUC guidance documents, legislation, and the California Long-term Energy Efficiency Strategic Plan (CAEESP) and associated action plans. Each sector identifies and highlights this alignment in the following chapters. This includes, but is not limited to the following:

- Governor’s Executive Orders and State Goals
- AB 758 – Implementing the Existing Buildings Energy Efficiency (EBEE) Action Plan
- SB 350 – Clean Energy, especially the doubling of energy efficiency in buildings and the focus on disadvantaged communities.
- AB 802 – Benchmarking and Data
- AB 793 - Energy Management Technologies
- Strategic Plan/Action Plans:
 - EBEE Action Plan
 - New Residential ZNE Action Plan
 - Summary of proposed Strategic Plan Updates (CPUC)
- Decision 12-11-015 and Decision 15-10-028, etc.

Key Issues, Trends and Experience Informing Business Plan

The overriding influencing factor for the BayREN's Business Plan is its identity as a local government and how that identity can provide a different perspective and approach to energy efficiency. With that perspective, the BayREN sees the following issues and trends as important to address and consider in setting goals, developing programs, and evaluating the REN's value to ratepayers.

- **Hard-to-reach is hard to reach** - While the BayREN embraces the challenge to take on the hard-to-reach markets and those that the utilities will not, it also knows that demonstrating "success" for all the stakeholders, as it is currently defined, will be difficult. There must be a clear and definitive value given to the BayREN for embarking on and sustaining this effort that allows EM&V and regulators to credit and consider the difficulties inherent in the RENs' charge. New criteria to judge success in these markets must be established.
- **Cost effectiveness** - In the same vein as above, cost effectiveness is a persistent issue for the RENs. This issue has multiple elements: 1. The relative small REN portfolio of programs does not enable the diversity of programs to aggregate savings and cost effectiveness in a beneficial way; 2. The hard-to-reach markets and those that the utilities will not take on are primarily not part of utility portfolios because they do not meet cost effectiveness tests - anywhere - California or elsewhere; and 3. Inadequate length of time to accrue and determine savings for more challenging markets, particular those with a goal of market transformation⁷. The BayREN proposes some alternative approaches to cost effectiveness in the next section.
- **Data Access** - One of the most exciting technological breakthroughs in recent years is the richness and availability of data tools to target programs and encourage new behaviors, particularly through Smart Meters. However, the BayREN has no ability to use customer energy usage data based on current rules and policies. This lack of energy usage data for Bay Area property owners creates a substantial disadvantage to the BayREN in creating programs and approaches that leverage this information. The BayREN will work to utilize data it does have such as access to property data, housing and transportation research from ABAG, and other sources. In addition, the BayREN will continue to advocate for more robust data sharing.
- **Unique Bay Area Energy profile** - The Bay Area is blessed with strong climate change/environment positive audiences, which can be leveraged in education, marketing and outreach efforts. However, the generally moderate climate limits how much savings it can harvest by each customer, particularly in whole building approaches supported by the Strategic

⁷ CPUC, "Guidance on Designing and Implementing Energy Efficiency Market Transformation Initiatives", Ken Keating, et.al, December, 2014.

Plan. The density of population and the receptivity to energy efficiency messaging will help, as will new approaches to each of the sectors.

- **Evolution (technology, market and policy)** - The BayREN must maintain agility and innovation to effectively respond and take advantage of technological changes as well as recognize and incorporate the impacts of these changes on the market. Since the adoption of the California Long-Term Energy Efficiency Strategic Plan, there have been substantial changes in policy and it is likely that this will continue as the State tries to react and anticipate the needs required to address climate change, while expanding economic prosperity and social justice.
- **Integration** - the future of energy efficiency is the convergence of multiple technologies and approaches that seamlessly incorporate traditional energy efficiency measures with distributed energy sources/renewables, energy storage, demand management technologies and behavior programs. This integration will expand to address optimization of grid resources, time of use load management, and the potential for shared energy among multiple buildings and owners. Zero Net Energy (ZNE) and district approaches will be the focus of this integration.
- **Advance Building Workforce** - The move to ZNE for California's buildings and the drive for deeper and deeper savings in existing buildings requires an expansion and increase in knowledge and capabilities in the building industry. This includes architects and engineers, builders, specialty contractors and raters and other players in the built environment. Without this capable, performance-oriented workforce, it will be a challenge to meet the State goals. The BayREN must support need for advanced training and leverage WE&T and other Statewide workforce and education providers.
- ~~**CPUC Guidance and Legislation** - The BayREN Business Plan cites and takes into account a number of CPUC guidance documents, legislation, and the CAEESP and associated action plans. This includes, but is not limited to the following:~~
 - ~~Governor's Executive Orders and State Goals~~
 - ~~AB 758 - Implementing the Existing Buildings Energy Efficiency (EBEE) Action Plan~~
 - ~~SB 350 - Clean Energy, especially the doubling of energy efficiency in buildings and the focus on disadvantaged communities.~~
 - ~~AB 802 - Benchmarking & Data~~
 - ~~AB 793 - Energy Management Technologies~~
 - ~~Strategic Plan/Action Plans:~~
 - ~~EBEE Action Plan~~
 - ~~New Residential ZNE Action Plan~~
 - ~~Summary of proposed Strategic Plan Updates (CPUC)~~
 - ~~Decision 12-11-015 and Decision 15-10-028, etc.~~

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Vision and Business Plan Framework

The following Business Plan Framework provides an overview of the BayREN’s Vision, Values, Business Plan Goals and Core Strategies and the expected Long-Term Outcomes from the proposed BayREN Business Plan. These overarching Goals capture the need and purpose of the REN, with Strategies that address key issues common across all of the sectors. The Framework will inform and focus the BayREN’s efforts over the next 10 years. As such, the Goals and Core Intervention Strategies are reflected in each sector and operationalized with customized and targeted tactics, which will be regularly adjusted and adapted to ensure flexibility and market responsiveness.

BayREN Vision

The BayRENs is a critical part of the solution for the State’s reliable and sustainable energy future that considers water, greenhouse gases, and resiliency.

By uniting and coordinating multiple efforts at a regional level and delivering these integrated solutions, the BayREN will help the State meet our aggressive goals related to climate change

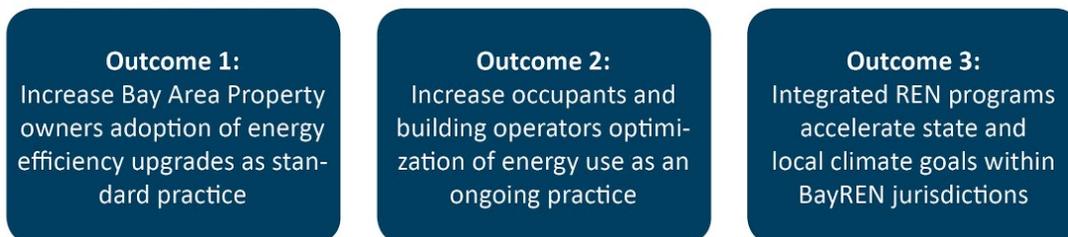
VALUES



GOALS & STRATEGIES



LONG-TERM OUTCOMES



Business Plan Tactics Summary

Strategy 1. Provide Wrap Around Services, Support and Financing (non-resource)	Strategy 2. Drive Adoption and Performance with Properly Aligned Incentives (resource)	Strategy 3. Test and Demonstrate Innovative Deployment Methods (non-resource)
RESIDENTIAL: Single Family Tactics		
R1. Expand Home Energy Advisor Services to educate and assist contractors and homeowners	R4. Incentivize enhanced/whole house measures with trigger activities and Home Energy Scores to produce deeper energy savings	R6. Establish demonstration projects for neighborhood approaches for long-term energy efficiency savings
R2. Increase number of trained whole-house building performance contractors	R5. Provide Direct Install incentive for measures related to plug loads and energy management systems	R7. Establish integrated Green Labeling to increase awareness and information transparency
R3. Provide Complementary services that drive leads and help to convert those leads to Upgrades		
RESIDENTIAL: Multifamily Tactics		
R8. Focus on building on-going, long-term relationships with property owners through ZNE investment planning and operational savings	R9. Continue BAMBE streamlined technical assistance and rebate program model	R10. Introduce other market drivers, specifically local government policies, green labeling and access to financing
COMMERCIAL Sector Tactics		
C1. Provide one-stop-shop/single-point-of-contact for energy efficiency and related services and offerings in the 9 county area	C4. Drive projects and energy savings via Pay-for Performance incentives paid out over time for metered savings	C5. Employ portfolio and district approaches for commercial energy efficiency improvements
C2. Establish co-pay financing for existing rebate/incentives program offerings that leverage existing project delivery infrastructure, marketing, contractors, etc.		
C3. Educate and support Commercial-PACE gatekeepers, particularly contractors, to take advantage of PACE financing		
PUBLIC Sector Tactics		
P1. Provide BEMS system design, acquisition, setup and commissioning		P3. Provide portfolio assessment and investment support analysis, based on BEMS data
P2. Provide BEMS training and support groups		P4. Provide integrated systems analysis to support early adoption of ZNE

Strategy 1. Provide Wrap Around Services, Support and Financing (non-resource)	Strategy 2. Drive Adoption and Performance with Properly Aligned Incentives (resource)	Strategy 3. Test and Demonstrate Innovative Deployment Methods (non-resource)
CROSS CUTTING: CODES & STANDARDS Tactics		
CS1. Integrate electronic and web-based compliance tools into local permit systems and common systems providers		CS5. Test and promote advanced energy codes and policies including ZNE.
CS2. Develop and promote energy code and best-practice trainings consistent with State code updates		CS6. Develop and promote tools and protocols to make energy-related permit data more accessible.
CS3. Engage local, regional, and state market actors with forums, workshops, and other joint collaborations		
CS4. Increase permit applicants' and building departments' use of vetted tools and mechanisms for energy code compliance		
CROSS CUTTING: WATER BILL SAVINGS Tactics		
WS1. Create municipal utility partnerships to scale service delivery		
WS2. Facilitate adoption of model tariffs and on-bill program design for market consistency		
WS3. Provide technical assistance to refine program components to meet efficiency needs specific to target customer classes		

* Note for 11/14 Revised Draft - BayREN will likely merge the Codes & Standards and Water Bill Savings Programs into a single Cross Cutting Chapter in the final draft of the BayREN Business Plan. That change is not being presented at this time given the significant number of redline edits that would trigger.

Summary Budget, Metrics and Cost Effectiveness

Summary Budget

The following budget is a summary of each sector’s budget and is estimated on proposed activities. It is anticipated that as the BayREN moves forward, this budget will be adjusted to respond to market changes, increased or decreased needs in particular areas, and the potential to scale particular approaches.

Sector	2016*	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Residential**	15,673,139	16,368,000	17,441,000	17,582,000	16,842,000	16,437,000	16,554,000	16,113,000	16,014,000	15,568,000	15,791,000
Commercial	431,578	1,040,000	2,995,000	4,112,000	4,547,000	4,643,000	4,568,000	4,665,000	4,765,000	4,868,000	4,974,000
Public		500,000	773,000	1,221,000	1,802,000	2,409,000	2,481,000	2,555,000	2,472,000	2,547,000	2,622,000
Codes & Standards	1,492,087	1,989,000	1,994,000	2,141,000	2,213,000	2,180,000	2,340,000	2,418,000	2,381,000	2,556,000	2,642,000
Water Bill Savings Program	401,718	1,170,000	1,370,000	971,000	678,000	653,000	673,000	693,000	712,000	734,000	757,000
Total	17,998,522	21,067,000	24,573,000	26,027,000	26,082,000	26,322,000	26,616,000	26,444,000	26,344,000	26,273,000	26,786,000
<i>Non- Incentive</i>	<i>8,548,522</i>	<i>11,277,000</i>	<i>14,243,000</i>	<i>15,177,000</i>	<i>14,890,000</i>	<i>15,630,000</i>	<i>15,924,000</i>	<i>16,427,000</i>	<i>16,327,000</i>	<i>16,881,000</i>	<i>17,394,000</i>
<i>Incentive**</i>	<i>9,450,000</i>	<i>9,790,000</i>	<i>10,330,000</i>	<i>10,850,000</i>	<i>11,192,000</i>	<i>10,692,000</i>	<i>10,692,000</i>	<i>10,017,000</i>	<i>10,017,000</i>	<i>9,392,000</i>	<i>9,392,000</i>

* 2016's actual budget is included for reference. 2017 budget is proposed as year 1 of the 10 year Business Plan. BayREN has included an annual cost of living adjustment in the proposed budgets for 2018-2026. The 2017 Advice Filing submitted on September 1, 2016 is intended as a placeholder only until this Business Plan is approved.

** SF Residential incentive levels are still under development based upon CAEECC stakeholder feedback on the draft sector chapter; allocations are presented based upon current sector offerings.

EM&V Roadmap Budget⁸

While BayREN's EM&V activities will depend on approval of the September 1, 2016 Advice Letter and Business Plan, we intend to utilize the program's EM&V budget to conduct evaluations that seek to verify the non-resource benefits of programs such as the Small and Medium Commercial Building Performance Advisor, Moderate Income Residential and Codes and Standards Program efforts to promote energy code best practices. In addition, BayREN may seek to identify processes and procedures that would allow current non-resource programs (e.g., PAYS, C&S electronic tools) to transition to resource programs.†

⁸ Please note that additional details will be included in the next draft plan.

Metrics Summary

Below is the BayREN’s portfolio level metrics based on the Plan’s Goals. These metrics represent a high-level summary of all of the sector metrics, detailed in the specific Sector sections.

Portfolio Goal	Goal 1. Overcome market barriers by addressing programmatic and service gaps	Goal 2. Unlock energy savings, in particular for hard-to-reach audiences	Goal 3. Leverage role as Local Government to innovate and create new solutions
Measure	# of Participants including Customers, Building Professionals, And Jurisdictions	Energy Savings	Greenhouse Gas Emissions Jobs Created Municipal Partnerships Real Estate Valuation
Metrics	XX participants	XX kWh XX Therms XX kW	XX GHG avoided XX Jobs Created XX \$\$ Real Estate Value

Cost Effectiveness

Language to Come

Portfolio Changes

The BayREN has had a very limited portfolio to date and will add more sectors and program areas, building on successful elements and experience from the last three years. Specifics about changes and details from the current portfolio are provided in each sector chapter.

Briefly, the BayREN is making the following changes:

Residential Sector

- Transitioning out of the Home Upgrade Whole House Program and creating a new Single Family Residential suite of programs targeted at moderate income that will encourage whole house savings overtime, engaging and leveraging existing Home Upgrade contractors as much as possible.
- Continuing the successful Multifamily program and developing new market drivers
- Making the Home Energy Advisor Program a stand alone program
- Expanding green labeling activities and addition of Home Energy Score

Commercial

- Expanding into the Small and Medium Commercial Sector, incorporating our existing Commercial PACE program

Public Sector

- Expanding into the Public Sector, serving unfilled niches and building on successful strategies by the SoCALREN and refined based on the Bay Area public sector market

Cross-Cutting: Codes and Standards

- Expanding and enhancing the ability of building professionals and building department staff to use electronic permitting and compliance tools to increase permitting rates and streamline enforcement
- Increasing the transparency and accessibility of permit date to better validate energy code compliance.

Cross-Cutting: Water Bill Savings

- Expanding the on-bill program design options to include a regional program model to increase access to capital and facilitate streamlined participation by municipal water utilities

* Note for 11/14 Revised Draft - BayREN will likely merge the Codes & Standards and Water Bill Savings Programs into a single Cross Cutting Chapter in the final draft of the BayREN Business Plan. 

Solicitation Plan

As indicated in the CPUC Decision D.12-11-015, the RENs were established as unique entities with the ability to design and deliver programs in ways that the utilities cannot. The RENs have “the independent ability, within the confines of the approvals of their proposals granted by the Commission, to manage, deliver, and oversee their own programs independently, without utility interference or direction as it relates to the design and delivery of their programs.”⁹ BayREN leverages the expertise and creativity of local governments for program design and delivery, while continuing to build internal capacity. While the BayREN member agencies oversee, manage and operate all BayREN programs, consultants are contracted to assist in the design and implementation of discrete elements or entire programs under the guidance and direction of member agencies. **Consultants currently comprise #% of BayREN's overall budget. It is anticipated that this percentage will at least remain stable, and will likely increase as new programs are approved.**

As the BayREN expands programs into the Commercial and Public Sector, additional consultants may be engaged. To that end, solicitations for services to design, administer, and or implement BayREN programs will be issued as **programs come online or as needed**. For the benefit of potential bidders interested in providing such services, each Sector Chapter of this Business Plan includes a general outline of proposed BayREN programs and their envisioned implementation timelines. Any solicitation required for programs will be conducted according to the specific local government procurement protocols for the issuing BayREN member agency (county, city or otherwise). All solicitations will be publicly noticed by the issuing agency.

Document Organization

The Business Plan is composed of the following sections that are numbered by section and organized to follow the CPUC guidance as well as stakeholder and CAEECC input:

- Section 1. Executive Summary
- Section 2. Residential Sector
- Section 3. Commercial Sector
- Section 4. Public Sector
- Section 5. **Cross-Cutting Codes and Standards** ¶
- ~~Section 6. Water Bill Savings Program~~ ¶
- Section ~~6~~7. Appendices
 - A. Supplemental Sector Information

⁹ D.12.11-015, at page 11.

- B. Acronyms and Abbreviations
- C. Glossary - Program Administrator Dictionary
- D. Procurement and Sources
- E. CAEECC Issues Tracker

In each of the Sector sections, the following information is provided:

- Introduction
- Sector Summary with Metrics and Budget
- Market Characterization
- Intervention Strategies and Tactics
- Coordinating Activities

* Note for 11/14 Revised Draft - BayREN will likely merge the Codes & Standards and Water Bill Savings Programs into a single Cross Cutting Chapter in the final draft of the BayREN Business Plan.

DRAFT

Section 2
RESIDENTIAL SECTOR

Introduction

The BayREN Residential Sector Business Plan addresses single family residences and multifamily properties, including tenants where possible. The BayREN residential programs reflect the REN's CPUC directive to address hard-to-reach audiences. Single family and multifamily sectors have proven to be challenging programs for program administrators to engage targeted property owners and achieve desired energy savings while maintaining cost-effectiveness. However, the residential sector has been the focus of recent legislation, is a state policy priority¹ and shows substantial potential for energy savings with continual increases in energy consumption in the PG&E Planning Area, upwards of 40,000 GWh by 2026².

This business plan for the Residential sector further develops existing programs that BayREN has implemented since 2013, with enhancements to expand reach and capacity, and refocuses the single family approaches to improve cost effectiveness and alignment with state legislation and goals.³

Ten Year Vision, Outcomes and Budget

Vision: *Residential property owners adopt energy efficiency upgrades as standard practice.*

Outcomes:

- *Increased residents, property owners and contractor participation in the BayREN residential programs.*
- *Penetration of hard-to-reach moderate income market.*
- *Integrated energy efficiency financing, green labeling and energy transparency at point of sale.*
- *A robust and true whole building customer journey that folds in offerings for renewables or ZNE.*

Ten year budget (total): \$M (TBD)

Market Context For BayREN Residential Sector

The BayREN suite of residential programs focuses on a segment of the Bay Area residential market, in particular on the hard-to-reach markets, as directed by the CPUC and on areas where the utilities cannot or will not develop programs⁴. To that end, the BayREN residential programs focus on moving the market towards whole building deep retrofits for single family and multifamily buildings. The single family market is significant, and in order to target our efforts and achieve the CPUC directive, BayREN will focus on moderate income households, which make up approximately 16% of the Bay Area housing market. The multifamily market is diverse, with 5 to 500 unit properties of most vintages being equally viable

¹ See SB350, AB 758, and AB 805

² CEC, "California Energy Demand (CED) Updated Forecast 2015-2025", December 2014.

³ Please note that the Single Family offering has been updated and is still under development based on comments received from CAEECC stakeholders.

⁴ CPUC Decision. 12-11-015, Pg 17.

candidates for some whole building work. Properties with central systems (roughly 60% of units⁵) experience the least split incentive and are most likely to participate in a whole building upgrade. Additional market and specific sector details are provided by subprogram areas beginning on page 2.9.

Sector Summary

Single Family⁶

BayREN's current single family residential program is focused primarily on the Energy Upgrade California® Home Upgrade Program, which includes the Home Energy Advisor Program. The Home Upgrade program was built upon the ARRA⁷ funding and designed to reach single family residents and incentivize whole house energy efficiency upgrades. The program was intentionally designed to be provided statewide and offered by all of the IOUs and the two RENs. This business plan will detail the single family strategies beginning in 2017 and continuing through 2027. The BayREN will be redesigning its single family offerings to more effectively connect to its directed hard-to-reach market segment, and to create new approaches to reach moderate income residents who are typically not served by the mainstream or the low-income program offerings. Whole home upgrades, the Home Energy Advisor, contractor development and incentivized measures will remain central to the single family approach, with a focus on generating energy savings for moderate income residents who might take a longer path towards energy savings while improving the overall program cost effectiveness.

Green Labeling

Green labeling will be implemented within the Single Family sector initially and expand into the Multifamily sector in later business plan years. This phased approach is to allow the BayREN to test and learn about how to make the effort as successful as possible and to build the market awareness to a point that it can effectively be integrated into the Multifamily program.

Multifamily

BayREN's current multifamily residential programs include the Bay Area Multifamily Building Enhancements (BAMBE) offering no-cost technical assistance and rebates, and Bay Area Multifamily Capital Advance Program (BAMCAP) offering co-financing with private lenders. The BayREN plans to continue our existing Multifamily offerings in the short- to mid-term until they reach a substantial share of the market to demonstrate the viability of energy upgrades. In the mid- to long-term BayREN will add strategies targeting a suite of diverse market drivers that will eventually replace resource-intensive financial incentives. Throughout, the BayREN will focus on fostering long-term relationships with the market. Strategies build upon the EBEE Action Plan for long-term engagement include customer-oriented

⁵ Residential Appliance Saturation Survey (RASS), 2010. Statewide value.

⁶ Please note that the Single Family offering has been updated and is still under development based on comments received from CAEECC stakeholders.

⁷ America's Reinvestment and Recovery Act

program design, engage large property owners at the portfolio level, upfront investment planning of multiple upgrade phases to approach ZNE, and addressing operational savings.⁸

Bay Area Multifamily Building Enhancements (BAMBE)

BAMBE provides targeted outreach to multifamily property owners to promote whole building upgrades. Participating property owners receive customized and streamlined no-cost technical assistance and a simple yet flexible per-unit rebate for meeting minimum scope requirements. These interventions are designed to lower barriers to multi-measure upgrades.

Multifamily Financing

The BayREN administers BAMCAP in conjunction with BAMBE, as authorized by D.13-09-044. BAMCAP offers no-interest co-financing to lenders who underwrite and service traditional loans directly with the property owner. It leverages existing lending practices and infrastructure and serves to lower the effective interest rate to the borrower while replenishing its capital pool. The current offering has successfully enabled BayREN to engage in the multifamily lending industry to facilitate several deals and engage in productive discussion with lenders around EE financing. The BayREN plans to continue to facilitate the use of private capital toward whole-building upgrades and will evolve its role to meet the market's needs.

Evolving Programs and Focus

BayREN plans to evolve its single family and multifamily programs over the next 10 years. This business plan lays out a strategy for increasing energy savings, non-energy benefits related to water and carbon, expanding the building performance contractor base, and working towards building a stronger single family and multifamily whole building retrofit market. In particular the BayREN will provide expanded access and engagement for moderate income residents, including renters. To date, the BayREN has trained over 300 contractors and enrolled 130 participating contractors, thereby increasing overall knowledge and interest in energy efficiency and supporting an expanding market. The BayREN will continue to build relationships and encourage contractors and raters to expand their knowledge of and skills in building performance. In addition, the BayREN model has allowed local governments to increase their local capacity and apply energy savings from projects to their climate action goals, and report the progress to elected officials.

To support its goals, the BayREN proposes to expand its activities in the Residential sector and transition certain existing efforts to new stand alone programs. This includes the Home Energy Advisor program, encouraging the adoption of local government policies for multifamily properties, and Green Labeling. These non-resource programs will leverage existing BayREN work with multiple partnerships and strategies to increase energy savings among all Residential sector programs and fill in current gaps that are

⁸ CEC, “Existing Buildings Energy Efficiency Action Plan”, 2015, Strategies, 2.1, 2.2, 2.2.4 and 3.4.

prevalent in the Residential market and eventually result in a market that does not require incentives and subsidies.

Lessons Learned from EM&V

Current and proposed program efforts build on lessons learned from past program cycles, including feedback from EM&V, contractors and internal evaluations. Administratively, the BayREN will focus on improved processes, data management and consistency in reporting to respond to EM&V feedback. (See page 2.36 for additional details regarding EM&V.)

An important element relating to EM&V and understanding past and future performance is the need to develop and agree upon an effective method to conduct EM&V for the BayREN programs given its unique mandate and make up. The BayREN, unlike the IOUs, operates a very limited portfolio of programs that by the CPUC’s mandate, must be to hard-to-reach markets. This impacts the BayREN in two critical ways: 1. It does not have the breadth of programs to balance more costly and expensive whole building efforts with high saving single measure activities; 2. By definition, the hard-to-reach areas have not been taken on by the IOUs because they are difficult and traditionally have a low TRC, especially in early phases of program ramp-up. The BayREN programs need to be evaluated based on like programs rather than on a portfolio basis. As discussed further in the “Coordinating Activities” section, the BayREN proposes continued coordination with the CPUC to enable the evaluation of REN programs to consider more than energy savings and measures costs and incorporate the difficulty of addressing more challenging markets, progress in market development and non-energy benefits.

Figure 1. Historic Program Performance

	2013	2014	2015
Single Family			
# of Home Upgrade Projects	40	697	1,394
Average Energy Savings	9%	12%	13%
TRC	Verified: N/A	Verified: 0.05	Claimed: 0.27
PAC	Verified: N/A	Verified: 0.06	Claimed: 0.44
Multifamily			
# of Upgraded Units	N/A	8,314	7,512 ⁹
Average Energy Savings	N/A	16%	16%
TRC	Verified: N/A	Verified: 0.27	Claimed: 0.73
PAC	Verified: N/A	Verified: 0.30	Claimed: 1.40

⁹ In response to comment CPUC#3.2, the BayREN believes the findings were drawn from incomplete 2015 budget information. In 2015, BayREN received supplemental funding to serve units beyond our goal. The rebate per unit and projected energy savings remains consistent from year to year. Projected per unit savings may be lower than claimed per unit savings in order to be conservative.

Vision, Intervention Strategies and Objectives

The table below provides the Residential Tactics aligned with the Plan’s overarching goals and intervention strategies and the sector vision. The BayREN will deliver a variety of services to address conditions and barriers that impact homeowners’ decisions, including readily available technical knowledge and advice, qualified and trained contractors, local government policies and green labeling systems that add transparency to the market, and accessible financing options reducing upfront costs.

Ultimately, this effort will result in residential energy efficiency upgrades becoming a norm, where owners do not consider the upgrade costs as an added expense, but see it as a standard cost of home or building ownership. Further, private investment in energy efficiency will significantly outweigh ratepayer incentive dollars, allowing limited ratepayer funds to be leveraged strategically to continue pursuing deeper energy efficiency. High volume of uptake will also bring down equipment, labor, and both soft and transaction costs.

Residential Sector Vision

Residential property owners adopt energy efficiency upgrades as standard practice.

Intervention Strategy	Tactics	Objective
Single Family		
Strategy 1. Provide Wrap Around Services, Support and Financing Estimated % of annual budget: TBD Non-resource	R1. Expand Home Energy Advisor services to educate and assist contractors and homeowners	<i>Increased homeowner and contractor participation in the BayREN single family programs</i>
	R2. Increase number of trained whole-house, building performance contractors	<i>Establish a robust industry to support whole house upgrades into the future</i>
	R3. Provide complementary services that drive leads and help to convert those leads to upgrades	<i>Reduce upfront barriers to deeper savings and whole house upgrades</i>
Strategy 2. Drive Adoption and Performance with Properly Aligned Incentives Estimated % of annual budget: TBD Resource	R4. Incentivize Enhanced/Whole House Measures with Trigger Activities and Home Energy Scores to produce deeper energy savings	<i>Improved penetration of hard-to-reach moderate income market and overall program accessibility</i>
	R5. Provide Direct Install incentives for measures related to plug loads and energy management systems	<i>Combine with trigger activities and/or whole home upgrades to deliver immediate customer benefits, program savings, and support kWh savings goals</i>

<p>Strategy 3. Test and Demonstrate Innovative Deployment</p> <p>Estimated % of annual budget: TBD Non-resource</p>	<p>R6. Establish demonstration projects for neighborhood approaches for long-term EE savings</p>	<p><i>Increase reach and scale of residential upgrades by encouraging energy efficiency within an entire neighborhood or district</i></p>
	<p>R7. Establish integrated Green Labeling Program to increase awareness and information transparency through region</p>	<p><i>Increase real estate professional education, leverage industry communications channels and increase homeowner upgrades at key trigger events</i></p>
<p>Multifamily</p>		
<p>Strategy 1. Provide Wrap Around Services, Support and Financing</p> <p>Estimated % of annual budget: TBD Non-resource</p>	<p>R8. Focus on building on-going, long-term relationships with property owners through ZNE investment planning and operational savings</p>	<p><i>Enable multifamily property owners to optimize trigger points and capital resources effectively</i></p>
<p>Strategy 2. Drive Adoption and Performance with Properly Aligned Incentives</p> <p>Estimated % of annual budget: TBD Resource</p>	<p>R9. Continue Bay Area Multifamily Building Enhancements (BAMBE) streamlined technical assistance and rebate program model</p>	<p><i>Expand program uptake until substantial market share demonstrates viability of whole-building upgrades</i></p>
<p>Strategy 3. Test and Demonstrate Innovative Deployment</p> <p>Estimated % of annual budget: TBD Non-resource</p>	<p>R10. Introduce other market drivers, specifically local government policies, green labeling and access to financing</p>	<p><i>Adoption of local government policies and presence of other market-based mechanisms that encourage building upgrades</i></p>

Summary Residential Sector Metrics and Budget

The following Sector Metric Table aligns with the BayREN Residential intervention strategies outlined in the previous pages and indicates anticipated short, mid- and long-term targets for each of the subprograms.

Please Note: The details of the single family metrics and budget are still in development based on comments received from CAEECC stakeholders and will be refined in the next draft.

Intervention Strategies	Market Effect Metrics	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Single Family						
Strategy 1. Provide Wrap Around Services and Support	Average annual participation (new and repeat participants)	2015 Baseline	Program Tracking Database	5,500 average participants/year	13,500 average participants/year	16,500 average participants/year
Estimated % of annual budget				23%	30%	50%
Strategy 2. Drive Adoption & Performance with Properly Aligned Incentives	Expand average annual program energy savings	2015 Baseline	Program Tracking Database	Average: 1,200,000 kWh/yr 290,000 Therms/yr 1,500 kW/yr	Average: 2,400,000 kWh/yr 580,000 Therms/yr 3,200 kW/yr	Average: 5,300,000 kWh/yr 1,180,000 Therms/yr 7,000 kW/yr
Estimated % of annual budget				75%	60%	45%
Strategy 3. Test and Demonstrate Innovative Energy Efficiency Deployment Methods	Increase number of residents engaged with a single coordinated effort	2018 Baseline	Program Tracking Database	Efforts likely to begin year 3-4	1 Districts/ neighborhoods annually	2 Districts/ neighborhoods annually
	Increased value of EE existing homes at time-of-sale	2017 level unimproved home value	Green building registry empirical study	10% increase in number of properties	20% increase in number of properties	Quantified value for EE existing homes at time of sale
Estimated % of annual budget				2%	10%	5%

Intervention Strategies	Market Effect Metrics	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Multifamily						
Strategy 1. Provide Wrap Around Services and Support.¹⁰	Number of units touched by program services or initiatives	2015 Baseline (5% of market)	Program Tracking Database	Increase to 10% of the market	Increase to 15% of the market	Increase to 25% of the market
Estimated % of annual budget				35%	25%	20%
Strategy 2. Drive Adoption & Performance with Properly Aligned Incentives	Energy Savings	2015 Baseline	Program Tracking Database	Average*: 1,500,000 kWh/yr 150,000 Therms/yr	Average*: 1,200,000 kWh/yr 120,000 Therms/yr	Average*: 900,000 kWh/yr 90,000 Therms/yr
Estimated % of annual budget				50%	50%	40%
Strategy 3. Test and Demonstrate Innovative Energy Efficiency Deployment Methods	Increased value of EE existing Multifamily properties at time-of-sale	2018 level unimproved home value	Green building registry empirical study	Not implemented until year 4	XX% increase in number of properties	Quantified value for EE existing homes at time of sale
Estimated % of annual budget				15%	25%	40%

* Multifamily Strategy 2 energy savings are incentivized work, and do not include additional savings for other proposed activities.

Budget (\$)	2016*	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Non-Incentive	6,223,139	6,578,000	7,611,000	7,732,000	6,992,000	7,087,000	7,204,000	7,438,000	7,339,000	7,518,000	7,741,000
Incent**	9,450,000	9,790,000	9,830,000	9,850,000	9,850,000	9,350,000	9,350,000	8,675,000	8,675,000	8,050,000	8,050,000
Total	15,673,139	16,368,000	17,441,000	17,582,000	16,842,000	16,437,000	16,554,000	16,113,000	16,014,000	15,568,000	15,791,000

* 2016's actual budget is included for reference. 2017 budget is proposed as year 1 of the 10 year Business Plan. BayREN has also included an annual cost of living adjustment in the proposed budgets for 2018-2026. The 2017 Advice Filing submitted on September 1, 2016 is intended as a placeholder only until this Business Plan is approved.

** SF Residential incentive levels are still under development based upon CAEECC stakeholder feedback on the draft sector chapter; allocations are presented based upon current sector offerings.

¹⁰ The number of units includes those served by technical assistance and those influenced by local government policies. The current plan is to directly incentivize 5-10% of total market, with the rest of the targeted market shares representing units served by technical assistance but not directly incentivized and influenced by other market drivers including local government policies (estimated 5% additional market share served by TA and another 10% influenced by other market drivers, by year 10)

SINGLE FAMILY OVERVIEW¹¹

California launched its first whole house program, Energy Upgrade California, during the ARRA phase in 2010. The original program was modified and relaunched in 2013 by the four IOUs and two RENs, and was renamed Home Upgrade (HU). The program focuses on a series of measures that improves the building shell and insulation, HVAC systems, hot water heaters and many other elements. Overall, the program measures tend to address gas savings at a higher rate than electric savings due to the typical configuration and type of systems for heating and water in California homes. The program has succeeded in rapidly increasing participation, but recent program and process evaluations have clearly shown that the program must evolve in order to reach the scale that is needed to achieve state and local climate action goals.

The BayREN proposes evolving the HU concept to be more in line with a consumer's needs and to effectively support the journey, incrementally, through a whole home upgrade to an eventual zero net energy home. The evolution would allow a single contractor or connected suite of programs to assist a homeowner considering energy efficiency improvements and continue the relationship over time to include deeper retrofits, behavior change and eventually Zero Net Energy. The BayREN also proposes to target this new approach on moderate income residents in the Bay Area - a component of the housing market that is not well served by the current program and is ineligible for low-income programs. The new model will drive greater overall energy savings and gradually decrease reliance on incentives, enabled in large part by the Home Energy Advisor and the adoption of a "customer journey" approach rather than a single touch.

Market Characterization

BayREN represents 101 cities and 9 counties within the San Francisco Bay Area and 20% of the California's total population. There are over 2 million single family homes within the BayREN region.

Since the inception of the BayREN, the current Single Family program offering has been focused on the Home Upgrade program and Assessment Incentive for the Advanced Home Upgrade program. Given the high average project cost of over \$14,000 for the Home Upgrade and \$16,000 for the Advanced Home Upgrade, these programs attracted higher income households who were able to assume the high costs of the upgrades. While program uptake has grown exponentially, more than doubling each year since program launch, the program has reached less than 1% of the available housing stock. The Home Upgrade program cannot be cost effectively scaled to reach a high enough proportion of the market and increased energy savings.

¹¹ Please note that the Single Family offering has been updated and is still under development based on comments received from CAEECC stakeholders.

Moderate Income Focus

“Participant characteristics [in energy efficiency programs] appear to correlate with the program’s “buy-in” - the amount a household is required to spend in order to participate. Programs with a high buy-in were more likely to have participants with high incomes, high educational attainment, who are white, or English-language speakers. Programs with no buy-in, or even with a negative buy-in (meaning the program pays an incentive or provides a service to the household without requiring any spend at all) were more likely to have participants with low or moderate incomes or a larger proportion of non-white participants.”¹²

BayREN plans to focus the next 10 years on reaching a higher percent of homeowners by providing a program that will be attractive and affordable to moderate income households. While energy efficiency programs for low-income households currently exist, BayREN’s modified program design will focus on attracting moderate income households above \$48,000 for a family of 4. While this group has not been able to participate in costly whole home retrofits, BayREN can apply our strategies to see that moderate income households can reduce their energy use. As indicated in Figure 2, this market segment represents approximately 16% of the households in the Bay Area. The definition of moderate income may actually include more households, up to 21%, if other costs such as transportation are incorporated into the calculation.¹³

Figure 2: Bay Area Single Family Housing Characteristics

Housing Units	1,756,483 attached, detached units 281,597 2-4 units 2,038,080 Total Single Family Units	
Vintage	2010 or later	16,864
	2000 to 2009	259,092
	1990 to 1999	260,344
	1980 to 1989	348,893
	1970 to 1979	504,160
	1960 to 1969	402,631
	1950 to 1959	392,584
	1940 to 1949	199,129
	1939 or earlier	426,167
Housing Tenure	1,461,633 owner-occupied 1,174,634 renter-occupied	
Household by Income	652,186	Very Low

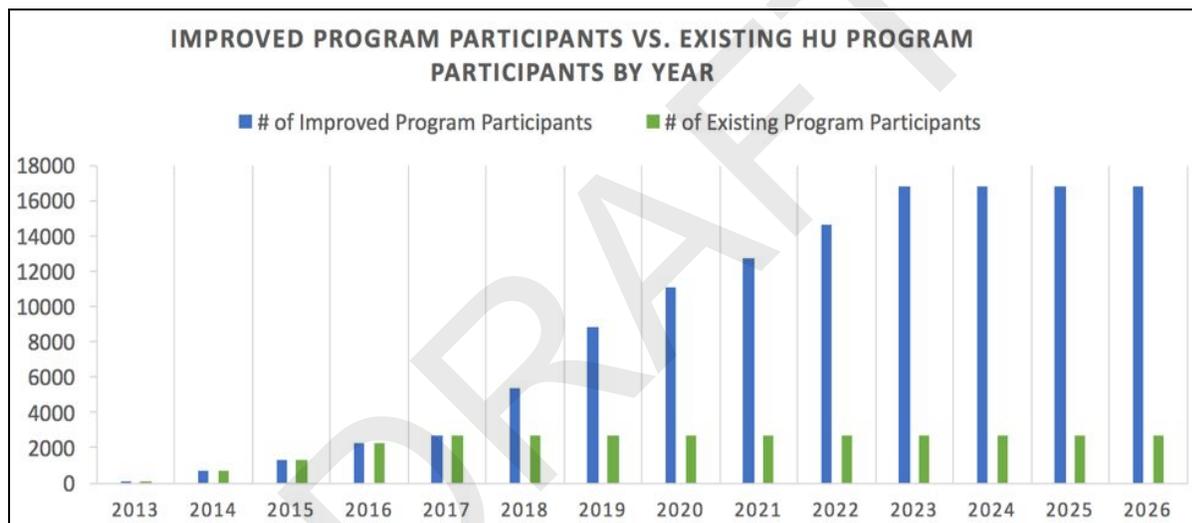
¹² CEC, “ Draft Report - A Study of Barriers and Solutions to Energy Efficiency, Renewables and Contracting Opportunities Among Low-Income Customer and Disadvantaged Communities”, September 2016, page 18.

¹³ Metropolitan Transportation Commission, “Bay Area Housing and Transportation Affordability: A Closer Look,” November, 2009.

	509,520	Low
	326,093	Moderate
	570,662	Above Moderate

Figure 3 shows the projected participation trend associated with an improved program design that is more accessible for moderate-income homeowners, compared to the existing Home Upgrade model, and is more scalable due to the incorporation of strategies that go beyond incentives. The existing program could not scale up without unsustainable growth in the incentive budget or risk damaging contractor trust and participation. In contrast, the improved program design would support an increasing volume of participation with a similar incentive budget, increasing potential contractors while simultaneously improving overall savings.

Figure 3: Potential Improved Program Participation vs. Existing BayREN Program Participation



Single family housing stock in the BayREN territory is abundant, but a whole home upgrade is an expensive product that is not attainable or attractive for the average homeowner. A focus on moderate-income households will allow the BayREN to tailor the program and further refine the target audience to home vintage, housing tenure, climate zone and other housing characteristics that are suitable for the program. As local governments, the BayREN can access housing data and apply it to program design and outreach.

Potential Energy Savings

While Home Upgrade had high uptake, it did not achieve the energy savings and cost effective metrics expected. Utilizing the data collected with Home Upgrade projects, the BayREN can now offer products that better target the single family market and will result in better energy savings and cost effectiveness. For example, past project data shows that higher savings is realized in older vintages of homes (68% of current projects are for houses built before 1979) as well as in the hotter climate zones. The BayREN takes

into consideration the varied 4 climate zones (SB 350, Section 8.c.3) to provide better customized energy efficiency decisions. This approach aligns with the second framework goal of the EBEE Action Plan to provide data-driven decision making that enhances program design while providing consumer-focused energy efficiency.

A significant finding in the Navigant 2013 study is the importance of non-energy benefits from the whole building market: “Non-energy benefits are highly valued by EUC participants; however, no policy framework exists to monetize these non-energy benefits for the purposes of cost-effectiveness screening or potential study modeling.”¹⁴ The Home Energy Advisor has been a successful element of the current program and will be an important mechanism to garner more energy savings and non-energy benefits. As of August 2016, the Energy Advisors have assisted over 4,000 Bay Area homeowners, including over 1,110 qualified homeowners with a 69% conversion rate¹⁵ and over 4,000 referrals to over 100 different complementary programs. Significantly, homeowners that worked with the Advisor had a 25% increased overall energy savings from those that did not use the Advisor. The strategies presented in this plan will yield additional non-energy benefits that will also be measures and accessed, such as Home Energy Advisor metrics, contractor development metrics and leveraged program data.

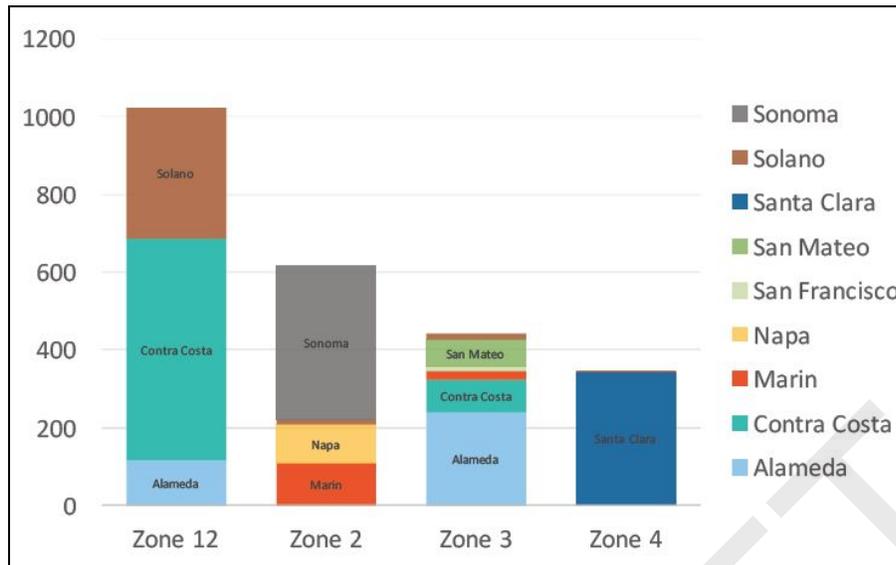
Climate Zones

The BayREN territory includes portions of 4 different climate zones: 2, 3, 4 and 12. Climate Zone 12 is the warmest climate zone and also reflects the highest project uptake. (See Figure 4). With the assistance of the Home Energy Advisor, and the addition of the neighborhood approach to the program, the BayREN can work with homeowners in target climate zones to direct homeowners to the highest energy-saving options.

¹⁴ Navigant, “2013 Potential and Goals Study”, page 144.

¹⁵ This is the "Any upgrade conversion rate" which is the percent of qualified accounts that move forward with any energy efficiency improvements even if they are not HU or AHU projects.

Figure 4: Project Uptake by Climate Zone



Contractor Market

“...[O]ne specialty contractor who enrolled in the program just before 2015 completed a total of 9 projects. After identifying this high volume contractor as “underperforming” and needing additional training, the Home Energy Advisors coordinated and completed additional trainings at the beginning of 2016 leading to a 211% increase to date in paid jobs with many more in the pipeline.” - BayREN Home Energy Advisor

Contractors are a critical component of the single family program. In the nine Bay Area Counties, there are substantial opportunities to expand the active contractor base in home performance with both specialty contractors and general contractors. The following numbers of contractors are licensed within the 9 BayREN Counties¹⁶:

- 23,572 General Contractors (B License)
- 1,617 HVAC Contractors (C-20 License)
- 161 Insulation Contractors (C-2 License)

Currently, the BayREN has 125 Participating contractors with just 7 contractors responsible for 51% of all completed projects. The BayREN will focus on expanding the skills of more contractors to deliver whole house projects through a customer journey and neighborhood approach.

¹⁶ Contractors State License Board, May 2014.

Single Family Intervention Strategies

A Customer Journey approach engages residents where they are, adapting to their needs and capabilities for energy upgrades, and building a lasting relationship to encourage and assist these residents achieve deeper and deeper energy savings overtime.

While the Home Upgrade Program experienced increased uptake, and opened the whole home market to specialty contractors, it has not proven to be a cost-effective means to increase energy efficiency in the single family market. To address this issue, the BayREN will build on the training and development of the HU contractors and focus efforts on a moderate-income market. The effort will attract customers to a whole home upgrade through a “customer journey” approach that is facilitated largely through the Home Energy Advisor and can pave the way toward Zero Net Energy. This will require iterative and dynamic program design and management, working closely with contractors to make sure that their business models can support changes and that homeowners are responding. This approach builds on the EBEE Action Plan Strategy 3.1.1 Sustainable and Effective Program Delivery as well as Strategy 2.2.1 Enhanced Program Design and ME&O.

The three overarching Single Family strategies address the key problem statements and barriers of this market segment and align with the overall BayREN portfolio goals. In many cases, multiple strategies will combine to respond most effectively to a market barrier. The table below illustrates this correspondence and provides additional detail connecting the strategies to the specific tactics that may be deployed. These tactics are discussed later in this section.

Problem	Market Barrier	Strategy
Many single family homeowners, in particular moderate-income residents, are unable to participate in comprehensive upgrades	Homeowners are not able to afford the high upfront cost of whole house improvements and the payback isn't attractive	S1 & S2: Offer “on-ramp” that begins with low hanging fruit improvements and leads to whole home upgrades, thereby increasing program accessibility <i>Tactics R1, R3, R4, R5</i>
Single family homeowners do not understand the need or value of energy efficiency and whole home upgrades	Homeowners are not educated on the benefits of energy efficiency and whole home upgrades	S1: Home Energy Advisor to target moderate income homeowners and renters and educate them on the value of energy efficiency and whole home upgrades <i>Tactics R1</i>
	The value and timing of whole house energy efficiency improvements are not aligned to the homeowner's needs and interests	S1, S2 & S3: Home Energy Advisor to introduce simpler packages as well as program add-ons such as Financing products, Home Energy Score and smart home products, to improve uptake <i>Tactics R1, R3, R4, R5, R7</i>

	The limited scale and uptake of whole house programs are not cost effective for implementers, contractors or homeowners, particularly for moderate income occupants.	S1 & S2: Provide a tiered, customer journey focused approach to upgrading homes, tying small improvements to Home Energy Advisor enrollment, and simultaneously encouraging deeper whole house upgrades. <i>Tactics R1, R3, R4, R5</i>
There are not sufficient numbers of whole-house, building performance contractors to market, support and complete the work	Contractors are not educated on the benefits of whole home upgrades as a business model	S1: Personalized support and one-on-one trainings from Contractor Services specialists and Home Energy Advisor to assist and educate contractors on the value of a whole house approach as well as support to overcome operational and business model barriers associated with the transition to home performance <i>Tactics R1, R2</i>
	Slow engagement among specialty contractors	S1: Assist specialty contractors to expand their services to full building performance and/or partner with other firms to achieve a better business model <i>Tactics R1, R2, R4</i>
	Reluctance to participate in government/IOU programs due to training requirements and administrative burdens	S1, S2 & S3: Make gradual program improvements that increase energy savings and decrease incentives while transforming the market and maintaining strong relationships with participating contractors <i>Tactics R1, R2, R4</i>
The path to ZNE for existing homes is largely unknown and unproven	Customers and contractors require proof of concept	S3: Partner with leading contractors and communities to design, test and deploy a ZNE existing homes path <i>Tactics R6</i>
Real estate agents are typically buyers' most trusted source of information about property purchases, rentals and upgrades, but most agents are unable to communicate the value of green and energy efficiency features	Buyers spend significantly more money on building improvements in the first two years after buying a property than in subsequent years.	S3: Train real estate agents so they can help clients' make better-informed decisions about investments in energy and green upgrades <i>Tactics R7</i>
	Buyers are unaware of energy efficiency-related incentives or financing programs.	S3: Train and support real estate agents, appraisers and mortgage lenders so they can connect clients with appropriate resources <i>Tactics R1, R3, R7</i>

Lack of transparency and standardized data means that energy efficiency features are largely invisible to buyers and real estate professionals	Buyers and renters who want information about energy efficient and green buildings do not know where to turn or which sources are credible	S3: Increase access to green labeling programs and increase use of green fields in MLS listings to improve transparency and credibility <i>Tactics R1, R7</i>
	It is difficult for real estate agents, appraisers and lenders to have confidence in claims about a property's green and energy efficiency features	S3: Expand real estate professional training, use of green labels, and use of green fields in MLS listings <i>Tactics R7</i>
	Current home energy rating programs are cost prohibitive in the context of home sale transactions or home improvement projects	S3: Test the use of low cost, accessible options for home energy labels <i>Tactics R7</i>

Strategy 1. Provide Wrap Around Services, Support and Financing

Tactic R1. Expand Home Energy Advisor services to educate and assist contractors and homeowners

Tactic Objective: Homeowners and contractors increase participation in the BayREN Single Family Program

The Home Energy Advisor will be expanded to become a stand-alone, non-resource program and a central tool to expand the effectiveness of the single family component. Advisors will continue to provide the same level of service as they currently do, but will expand their engagement with homeowners and contractors to include such topics as behavior change practices, smart home applications, and tools that can reduce kWh. Perhaps the most important change is that Advisors will become a critical piece of a customer's journey - long-term engagement with homeowners to help them move along a path to deeper and deeper energy savings as envisioned in the EBEE Action Plan Strategy 2.2.5 Strategic Energy Planning, and Strategy 2.2, Customer-Focused Energy Efficiency. Further, the Advisors will continue to support the IOU, State Low Income Programs, CCAs, local jurisdictions, financing, and other complementary energy and water programs with referrals and customer support (SB 350 S.8.5).

Fostering successful relationships with customers leads to a myriad of program benefits. These include, but are not limited to increased likelihood of participation, larger projects, increased engagement, ability to effectively capture customer concerns and identify areas for improvement, repeat participation, etc. With the expansion of services, the BayREN will build upon current best practices in order to engage with more customers and improve the cost of customer acquisition. For example, Home Energy Advisors are already

developing long-term relationships with customers that increase customer likelihood of participation. In Q1 of 2015, only about 30% of new customers who initially engaged with an advisor in Q1 completed projects in the same quarter, while about 35% of customers completed projects in Q2, 20% in Q3, and 15% in Q4 2015 and Q1 2016 (almost a year later). Even customers who initially engaged with an advisor in 2013 are completing projects 2 and 3 years later. In addition, these customers saw on average a 25% increase in overall project savings compared to those who didn't engage with an advisor resulting in deeper energy savings. With the planned expansion of the Home Energy Advisor, the BayREN expects to leverage both existing relationships and develop new relationships to further drive participation and deeper savings through the program.

Home Energy Advisors are Building Performance Institute (BPI) certified and serve as a support resource and lead generation tool for Participating Contractors¹⁷, as well as follow up on leads generated from outreach efforts and provide one-on-one support to both contractors and homeowners throughout the upgrade process, and in so doing, building on the EBEE Action Plan Strategy 3.1 Streamlined and Profitable Industry.

Tactic R2. Increase number of trained whole-house building performance contractors

Tactic Objective: Establish a robust industry to support whole house upgrades into the future

The BayREN's approach to contractor recruitment and development will evolve with the needs and opportunities provided by the Program. The current focus is on recruiting specialty contractors to the program and building their home performance training and qualifications. The easier "on ramp" measures will help open the door to more contractors. Moving forward, the focus will shift to further develop the skills and business models of the contractor base so that they are making whole home retrofits a central part of their businesses. In addition, the BayREN will work with participating contractors who have satisfied program requirements to determine how they can deliver a greater number of jobs and deeper savings.

In order to realize these objectives and maintain successful working partnerships with participating contractors, the BayREN will leverage a consultative and analytical approach to identifying participating contractor priorities, needs, barriers, and areas for improvement in order to maximize effectiveness of subsequent workforce education and training. In addition, the BayREN plans to host working groups with participating contractors in order to solicit feedback and gauge buy-in prior to any significant program redesign, thereby maintaining strong relationships and allowing for an iterative and dynamic process with key stakeholder input.

The BayREN offers a Core Contractor Training program and specific online training to educate contractors about the particulars of the BayREN program. Moving forward, training resources may expand or leverage existing Workforce, Education and Training ("WE&T") offerings related to building a home performance

¹⁷ Definitions and qualifications for "participating contractors" will be updated in the Implementation Plan.

business, sales training, and other similar offerings that will help contractors become more successful and profitable. This will include increased Home Energy Advisor support to contractors and additional technical trainings to expand the skills of the workforce, and to help reach deeper energy savings.

Tactic R3. Provide complementary services that drive leads and help to convert those leads to Upgrades

Tactic Objective: Reduce upfront barriers to deeper savings and whole house upgrades

The BayREN will remove barriers to initial participation while helping contractors and homeowners realize the value of whole home upgrades. This will include layering of financing programs, use of technology and smart-home products, marketing and education via the Home Energy Advisor, and the Home Energy Score (see more details under Green Labeling). Given the high cost of upgrades and the slow return on investment, these program improvements and add-ons will provide benefits that can be realized early on in the whole home upgrade process while also reducing the upfront cost to participation. In addition, program incentives will be shaped and evolve over the Business Plan time period to encourage measures that provide the greatest energy savings in the areas most desired.

The BayREN will provide contractors and homeowners with information and resources regarding the multiple financing offerings while also leveraging the support of the statewide Go Green Financing program. The BayREN also plans to leverage its Green Labeling program by enhancing the Single Family whole house program with the Home Energy Score (HES) rating.

Strategy 2. Drive Adoption and Performance with Properly Aligned Incentives

Tactic R4. Tie whole house measures to trigger activities to drive deeper energy savings

Tactic Objective: Improved penetration of hard-to-reach moderate income market and overall program accessibility

“Moving forward, energy efficiency programs should provide effective, modular approaches to customer engagement by addressing each customer’s needs and situation with common sense, straightforward suite of options....Implementers can help to make energy efficiency improvements more attractive by allowing for phased improvements and providing technical assistance and guidance about how to sequence improvement over time, keeping in mind the importance of building science and best practices.”¹⁸

In order to penetrate hard-to-reach markets, increase overall participation, and deliver a customer-centric program that allows homeowners and contractors to phase improvements, a deep reevaluation of the

¹⁸ CEC, “Existing Buildings Energy Efficiency (EBEE) Action Plan”, page 63.

current delivery model is required. Potential improvements have already been identified that include; “on-ramp” packages combining “trigger” measures (i.e. HVAC replacement, hot water heater replacement, etc. and other high energy saving measures) with low hanging fruit improvements creating more accessible packages for middle-income homeowners; and consultation with a Home Energy Advisor to educate and encourage whole house improvements and track success with add-on measure adoption. The incentive structure will be redesigned to provide a boost where needed and with thoughtful consideration toward sustainable growth of the market and the many non-energy benefits customers derive from home upgrades.

Over the next 10 years as the workforce develops and the market for residential energy efficiency transforms, whole house measures will become increasingly common. This will provide the opportunity to reduce and simplify incentives in the short-term, while portraying the Zero-ready¹⁹ or ZNE home as the ultimate objective of the Bay Area homeowner’s journey. Through participation in the program, homeowners will be exposed to the value and benefits of whole house upgrades. In the long-term period of the business plan, homeowners will be introduced to ZNE as part of their project (if applicable) and also through longer-term engagement as part of the customer journey. (See also Tactic R6).

Tactic R5. Encourage adoption of measures related to lighting, plug loads and energy management systems

Tactic Objective: Combine with trigger activities and/or whole home upgrades to deliver immediate customer benefits, program savings, and support kWh savings goals

Due to the historical high cost of upgrades and the slow return on investment, addition of complementary, lower cost measures will provide benefits that can be realized early on in the whole home upgrade process while also reducing the upfront cost to participation. This will include “on-ramp” measures that combine upgrade measures with low hanging fruit improvements, as well as the a combination of lighting, technology and smart-home products (i.e. smart thermostats, LEDs, lighting controls, advanced power strips, etc.) leveraging self reported improvements and direct installs during critical touch points in the customer journey.

The Bay Area is uniquely set in one of the most technology driven regions of the country. Use of smart home technology can help homeowners to actively participate in saving energy inside their home and realize a quicker benefit than they might with only a whole home upgrade. Disconnected homeowners do not understand the value of whole home upgrades and prefer to make cosmetic upgrades to their homes that have already been proven to yield a high return on investment. While it may take several billing cycles to see a reduction in energy costs, smart home products when combined with whole home upgrades can show immediate benefits. This tactic will deliver immediate customer benefits and aligns with the objectives of AB 793 to promote the adoption of energy management systems.

¹⁹ Zero-ready is a defined as home that is high performing with a level of energy efficiency to allow it to move to Zero Net Energy with the addition of renewables.

Strategy 3. Test and Demonstrate Innovative Deployment Methods

Tactic R6. Establish demonstration projects for neighborhood approaches for long-term energy efficiency savings

Tactic Objective: Increase reach and scale of residential upgrades by encouraging energy efficiency within an entire neighborhood or district

The residential market has historically been not cost effective, especially for deep energy retrofits, the whole house approach or ZNE. The BayREN will test alternative delivery methods to find higher savings and great scale through neighborhood and district approaches. This effort will be designed to benefit from economies of scale, local government planning processes, and the long-term relationships being developed with the Home Energy Advisor.

Neighborhood or district approaches offer ways to address a number of homes, both new and existing with a more comprehensive and long-term approach. This approach may have even greater effectiveness when applied to moderate income neighborhoods, where upfront costs and lack of trust in contractors and utilities could be overcome with peer engagement and local government involvement. Several local governments within the BayREN are already piloting municipally-focused ZNE pilots integrating deep energy efficiency, renewable generation, storage, electrical vehicle charging, and related microgrid approaches to support this vision, and in some instances, involving multiple buildings and sites. These efforts are being driven by a powerful combination of energy innovation at the local level; a desire to demonstrate “community resiliency,” or the ability to serve critical constituent needs after disruptions caused by external forces such as natural disasters; and the collaborative spirit of public agencies that the BayREN works to foster. The EBEE Action Plan provides several areas for this approach including in Strategy 1.7 Local Government Leadership and the development of Energy Performance Districts²⁰. The BayREN will work with member agencies to identify potential districts and choose 1-3 to test and demonstrate the ability of the approach to achieve goals.

Tactic R7. Establish green labeling to increase education, inclusion in MLS and drive demand.

Tactic Objective: Increase real estate professional education, leverage industry communications channels and increase homeowner upgrades at key trigger events

The BayREN will expand the existing Green Labeling program element to become a stand alone non-resource program to support and increase savings in the single family and eventually multifamily programs. The Green Labeling program will build upon and expand its work in the single family sector, where it anticipates that there is greater potential for energy savings—single family homes account for 75% of the Bay Area’s housing units. Research has already documented the value of green labels for single

²⁰ Ibid, page 56.

family homes, which is likely to help green labeling gain acceptance among homeowners, buyers and the real estate and financing industries.²¹ The BayREN will offer incentives to homeowners who have their home rated with the Home Energy Score and refer them to the whole house program and Home Energy Advisor as a solution to increasing their home's rating. These goals will be accomplished through the following activities.

Educate and motivate

Engage, educate and motivate the Bay Area's real estate, rental and financing professionals so they can help their clients—single family home buyers and sellers, multifamily property owners and managers, and renters—make better-informed choices about where they live and the real estate and building upgrades they invest in.

Educational information will address various labels, assessments and ratings that may be available for a building, such as Energy Star, HERS, or Home Energy Score. However, the BayREN's focus is on professionals who serve the existing building market, as opposed to new home builders, because older housing stock is the primary target for energy upgrades.

Green Fields in MLS

Support statewide and national efforts to consolidate information about energy efficient homes and enable automated data transfers to MLS systems and other industry platforms. Promote the use of green fields in the Bay Area's Multiple Listing Services (MLS) in coordination with the Real Estate Standards Organization data protocols. Promote third-party platforms for home sales and apartment rentals that convey the value of green and energy efficiency features.

The BayREN is tracking the emergence of applications, such as Utility Score, that provide estimated utility bill costs for homes on consumer-oriented websites (ie. Trulia, Zillow, HotPads). These private sector tools are coming to market at a much faster pace than the "Greening of the MLS," and may become freely accessible to consumers by the end of 2017.

Test affordable, accessible options for green labeling

Leverage efforts with the Home Energy Score and test affordable, accessible options for green labeling to drive demand for energy efficiency upgrades among homeowners and buyers, multifamily property owners and managers, renters, building contractors, and the real estate and financial professionals who facilitate transactions.

MULTIFAMILY OVERVIEW

The Bay Area Multifamily Building Enhancement (BAMBE) program provides multifamily property owners with a range of services aligned to their business needs and capital resources to promote adoption of energy efficiency upgrades. The program is designed to serve the full range of diverse multifamily

²¹ A 2012 study by researchers at UC Berkeley and UCLA, "The Value of Green Labels in the California Housing Market," found that homes in California labeled with Energy Star, GreenPoint Rated or LEED sell for a premium compared to non-labeled homes. The report is available at www.stopwaste.org/about/news/homes-green-labels-sell-more.

market, including individually and master metered, individual and central system properties, and common area and in-unit end uses. It addresses the whole building regardless of whether the property owner or tenant is responsible for the utility bill related to particular end uses. The property owners enroll in a technical assistance program designed to lower barriers to multi-measure, whole building upgrades by providing technical and financial assistance. BAMBE serves as a complement to a whole-building utility rebate program and will reduce cost barriers for multifamily property owners who would like to conduct energy efficiency upgrades. The program also conducts workforce development for specific multifamily building trades.

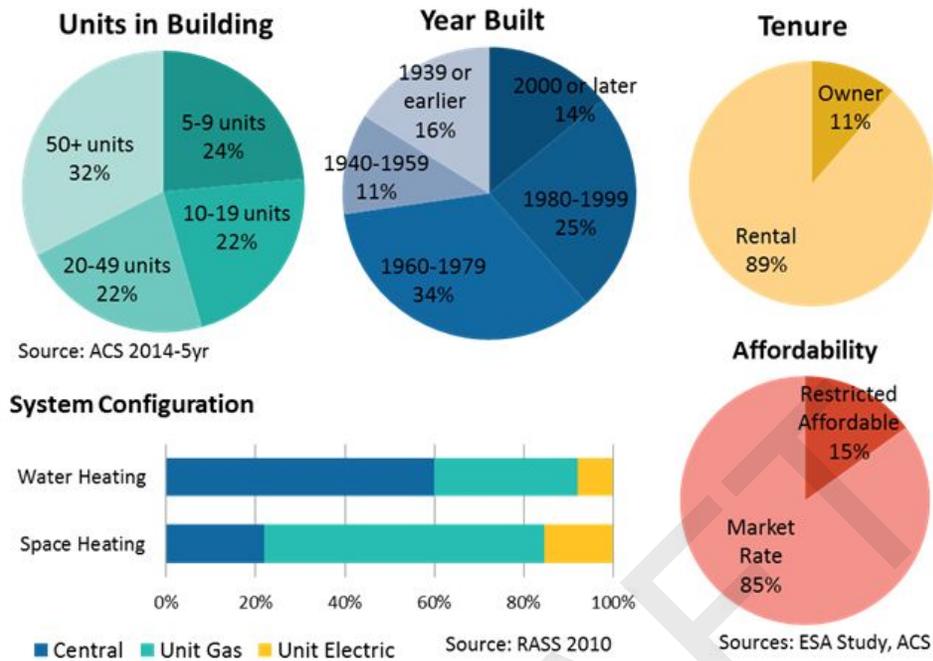
Market Characterization

In the Bay Area there are over 700,000 housing units in multifamily buildings with 5 or more units. This represents 25% of the Bay Area housing units, and represents almost a quarter of statewide multifamily units (2014 ACS). The building stock is diverse in size, age, ownership, and energy system and metering configuration.

Serving a diverse multifamily sector requires a customized, flexible offering and multiple market drivers. Because program designs that work in other sectors have not found similar uptake in the multifamily segment, the sector has been considered hard-to-reach. Yet programs customized to the sector have the opportunity to realize significant savings. Nationally, “programs have shown that comprehensive retrofits can cost-effectively improve the energy efficiency of multifamily buildings by 30% for natural gas and 15% for electricity, which would translate into annual utility bill cost savings of almost \$3.4 billion”.²² The diversity of the building stock means each case is unique and requires a flexible approach that can fit the building’s existing condition and needs, and speaks to its core business motives. While direct financial incentives may be attractive across the sector, other market drivers are most salient to specific sub-sectors.

²² ACEEE (American Council for an Energy-Efficient Economy) 2013. The Multifamily Energy Savings Project. American Council for an Energy-Efficient Economy.

Figure 5: Bay Area Multifamily Sector^{23,24}



According to the EBEE Action Plan, within California multifamily housing stock the highest energy uses are space heating (22%) and water heating (39%). While on average only about 500 kWh is used for space conditioning and water heating, electric fuel for space and water heating is more common in multifamily than in single family. The average multifamily household in California uses 3,700 kWh a year, lowest among housing types with the majority being baseload energy use.²⁵ BayREN lacks data on the split between common area and in-unit energy usage. However, BAMBE is designed to serve all end uses and configurations.

The target decision maker in a multifamily whole building upgrade is the property owner or delegated manager. In rental properties, which constitute the majority of the multifamily housing stock, the property owner/manager operates their property as a commercial asset and evaluates investment decisions based on financial impacts. Yet the end uses are distinctly residential, resulting in different savings opportunities than commercial properties. Property owners typically undertake building improvements during certain trigger events and develop capital investment schedules over time. They require a minimum return on their investments and demonstrated financial value to their net operating income in the form of lowered

²³ Owners of rental properties include individuals, corporations, nonprofits, and other entity types. While only 15% are restricted affordable housing, statewide 37% of multifamily units are occupied by low-income households. Sources: EBEE Action Plan and Energy Savings Assistance Program Low-Income Market Segment Study, Cadmus

²⁴ Although data on central versus individual metering configurations are unavailable, almost all units must be individually metered for electricity. Gas metering usually depends on system configuration and master metering is more common than for electricity.

²⁵ CEC, “Residential Appliance Saturation Survey (RASS)”, 2010.

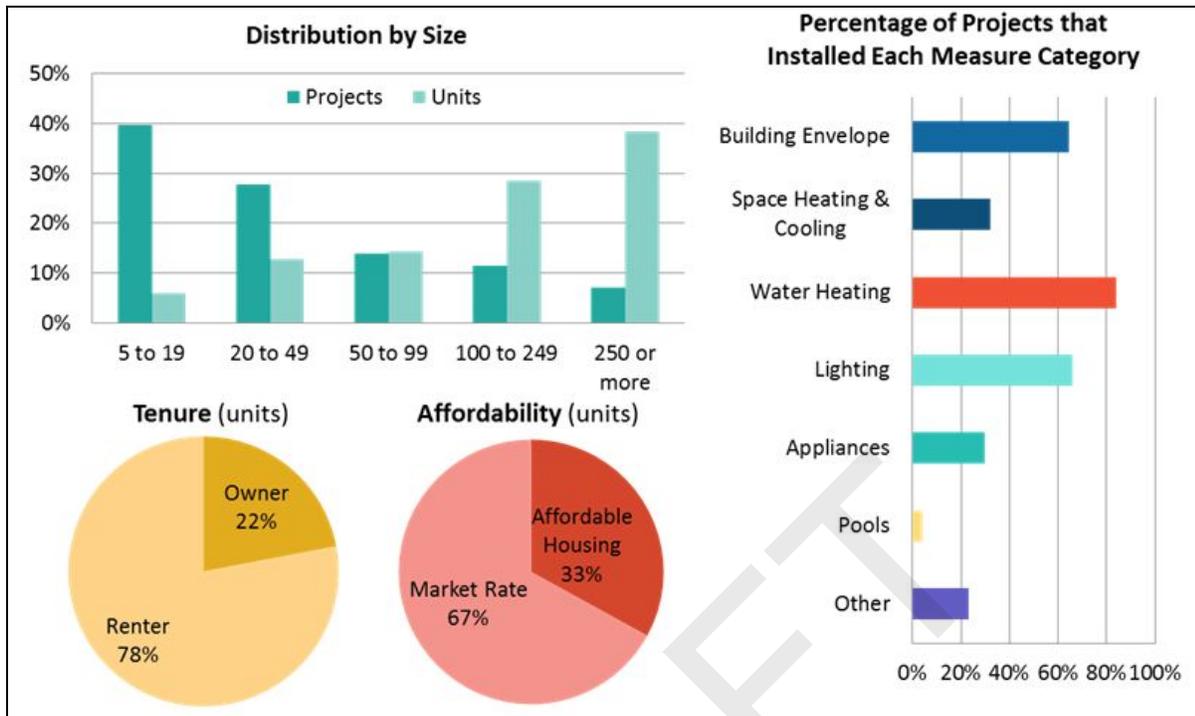
operating expenses or increased revenues. The market is still relatively new to energy efficiency and conversations with program participants have revealed a preference for simple procedures. Streamlining the participation process and offering a lot of customized hands-on assistance helps participants engage in a whole building upgrade. Helping owners integrate energy efficiency into their long-term plans aligns energy efficiency with their existing business practice and creates an opportunity for ongoing engagement.

The program served properties with both central and individual systems. The participation of projects with individual systems and metering indicates the program's success at overcoming the split incentive barrier. Of completed units for which the heating system details were recorded, 27% had central space heating; 44% had individual gas and 29% had individual electric. Central water heating was more common, as is the case in the housing stock, with 85% of completed units with recorded DHW details having central systems; 14% had individual DHW systems.

BAMBE was specifically designed to target more than one upgrade to encourage a range of building systems to be addressed at the same time. The program data shows that BAMBE participants in 2013-2015 upgraded an average of 4.5 measures in 2.5 categories, demonstrating that the project scopes are successfully upgrading multiple measures across building systems.

The BAMBE model has successfully served the market's diversity. The portfolio of completed projects is as diverse as the housing stock. The program has struck a balance between incentivizing large properties that yield a high volume of units and savings, and reaching a good representation of smaller buildings. Consistent with the housing stock, the majority, 78% of completed units, were renter-occupied. The unusual accomplishment is the participation of owner-occupied properties which have previously been difficult to serve due to their complicated and distributed decision making. The program served both market rate (67% of completed units) as well as affordable housing (33%).

Figure 6. BAMBE Completed Projects



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Multifamily Intervention Strategies

“The multifamily housing sector is different from other sectors in fundamental ways. Energy saving goals cannot be accomplished by expanding single family or modifying commercial building approaches.”²⁶

The following section provides detail on the key tactics for the multifamily sector. Below is a summary chart outlining how the problems identified in the previous section will be addressed.

Problem	Market Barriers	Strategy
The multifamily sector is diverse in building, occupancy, and ownership characteristics making it difficult to efficiently target and address the sector	Unique and multiple needs and requirements	Customized technical assistance and flexible scopes qualifying for rebates <i>Strategy R9</i>
	Multiple market drivers influence decision making	Facilitate policies, green labeling, and diverse financing products <i>Strategy R10</i>
The multifamily is residential in occupancy but operated like commercial and property investment decisions are based on financial motives	Low tolerance for upfront transaction costs	Simplify program process and requirements and offer no-cost upfront technical assistance <i>Strategy R8</i>
	Requires short ROI or payback period	Offer incentives until substantial portion of market has adopted energy efficiency <i>Strategy R9</i>
	Capital investment occur over time	Align energy upgrade recommendations with long-term capital improvement schedules by developing multi-phase deep energy savings (or ZNE) investment plans <i>Strategy R10</i>
	Reduced operating expenses or increase revenue must be demonstrated	Introduce green labeling as a mechanism to make energy efficiency visible and valuable in the market <i>Strategy R10</i>
	Multifamily owners will not engage if perceived as a competitive disadvantage	Flatten the playing field by assisting local government to adopt policies in a regionally coordinated manner <i>Strategy R10</i>
There is limited incentive for rental property owners	Prospective renters do not have information on an apartment’s	Increase use of green labeling by rental property owners and on rental listing

²⁶ CEC, “EBEE Action Plan”, 2015, page 11.

to invest in energy efficiency.	energy usage or environmental attributes	platforms to improve transparency and credibility <i>Strategy R9, R10</i>
	Financial underwriting criteria for income properties (e.g., net operating income and debt service coverage ratio) do not currently value utility savings or revenue increases due to energy efficiency	Educate lenders about financial benefits of energy efficiency. Create a body of research to demonstrate financial benefits <i>Strategy R8</i>

Strategy 1. Provide Wrap Around Services, Support and Financing

Tactic R8: Focus on building on-going, long-term relationships with property owners through ZNE investment planning and operational savings

Tactic Objective: Enable multifamily property owners to optimize trigger points and capital resources effectively

The multifamily sector typically undertakes building improvements over time, aligning with certain trigger events and as capital resources become available. To align with this practice, the BayREN program will focus on building on-going, long-term relationships with property owners through excellent customer service, Zero Net Energy (ZNE) investment planning and operational savings. Extending program cycles beyond one year authorizations will allow the program to assure the property owner of future assistance and facilitate trust building between the program and property owner.

ZNE investment plans include phases of upgrade scopes that are planned to occur sequentially to result in the deepest energy savings possible. The plans will be used as schedules for re-engaging the property owners when the planned date for the next phase is approaching. The program currently offers ZNE planning for interested property owners. We will continue this offering through TA services and build a portfolio of 20-40 projects with ZNE plans to establish the model of following up over time. As the timing for the next phases of ZNE plan scopes approaches, the program will introduce an incentive structure specifically for the second or third phase. Within the 10 year horizon, the program aims to incentivize its first projects to complete their full ZNE plans.

The core of a long-term engagement strategy is relationship building. The BayREN has already establishing lasting relationships with property owners and portfolio owners. Portfolio owners in particular have the potential to upgrade project after project over time. Ongoing relationships also allow conversations about operational savings which are currently left on the table. While engaging with hundreds of property owners through BAMBE technical assistance, we have gained insights into how to evolve the program offerings to target deep energy savings over time required to meet state and local energy efficiency and climate goals.

Strategy 2. Drive Adoption and Performance with Properly Aligned Incentives

Tactic R9. Continue BAMBE streamlined technical assistance and rebate program model

Tactic Objective: Expand program uptake until substantial market share demonstrates viability of whole-building upgrades

The 2013-2015 BAMBE program exceeded enrollment and completion expectations. It demonstrates an effective model for achieving multiple-measure upgrades in every segment of this hard-to-reach sector. BAMBE offers streamlined, program-provided technical assistance and a flat per-unit rebate for any scope that meets the minimum savings and measure count requirements. The program was designed to address several aspects of our defined problem statement. Specifically, it addresses the sector requirements for a customized, flexible offering; low transaction costs by offering no-cost up-front technical assistance and simplified program participation requirements; and sufficient incentives to make the project financially justifiable. The offering was designed based on property owner input and aligns with the Multifamily Home Energy Retrofit Coordinating Committee (MF HERCC) recommendations.

The BayREN's first strategy is to continue the popular BAMBE streamlined technical assistance and rebate program model to reach substantial market penetration (5-10%). The industry seeks best asset management practices and BAMBE aims to reach a significant enough market share to demonstrate the viability of multiple-measure upgrades, highlighting diverse case studies.

Strategy 3. Test and Demonstrate Innovative Deployment Methods

Tactic R10. Introduce other market drivers, specifically local government policies, green labeling, and access to financing

Tactic Objective: Adoption of local government policies and presence of other market-based mechanisms that encourage building upgrades

Once a substantial market share has demonstrated the viability of whole-building upgrades, BayREN plans to shift its focus to supporting market-based mechanisms that require less ratepayer funding over time. Specifically, BayREN plans to advance local government mandatory policies, green labeling initiatives, and access to private-sector financing. This market-focused strategy could be broadened to encompass other market mechanisms that are identified to be potentially effective and meaningful to the market overtime. We anticipate adjusting the existing technical assistance and incentive offerings to complement

these drivers. For example, the multifamily effort seeks to align technical assistance with requirements of local government policies, or to support green labeling through an aligned incentive design.

Local government policies

The BayREN will assist local governments to pass appropriate policies to require multifamily property owners to disclose their energy usage or system characteristics (e.g. through an audit report) and/or undertake upgrades. The type of policy will depend on each jurisdiction's goals and political dynamics. Policies may require benchmarking, audits, or upgrades. They may apply to all or a portion of the multifamily housing stock based on variables such as size or age. They may be triggered by certain events like sale or rental of a property, or may apply to all applicable properties by a certain compliance date. The BayREN members will begin in the short-term with recognition of the many successfully completed BAMBE projects and build a case for normalizing energy efficiency practices in the industry. At the same time, the BayREN will develop policy tools for the multifamily sector, which will be used in the mid-term to support local governments in adopting policies. Technical assistance services and incentives will be continued and aligned to support property owners with policy compliance.

Green Labeling

In the mid to long-term phase of this business plan, the Green Labeling program will build on the experience and lessons learned in the single family sector and expand to include multifamily properties. The green labeling strategy aims to increase market value for energy efficiency properties and green operating and maintenance practices. The BayREN will engage real estate brokers, partner with green labeling programs and industry platforms, such as tenant-oriented sites and apps. Success will be measured by an increase in the number of green labeled properties and studies that demonstrate a tangible value add for adding a green label to the property.

There is currently no standardized way for owners of existing multifamily properties to convey an apartment's green or energy efficiency features to tenants or prospective renters. A standardized green label that is affordable and relatively easy to provide could benefit multifamily property owners in many ways, including increasing tenant retention and potentially receiving higher rents for energy efficient units.²⁷

In addition, a multifamily green label could make it easier for renters to identify healthier, more comfortable and more energy efficient homes. Recent real estate and apartment industry surveys reveal trends that the renter population is more permanent and likely to grow compared to single family homeowners. If today's renters remain renters much longer than previous generations, it is likely they will increasingly seek amenities similar to what they would expect from single family homes, such as green and energy efficiency features.

²⁷ Eighty-nine percent of renters are willing to pay \$25 or more in rent per month for a green apartment (Strata Research, "Green Renter Survey Executive Report," 2011).

Multifamily financing

Financing is a mechanism to bring more private capital into funding energy efficiency projects, allowing programs to reduce direct incentive expenditures. There is potential to leverage financial trigger events, such as refinancing and recapitalization events, and insert energy efficiency work scopes. The multifamily lending industry is diverse like its housing stock, and successful strategies need to address this diversity. With this in mind, BayREN introduced BAMCAP which was designed to be flexible and work with existing industry lending practices. BAMCAP has successfully closed loans in a sector where other products have struggled to gain a foothold, but the program is resource intensive and its overall capital pool is insufficient to fully test the market potential for the program design.

The BayREN also offers its Water Bill Savings Program (formerly BayREN PAYS® - see Cross Cutting Chapter) in partnership with participating water utilities to deliver water efficiency improvements as part of water utility service, and allows certain cost-effective energy measures to ride along on the water bill surcharge mechanism.

Additionally, BayREN multifamily technical assistance is able to provide program referral to financing products offered by other entities, such as PG&E On-Bill Financing (OBF), Property Assessed Clean Energy (PACE) products, and Master-Metered Multifamily On-Bill Repayment (OBR) when available.

Since 2013, when BayREN originally designed BAMCAP, the private sector has made significant progress toward offering energy efficiency financing products to the multifamily sector. Small and large portfolio lenders have introduced products since then, including Fannie Mae and several regional banks. BayREN will leverage these new products by engaging the lenders to establish referral protocols from the BayREN pipeline to appropriate financing products. BayREN continues to focus on its role of filling gaps in the market, and will refine BAMCAP to target it to market segments that remain underserved by existing and emerging, public and private lending products.

Leveraged Activities for BayREN Residential

The BayREN, as a collaboration of local government implementers, is uniquely positioned to address the needs of homeowners, renters and contractors. This can be done through our marketing, education and outreach, partnerships and collaborations with other agencies and providers, as well as public perception as a trusted messenger.

As a local government entity, the BayREN can leverage other programs and agencies to expand benefits to residents that may not be available for an IOU only program. The BayREN will leverage Local Government Partnerships, Community Based Organizations and member agencies to expand outreach efforts and connect with homeowners as a trusted messenger. The BayREN also offers its Water Bill Savings Program, in partnership with participating water utilities, to deliver water efficiency improvements as part of water utility service, and allows certain cost-effective energy measures to ride along on the water bill surcharge mechanism. BayREN is developing stronger relationships with other agencies such as the ABAG resiliency program and the Bay Area Air Quality Management District to create new cross-promotional products such as the “Resilient Home”, which will leverage the whole home program and pair it with earthquake retrofits. Similarly, the BayREN is investigating testing approaches for Community Scale retrofit programs that integrate water, waste and alternative transportation. The intent is to continue to innovate with small scale efforts and test the feasibility to increase to a mainstream effort that can be adopted throughout a REN or Utility territory.

Home Energy Score in the Bay Area

In 2015, after analyzing various alternatives, BayREN member StopWaste began offering HEScore, a U.S. Department of Energy (DOE) program, in the Bay Area through an official partnership with the DOE. The HEScore report provides a critical link between information and action. HEScore uses a simple metric similar to a vehicle’s mile-per-gallon rating. Single family homes are scored on a scale from 1 to 10 relative to other homes in the same climate zone, with 10 representing a highly efficient home and 1 representing a low efficiency home. The score reflects expected energy usage based on the home’s building energy efficiency characteristics. The cost of delivering a standalone Home Energy Score in the Bay Area is on average \$250.

BayREN has funded the recruitment and training of HEScore qualified assessors, development of HEScore program protocols, and the creation of a customized energy efficiency upgrade recommendations report that aligns with the Home Upgrade program or future whole home program. Along with the score and customized report, BayREN’s single family program provides homeowners with associated energy and cost saving estimates, and referrals to home upgrade programs, incentives, and financing tools. A recent ACEEE presentation entitled “Predicting Home Energy Rating and Disclosure Program Impacts for North American Jurisdictions” found that 12-37% of home buyers act on energy improvement recommendations provided at time of sale.

BayREN's Green Labeling program will build on the current HEScore program by carrying out these activities:

- Expand availability of the Home Energy Score program throughout the region
- Continue training and supporting contractors and other building professionals to serve as HEScore assessors
- Offer Home Energy Score incentives to promote voluntary participation
- Support contractors in marketing HEScore as a pathway to efficiency upgrades
- Develop tools to streamline HEScore quality assurance and field data collection/submittal for home inspectors
- Bundle Advanced Home Upgrade assessment incentive with HEScore
- Test ways to improve the affordability and accessibility of green labels for multifamily buildings

In the mid-term of the program, EM&V could include an evaluation of the follow up from Home Energy Scores provided at time-of-sale. This would help determine the effectiveness of Home Energy Score as a lead generator for completed home upgrades. The analysis could be combined with evaluation of the BayREN single family program. The California Energy Commission anticipates that a new Energy Rating Index will be available by 2020, at which time BayREN could participate in a pilot program.

The later stage of the Green Labeling program (years 8 to 10) includes activities designed to evaluate the value of labeled homes. This may include a follow-up study to the report, "The Value of Green Labels in the California Housing Market." This 2012 study by researchers at UC Berkeley and UCLA provides an economic analysis of the impact of green labeling on the sales price of homes. The researchers found that homes in California labeled with Energy Star, GreenPoint Rated or LEED sell for a premium compared to comparable, non-labeled homes. This was the first rigorous, large-scale independent economic analysis of the value of green homes in California.²⁸

BayREN is proposing to support a follow-up evaluation that includes existing homes after enough time has elapsed to do a fair analysis of the potential impact of ratings, labels or documentation of completed energy upgrades on home sale prices.

²⁸ Report available at: www.stopwaste.org/about/news/homes-green-labels-sell-more

Coordinating Activities

EM&V

BayREN Responses to 2013-14 EM&V Studies

Single Family Data Quality and Tracking: BayREN feels that a better platform for communication of expectations regarding reporting should be implemented to enhance consistency. BayREN is working to ensure our data sources are aligned when submitted to the CPUC. We have set up an internal process to conduct data quality checks on a quarterly basis including running data through the Cost Effectiveness Tool (CET) for quarterly reporting. The single family sector will cooperate in tracking costs associated with both resource and non-resource activities.

Multifamily Data Collection: The multifamily sector currently lacks access to whole building aggregate energy usage data due to IOU technological limitations or policy restrictions. The BayREN will cooperate with efforts under AB 802 compliance to obtain this meaningful level of utility billing data. This data will allow for a reconciliation of modeled savings as well as monitoring actualized savings over time.

Multifamily Internal Performance Analysis: The BayREN's Multifamily program is designed specifically to respond to continuous internal performance analysis and be adjusted accordingly. The primary metrics the program will track include: kWh and therm savings per incentive dollar, dollars of private participant investment per incentive dollar, participant satisfaction and feedback, and how well the portfolio of participating buildings reflects the housing stock in variables such as geography, size, affordability, and vintage.

Multifamily Net-To-Gross: In relation to the Multifamily program, the CPUC evaluations produced recommended NTG values. Net energy savings and TRC have incorporated these recommended values. To improve upfront assessment of potential free ridership, the multifamily technical assistance offering will begin to include some of the EM&V survey questions during initial technical assistance. While it will be difficult to exclude participation of free riders, this information will inform program design adjustments to reduce the percentage of free-ridership, for example by changing the eligible measures list to exclude measures that most frequently observe free-ridership.

BayREN Anticipated Residential EM&V Study Needs

The BayREN proposes to continue efforts with the CPUC to establish and pursue appropriate methodologies to evaluate BayREN's programs in the context of hard-to-reach markets, moderate income approaches and the State and local climate goals, including the following non-energy benefits:

- Carbon and other GHG reductions
- Contractor services
- Health and indoor air quality
- Climate resilience

Marketing, Education & Outreach

BayREN's unique organizational structure as a collaboration of the 9 Bay Area counties has enhanced the success of its programs through our perception as trusted messengers. As local governments, we are known and trusted by the local communities and have a long track record of delivering successful program and services. Local governments may also leverage marketing and outreach strategies with other local programs providing a full offering to consumers and contractors. There are 101 cities within the 9 BayREN counties that can serve as program partners and further customize the message of energy efficiency and the whole home concept. Furthermore, local governments may leverage partnerships with community based organizations and other sustainability and energy related local initiatives. BayREN also works closely with the Statewide ME&O Energy Upgrade California program and coordinates marketing efforts where possible.

Workforce Development, Education and Training

As discussed earlier, BayREN offers a Core Contractor Training program and specific online training to educate contractors about the particulars of the BayREN programs. Moving forward, training resources may expand or leverage existing Workforce, Education and Training ("WE&T") offerings related to building a home performance business, sales training, and other similar offerings that will help contractors become more successful and profitable. This will include increased Home Energy Advisor support to contractors and additional technical trainings to expand the skills of the workforce, and to help reach deeper energy savings.

Cross-Cutting Efforts

BayREN Water Bill Savings Program

The BayREN also offers its Water Bill Savings Program. Water and energy efficiency are currently siloed, when leveraging them together could enable greater savings in both resources. The PAYS® model delivers efficiency improvements as part of utility service, and allows certain cost-effective water and energy measures to be installed and repaid through an efficiency charge on the utility bill.

The BayREN Water Bill Savings Program works with partner municipal water utilities (Partner Utilities) to facilitate efficiency services (Services) that provide water customers (including hard to reach classes such as multifamily and small commercial) with on-bill upgrades for cost effective measures. Consistent with EEBE Action Plan Strategy 5.4.3 to provide alternative models for streamlined delivery of efficiency

solutions, Water Bill Savings Programs implemented by Partner Utilities offer customers a simple path to install energy- and water-saving technologies with no up-front cost. Participating customers pay for measures through a monthly tariffed “efficiency charge” attached to their utility meter, with the assurance that their total utility bill savings will exceed program charges. Current BayREN Partner Utilities include the Town of Windsor, the City of Hayward and East Bay Municipal Utility District (EBMUD). BayREN is proposing to expand partnerships through a regional model to include 10 Bay Area water utilities in the short term (i.e., 1-3 years), 20 utilities in the medium term (i.e., 4-7 years), and 40 utilities in the long term (i.e., 8-10 years).

Key Partners/Coordination

The BayREN will work with, partner and coordinate with a number of State, Regional and local government agencies, as well as Bay Area specific groups related to energy and climate change. Groups include, but are not limited to:

Partner	Single Family Coordination	Multifamily Coordination
Bay Area Cities and Counties	Outreach partner	Outreach partner
PG&E Coordination	Leverage program offerings	Leverage program offerings
PG&E Local Government Partnership Programs	Leverage program offerings	Leverage program offerings
California Solar Initiative	Leverage program offerings	Leverage program offerings
Community Service & Development (CSD) Weatherization and Low Income Programs	Leverage program offerings	Leverage program offerings
Community Choice Aggregation (CCA) energy efficiency programs	Leverage program offerings Outreach Partner	Leverage program offerings Outreach Partner
Municipal utility programs	Leverage program offerings Outreach Partner	Leverage program offerings Outreach Partner
Water Utilities	Leverage program offerings Outreach Partner	Leverage program offerings Outreach Partner
Financing Programs	Leverage program offerings	Leverage program offerings

	Outreach Partner	Outreach Partner
Other government demand side energy programs (EE, DG, EV, etc.)	Leverage program offerings	Leverage program offerings
Local Trade and Real Estate Associations, Workforce Investment Boards, Retailers, Suppliers	Outreach Partner	Outreach Partner
Green Building Labeling Organizations	Outreach Partner	Outreach Partner
Community Based Organizations, Religious Institutions, Educational Institutions	Outreach Partner	Outreach Partner

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Section 3
COMMERCIAL SECTOR

Introduction

The BayREN Commercial Sector Business Plan targets Small and Medium Commercial Buildings (SMCB) and small and medium business (SMB)¹ customers with efficient service delivery and comprehensive, cost-effective measures to lower energy costs and improve their facilities. The business plan strategies leverage existing and new offerings, and coordinating closely with local governments, Local Government Partnerships (LGPs), Energy Efficiency (EE) finance providers, and an array of cooperative public agencies and programs that provide SMCB customers, including the Hard-to-Reach².

Ten Year Vision, Outcomes and Budget

Vision: *In ten years, decision-makers in the Bay Area's SMCB sector will increase engagement in energy efficiency behaviors and equipment upgrades as a matter of regular practice.*

Outcomes:

- *10% of Bay Area SMCB's in target market to receive comprehensive upgrades achieving minimum 20% energy savings.*
- *\$50 million in leveraged private capital invested into SMCB energy efficiency as a result of BayREN offerings.*

Ten year budget (total): \$37,070,850

A multi-level strategic approach will be offered to the SMCB sector with trusted information and a range of solutions delivering energy savings recently enabled by legislation and new technology (e.g. AB 802, SB 350, AB 793). Innovative private financing models, both publicly supported and 100% private, will play a key role in program delivery and will complement existing and new energy efficient incentive structures. BayREN activities are designed to meet SMCB customers and building owners where they are, while promoting comprehensiveness, market-based solutions, deep energy reduction, and long-term energy management goals.

Market Context

The BayREN Commercial Sector Business Plan focuses on the small and medium commercial segment of the Bay Area market and intends to complement existing LGP and IOU programs, and develop and test new models of delivering energy efficiency value to this challenging customer class. The BayREN commercial strategies focus on technical support, programs, services and financing to inspire whole

¹ For this Business Plan, "SMCB" is used as a reference to small-to-medium sized commercial building owners and the tenants and business that occupy those buildings.

² CPUC "Energy Efficiency Policy Manual, Version 5", 2013, page 15.

building deep retrofits for small and medium commercial buildings. Specifically, the BayREN market focus includes the hard-to-reach sites and/or businesses or property owners with one of the following characteristics:

1. Under 200 kW in demand or Less than 20 Employees
2. Owner / Business Operator with English as a Second Language
3. Leased Space
4. Building is Under 50,000 Square-Feet

Additional market characterization data is provided on page 3.7.

Sector Summary

The following is a brief overview of initial program approaches that will be advanced in separately filed Implementation Plans and support the Business Plan intervention strategies. These concepts will evolve overtime, informed by internal evaluation and third party EM&V.

SMCB Performance Advisor

The SMCB Performance Advisor is modeled after BayREN's successful residential Home Energy Advisor, and will be a "one-stop-shop" of expert technical assistance, training, and customer and contractor engagement by providing one-time and/or ongoing assistance to enable a wide range of savings opportunities and activities, including linking to utility rebate, incentive, and financing programs. The Performance Advisor will allow the BayREN to offer a range of advisory services to busy small and medium businesses and property owners going beyond energy, including water conservation, distributed energy resources (e.g. demand response, electrical vehicle charging, energy storage), integrated financing, and other implementation support to help SMCB stakeholders participate in a range of clean energy solutions. Access will be simplified, the process streamlined, and information easily understood and acted on. Offerings will be bundled and optimized to match the site-specific and energy needs of the customer. In addition, contractors will have access to expert technical assistance services and advice on how to develop and sell successful projects.

SMCB Pay-for-Performance (P4P)

SMCB Pay-for-Performance will incent SMCB projects, at the measure and multi-measure levels, based on actual savings instead of deemed or calculated values. This approach is suggested in the EBEE Action Plan in Strategy 3.2 Performance Driven Value,³ as well as the express language of AB 802:

"the Commission... shall, by September 1, 2016, authorize electrical corporations or gas corporations to provide financial incentives, rebates, technical assistance, and support to their customers to increase the energy efficiency of existing buildings based on all estimated energy savings and energy usage reductions, taking into consideration the overall reduction in normalized

³ CEC, "Existing Buildings Energy Efficiency Action Plan", 2015, page 75.

metered energy consumption as a measure of energy savings. Those programs shall include energy usage reductions resulting from the adoption of a measure or installation of equipment required for modifications to existing buildings to bring them into conformity with, or exceed, the requirements of Title 24 of the California Code of Regulations, as well as operational, behavioral, and retro-commissioning activities reasonably expected to produce multi-year savings.”

Capturing savings enabled by AB 802 points to small to mid-sized commercial buildings that have more complex systems than simple tenant spaces, and therefore present greater opportunities in using a comprehensive whole building approach and finance-based solutions to obtaining savings.

Technologies ranging from Advanced Metering Infrastructures (AMI) to third-party aggregators have evolved and are offering reliable data analytics that result in greater accuracy in measured savings. As a result, incentives can now be set and adjusted to closely match normalized, realized savings.

Co-pay Microfinancing for Existing Incentive Programs

This financing approach identifies “good capital” (i.e. that which can bear a very low or sometimes no financial return on investment) and utilizes local micro-lenders to provide very low cost or zero percent interest loans specifically for small businesses to fund co-payments for energy efficiency projects, helping to spend down existing direct install rebate budgets and obtain additional savings from mature program infrastructure.

Hard-to-Reach businesses are often challenged by co-payments for energy efficiency projects. Based on experiences gathered from Bay Area LGPs, many such businesses cannot contribute even relatively small co-pays for high-impact energy efficiency projects because of their tight operating budgets. Indeed, even amounts less than \$500 are unaffordable and represent a very real barrier that prevents action and savings. Besides high-interest credit cards, currently there are no lending instruments available for such small loan amounts, especially for the purpose of funding energy efficiency projects.

Commercial PACE

BayREN’s existing Commercial PACE Financing initiative is designed to increase uptake in commercial PACE financing available through a variety of PACE program administrators and capital providers in the Bay Area. A tremendous amount of public and private investment has already been made to establish PACE programs throughout the state, yet for commercial property owners, much of the potential has yet to be realized. BayREN will continue to support this effort with ongoing advanced contractor training, education, and project development support services that are responsive to the priorities of the entire range of PACE “gatekeepers”: building owners, capital providers, mortgage holders, and most of all, energy efficiency contractors who are key to identifying and implementing projects.

Vision, Intervention Strategies and Objectives

Commercial Vision

In ten years, decision-makers in the Bay Area’s SMCB sector will increase engagement in energy efficiency behaviors and equipment upgrades as a matter of regular practice

This vision is supported by a cascading set of activities. Owners, tenants, and businesses will undertake a range of actions from a menu of approaches – upgrades, financing, information, and behavior. These options will increase energy and business performance, and in allocating and pricing risk among program participants, will increase transparency, align interests, and increase confidence. Readily available technical knowledge and advice, standardized formats for developing investor-ready projects, and a variety of financing options will facilitate these decisions, being specifically designed to meet SMCB customers where they are. Since energy efficiency upgrades have become a sector norm, owners will not consider the upgrade costs as an added expense, but rather see it as a new value stream to increase business health as well as the attractiveness and marketability of real estate and business assets. Private investment in energy efficiency significantly outweighs ratepayer incentive dollars in terms of potential impact, allowing limited ratepayer funds to be leveraged strategically to continue pursuing deeper on persistent energy efficiency.⁴

Intervention Strategy	Tactics	Objective
Strategy 1. Provide Wrap Around Services, Support and Financing % of budget	C1. SMCB Performance Advisor- Provide one-stop-shop/ single-point-of-contact for energy efficiency and related services and program offerings in the 9 county area	<i>Increase customer, contractor, and building owners knowledge, comfort and understanding of the benefits of doing energy efficiency upgrades</i>
	C2. Co-Pay Financing - Establish co-pay financing for existing rebate/incentives program offerings that leverage existing project delivery infrastructure (e.g. Local Government Partnership	<i>Reduce upfront barriers and increase participation in partner and regional commercial energy efficiency programs</i>

⁴ See TURN May 15, 2015 IDSM comments in R.14-10-003, page 9: “To move beyond the inherent limitations of the current customer-centric approach to bundled efficiency, new transaction structures are needed to value “bundled efficiency as energy” for capital markets. “Bundled efficiency” is site-specific, persistent, correlates well to circuit and substation loads, and is measurable at the meter. Preliminary data suggests that it may be possible to reduce building loads by 25-40% by creating long-term investment opportunities in bundled efficiency. Building energy savings of this magnitude can be valued for investment purposes as the difference in load and energy requirements pre- and post- the implementation of EE, DR, ES and distributed resources. The energy reductions are used as to create new transaction structure opportunities to attract the capital markets to invest in building bundled efficiency over 20-30+ years.”

	programs), marketing, contractors, etc.	
	C3. Commercial PACE - Educate and support Commercial-PACE gatekeepers, particularly contractors, to take advantage of PACE financing	<i>Expand use of PACE financing to reduce upfront costs and barriers to comprehensive, multi-measure upgrades, especially in SMCB's</i>
<i>S2. Drive Adoption and Performance with Properly Aligned Incentives</i> <i>% of Budget</i>	C4. Pay-for-Performance - Drive projects and energy savings via Pay-for Performance incentives paid out over time for metered savings	<i>Enable long-term energy savings in SMCB sector</i>
<i>S3. Test and Demonstrate Innovative Deployment Methods</i> <i>% of Budget</i>	C5. SMCB Portfolio and District - Employ portfolio and district approaches for commercial energy efficiency improvements	<i>Increase participation and scale of efforts, including creating effective paths to ZNE for existing SMCB.</i>

Summary Metrics and Budget

The following Sector metrics align with the BayREN Commercial intervention strategies outlined in the previous pages and indicates anticipated short, mid- and long-term targets for each program area. A full metrics table is detailed at the end of this chapter.

Intervention Strategies	Market Effect Metrics	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Strategy 1. Provide Wrap Around Services and Support Estimated % of annual budget:	Expanded small commercial EE workforce empowered to deliver integrated and attractive SMCB solutions	Program start will establish baseline at 0	Program Tracking Database	50 participating SMCB Contractors Completing 10+ Projects/Year	Increase 5% over previous year	Increase 5% over previous year
	Increase SMCB participation comprehensive solutions adopt pathways to zero net energy (or ZNE-ready) retrofits	Program start will establish baseline at 0	Program Tracking Data	Annual # of leads: 50; Number of Projects: 5 Dollars loaned: \$2 million	Number of leads: 100; Number of Projects: 20 Dollars loaned: \$8 million	Number of leads: 200; Number of Projects: 75 Dollars loaned: \$20 million
Strategy 2. Drive Adoption and Behavior with Properly Aligned Incentives	Widespread interest in EE solutions where incremental cost is no longer a major barrier and customers act on projects based on high confidence in financial benefits of EE investment.		Program Tracking Database	Annual # of P4P projects (average/yr): 165 P4P incentives paid (average/yr): \$825,000	Annual # of P4P projects (average/yr): 200 P4P incentives paid (average/yr): \$1,000,000	Annual # of P4P projects (average/yr): 300 P4P incentives paid (average/yr): \$1,500,000
Strategy 3. Test and Demonstrate Innovative Energy Efficiency Deployment Methods Estimated % of annual budget: 25%.	Increase number of SMCB engaged with a single coordinated effort via portfolio or district engagement		Program Tracking Database	– Efforts likely to begin year 3-4	2 Districts or Portfolios annually	3 Districts or Portfolios Annually

Budget (\$)	2016*	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Non-Incentive	431,578	1,040,000	2,495,000	3,112,000	3,205,000	3,301,000	3,226,000	3,323,000	3,423,000	3,526,000	3,632,000
Incent	0	0	500,000	1,000,000	1,342,000	1,342,000	1,342,000	1,342,000	1,342,000	1,342,000	1,342,000
Total	431,578	1,040,000	2,995,000	4,112,000	4,547,000	4,643,000	4,568,000	4,665,000	4,765,000	4,868,000	4,974,000

* 2016's actual budget is included for reference. 2017 budget is proposed as year 1 of the 10 year Business Plan. BayREN has also included an annual cost of living adjustment in the proposed budgets for 2018-2026. The 2017 Advice Filing submitted on September 1, 2016 is intended as a placeholder only until this Business Plan is approved.

This budget will facilitate the forecasted short, mid, and long term metrics targets with the expectation that increased participation and project volume is achieved as initial efforts scale and gain traction.

Market Characterization

The Bay Area is home to an abundance of small businesses that are vital to the economic health of the region, provide crucial needs and services, and collectively, represents an underserved market segment with robust opportunities to realize vast energy savings. Additionally, reducing energy consumption in SMCBs is essential to meeting emissions reduction targets and requirements set by local governments, California's AB32 and related policy mandates. Therefore, the BayREN Commercial effort targets the small, medium and micro-sized businesses, referred to as Hard-to-Reach¹. As a REN, our directive is to serve the Hard-to-Reach sectors with programs in areas where the utilities cannot, will not, or have not had success in deploying comprehensive energy effective retrofits. To that end, the BayREN commercial programs focus on whole building, multi-phase, comprehensive retrofits for the SMCBs.

SMCB Market Share

In 2015, the nine Bay Area counties are home to 274,946 businesses, of which 246,237 of them hire an average of less than 20 full-time employees⁵. In other words, nearly 90% of businesses in the region may be classified as “small businesses” under different criteria, ranging from annual property tax / payroll to gross receipts. Sector growth is trending upward because this region continues to economically expand and attract entrepreneurs, despite high business costs such as rent, licenses, and labor. This is because the Bay Area is a mass market of more than 7 million people, in 101 cities⁶, with comparatively high household incomes. As such, “the number of small businesses in this region is projected to grow, with an estimated 64% of Bay Area small businesses planning to hire in the coming year (2016), an increase from 42% a year ago. Additionally, 77% of area businesses plans to grow their business over the next 5 years, a 16% increase from last year, and 71% are confident their revenue will increase in the coming year, a 17% point jump from a year ago.”⁷

⁵ California Employment Development Department, Labor Market Information Division, Data by Counties, 2015.

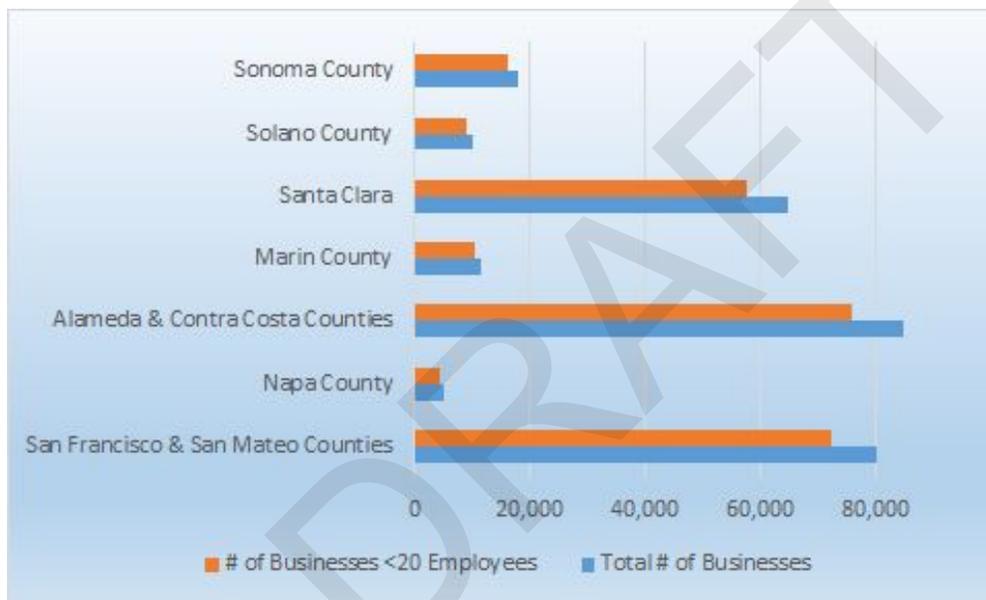
⁶ MTC-ABAG Library, “Bay Area Census Data,” 2010.

⁷ Bank of America, “Small Business Owner’s Report,” Fall 2015.

Collectively, small businesses represent a powerful economic engine whose presence has a huge impact on not just the Bay Area, but the State. The Bay Area’s 2014 Gross Domestic Product is \$721 billion, making it the leader in California and the U.S.⁸ According to the California State Employment Development Department (EDD), Bay Area businesses with less than 20 employees hire 5% of the total number of employed persons in the State, with an annual payroll exceeding \$305 million.⁹ As Figure 2 shows, most of these small businesses are clustered in the three major metropolitan areas of San Francisco, Oakland-Alameda and Santa Clara.

The Bay Area SMCB market is robust and growing. It provides vital goods and services to the area’s population and is a powerful economic force that attributes to the State’s continued economic well-being. Thus, this sector has a large potential for delivering innovative, effective, comprehensive energy-efficiency solutions.

Figure 1. No. of Businesses with <20 Employees by County

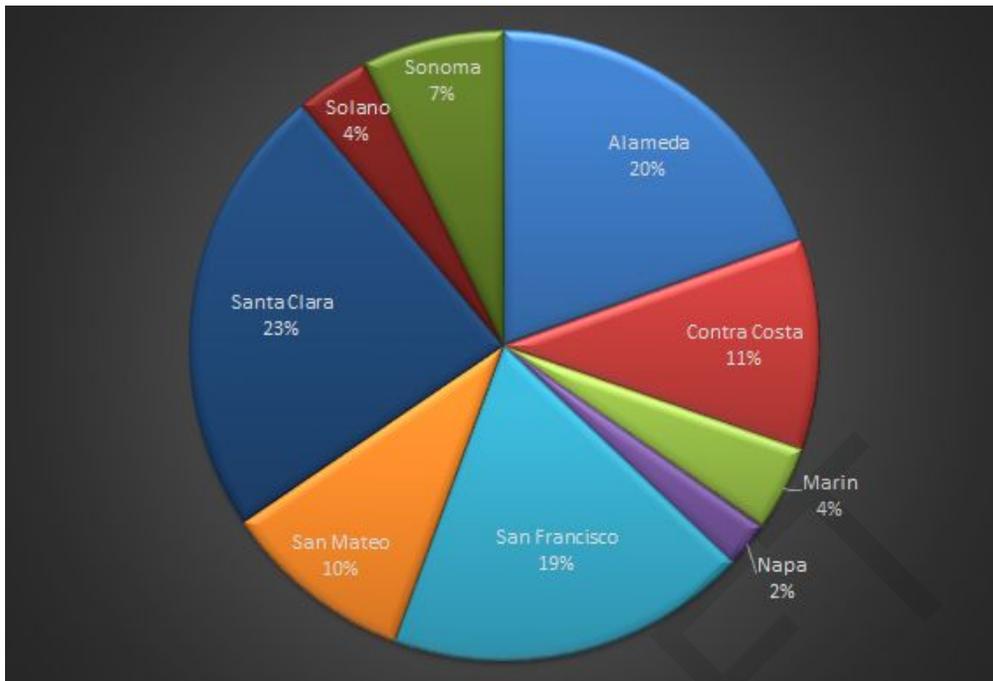


Source: California EDD, Labor Market Information Division, Business Data by Counties, 2015.

⁸ US Bureau of Economic Analysis, 2014.

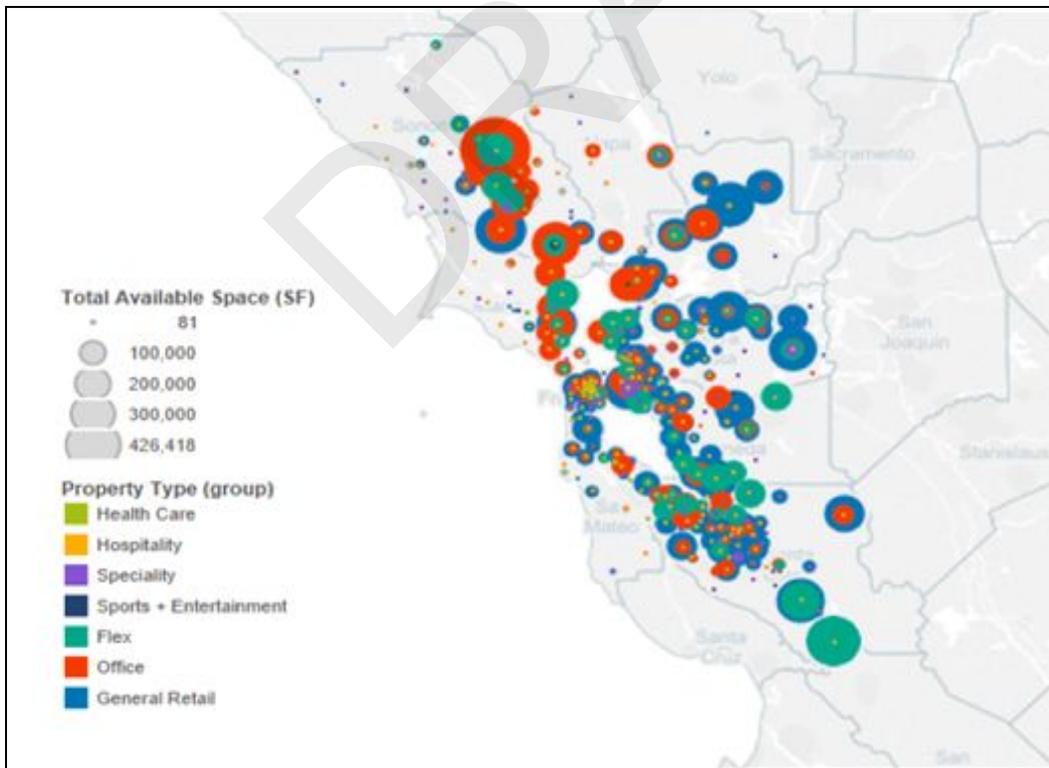
⁹ California Employment Development Department, Labor Market Information Division, Size of Business Data, 2015.

Figure 2. No. of Employees in Businesses with <20 Employees, by Bay Area Counties



Source: California EDD, Labor Market Information Division, Size of Business Data, 2015.

Figure 3. Commercial Buildings Location and Square Footage by Type



Source: BayREN Commercial Building Screening Tool, 2014

Nationally, in 2014, this sector was responsible for 47% of building sector energy consumption in the U.S. and represent 51% of total floor area. Of the approximately 4.8 million commercial buildings in the U.S. (of which 98% are less than 100,000 square feet in size), fewer than 10% have Building Automation Systems (BAS). In light of new technological advances in advanced metering, the granular insight and data analytics BAS provide, and the ability to participate in automated Demand Response programs, this is an area of significant opportunity to create new channels for SMCB's to participate in and benefit from energy efficiency solutions. Further, "more than 50 percent of commercial buildings nationwide are less than 5,000 square feet, and 82% of those contain only one business. Another 36% of commercial buildings are between 5,000 and 25,000 square feet, with 74% containing one business. Only 10% of commercial buildings are more than 25,000 square feet. This indicates the importance of addressing the small and medium-size building sector and potentially focusing on the single tenant instead of the larger buildings with multiple tenants."¹⁰

As illustrated in Figure 4, locally, of the 61,926 office, retail, hotel, and industrial buildings in the nine-counties, 91% (56,473) are less than 25,000 ft², 51% are less than 5,000 ft² and 70% were built prior to 1990.¹¹ In addition, San Francisco and Berkeley are currently leading implementation of commercial building benchmarking and energy audit ordinances that apply to more than 1,620 SMCB's each year,¹² offering the BayREN unique insight into owner performance patterns, and opening unique pathways to engage with and support small and medium owners and stakeholders to manage and improve energy efficiency over time.

¹⁰ Navigant Consulting, "California Potential and Goals Study", 2013, page XX.

¹¹ BayREN, Commercial Building Data Gather and Cleaning Tool, 2014.

¹² Data provided by Cities of San Francisco and Berkeley, 2015.

Figure 4. Bay Area Building Stock Characteristics

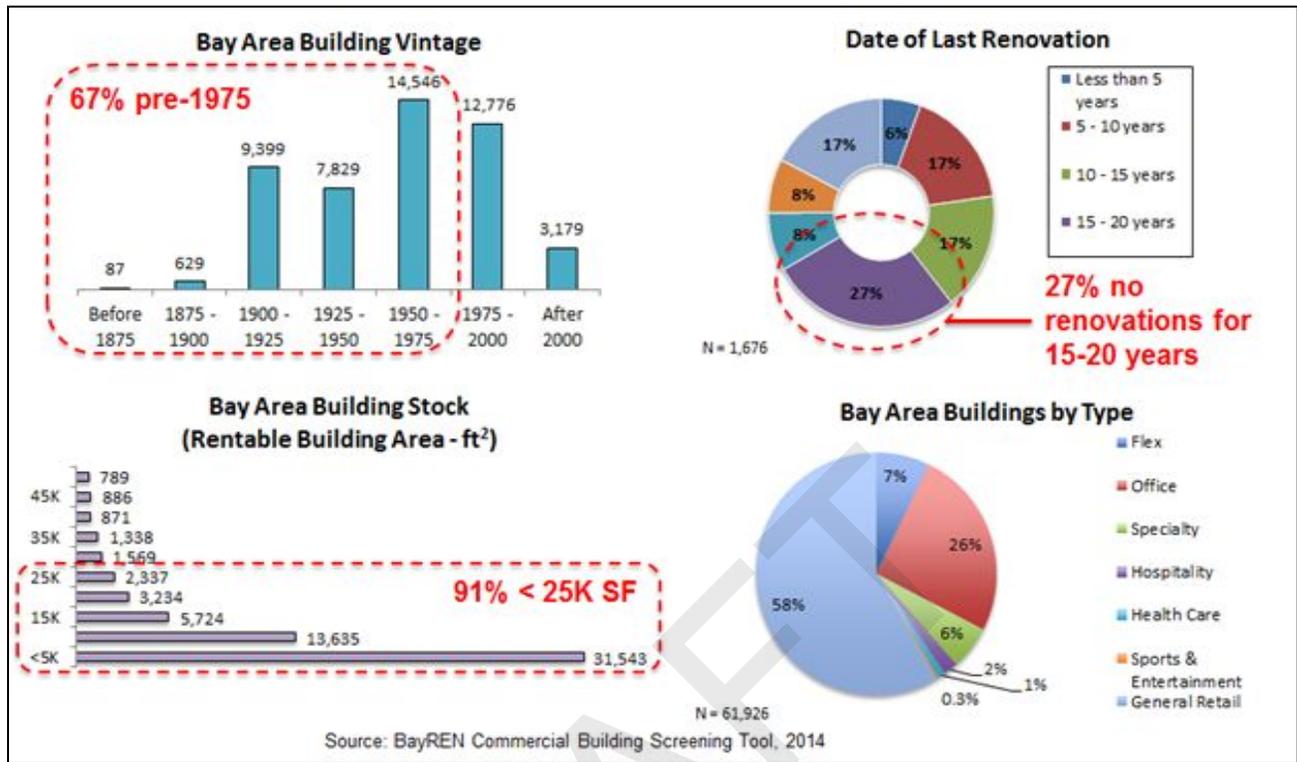
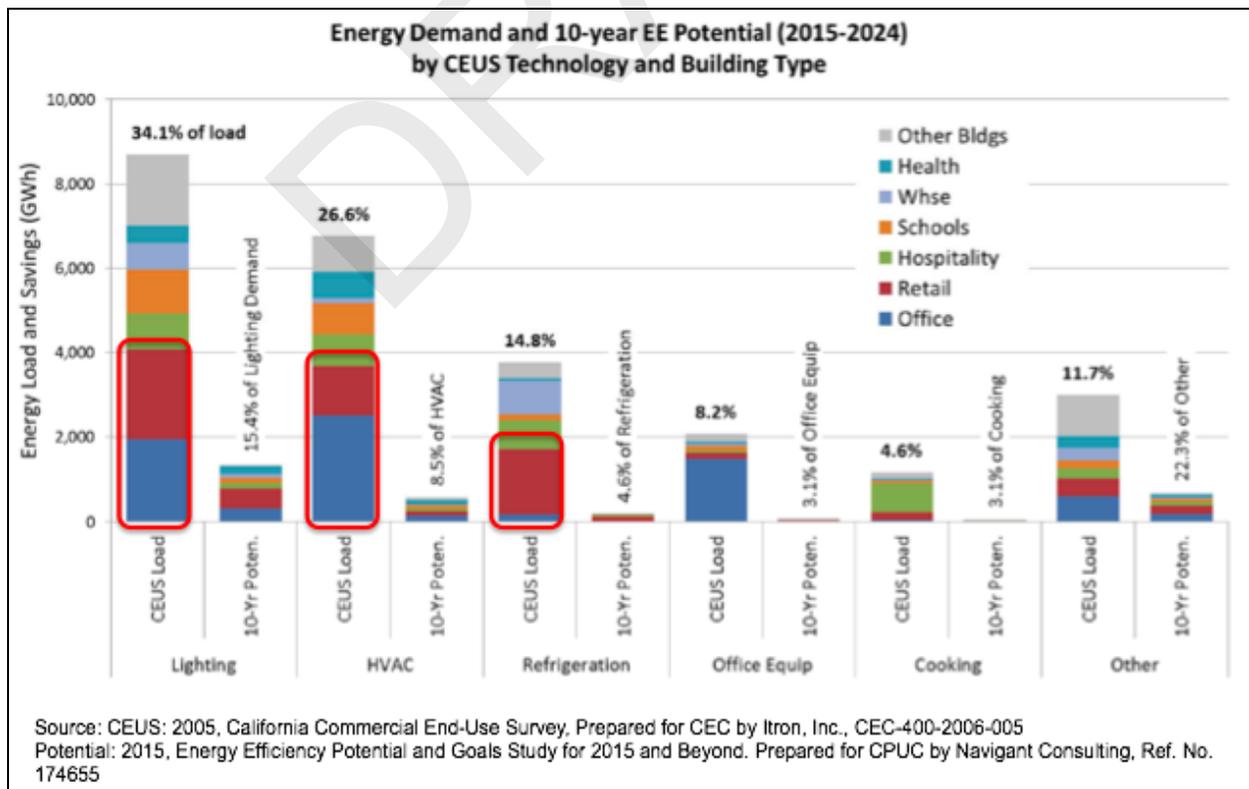


Figure 5. Load and Savings Potential by Building Type



Energy Efficiency in SMCB

Traditional “widget-based” rebates and incentive programs, with savings based on deemed values, have been successful in reaping the “low-hanging fruits,” such as lighting and refrigeration upgrades. However, they have had less success in developing and implementing comprehensive energy efficient projects which typically require sophisticated evaluation techniques and more engineering. Furthermore, ACEEE research reveals that programs that offer comprehensive retrofits have relatively low participation rates due to the complexity and costs of typical complete retrofits, as well as the fact that major renovation projects are often included in new construction programs.¹³ Existing program limitations aside, SMCB stakeholders typically have limited time, money, and expertise to address energy efficiency improvements that would benefit their businesses.¹⁴ As a result, traditional small business programs historically have relied heavily on lighting improvements, as these offer quick paybacks and are relatively simple to implement. Although rebates in HVAC, food service and laundry equipment and controls are offered, the measure lists are short (as compared to lighting), and associated rebates represent a fraction of the overall upgrade cost. In other words, rebates and incentives have limited impact in aiding the business decision of the small business owner. Moreover, such equipment requires much more technical and financial assistance, and are often beyond their immediate capacity.

Additionally, whole building retrofits, lighting, refrigeration, and HVAC represents the greatest source of energy savings potential in California, but this sector is well recognized as “hard-to-teach” because of its perceived value of energy efficiency towards lowering building operating costs; bias toward conservative risk metrics (simple payback) instead of business health metrics (cash flow); lack of the knowledge and technical information to implement cost effective energy efficiency measures/projects; lack of capital and credit required for conventional financing¹⁵; and the belief that existing equipment is adequate. Energy costs are perceived as fixed and energy efficiency improvements are often perceived as an inconvenience and are not a priority. Further, energy-related investment decisions are typically in the hands of small business stakeholders who have little time to be concerned or informed about energy management.

According to the American Council for an Energy-Efficient Economy (ACEEE), annual participation rates of surveyed SMB programs were typically in the 1 to 2% range¹⁶. However, the savings and economic benefit potential is too significant to be ignored: one study by NREL estimates that well designed small business energy efficiency initiatives could result in 1.07 quadrillion Btu of site energy savings, or \$30 billion in energy cost-savings every year in the U.S.¹⁷

The current small business characterizations are based on a modified version of the “Hard-to-Reach” definition, from CPUC Resolution G-3497, resulting in qualifications that exclude many legitimate small businesses in the region. As a result, efficiency-program participation from this sector is low compared to the number of small businesses. For example, data from the San Francisco Direct Install program

¹³ ACEEE, “The Promise and Potential of Comprehensive Commercial Building Retrofit Programs,” 05/2014

¹⁴ CEC, “Existing Buildings Energy Efficiency Action Plan,” 2015, page 19.

¹⁵ Navigant Consulting, “California Potential and Goals Study”, 2013.

¹⁶ ACEEE, “Growing the Energy Efficiency Pie,” 2015, p. 49

¹⁷ NREL, “Small Buildings = Big Opportunity for Energy Savings”, December, 2013.

indicates a 16% participation from this sector.¹⁸ Most of these sites are micro, not small, businesses as indicated by their kWh usages. Comparatively, the latest information indicates that of the 80,433 businesses in San Francisco and San Mateo Counties, 72,481 businesses (90%) have <20 employees.¹⁹

Small and Medium Contractors and Energy Service Providers

Finally, new initiatives that will effectively reach this latent market must address not only customer barriers, but also address those faced by contractors. *“...[T]he residential and small commercial market segments are together, because, technical considerations aside, these markets share many characteristics. The small commercial and single-family residential market segments are highly competitive and price-driven. Consumers in these segments have difficulty distinguishing contractors on the basis of quality, because many of the attributes that contribute to energy efficiency—such as unit sizing, duct sealing, air flow, and refrigerant charge—cannot be easily appraised by most consumers. Barriers to entry for firms in these market segments are fairly low, but an estimated 25 percent of all HVAC firms go out of business in a given year.”*²⁰

Addressing contractor barriers is critical for increasing program participation. Typical barriers include high transaction costs, lack of functional alternatives to building energy modeling²¹, limited financing options to offer customers, and a general lack of sales and marketing skills to move multi-measure projects. Several of BayREN’s suite of commercial offerings (such as the existing Commercial PACE subprogram) emphasize the need to support contractors, specifically smaller firms that have participated in traditional direct install programs, in order to expand the workforce needed to serve SMCB’s with holistic, comprehensive energy solutions.

Figure 5. Difference in Large and Small Commercial Contractors Markets

	High Road	Low Road
Market Segments	<ul style="list-style-type: none"> • Large owner-occupied commercial • Public buildings 	<ul style="list-style-type: none"> • Residential • Small commercial
Wages	\$14 to \$22/hr+ entry wage for apprentices Prevailing wage average \$37/hr (plus benefits)*	\$10 - \$15/hr Maximum around \$25/hr
Turnover	Low	High
Training	5-year apprenticeship, comprehensive, funded by employer/employee contributions averaging \$1.15 per journey hour worked	On the job, skills specific, paid for by worker or public subsidy
Certifications**	Common Journey Card NATE UA STAR TABB	Rare NATE HVAC Excellence ICE

Source: DVC, Needs Assessment, Page 99.

¹⁸ City of San Francisco, Direct Install Program Data, 2012-9/16.

¹⁹ California Employment Development Department, Data for Metropolitan Areas, San Francisco & San Mateo Counties, 2015.

²⁰ Don Vial Center on a Green Economy, “California WE&T Needs Assessment”, 2011, page 93.

²¹ NEEA, “Existing Building Renewal: Deep Energy Renovation Planning Workshop Summary Report,” 2010.

In summary, the proposed BayREN SMCB programs are structured to specifically serve a Bay Area SMCB market characterized as growing and vital to the economic health of the region, yet also underserved resulting in stranded opportunities especially in HVAC and other integrated whole building solutions. Traditional programs have led to much lighting and refrigeration improvements, but barriers, such as lack of time and technical capacities, financing and contractor involvement, remain.

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Commercial Strategies and Tactics

The BayREN SMCB Business Plan was informed by lessons learned from the BayREN Home Upgrade Program, Multifamily Program, and current commercial efforts within the Bay Area, among others. These activities illustrate the critical need for a strong contractor training and engagement program, the effectiveness of technical assistance and “one-stop” shop resources, as well as aligned incentives and other mechanisms to engage property owners and help move them to action.

Problem	Market Barriers	Strategy and Tactics
<p>SMCB customers lack the capacity and capital resources to engage in comprehensive program offerings and solutions, causing low or static participation rates, “stranded savings”, and missed opportunities to reduce energy costs and maintain savings over time</p>	<ul style="list-style-type: none"> ● Fragmented sector, diversity of building ownership structures ● SMCB customers focus on immediate business operations and near term finances ● Specialized and often changing offerings make it challenging to engage SMCB customers 	<p>Provide technical assistance, build long-term engagement and relationships with property owners as well as tailored financing mechanism. S1. Wrap Around Services, C1, C2, C3</p>
<p>Contractor base is limited in size and constrained by current programs that favor single measure projects, leading to unrealized value. Lack of transparency standardization in EE project proposals</p>	<ul style="list-style-type: none"> ● Contractors lack access to usable alternatives to energy modeling and other project analysis tools ● No standardized language and process to develop proposals with numbers that customers trust ● Lack of adequate sales and marketing skills to move multi-measure projects 	<p>Engage contractors via the SMCB Performance Advisor, assisting with knowledge and training resources, leads, and C-PACE training S1. Wrap Around Services, C1, C3</p>
<p>Limited capital and tailored offerings for SMCB sector to complete comprehensive projects, and maintain savings over time</p>	<ul style="list-style-type: none"> ● Lack of accessible financing options to pay for projects ● High project transaction costs ● Skepticism of savings projections and economic value of projects ● Split incentives (landlord-tenant) 	<p>Provide incentives to increase tailored offerings for sector that will provide low-entry barriers and long-term savings S2. Drive Adoption and Performance, C4</p>
<p>It is time consuming and resource intensive to reach out to individual SMBC and successful engage them and drive deeper EE upgrades</p>	<ul style="list-style-type: none"> ● Lack of time and awareness of benefits ● Perception about costs and available financing ● Distrust ● Hard to identify and engage quality contractors who understand needs and can implement effective, timely services 	<p>Establish program offerings that address a single property owner with multiple buildings or address a defined district with multiple owners who have similar buildings S3. Test and Demonstrate Innovative Deployment, C5</p>

Strategy 1. Provide Wrap Around Services, Support and Financing

Tactic C1. Provide one-stop-shop/single-point-of-contact for energy efficiency and related services and program offerings in the nine county area

Tactic Objective: Increase customer and building owners knowledge, comfort and understanding of the benefits of doing energy efficiency upgrades

SMCB decision-makers often lack capacity and technical knowledge to exercise EE-related decisions because their focus is strictly on keeping the businesses going. Many are confused by the ever-changing and hard to understand array of program offerings, and need a trusted source for information to increase confidence and participation.

This sub-program provides a one-stop-shop or single-point-of-contact of expert technical assistance, training, and customer and contractor engagement to enable a wide range of savings opportunities and activities. Recent ACEEE research confirms that program administrators are increasingly turning to this model as a way to “provide customers with a single point of contact to access a full array of services and incentives available.”²² Customers may receive a one-time consultation and/or ongoing assistance as needed. This effort will inject into the market “knowledgeable energy management service providers that can conveniently arrange comprehensive improvements in buildings.”²³

The SMCB Advisor will use BRICR (see “*Leveraged Activities for BayREN SMCB Sub-programs*” at page 2.18 for more details) to streamline lead generation for ICP-credentialed and Q/A providers, small and medium-sized contractors, utility offerings, LGPs and other implementation partners. The SMCB Advisor will provide local government staff with linkages to private and ratepayer supported financing options, answer questions from SMCB customers, stay abreast of ongoing related sub-program changes and updates, disseminate new information to market participants, and provide a link to other local government-sponsored sustainability programs (e.g. green business programs, water agency conservation programs, Pay As You Save (PAYS) financing, small business finance assistance, etc.). The SMCB Advisor sub-program is intended to serve as the central hub and information funnel for BayREN’s efforts in the small and medium commercial business sector.

As in the multifamily sector, many LGP programs operating in the Bay Area also have small commercial offerings. In these cases, projects will be referred to them as appropriate under the SMCB Advisor sub-program. Within the BayREN territory, Marin Clean Energy (MCE) operates programs serving small and medium commercial customers. In these areas BayREN will coordinate with MCE (or other community choice energy providers) in referring projects to its programs as appropriate.

²² ACEEE.” Expanding the Energy Efficiency Pie,” 2015. page 8.

²³ CPUC, “California Long-Term Energy Efficiency Strategic Plan”, 2008, page 37.

Tactic C2. Expand co-pay financing for existing rebate/incentives program offerings that leverage current project delivery infrastructure (e.g. Local Government Partnership programs), marketing, contractors, etc.

Tactic Objective: Reduce upfront barriers and increase participation in partner and regional commercial energy efficiency programs

There are very limited options for energy efficiency loans of less than \$5,000, the threshold for PG&E's on-bill-financing (OBF); this gap in access to small capital sums prevents many businesses from taking advantage of ratepayer-funded incentives intended to drive savings in the sector. LGPs targeting SMCB's are already struggling to maintain cost-effectiveness targets due to increasing code stringency and narrowing measure lists. The directive to double program savings (SB 350) within fourteen years is daunting. Providing customer access to small sums of funds to cover the "co-pay" (project cost minus program incentive) would significantly increase uptake of energy efficiency projects with current offerings and structures.

San Francisco is currently piloting this approach using non-ratepayer funds to capitalize a revolving loan fund (RLF), offering 0% interest "microloans" to cover these co-payments. Administered by a non-profit community lending partner, this new microloan leverages an experienced team of sales and technical staff and a well-established program delivery infrastructure under San Francisco Energy Watch. BayREN intends to scale this model to the nine county region, which will attract capital sources (Strategic Energy Resources; foundation, and PRI funds) and build on the success of the San Francisco pilot to expand access to additional markets. Because of the small microloan amounts, a very modest amount of capital can fund a large number of co-pays.

The BayREN also offers its Water Bill Savings Program (formerly BayREN PAYS® - see Cross Cutting Chapter) in partnership with participating water utilities to deliver water efficiency improvements to commercial water customers as part of water utility service, and allows certain cost-effective energy measures to ride along on the water bill surcharge mechanism.

Tactic C3. Educate and support Commercial PACE gatekeepers, particularly contractors, to take advantage of PACE financing

Tactic Objective: Expand use of PACE financing to reduce upfront costs and barriers to upgrades

The existing Commercial PACE Financing Subprogram is designed to increase uptake in commercial PACE financing available through a variety of program administrators and capital providers throughout the Bay Area. There has already been tremendous investment of public and private resources to establish PACE programs throughout the state, yet for commercial property owners, much of the potential has yet to be realized. Access to financing for energy improvements remains a significant barrier to achieving savings and scaling goals directed by the state. In commercial properties, companies with unrated credit own over 90% of commercial real estate, which essentially freezes out a large swath of the sector from

easy access to capital to fund projects.²⁴ C-PACE allows many more property owners to qualify for financing of a wide range of projects that can be cashflow positive because of the uniquely longer terms of PACE.

BayREN currently supports the advancement of the market's acceptance and increased use of this innovative financing solution by providing advanced contractor training, education, and project development support that is responsive to the priorities of the entire range of PACE "gatekeepers" (key decision makers), including: building owners, first mortgage lenders, capital providers/PACE administrators, and perhaps most importantly, contractors. Since launching in 2015, the sub-program has trained over 100 commercial energy contractors and has developed a pipeline of \$15 million in projects. In addition, PACE administrators have responded to BayREN's open and transparent approach by lowering preferred minimum transaction sizes and offering more competitive interest rates, which will favor use by SMCB's.

Strategy 2. Drive Adoption and Performance with Properly Aligned Incentives

Tactic C4. Drive projects and energy savings via Pay-for Performance incentives paid out over time for metered savings

Tactic Objective: Enable long-term energy savings in SMCB sector

Direct install and deemed rebate programs are unable to maintain their rate of savings delivery after decades of program delivery, much less double energy savings as mandated by SB 350. But in allowing ratepayer incentives for to-code savings, AB 802 has unlocked the potential to realize the significant savings stranded under prior program cycles. It is particularly impactful for the relatively complex systems in the small to mid-sized commercial buildings, but will require a comprehensive approach to measuring savings.

By aligning new incentive structures and emerging innovative approaches to financing energy efficiency projects (e.g. OBF_AP, and C-PACE), and focusing on measuring savings at the meter (AMI and related technology-enabled), BayREN intends to support key market actors to deliver high value projects to the SMCB sector. BayREN will promote and leverage local government energy efficiency staff and existing partnerships (LGP's), the Investor Confidence Project (ICP) protocols and their practitioners (see "Leveraged Resources" page 3.21 for more details), and the BRICR modeling and targeting tool. BayREN will enable technological solutions to efficiently track and monitor savings, work closely with public and private financing providers to leverage P4P and other incentives, and provide technical support and tools for operations and maintenance (O&M) savings opportunities. The means of calculating metered savings will also support an innovative and efficient EM&V process for proposed resource activities.

²⁴<http://beedison.com/will-standardized-credit-assessments-for-unrated-off-takers-unleash-the-potential-of-solar-in-the-non-residential-space/>

Furthermore, as AMI and BAS technologies continue to advance while pricing continues to decline, DR in the SMCB sector represents an untapped market with strong potential which will play a role in P4P. Existing DR programs often overlook this sector because of perceived difficulty in enrolling small businesses and low resultant kW. However, technology now exists to fully integrate this sector into a comprehensive DR strategy. For example, DR-enabled thermostats are now readily available at affordable price points which can enable SMCB sector participation in DR. In exchange, SMCB owners and operators enjoy improved comfort and reduced utility costs.

Strategy 3. Test and Demonstrate Innovative Deployment Methods

Tactic C5. Employ portfolio and district approaches for commercial energy efficiency improvements

Tactic Objective: Increase participation and scale of efforts, including creating effective paths to ZNE for existing SMCB

SMCB customers are challenging to effectively engage due to their numbers, diversity and owner/tenant characteristics. In addition, efforts to reach and encourage upgrades is time consuming and resource intensive. The size of the businesses can make it difficult to finance substantial improvements, as well as address the relative lack of time and interest of these customers to engage in energy efficiency programs.²⁵

There is potential to try new approaches in this sector by creating aggregated programs that leverage a portfolio-wide or district of small and medium commercial customers. The portfolio approach, e.g. working with a single owner of multiple buildings, may result in streamlining as these relationships will be established and strengthened through the Performance Advisor. This portfolio strategy is supported in the EBEE Action Plan, Strategy 2.2.4 Building/Portfolio Cohorts, indicating the ability to “encourage engagement, awareness, value and implementation.” The BayREN will evaluate early program implementation to determine who and where the most potential for portfolio approaches may be found. Initially, this approach will be implemented as a test and learn approach to ensure it is effective and meets the Plan’s objectives.

District approaches offer additional potential for this sector and could allow for ways to address a number of buildings, both new and existing with a more comprehensive and long-term approach. Equally, district-wide financing tools such as the Enhanced Financed Infrastructure District (EIFD), group procurement, and peer engagement can all be used to enhance and push deeper energy savings in a defined geographic area over time. This District concept was referenced in the draft Strategic Plan 2016 Highlights²⁶ and indicates an approach to achieve aggregated ZNE at the District level. Several local governments within BayREN are already piloting municipally-focused ZNE pilots integrating deep energy efficiency, renewable generation, storage, electrical vehicle charging, and related microgrid

²⁵ California Energy Commission “Existing Buildings Energy Efficiency Action Plan” 2015, page 19.

²⁶ Email guidance provided by the CPUC August 15, 2016. “DRIVER 1. Programs Enable ZNE Buildings and Districts: New Commercial Construction and Renovation Programs (e.g. Savings by Design, Prop 39 School, and future programs) facilitate the development of ZNE Buildings and Districts, through incentives, technical assistance and training.”

approaches to support this vision, and in some instances, involving multiple buildings and sites. These efforts are being driven by a powerful combination of energy innovation at the local level; a desire to demonstrate “community resiliency” (or the ability to serve critical constituent needs after disruptions caused by external forces such as natural disasters); and the collaborative spirit of public agencies that BayREN works to foster. The EBEE Action Plan provides several areas for this approach including in Strategy 1.7 Local Government Leadership and the development of Energy Performance Districts.²⁷ The BayREN will work with member agencies to identify potential districts and choose 1-3 to test and demonstrate the ability of the approach to achieve goals.

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²⁷ Ibid, page 56.

Coordinating Activities

Leveraged Resources

BayREN's efforts in the small and medium sized commercial sector will build on two key innovations: the ability to target customers' expanded energy-using needs through site-specific information on efficiency bundled with other distributed resources, and project standardization that promotes comprehensiveness and reduces transaction costs.

DOE SMCB Grant (BRICR)

In March 2016, ABAG (under the auspices of BayREN), was awarded a Federal grant by the U.S. Department of Energy's Building Technologies Office (BTO) Commercial Buildings Integration Program to support innovative approaches to assessing SMCB's at scale for the purpose of accelerating targeting and delivering energy efficiency in the small, medium commercial buildings market. The project, called "BayREN Integrated Commercial Retrofits" project ("BRICR") is supported by the following innovations:

- *Comprehensive Approach.* Local governments' need for climate-secure, resilient energy resources align with commercial building owners' interest in reduced costs, electric reliability, and tenant demand for services such as renewables and electric vehicle charging.
- *Leveraging Existing Programs.* Local governments manage and implement incentive programs, which operate within cost effectiveness tests, EM&V criteria, and energy code. As BRICR drives down the cost of targeting, design, and project development using open source tools, the underlying data will afford the same opportunity to all market actors in the Bay Area.
- *Continued Funding.* Advanced analytics developed by the project will inform and enhance existing and new energy offerings, directing building owners along two paths for comprehensive efficiency improvements: (1) deep energy retrofits, and (2) serial upgrades integrated into capital improvement cycles that aim for zero net energy (ZNE). BRICR will make a strong case for ratepayer investment to continue to support these outcomes.

BRICR posits that one of the key limits to existing incentive programs is the lack of information infrastructure to systematically assess not-yet-realized efficiency potential. While program implementers and contractors have considerable engineering capacity, and programs offer incentives for a wide array of measures, in the absence of an accessible method to deliver energy scenario simulation, customer offerings rarely address the entire building. Participating contractors are a significant source of leads and cost estimates, but contractors commonly serve specific end-uses and are unqualified to estimate costs, integrate opportunities beyond their scope, or knowledgeably offer financing options.

One of BRICR's primary outputs will be a tool that builds on existing open source tools (developed by the national labs) to perform large-scale building energy modeling analysis on SMCB's to reduce the cost of targeting, design, and project development. BRICR leverages previous work to create a useful and

durable modeling and targeting tool. The user interface will give program implementers and other market actors the ability to update building energy asset data based on observation, adding to our shared knowledge of energy efficiency opportunities in small commercial buildings, including accurate descriptions of energy end uses in buildings.

Using the BRICR tool, large scale building energy models will be developed regionally, calibrated with data from city benchmarking programs (e.g. San Francisco and Berkeley), and energy project development opportunities derived from the tool will be piloted in these communities, leveraging the existing interaction with project stakeholders. BRICR will serve as a central coordinating hub to inform and implement the BayREN commercial sector strategy and related policy initiatives. This approach aligns with the second framework goal of the EBEEAP (2015) to provide data-driven decision making that enhances program design while providing consumer-focused energy efficiency.²⁸

The Investor Confidence Project (ICP)

Another component of BRICR and BayREN’s proposed approach is to leverage best practices for energy efficiency project development platforms, such as the Investor Confidence Project (ICP). A project of the Environmental Defense Fund (EDF), ICP defines a clear road-map from retrofit opportunity to reliable investable projects. ICP is enabling a marketplace for building owners, project developers, utilities, public programs and investors to trade in standardized energy efficiency projects. ICP is best practice that can “align efforts and help establish a consistent statewide market for energy efficiency project finance.”²⁹ By certifying projects against an industry standard, ICP reduces transaction costs and increases confidence in savings in order to help attract private capital and scale up energy efficiency investments. PG&E is currently piloting an “alternative pathway” for on-bill financing as CPUC-approved HOPPs program that uses ICP as a project qualification standard, and recently the Green Building Certification Institute announced it would be providing third-party verification support for the ICP system. BayREN intends to expand and disseminate these efforts to build the market for Investor Ready Energy Efficiency™ projects.

EM&V Efforts

To be incorporated in final draft.

Marketing, Education & Outreach

As mentioned in the Residential Business Plan, BayREN’s unique organizational structure as a collaboration of the nine Bay Area counties has enhanced the success of its existing programs through our perception as trusted messengers. As local governments, we are known and trusted by the our communities and have a long track record of delivering successful program and services. Local governments may also leverage marketing and outreach strategies with other local programs, such as Local Government Partnership programs and Green Business Programs, providing a full offering to constituents, vendors and contractors. Furthermore, local governments will leverage partnerships with

²⁸ CEC, “Existing Buildings Energy Efficiency Action Plan,” 2015. Goal 2, Strategy 2.1.

²⁹ Ibid., Goal 5.

community based organizations and other sustainability and energy related local initiatives to deliver effective marketing tactics.

Program marketing is increasingly important, especially as consumers face an ever expanding array of messages in all aspects of their lives. Big data is emerging as fertile ground for more sophisticated, tailored marketing of programs. Smart meters and related technology yield highly detailed customer energy use data; leveraging these rich data sets with advanced analytics can identify customer segments that may be most receptive to particular messages and services. As mentioned previously, BRICR will also provide another valuable set of building data to drive marketing efforts.

Obviously, budgets are a large determinant for program participation rates. Recent ACEEE research highlighted numerous examples of programs that were restricted by budget limitations. While good program design and marketing can help drive participation, “without sufficient funding, programs are inherently constrained in their reach.”³⁰

Workforce Development, Education and Training

The energy efficiency programs must move from largely deemed projects to those which include multiple measures, and address below-code savings opportunities. This requires significant evolution in the contractor base participating in the energy efficiency programs.

BayREN will draw on all existing contractor pools: those of the Local Government Partnerships, the third-party direct install providers, and the BayREN pool. In addition, BayREN will tap into the developing market of energy audit providers which continues to grow in response to benchmarking legislation at the state and local level. Some of these providers are partnering with implementers and contractors, making these teams a natural fit for P4P programs in SMCB. As mentioned above, emerging frameworks and processes such as the Investor Confidence Project (ICP) protocols will be actively disseminated and leveraged to provide contractors third-party verification support and enhance their credibility when making project proposals. Related sales training and proposal tools focusing on tangible business benefits for small business participation will be offered as well.

Significant training will be required to transition small local HVAC, lighting and refrigeration contractors to operate under a more comprehensive pay-for-performance model. With innovative, impactful financing to increase close rates, we expect the contractor base will be motivated to evolve.

BayREN will use the SMCB Performance Advisor as a central coordination and communication portal for ongoing education to the contractor base. BayREN will track evolving contractor expertise, and tailor offerings accordingly.

³⁰ ACEEE, “Expanding the Energy Efficiency Pie,” 2015, p. ix.

Cross-Cutting

BayREN Water Bill Savings Program

The BayREN offers its Water Bill Savings Program (formerly BayREN PAYS®). Water and energy efficiency are currently siloed, when leveraging them together could enable greater savings in both resources. The PAYS® model delivers efficiency improvements as part of utility service, and allows certain cost-effective water and energy measures to be installed and repaid through an efficiency charge on the utility bill.

The BayREN Water Bill Savings Program works with partner municipal water utilities (Partner Utilities) to facilitate efficiency services (Services) that provide water customers (including hard to reach classes such as multifamily and small commercial) with on-bill upgrades for cost effective measures. Consistent with EEBE Action Plan Strategy 5.4.3 to provide alternative models for streamlined delivery of efficiency solutions, Water Bill Savings Programs implemented by Partner Utilities offer customers a simple path to install energy- and water-saving technologies with no upfront cost. Participating customers pay for measures through a monthly tariffed “efficiency charge” attached to their utility meter, with the assurance that their total utility bill savings will exceed program charges. Current BayREN Partner Utilities include the Town of Windsor, the City of Hayward and East Bay Municipal Utility District (EBMUD). BayREN is proposing to expand partnerships through a regional model to include 10 Bay Area water utilities in the short term (i.e., 1-3 years), 20 utilities in the medium term (i.e., 4-7 years), and 40 utilities in the long term (i.e., 8-10 years).

Key Partners/Coordination

Other REN Subprograms	Coordination Mechanism	Expected Frequency
Financing (BayREN C-PACE program, PAYS, etc.)	Project referrals, co-training	As requested by contractor/building owner or determined by SMCB Advisor, or co-marketed through C-PACE contractors, CAEATFA/CHEEF program, private energy efficiency financing providers, and others
Codes and Standards	Meetings, other regular communication	As needed to ensure consistency of message and increase efficiency of local government outreach
IOU Programs	Coordination Mechanism	Quarterly
PG&E Local Government Partnerships	Meetings, communication, participating contractor and QA updates	Quarterly
PG&E OBF_AP (HOPPs)	Meetings, communication, participating contractor and QA updates	Quarterly
Coordination Partners Outside the Commission	Coordination Mechanism	Quarterly or as needed
ABAG BRICR project	Regular meetings, other communication	Monthly
Non-BayREN Financing Programs (OBF, CHEEF, private financing solutions)	Project referrals, meetings, other regular communication	Quarterly or as needed
EDF Investor Confidence Project	Meetings, other regular communication	Quarterly or as needed
Local Workforce Investment Boards	Meetings, other regular communication	Quarterly or as needed
Building Trade Associations	Meetings, other regular communication	As needed as part of marketing efforts
Real Estate Associations	Association meetings, trainings	As needed as part of marketing efforts

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Section 4
PUBLIC SECTOR

Introduction

The BayREN proposes a new Public Sector initiative to provide unique strategies and tactics to support Bay Area local governments to become leaders in advanced energy practices. BayREN will lead a targeted market transformation effort to provide local government agencies with a strong level of control and understanding of their facilities enabling them to increase participation in other ratepayer programs, fully engage with State energy policies and provide leadership to their communities. BayREN will also expand upon a current BayREN Codes & Standards pilot and tap the State Zero Net Energy (ZNE) initiative led by the Department of General Services.

This Public Sector Business Plan proposes services new to BayREN, but are common needs and activities of the BayREN local governments and member agencies. In addition, these activities support the implementation of the EBEE Action Plan, in particular Strategy 1.7 Local Government Leadership. The proposed services were developed in consultation with PG&E and Bay Area Local Government Partnerships (LGP) and are consistent with Commission policy in D.12.11-2015 that Regional Energy Networks (RENs) should:

1. Provide activities that utilities cannot or do not intend to undertake,
2. Pilot activities where there is no current utility program offering, and where there is potential for scalability to a broader geographic reach, if successful, and
3. Pilot activities in hard-to-reach markets, whether or not there is a current utility program that may overlap.¹

Ten Year Vision, Outcomes and Budget

Vision: By 2020, Bay Area local governments will be leaders in using energy efficiency to reduce energy use and global warming emissions both in their own facilities and throughout their communities.

Outcomes:

- *XX% of Bay Area local governments use standardized energy management systems and best practices to increase energy efficiency in local government buildings*
- *Local government early adoption of ZNE buildings accelerate broader local ZNE adoption*

Ten year budget (total): \$19.4 M

¹ California Public Utilities Commission. November 8, 2012. [Decision 12-11-015, Decision Approving 2013-2014 Energy Efficiency Programs and Budgets](#). Page 17.

Market Context

The Public Sector as defined by the Commission represents a broad range of organizations and facility types, and can be divided into the following sub-categories:

- Federal
- State
- Local Government (City, County, Special District)
- Education (University, Community College, K-12 School)

The following statistics characterize the local government sub-sector:²

- In PG&E's service territory local government facilities represent 3.38% of the commercial sector electric consumption and 2.01% of the commercial sector gas consumption
- PG&E local government electricity sales are broken down as:
 - Facilities: 60%
 - Water Supply-Irrigation System: 16%
 - Street Lights: 13%
 - Wastewater Treatment: 11%
- PG&E local government natural gas sales are divided into the following categories:
 - Electric power generation: 73%
 - Facilities: 27%
- In PG&E service territory 73.7% of street lights are customer owned, and 26.3% PG&E owned

The BayREN public sector programs will initially target local government facilities, as defined above. The BayREN territory represents 101 cities and 9 counties within the San Francisco Bay Area and 20% of the California's total population.

This sub-sector is already the target of a variety of existing and proposed programs, including by PG&E and the PG&E Local Government Partnerships (Marin Clean Energy does not serve the public sector). The BayREN scope has been carefully developed in consultation with these market actors to fill niches that directly support existing and emerging programs.

² The California Energy Commission has noted that: "Definitive data are not available for the number of local government buildings in California." ([California's Existing Buildings Energy Efficiency Action Plan](#), 2015, page 21. Data presented above are from Local Government Quantified Savings Component of Strategic Plan Update, Technical Appendix - Final Presentation. Navigant Consulting, Inc. October 15, 2014.

Sector Summary

Public Sector activities will provide unique strategies and tactics to support Bay Area local governments to become leaders in advanced energy practices.

Advanced Energy Management and Decision Support

The Advanced Energy Management and Decision Support service is a targeted market transformation initiative that will provide agencies with a strong level of control and understanding of their facilities enabling them to increase participation in other ratepayer programs, fully engage with State energy policies and provide leadership to their communities. The service will strive to achieve market transformation by focusing on the entire market, rather than individual customer, and achieving savings on a portfolio level, rather than a summation of individual measures and efforts. It is intended to complement existing and proposed programs and services, including LGP programs, PG&E's proposed job order contracting program and energy information programs and was influenced by SoCalREN's Enterprise Energy Management Information System (EEMIS).

The service will increase the deployment of building monitoring and control systems under a regional portfolio of Building Energy Management Systems (BEMS) as a means to optimize building operations, engage stakeholders and use real data to inform investment and policy decisions. As used here, a BEMS refers to a system or set of systems that can be accessed remotely to monitor and control equipment (via hardware, pneumatics or wireless), integrates with utility billing data and provides data visualization and analytics.

The service incorporates three tactical approaches:

- 1) aggregated procurement of BEMS;
- 2) training for staff and contractors in those systems; and
- 3) centralized monitoring and evaluation of a regional portfolio of BEMS-controlled facilities and decision support analysis to encourage investments and policies by reducing uncertainty and financial risk.

The decision support services, based on data collected through the BEMS, is intended to drive investments in other technologies, participation in other ratepayer-funded programs and adoption of policies affecting both public and private facilities.

According to a BayREN survey (summary results follow below), BEMS systems, where they exist, are not being used to their full potential due to a lack of standardization and training. A properly functioning BEMS would enable facilities staff to accurately schedule building operating hours, optimize temperature and airflow to maintain occupant comfort, manage peak demand charges by preconditioning space and staggering equipment operating cycles, and remotely diagnose equipment failure. More importantly, BEMS will provide equipment and operational data that can support investment decisions in energy

efficiency, equipment maintenance and capital expenditures, promoting institutional change that will lead to market transformation.

As currently envisioned, the BayREN would facilitate the deployment of functional BEMS systems, through, for example, a competitive solicitation consistent with public procurement requirements for BEMS design, including set-up, commissioning, training, licenses and installation of open-source control actuators and monitors (as needed). The strategy would also seek to create a user community by, for example, establishing a regional user-group(s) and knowledge base. The strategy should also offer analytics based on equipment and operational data acquired through the BEMS deployment to provide decision support analysis for investments in energy retrofits, early equipment retirement and capital improvements, connect clients to rebate and incentive programs and assist agencies to identify financing sources based on reliable projected energy cost savings.

Systems Integration for Early Adoption of ZNE

The Systems Integration for Early Adoption of ZNE service, also a targeted market transformation initiative, seeks to expand upon a BayREN Codes and Standards pilot and tap the State ZNE initiative led by the Department of General Services (DGS)³. The program will accelerate the development of ZNE projects and policies by, for example, providing technical assistance to support early adoption of ZNE buildings with the goal of creating ZNE portfolios, and potentially leveraging procurement and financing enabled by the State. A major focus should be on minimizing energy intensity to enable on-site generation to meet the demands of the facilities. However, the program should also support broader State policy goals by providing local jurisdictions with resources to incorporate energy efficiency as well as electrification and renewable distributed energy generation and storage.

Evolving Approaches

The BayREN has extensive experience in the residential and codes and standards markets and has developed expertise and relationships with local agencies and Local Government Partnerships throughout the region. In the process, the BayREN has come to learn about the needs of local agencies, and in particular, those needs that are best met at a regional level. The BayREN proposal also draws from external sources. In developing its public sector strategies, the BayREN sought to support existing ratepayer-funded programs and services and has drawn upon lessons learned from other service providers.

Public sector programs have been evolving from technical assistance and project management, to include portfolio management and financing. Most Local Government Partnerships in the Bay Area and the SoCalREN offer technical assistance, turnkey and/or direct install programs. Many offer some form of analytics as well, such as benchmarking, data analytics and visualization and advanced energy accounting.⁴

³ The DGS is leading the effort to implement Governor Brown's Executive Order B 18-12 for 50% of new State Buildings to be ZNE beginning in 2020; 100% in 2025 and 50% of Existing Building Area to be ZNE.

⁴ Benchmarking is a common service amongst many service providers. The East Bay Energy Watch is piloting a dashboard service (Lucid) and SoCalREN offers agencies advanced energy accounting and analytics through the Enterprise Energy Management Information System (EEMIS).

Even with these services, financing remains a significant barrier. SoCalREN found that “[t]here is limited availability, or understanding, of ‘turn-key’ financing mechanisms. Specifically, the need for financing that follows a standardized underwriting protocol; offers competitive interest rates attractive to cost-conscious jurisdictions; and provides adequate information for agencies to make investments decisions regarding energy efficiency, all with the goal of reducing overall operating costs.”⁵

Just as the progression from projects to portfolios is dependent upon the availability of capital, the availability of capital is dependent upon the quality of underlying asset, that is, the projected savings⁶. In response, the BayREN’s services seek to provide public agencies with a sophisticated understanding of their facilities (existing and planned), which will not only help them manage operations more efficiently, but will also minimize performance risk and increase access to capital thereby spurring investment.

The **Advanced Energy Management and Decision Support** service will provide public sector staff with specific-high quality data and analysis that will enable them first to optimize operations of existing equipment and then to pursue projects through other ratepayer-funded programs.

The program takes a systems approach, both in terms of technology and business practices, which will result in transformative institutional changes. Monitoring and control technology, together with training and analysis will provide local governments with equipment-level priorities as well as highly robust pro formas to support low-risk financing. The process will result in a set of business practices which integrates capital planning and operational expenses, enabling agencies to achieve comprehensive savings and demonstrate leadership within their communities.

Similarly, the **Systems Integration for Early Adoption of ZNE** service will provide tools and analysis to help public agencies incorporate ZNE into their capital programs. The long-term goal is to establish ZNE portfolios amongst Bay Area local governments and through such leadership and demonstration support the advancement of ZNE policy in the private sector as well, including ZNE communities policies.⁷ The BayREN intends to partner with the DGS, building on their advisory committee’s work on ZNE definitions and emerging policy regarding the role of energy efficiency versus renewables. The BayREN also proposes to utilize the training curriculum being developed by PG&E for DGS.

The program expands on a 2016 BayREN pilot which established a foundation for local jurisdictions to implement ZNE at both the project and policy levels. This pilot had three major components:

- Municipal ZNE Technical Assistance
- Development of a ZNE Policy Resource Toolkit for local jurisdictions to adopt reach codes

⁵ Southern California Regional Energy Network. 2/14/16. [2013–2014 Energy Efficiency Portfolio Southern California Regional Energy Network \(SoCalREN\) Program Implementation Plan](#). Page 161.

⁶ Risk management is a key to financing; Southern California Edison specifically noted this with respect to the public sector ([Southern California Edison Energy Efficiency Business Plan Public Sector Chapter](#). Draft. Page 17). The same document also notes that “[i]nadequate data exists about building level performance, making identification of potential energy savings difficult.” (page 3).

⁷See policy paper for a discussion of ZNE definitions and scopes that will be considered as part of this strategy. CalState. [Definition of Zero Net Energy \(ZNE\) for California State Agency Compliance with Executive Order B-18-12](#). May 19, 2016.

- Analysis of non-residential energy reach-code metrics utilizing a Zero Energy Performance Index in Climate Zones 2, 3, 4, 12

The Municipal ZNE technical assistance pilot supported six jurisdictions with engineering analysis on specific municipal buildings. While offered as project level assistance, development of flagship municipal ZNE projects is seen as a policy enabler as local governments need to demonstrate feasibility of ZNE implementation in order to gain community support for reach code ordinance adoption. These jurisdictions were offered a customizable suite of engineering analysis via a consultant including the following services:

- Develop municipal ZNE pilot project scopes of work
 - Engineering specifications, energy savings and cost estimates
 - System design comparisons
 - Gas vs. electric system evaluation to optimize GHG saved per dollar spent
 - Energy modeling for system optimization and code compliance
- Procurement - connect projects with options for purchasing and financing efficient equipment
- Community Scale Municipal ZNE Planning - incorporate energy efficiency as a component of plans/policies to offset the jurisdiction's municipal energy load/bills

The intent of the expanded Municipal ZNE pilot in 2017 and beyond is to enable local governments to lead by example on their own portfolios which will prime the market for adoption of ZNE policies.

Vision, Intervention Strategies and Objectives

BayREN’s Public Sector activities are aligned with BayREN’s overarching intervention strategies to advance energy efficiency with wrap around services and supports and the demonstration of innovative deployment methods. These activities are intended to achieve the CPUC’s 10 year vision in which Bay Area “*local governments will be leaders in using energy efficiency to reduce energy use and global warming emissions both in their own facilities and throughout their communities.*”⁸

Intervention Strategy	Tactic	Objective
S1. Provide Wrap Around Services and Support <i>Estimated % of annual budget: 60%</i> <i>Non-resource for 2017</i>	P1. Provide BEMS system design, acquisition, setup and commissioning	<i>Public agencies possess an advanced level of control and understanding of their facilities using state-of-the-art building energy management systems</i>
	P2. Provide BEMS training and support groups	<i>BEMS systems are actively maintained and trend data are available to inform operations and support resource allocations</i>
S3. Test and Demonstrate Innovative Energy Efficiency Deployment Methods <i>Estimated % of annual budget: 40%</i> <i>Non-resource for 2017</i>	P3. Provide portfolio assessment and investment support analysis, based on BEMS data	<i>Capital and expense budgets are programmed to optimize energy and operational savings through application of analysis based on real trend and cost data</i>
	P4. Provide integrated systems analysis to support early adoption of ZNE	<i>Local governments build/renovate to ZNE standards in advance of State target (2030) and accelerate community commitments to ZNE</i>

Achieving the CPUC’s vision will require that local governments: 1) adopt energy efficiency as a standard practice; 2) staff is trained and policy-makers are committed to advanced energy efficiency practices; and 3) ultimately, this new capacity supports participation in the broader set of State policies, both at the agency corporate level and throughout the community.

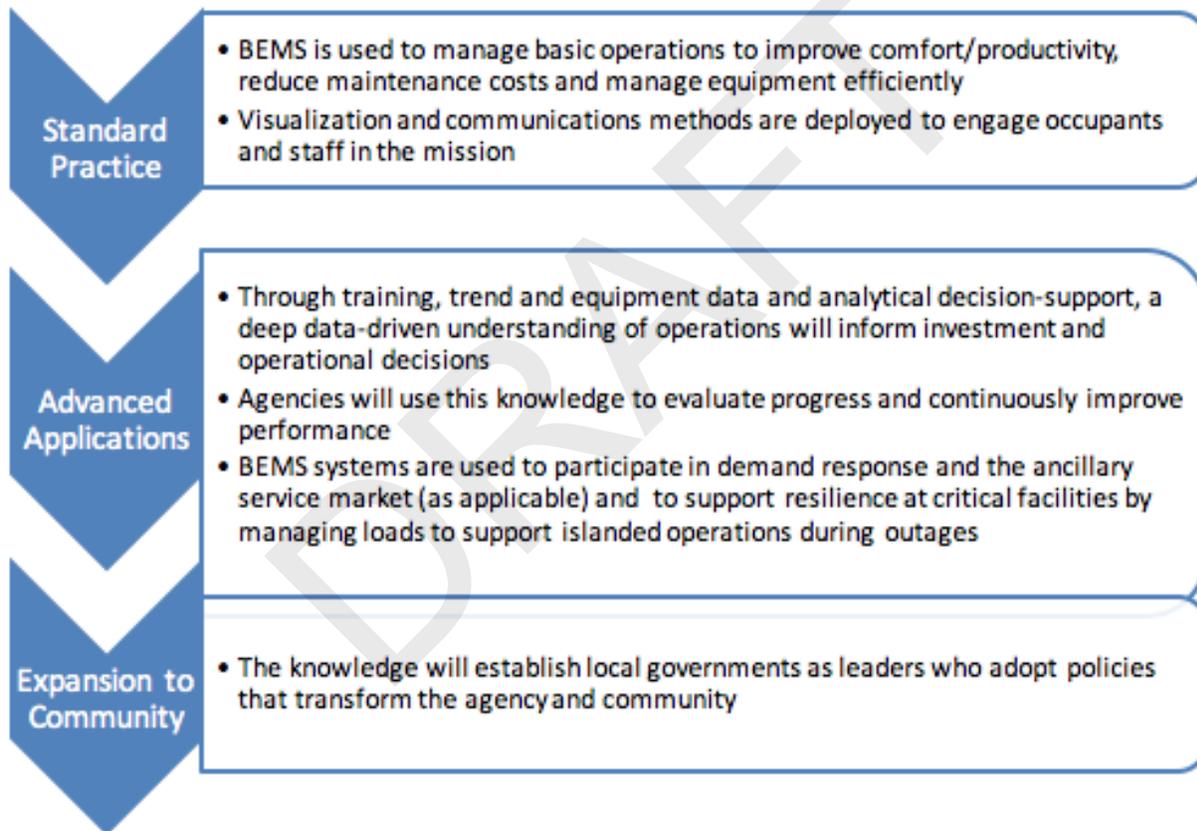
The BayREN proposes two different approaches to help achieve this vision. The first is grounded in BEMS and data visualization systems (including integration with billing data), which can provide facilities managers and energy staff with a sophisticated, data-driven understanding of their facilities and opportunities for managing energy, including integration with regular operations and maintenance and capital improvements. The deployment of BEMS systems should be accompanied by training, user groups

⁸ CPUC, “[California Long Term Energy Efficiency Strategic Plan](#),” 2010, Page 90.

and ongoing analysis and support to provide a set of strong service-based relationships that will lead to continuous improvement in energy management. Training will be sought through the Pacific Energy Center and through BEMS service providers.

The approach seeks to achieve market transformation, as described by Navigant Consulting⁹ by focusing on “mobilizing widespread market adoption” versus individual participants, measuring “modeled savings based on ‘deemed’ or average savings, extrapolated to the market” versus a “summation of site-by-site savings” and striving for “success based on long-term outcomes” versus “annual savings.” BayREN’s method, as suggested by Cathleen Fogel¹⁰, will be a bottom-up assessment of savings from an aggregated portfolio over various time periods.

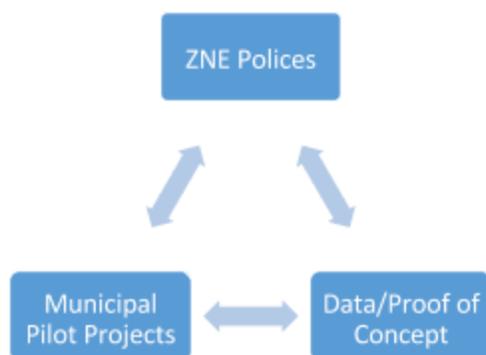
It is envisioned that the level of participation will evolve as illustrated below.



BayREN’s second approach will provide integrated ZNE design analysis and is intended to provide proof of concept for local governments to support policy adoption.

⁹ Galvin, Toben; McDonald, Craig; Luboff, Jay (Navigant Consulting Inc.). 2016, “[A Strategy for Integrating Market Transformation Savings into Resource Acquisition Portfolios](#)”, CEEE Market Transformation Conference, Baltimore, MD. Page 4.

¹⁰ Cathleen Fogel, Energy Efficiency Branch, Energy Division, CPUC. [Overarching Comments on Program Administrator Business Plans Focus on Market Transformation Strategies](#). CPUC. September 28, 2016. Page 4.



Summary Metrics and Budget

Intervention Strategies	Market Effect Metrics	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Strategy 1. Provide wrap around services and support Estimated % of annual budget: 60 Non-resource for 2017	Output: Percentage of floor area subject to competent BEMS management	Establish with Survey in 2017	Program tracking data for change	Increase space covered by 30%	Increase space covered by 40%	Increase space covered by 50%
	Output: Energy savings/sf	Establish with Survey in 2017	Program tracking data for change	Achieve average savings of 10%	Achieve average savings of 10%	Achieve average savings of 10%
	Outcome: Increased use of EMS and best practices	Establish with Survey in 2017	Bi-Annual Survey	Annual increase 5% over baseline	Increase 5% over previous year	Increase 5% over previous year
Strategy 3. Test & demonstrate innovative energy efficiency deployment methods Estimated % of annual budget: 40 Non-resource for 2017	Output: Increase in investment in energy efficiency	Establish with Survey in 2017	Survey for investment data.	Increase investment by 10%	Increase investment by 30%	Increase investment by 50%
	Output: Energy savings/sf	Establish with Survey in 2017	Program tracking data for change.	Achieve average savings of 15%	Achieve average savings of 15%	Achieve average savings of 15%
	Number/floor area of ZNE facilities constructed	Establish with Survey in 2017	Program tracking data	70,000 sf programmed for ZNE	200,000 sf. programmed for ZNE/ 70,000 sf built to ZNE	400,000 sf programmed for ZNE/ 270,000 sf. built to ZNE
	Outcome: Increased early adoption of ZNE retrofits	Establish with Survey in 2017	Bi-Annual Survey	Annual increase 5% over baseline	Increase 5% over previous year	Increase 5% over previous year

Budget (\$)	2016*	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Non-Incentive	0	500,000	773,000	1,221,000	1,802,000	2,409,000	2,481,000	2,555,000	2,472,000	2,547,000	2,622,000
Incent	0	0	0	0	0	0	0	0	0	0	0
Total	0	500,000	773,000	1,221,000	1,802,000	2,409,000	2,481,000	2,555,000	2,472,000	2,547,000	2,622,000

* As a newly proposed area of activity, there was no 2016 BayREN Public Sector budget. 2017 budget is proposed as year 1 of the 10 year Business Plan. BayREN has also included an annual cost of living adjustment in the proposed budgets for 2018-2026.

Market Characterization

The BayREN initially plans to target municipal and county facilities (hereinafter referred to as local government facilities); the market characterization below is limited to this market. However, it should be noted that as the CPUC’s Strategic Plan indicates local governments can provide leadership for their communities, significantly expanding the market impacts of interventions in the public sector.

Navigant Consulting, Inc. estimates that energy consumption from local government facilities (excluding streetlights and water treatment) range from 16-20%.¹¹ Anecdotally it has been reported that there has been significant participation in lighting retrofits but that more complex and costly measures remain stubbornly hard to access. Theoretically at least, local governments have great incentive to invest in energy efficiency since the portfolios consist largely of long-term, owner-occupied sites. However, the barriers are persistent, as illustrated in the table below. The BayREN’s services do not focus on a particular technology or end use. Rather, the goal is to provide local governments with the tools, training, data and analysis to support a comprehensive energy program.

The Advanced Energy Management and Decision Support service plans to use BEMS as a means both to acquire immediate operational savings as well as a platform to stage more comprehensive improvements, including retro-commissioning, retrofits and early retirement. These markets and the associated savings are much larger than the market for BEMS technology. Nevertheless, BEMS has immediate potential. Katipamula and Brambley found that nationally, “[p]oorly maintained, degraded, and improperly controlled equipment wastes an estimated 15% to 30% of energy used in commercial buildings. Much of this waste could be prevented with widespread adoption of automated condition-based maintenance.”¹²

BEMS is an important access point in that it addresses a core facility management concern - maintenance. Maintenance in the local government sector is a particular challenge in that the portfolios are very diverse and decentralized. Not only are the building types diverse, but the systems themselves vary; many local agencies struggle to maintain multiple BEMS applications, a result of low-bid construction contracts that do not specify brands.

¹¹ Navigant Consulting, Inc., Tierra Resource Consultants, LLC. 10/15/2014. [Local Government Quantified Savings Component of Strategic Plan Update, Technical Appendix – Final Presentation](#). Page 11.

¹² Srinivas Katipamula & Michael R. Brambley. 2011. [Review Article, Methods for Fault Detection, Diagnostics, and Prognostics for Building Systems—A Review, Part I](#). Page 1.

A BayREN survey of 12 Bay Area agencies (12% response rate) responsible for nearly 25 million square feet of facility space found:

- There are 12 different BEMS brands in use, with as many as seven different brands at a single agency
- On average, 40% of facility space is controlled with BEMS
- All respondents considered that it is Very Important (7) or Somewhat Important (4) to acquire, expand or upgrade BEMS in their facilities
- All of the systems but two are managed by staff (one is managed by a contractor, the other is not managed at all)
- Only one jurisdiction considered themselves expert in their system. The others rated themselves as “capable of making occasional minor modifications” (4) and “regular, competent users” (4)

Cook, Smith and Meier (UC Davis and Microsoft) report in an ACEEE paper that “[t]he primary benefit of the Smart Building solution is its positive impact on the productivity of building managers and engineers. Microsoft will retro-commission roughly 20% of campus buildings each year. Even at this rate of inspection, only large pieces of equipment are checked because it is too costly and labor intensive to hunt for problems with smaller equipment. By using FDD [fault detection and diagnostics] to conduct maintenance in real-time and prioritize faults based on estimated savings, building managers are able to identify more problems, strategically target the critical ones and make informed decisions about how to allocate their time and resources.”¹³

This work with local governments will also provide valuable information to support program adoption in the small and medium commercial sector, as required by AB 793. By integrating controls, monitoring and billing data, BEMS offers an opportunity to claim and verify operational savings in the smaller facility market where the pay-for-performance approach has been too costly. Deployment in smaller centrally managed facilities can provide valuable information as the State seeks to acquire operational savings from the small commercial market. Furthermore, the harvesting of verifiable operational savings through BEMS can be reinvested into other areas - such as facilities/energy staff, program participation and training - creating a virtuous cycle.

The market for the **Systems Integration for Early Adoption of ZNE** service focuses on renovation and new construction. Local governments periodically renovate facilities as part of seismic retrofits or in response to long-term deferred maintenance. The market is driven largely by the availability of funds, which include Federal and State sources, like Community Development Block Grants and FEMA. The most significant sources however are bond funds, which are subject to voter approval. Policymakers may be reluctant to commit to ZNE in the text of local bond measures due to the uncertainty of associated costs. Without such a commitment, ZNE features, as well as other above-code measures, are subject to being value-engineered out of projects if budget margins narrow. The BayREN service will enable local

¹³ Cook, Jonathan (UC Davis Energy Efficiency Center), Smith, Darrell (Microsoft), Meier, Alan (UC Davis Energy Efficiency Center). 2012. [Coordinating Fault Detection, Alarm Management, and Energy Efficiency in a Large Corporate Campus](#). ACEEE. Page 12.

governments to commit to sustainable design and ZNE during the earliest stages of project development, including bonding authority.

Public Sector Strategies and Tactics

Problem	Market Barrier	Strategy and Tactics
<p>Many local governments do not have adequate dedicated staff or resources to move proactively on energy efficiency in their own or community buildings</p>	<ul style="list-style-type: none"> ● Complexity of issues and diverse portfolios make it difficult for staff to specialize in energy management ● Public sector agencies serve a broad set of needs and constituents with competing and shifting priorities and may not be able to focus only on energy efficiency ● Agencies are subject to regulations which restrict communications with vendors and result in substantial transaction costs in analyzing and procuring materials and professional services 	<p>S1. Wrap Around Services P1. Provide BEMS system design, acquisition, setup and commissioning</p>
		<p>S1. Wrap Around Services P2. Provide BEMS training and support groups</p>
<p>Many local governments lack data, analytical tools and budget mechanisms to incorporate energy efficiency into their routine operations and decision-making processes</p>	<ul style="list-style-type: none"> ● Public agencies have a broad span of responsibilities; staff are often generalists and lack the capacity to understand, evaluate and act on specialized issues ● Limited access to capital: <ul style="list-style-type: none"> ○ expense and capital budgets are often isolated from each other ○ local governments are not well-suited to manage the risks associated with financing secured by potential savings ○ reliable projections of potential savings to underwrite financing are not readily available 	<p>S.3. Innovative Deployment. P3. Provide portfolio assessment and investment support analysis, based on BEMS data</p>
<p>Many local governments are interested in leading by example and the need to demonstrate ZNE feasibility on their own facilities, yet lack the in-house capabilities to provide early design/cost analysis</p>	<ul style="list-style-type: none"> ● The fragmented approach to efficiency and renewables programs makes it difficult to scope ZNE projects ● Traditionally program (intended use) considerations precede capital budgets and design but energy features are frequently considered after the initial budget has been established and conceptual design has been articulated. It is then quite difficult to change fundamental design characteristics without incurring significant and costly delays ● Capital budgets established without consideration of future operational expenses severely limit project financing 	<p>S.3. Innovative Deployment. P4. Provide integrated systems analysis to support early adoption of ZNE</p>

Strategy 1. Provide Wrap Around Services, Support and Financing

P1. Provide BEMS system design, acquisition, setup and commissioning

Objective: Public agencies possess an advanced level of control and understanding of their facilities using state-of-the-art building energy management systems

This tactic seeks to increase the deployment of building monitoring and control systems under a regional portfolio of BEMS. The approach will likely involve a competitive solicitation consistent with public procurement requirements for an aggregated procurement of BEMS design and setup services, commissioning, staff training, software licenses and installation of open-source controls (as needed).

BEMS systems, where they exist, are not being used to their full potential due to a lack of standardization and training. A properly functioning BEMS would enable facilities staff to accurately schedule building operating hours, optimize temperature and airflow to maintain occupant comfort, manage peak demand charges by preconditioning space and staggering equipment operating cycles, and remotely diagnose equipment failure.

A robust BEMS should include the following features:

- Remote access to monitor and control equipment using open source BACNET technology
- Hardwire interface, wireless interface and pneumatic actuator interface
- Fault detection and diagnosis
- Automatic acquisition and integration of utility billing data (either directly or through existing commonly used platforms)
- Robust analytical and data visualization
- Simple data sharing procedures to enable export to other commonly used platforms
- Data and cyber-security controls
- Various privilege levels, including the ability to share trend data with a regional portfolio administrator for analysis
- 24x7 support services
- Automated Demand Response (ADR) capability
- Project financing through the BEMS vendor (optional)

P2. Provide BEMS training and support groups

Objective: BEMS systems are actively maintained and trend data are available to inform operations and support resource allocations

This tactic seeks to provide BEMS training for staff and contractors and create a user community by, for example, establishing a regional user-group(s) and knowledge base. Training will be sought from a variety of sources, including BEMS service providers and the Pacific Energy Center.

Training should include the following elements:

- General BEMS training, prior to the BEMS solicitation, so that staff can provide informed input to the specifications
- Full on-site training for all installed systems, including customized user manuals. This element will be incorporated into the BEMS commissioning process
- On-line training for refreshment, updates topics on demand
- Periodic trainings for new staff and on in-depth topics
- A regional user's group, with an online knowledge base
- Ongoing customer services help line for specific issues

Strategy 3. Test and Demonstrate Innovative Deployment Methods

P3. Provide portfolio assessment and investment support analysis, based on BEMS data

Objective: Data are used to reduce risk and drive investment decisions

This tactic seeks to provide analytic and decision support services to optimize energy and operational savings, based on real trend and cost data collected through the BEMS. As envisioned, trend and equipment data for the regional portfolio would be centrally available and subject to analysis to identify large-scale opportunities for energy efficiency improvements, improved occupant comfort/productivity, reduced maintenance costs and to generate pro formas to support project financing.

A BEMS portfolio should be considered as a platform to stage comprehensive energy projects. By scaling up the portfolio and getting access to detailed information, the service can provide expertise that would not otherwise be available or affordable to individual communities, leading to a comprehensive set of project recommendations, accurate life-cycle savings projections to reduce financing risks, and underwrite financing and measurement and verification equipment to support participation in other performance-based incentive programs. This analysis will help local governments level the playing field between operating and capital budgets and access long-term comprehensive savings and improved productivity and operations.

P4. Provided integrated systems analysis to support early adoption of ZNE

Objective: Agencies program capital and adopt policies such that efficiency, renewables and storage are balanced to achieve early adoption of ZNE

This tactic expands upon a BayREN Codes & Standards pilot that provides technical assistance to support early adoption of ZNE and integrates with the ZNE campaign underway at DGS. A major focus will be on minimizing energy intensity to enable on-site generation to meet the demands of the facilities. However, the program will also support broader State policy goals by providing local governments with resources to evaluate their options to implement electrification and renewable distributed generation and storage.

A ZNE strategy should provide the following:

- Project-specific systems engineering and cost analysis to increase efficiencies and lower energy intensities to levels that can be served by on-site renewables
- On-site renewable generation assessments “right sized” for lowered energy loads
- Modeling for optimized gas and electric system design, and optimized investment in efficiency and renewables
- Integration of storage for demand management and ancillary services markets and islanding, as appropriate
- Support for portfolio ZNE strategies, as appropriate where jurisdictions have set the objective of achieving Zero Net Energy at the community scale, and where community scale is defined by a jurisdiction’s municipal building portfolio
- Local government training:
 - Targeted to code enforcement staff who will be reviewing ZNE projects receiving buildings permits
 - Target to public works, capital, engineering and facilities staff who will be designing and operating municipal ZNE facilities (possibly using a version of the PG&E curriculum under development for DGS)
- Monitoring performance of buildings/portfolios intended to achieve ZNE
 - Provide tools (eg data loggers, building/portfolio monitoring software such as Lucid) for measuring and tracking energy usage and generation in order to assess if reduced energy loads are being met by energy generated either on-site or within the municipal portfolio.
- Communication templates and case studies to support ZNE reach code policy adoption

This program will provide an opportunity for the CPUC to test mechanisms to fund project activities that provide both energy efficiency and renewable resources.

Coordinating Activities

Leveraged Resources

Additional content to be provided in future drafts.

EM&V Efforts

As market transformation initiatives, the services should be assessed in terms expressed by Navigant Consulting¹⁴ i.e., “mobilizing widespread market adoption” measuring “modeled savings based on ‘deemed’ or average savings, extrapolated to the market” and striving for “success based on long-term outcomes”.

With this in mind, two documents provide a useful framework. In their policy paper, CPUC consultants Prah and Keating¹⁵ draw a distinction between evaluation of resource acquisition and market transformation strategies, particularly with respect to the timeframe used for the evaluation. They suggest managing risk by careful vetting and focusing on leading indicators of success. CPUC staff Cathy Fogel builds on their framework in her comments to draft business plans,¹⁶ proposing a three phase process:

- Phase I, scanning and identification of target markets, conducted as part of the draft Business Plan
- Phase II, vetting and approval by the CAEEC and the CPUC, and should be contained in the final Business Plan and Advice Letter
- Phase III, implementation and continuous evaluation, should be incorporated into the implementation plan. Elements include continuous evaluation, industry partnerships, market evaluations, coordination with downstream activities and periodic review by the CAEEC.

Several outcomes can be directly and indirectly measured (see metrics table for more information). Short-term BEMS-related savings can be based on reliable verified savings data using performance-based incentive protocols. Savings on ZNE facilities can be measured initially using building simulations and, after a full year of operations, actual performance data as reported to the New Buildings Institute or the International Living Future Institute. (Note, since this service will be addressing renewables as well, the EM&V process should be coordinated with renewable program EM&V activities.)

Indirect savings associated with market transformation outcomes can be measured through changes in the level of investment and participation in other ratepayer programs, actual measured savings that are not attributable to the BEMS and the adoption of policies affecting municipal and the larger community portfolio of buildings.

¹⁴ Galvin, Toben; McDonald, Craig; Luboff, Jay (Navigant Consulting Inc.). Op. cit.

¹⁵ Ralph Prah, Ken Keating, Consultants to the CPUC Energy Division. [Building a Policy Framework to Support Energy Efficiency Market Transformation in California](#). October 14, 2013.

¹⁶ Cathleen Fogel, Energy Efficiency Branch, Energy Division, CPUC. [Overarching Comments on Program Administrator Business Plans Focus on Market Transformation Strategies](#), September 28, 2016, Page 4.

One particular possible area of study regarding the comprehensiveness of small and medium commercial sectors cited in the EM&V plan¹⁷ may also prove helpful: “[w]e might want to do this study on an annual basis, and the current study is also framed as leading into follow-up process evaluation work to figure out why certain program are positive or negative outlier. The study looks across all nonresidential programs in 2010-2014. Study findings will be include [sic] multiple metrics and review different measure type, program type, urban/rural, and building type.

Similarly, the Energy Division recommended additional study of the SoCalREN Enterprise Energy Management Information System (EEMIS), to assess ease of use and the potential for scaling up the program.¹⁸

Other EM&V questions may include the following:

- To what extent do the services affect participation in other measure-specific programs, including demand for services under PG&E’s Job Order Contracting program? Historic trends and comparisons to control groups should help assess the effectiveness of the intervention strategies.
- Does the approach lead to widespread adoption? This can be measured through changes in the amount of floorspace affected by the strategies.
- Do the services achieve long-term success. In the short-term, this can be positing through changes in the level of staff competence, as measured through surveys and testing during training.

Marketing, Education & Outreach

The BayREN will utilize several channels for marketing, education and outreach. The primary channels will be direct communication between the BayREN and its network of local agencies and the PG&E Local Government Partnerships.

BayREN’s unique organizational structure as a collaboration of the 9 Bay Area counties and 101 cities has enhanced the success of its programs through our perception as trusted messengers. As local governments, we are known and trusted by the local communities and have a long track record of delivering successful program and services. Outreach will be conducted directly through known contacts with program staff in the 101 local agencies and through the County-level BayREN representatives.

The BayREN will also collaborate with the PG&E LGPs. Each of these partnerships already provides services to the public sector and PG&E is proposing an overarching job order contracting program through the Local Government Partnerships. The BayREN’s proposed strategies were designed to dovetail with these programs, providing a foundation to increase participation.

In addition, the BayREN will specifically target facilities staff (which is usually not the same as energy/sustainability staff) through the Northern California Chapter of the American Public Works Association, in the form of presentations at regular chapter meetings.

¹⁷ California Public Utilities Commission, [“2013-2016 Energy Division & Program Administrator Energy Efficiency Evaluation, Measurement and Verification Plan Version 6”](#), 2016, Page 81.

¹⁸ Ibid., Page 177.

Workforce Development, Education and Training

As service-oriented strategies, workforce education and training are essential elements of the BayREN scope. Training will be sought from a variety of sources, including BEMS service providers and the Pacific Energy Center (e.g., Programmable Logic Controller series; Control: Design, Performance and Commissioning series). Training may include the following elements:

- General BEMS training, prior to the BEMS solicitation, so that staff can provide informed input to the specifications
- Full on-site training for all installed systems, including customized user manuals. This element will be incorporated into the BEMS commissioning process
- Ongoing customer services help line for specific issues
- Periodic trainings for new staff and on in-depth topics
- A regional user's group, with an online knowledge base
- ZNE Training customized to building department staff, including overview of key metrics which indicate to a plan reviewer whether a building is meeting a specific ZNE definition
- ZNE training customized to public works, local government design/engineering staff, and facility managers who design and operate municipal facilities (possibly using the curriculum being developed by PG&E for DGS)

Cross Cutting

The BayREN public sector programs will support the Codes and Standards program. As staff becomes more familiar with the technologies and approaches and as public buildings successfully demonstrate these approaches, local agencies are more likely to adopt policies supporting advanced energy practices throughout the community, consistent with the CPUC's Energy Efficiency Strategic Plan goal number 3.

Key Partners/Coordination

These strategies have been designed to complement existing and proposed services and have been developed in consultation with Bay Area Local Government Partnerships, PG&E and DGS. As the programs are developed and deployed, the BayREN will work with, partner and coordinate with a number of State, Regional and local government agencies, as well as Bay Area specific groups related to energy and climate change.

- **Bay Area Cities and Counties** represent the target market and will engage in contracts directly with the BEMS service provider(s) and will be the recipient of ZNE design services
- **PG&E and PG&E Local Government Partnerships** will continue to be engaged in the development of the programs and will be solicited to provide technical assistance, financing assistance and incentives through direct install programs and job order contracting
- **Community Choice Aggregators** will be consulted during the development of the programs and will be included in marketing and outreach campaigns

- **BEMS providers** will be recruited, likely through a competitive solicitation with model contracts. It is expected that the solicitation would occur approximately six months after the execution of the BayREN agreement
- **Energy Engineers/Consultant(s)** will be recruited, probably through a competitive solicitation, to provide analysis for the Bay Area portfolio
- **Business associations and ProspectSV** may be engaged to solicit participation in the BEMS solicitation process
- **Third-party program implementers** may be engaged to provide products and services identified for upgrades through Decision Support Analysis
- **The California Department of General Services** may be engaged to provide guidance on specifications for BEMS and on ZNE definitions and policies, strategies and training
- **The California Energy Commission and the ISO** may be engaged to identify opportunities for advanced demand management strategies and participation in market mechanisms

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Section 5
CODES AND STANDARDS

Introduction

The BayREN Codes & Standards Business Plan addresses three key strategy areas: Energy Code Compliance Tools and Services; Specialized and Focused Trainings and Workshops; and Stakeholder Engagement and Policy Development. Activities are intended to reinforce and expand existing local government infrastructures and capacities for permitting and inspecting buildings, encouraging building activity to exceed the requirements of the California Building Energy Efficiency Standards (Title 24, Part 6, also the Standards), and reporting on building activity and progress towards energy efficiency goals. Activities leverage the relationships held by local governments to engage market actors that for one reason or another may not prioritize energy efficiency in building projects. This includes permit applicants for residential and small commercial projects (property owners and contractors) and building department staff including building officials, permit technicians, plan reviewers, and building inspectors.

This Codes & Standards Business Plan further develops existing activities that BayREN has implemented since 2013, based upon feedback from key program stakeholders and partners including: Bay Area building professionals, building departments, and chapters of the International Code Council (ICC) Bay Area planning and policy agencies, the Statewide IOU Codes & Standards Team, the California Energy Commission's Standards Development and Outreach Teams, and the California Building Officials Organization (CALBO).

Ten Year Vision, Outcomes and Budget

Vision: *Key actors use tools and technologies that optimize and validate energy code compliance and energy efficiency in a regionally consistent market.*

Outcomes:

- *85% of Bay Area Jurisdictions receive energy code compliance support and services to effectively increase permit closeout rates by 50%*
- *Data from over 16,000 projects in 50 Bay Area jurisdictions help drive increased adoption of advanced energy policies*

Ten year budget (total): \$22.8 M

Market Context

The BayREN Codes & Standards activities address both residential and non-residential properties where local authorities having jurisdiction (AHJs) are responsible for enforcing California's efficiency standards as well as local reach codes and energy-related policies. Carrying out these activities in the Bay Area means working with 7.5 million residents who live and work in buildings primarily built before the

Standards were implemented in 1978¹, across 110 different AHJs. These AHJs serve almost 28,000 contractors.

The resources and capacities across these AHJs varies significantly. BayREN's preliminary research of 63 local governments indicates that 54% of jurisdictions had three or fewer full time staff in their building division (with 10% having zero full time staff) with building division budgets ranging from \$5-\$499 per capita. A review of publically available information indicates that 40% of building departments have electronic permitting systems available, and 34% have permit systems with on-line services for applicants. This same review indicates that 80% of AHJs have the option to use contracted, third-party plan check and building inspection services. Bay Area building departments oversee building activity related to 2,800,000 existing housing units and *XAA,XAA,XAA* square feet of existing commercial buildings.

Sector Summary

Since 2013, the BayREN has engaged with building departments and building professionals representing over 77 Bay Area jurisdictions to reduce energy use in buildings by:

- Assisting in the creation and promotion of best practices and data sharing at individual jurisdictions to promote compliance with energy codes and green building standards and transparent compliance data;
- Directing building department staff and building professionals to available trainings related to the energy codes, and developing and providing solutions for unmet training needs; and
- Promoting local reach codes, policies, and ordinances that strengthen local agency efforts to improve energy efficiency standards and encourage greater use of renewable and sustainable materials in building construction.

Codes and Standards activities are informed by the BayREN's 2013 C&S Survey, to which over 144 building department staff and building professionals responded, and continued engagement with key stakeholders and partners. Ongoing activities are also informed by evolving state and regional policies including California's Long Term Strategic Energy Efficiency Action Plan, the Existing Building Energy Efficiency Action Plan, and evaluation reports of the BayREN programs to date. Starting in 2017, BayREN Codes and Standards activities are proposed to focus on three primary areas:

- **Energy Code Compliance Tools and Services:** the BayREN works with self-selected Bay Area jurisdictions to identify enforcement barriers and challenges, recognize successful energy code enforcement processes and strategies, provide resources to improve compliance with the Standards, and document and report on compliance.
- **Specialized and Focused Trainings and Workshops:** the BayREN connects building department staff and private sector professionals with energy code trainings and workshops that focus on enforcement processes and best practices. This includes referral to existing training resources offered through Energy Code Ace and the Statewide IOU C&S team, trainings

¹ Nearly 70% of the Bay Area's residential and small-medium commercial buildings were built before 1978

developed and delivered by the BayREN, and locally hosted building department/building professional workshops.

- **Stakeholder Engagement and Policy Development Activities:** local government policymakers, sustainability staff, and building professionals are engaged through regional forums, local council meetings, and other opportunities to learn about and receive resources related to policy and program design issues on energy efficiency and energy code compliance improvement.

Evolving Approaches

BayREN Codes & Standards will continue to evolve over the next ten years, consistent with guidance from the Commission, EM&V Evaluations, and the needs of our local government stakeholders. In addition, we will continue to pursue partnership opportunities with the Statewide IOU C&S Team, the CEC, local building professionals, and local building departments. BayREN will continue to focus efforts on activities that meet the needs of these stakeholders, and test innovative services and tools that could be scaled to larger regional or statewide efforts.

Over the long term, these activities will create opportunities to enhance code compliance that are specific to local governments. Long term strategies for the BayREN C&S Program:

- **Energy Code Compliance Tools and Services:** Local government permit systems offer a wealth of data and information that should be fully deployed to inform state metrics and data repositories. BayREN C&S will continue to monitor and track the evolution of e-permitting systems and will seek to add functionality and metrics necessary to foster streamlined compliance and enhanced tracking of permit data and energy metrics.
- **Specialized and Focused Trainings and Workshops:** Local governments are specifically charged with working across key market actors, and provide a common venue for building professionals, building department staff, policy makers, and program implementers to coordinate activities between design firms, build firms, industry organizations, local and state agencies, and municipal and investor-owned utilities. In addition, the move towards more outcome-based codes and post-occupancy code requirements (such as commissioning and ZNE) promises to stretch the limits of traditional building code and inspection processes. As the energy code gets increasingly complex and integrated with other parts of the building code (such as the T24 green building code, Part 11, and the plumbing and electrical codes), BayREN C&S will seek to find common training applications that offer comprehensive updates on enforcement best practices. Forums, workshops, and other joint efforts for collaborative solutions towards advancing code requirements will be valuable as the industry evolves to more performance-based outcomes.
- **Stakeholder Engagement and Policy Development Activities:** Local governments provide a “testing ground” for implementing and learning about advanced energy policy options. The Bay Area has long been a leader in voluntary adoption of above-code measures by local governments.²

² The Bay Area policy assessment of 2010 illustrates that many local governments have deep experience exceeding code minimums through policy:

<http://www.usgbc-ncc.org/storage/documents/advocacy/bacc%20regional%20assessment.pdf>

Effective “reach” policies and codes of the future will be vetted by leading public agencies today, and BayREN is in a unique position to catalyze greater uptake of leading regional policies and initiatives. Furthermore, the Bay Area jurisdictions have a lot to say about the code-making process, so having BayREN as a vocal member of the codes and standards update process in California will continue to be an important part of what the C&S program offers to the region.

More near-term examples of how this overarching approach to the development and implementation of sector activities include, but are not limited to:

- **Tools and Services:** BayREN is testing several electronic tools to help improve permitting compliance, including online- and kiosk-hosted information tools for residential water heater replacement permits and tablet-based non-residential lighting design, plan check, and inspection software. For e-tools with demonstrated potential, BayREN will explore software add-ons that will allow these tools to more easily “plug-in” to common permitting systems such as Accela and eTrackIt, increasing the scale and scope of tool deployment.
- **Trainings:** BayREN’s Title 24 Part 6 trainings complement and supplement existing IOU/EnergyCode Ace trainings, by offering short (60-90 minute) and long (4 hour) modules that focus on specific topics such as Residential Forms and Permit Submittals for Additions. Based on Commission evaluations, BayREN will be adding online webinar trainings for existing curriculums to reach a larger, statewide audience.
- **Policy Development:** A current ZNE Municipal Analysis initiative within Codes & Standards has been over-subscribed for 2016. BayREN is proposing as part of the Municipal/Public Sector Chapter of this Business Plan that this initiative be expanded into a stand alone “Systems Integration for Early Adoption of ZNE” program.

Figure 1. Codes & Standards Historic Program Achievements

	2013	2014	2015	2016 (as of 9/30)
# of Training Modules	N/A	72	54	32
# of Trainings/Attendees	N/A	469	552	438
# of Regional Forums	1	6	6	3
# of Regional Forums/ Attendees	78	333	225	211
# of Tools/Resources Developed	N/A	12	15	13

Vision, Intervention Strategies and Objectives

BayREN’s Codes & Standard activities are aligned with BayREN’s overarching intervention strategies to advance energy efficiency with wrap around services and supports and the demonstration of innovative deployment methods. These activities are intended to achieve a 10 year vision in which key actors use

tools and technologies that optimize and validate energy code compliance and energy efficiency in a regionally consistent market.

Intervention Strategy	Tactic	Objective
<p><i>S1. Provide Wrap Around Services and Support</i></p> <p><i>Estimated % of annual budget: 75%</i></p> <p><i>Non-resource</i></p>	CS1. Integrate electronic and web-based compliance tools into local permit systems and common systems providers	<i>Key market actors use online interfaces powered by energy code analytic software for: permit application; plan review; inspection requirements and verifications; permit close out</i>
	CS2. Develop and promote energy code and best-practice trainings consistent with State code updates	<i>Key market actors access relevant energy efficiency resources using online content and in person trainings</i>
	CS3. Engage local, regional, and state market actors with forums, workshops, and other joint collaborations.	<i>Key market actors have regular opportunities to share common and best practices.</i>
	CS4. Increase permit applicants' and building departments' use of vetted tools and mechanisms for energy code compliance.	<i>Key actors effectively leverage HERS, Acceptance Testing, benchmarking, and other strategies to deliver increased and streamlined compliance.</i>
<p><i>S3. Test and Demonstrate Innovative Energy Efficiency Deployment Methods</i></p> <p><i>Estimated % of annual budget: 25%</i></p> <p><i>Non-resource for 2017</i></p>	CS5. Test and promote advanced energy codes and policies including ZNE.	<i>Local governments contribute research and findings on advanced building concepts (i.e., ZNE; benchmarking) and infrastructure supports for policy implementation.</i>
	CS6. Develop and promote tools and protocols to make energy-related permit data more accessible.	<i>Key market actors have access to regionally aggregated database of local permit information.</i>

Summary Metrics and Budget

The following Sector Metric Table aligns with the Intervention strategies outlined in the previous pages and indicates anticipated short, mid- and long-term targets for each program area. A full metrics table is detailed at the end of this chapter.

Intervention Strategies	Market Effect Metrics	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Strategy 1. Provide Wrap Around Services and Support. Estimated % of annual budget: 75%. Non-resource	Output: Number of jurisdictions receiving services	2015 Baseline - 68% of Bay Area jurisdictions	Program Tracking Data	- Serve 80% of jurisdictions	- Serve 85% coverage	- Maintain 85% coverage
	Output: Number of participants receiving services	2015 Baseline - 777 participants	Program Tracking Data	Annual increase 10% over baseline	Increase 10% over previous year	Increase 10% over previous year
	Output: Number of building projects receiving services*	2015 Baseline - 32 projects	Program Tracking Data	Annual increase 200% over baseline	Increase 200% over previous year	Increase 200% over previous year
	Outcome: Increased code compliance and permit closeout	Establish Baseline with Survey in 2017	Bi-annual survey	Annual increase 5% over baseline	Increase 5% over previous year	Increase 5% over previous year
Strategy 3. Test and Demonstrate Innovative Energy Efficiency Deployment Methods Estimated % of annual budget: 25%. Non-resource	Output: Number of building projects enrolled in demonstrations*	2015 Baseline - 32 projects	Program Tracking Data	Annual increase 200% over baseline	Increase 200% over previous year	Increase 200% over previous year
	Output: Number of jurisdictions / participants enrolled in demonstrations	2015 Baseline - 5 jurisdictions	Program Tracking Data	Annual increase 30% over baseline	Increase 30% over previous year	Increase 30% over previous year
	Outcome: Increased adoption of advanced energy policies	Establish Baseline with Survey in 2017	Bi-annual survey	Annual increase 5% over baseline	Increase 5% over previous year	Increase 5% over previous year

*Currently, the building project metric is not disaggregated between Strategy 1 and 3. This will be addressed in the C&S Implementation Plan to avoid double counting.

Budget (\$)	2016*	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Non-Incentive	1,492,087	1,989,000	1,994,000	2,141,000	2,213,000	2,180,000	2,340,000	2,418,000	2,381,000	2,556,000	2,642,000
Incent	-	-	-	-	-	-	-	-	-	-	-
Total	1,492,087	1,989,000	1,994,000	2,141,000	2,213,000	2,180,000	2,340,000	2,418,000	2,381,000	2,556,000	2,642,000

* 2016's actual budget is included for reference. 2017 budget is proposed as year 1 of the 10 year Business Plan. BayREN has also included an annual cost of living adjustment in the proposed budgets for 2018-2026. The 2017 Advice Filing submitted on September 1, 2016 is intended as a placeholder only until this Business Plan is approved.

The increased budget is requested to support the activities proposed. The annual variation of the BayREN C&S budget is due to activities and anticipated level of effort associated with the regular update cycle for Title 24, including but not limited to updates for training curriculums; increased demand for trainings, participation in code update workshops and rule making.

This budget will facilitate the forecasted short, mid, and long term metrics targets with the expectation that increased participation and project volume is achieved as initial efforts scale and gain traction. For example, webinar based trainings will be able to reach larger audiences with marginal increased effort.

Market Characterization

The Bay Area's 110 local governments (building and planning departments) oversee a significant volume of construction activity in the residential and nonresidential markets. While the nine Bay Area counties account for approximately 20% of California's residential population, the region accounted for approximately 25% of California's new residential construction in 2014. In addition, there is significant building activity related to additions, alterations, renovations, rehabs, and tenant improvements, in the region's existing buildings, including approximately 2,800,000 existing housing units. Of the Bay Area's residential and small-medium commercial buildings, nearly 70% were built before 1978 and the introduction of the Standards. This represents a significant opportunity to increase building efficiencies and achieve energy savings through better energy code compliance and enforcement and more advanced energy policies and ordinances.

While comprehensive data on building activity is difficult to compile, permit data for new residential construction and HVAC replacement help illustrate industry activity. In 2014 there were 7,056 new residential buildings permitted in the Bay Area³, representing 21,389 living units and over \$5 billion in construction costs. While HVAC projects are known to be significantly more numerous compared to the number of HVAC permits pulled, the more than 4,900 HVAC permits (~13% of all HVAC permits in California) issued in the nine Bay Area counties in 2014 gives a sense for the geographic distribution of this common retrofit project⁴.

³ Information compiled from Annual 2014 Permit Data for the nine Bay Area Counties as reported by the U.S. Census: <http://censtats.census.gov/bldg/bldgprmt.shtml>

⁴ CIRB 2014 Annual Building and Energy Permit Summaries

Figure 1. 2014 New Residential Construction in the Bay Area, percentage by County

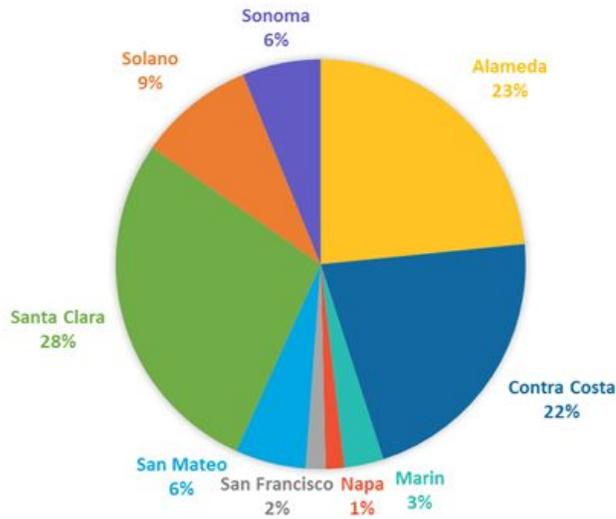
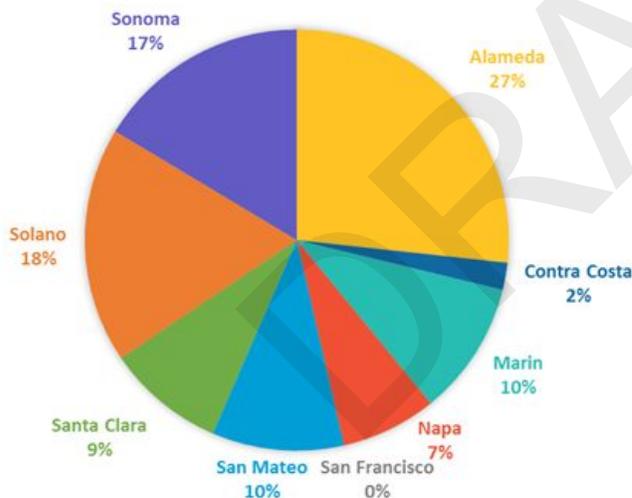


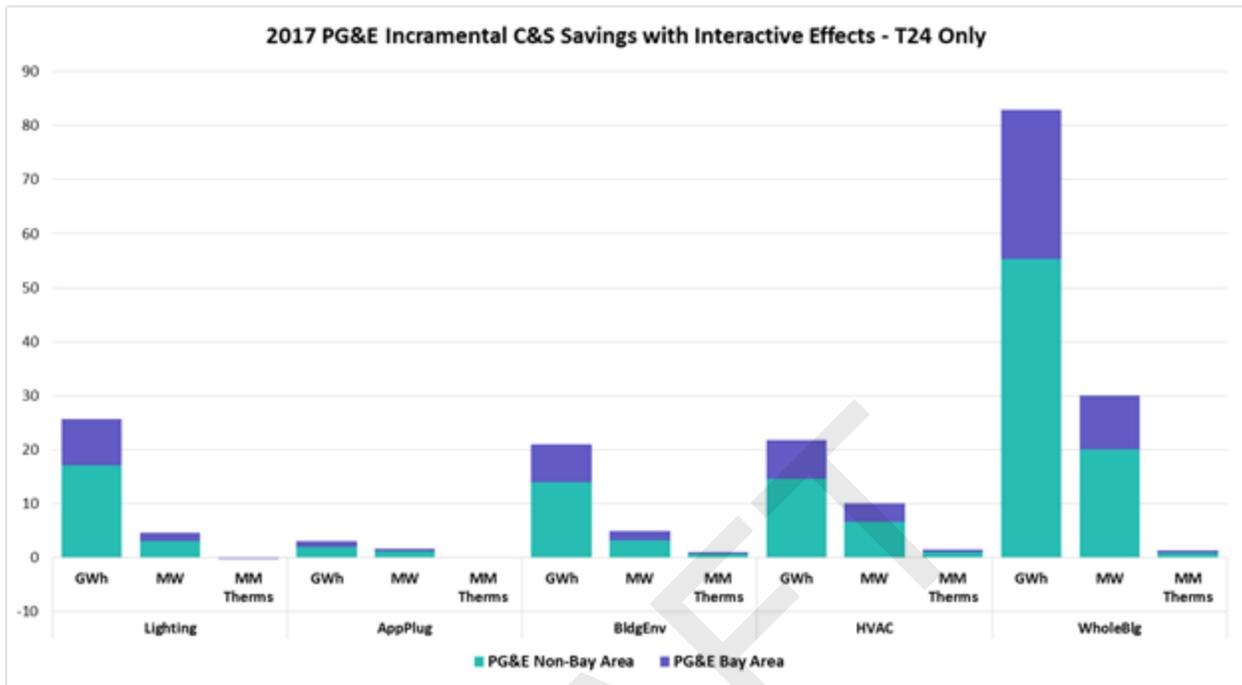
Figure 2. 2014 HVAC Permits in the Bay Area, percentage by County



The Bay Area’s building activity, if in compliance with California’s Building and Appliance Standards for energy efficiency, should deliver significant energy savings to the benefit of California’s residents and the State’s energy goals. Looking ahead to 2017, compliance with Title 24, Part 6 could result in an estimated savings potential of over 51 GWh, 17 MW, and 1 MM Therms within the Bay Area⁵.

⁵ Navigant Goals and Potential Study (ResultsViewer62615PUBLICDRAFT.xlsx)

Figure 3. 2017 PG&E Incremental C&S Savings with Interactive Effects



T24 related-savings for the entire PG&E service territory. Assumed 1/3 of savings are for Bay Area. ComRefrig, FoodServ, ProcDist, and SHW are omitted due to little to no savings.

Business Plan Strategies are designed to engage the following key market actors:

- Building Department and other Local Government Staff
 - Chief Building Officials
 - Permit Technicians
 - Plans Examiners
 - Building Inspectors
 - Planners
 - Sustainability Staff
 - Elected Officials
- Building Professionals and Permit Applicants
 - Designers
 - Contractors
 - Energy Consultants
 - Third Party Code Inspectors
 - Building Owners and Managers

This landscape of building professionals and building department staff is vast. Considering just the contractor community, the Bay Area is served by over 1,500 licensed HVAC contractors, over 2,500 plumbers, and over 4,300 electrical contractors.⁶

County	Total Number of Contractors	Count by Unique License Type									
		B	C-2	C-4	C-10	C-11	C-20	C-36	C-38	C-39	C-45
		General Building	Insulation & Acoustical	Boiler, Hot Water Heating &	Electrical (General)	Elevator	HVAC	Plumbing	Refrigeration	Roofing	Electrical Sign
Alameda	4,788	3,577	45	41	783	9	289	413	59	169	26
Contra Costa	4,258	2,908	35	38	624	1	280	336	50	112	13
Marin	1,955	1,507	15	13	239	1	53	125	9	33	3
Napa	723	503	3	5	117	1	31	51	4	20	3
San Francisco	2,989	2,107	11	44	528	3	104	423	17	71	3
San Mateo	3,366	2,350	16	36	528	5	176	368	29	84	6
Santa Clara	5,495	3,674	40	35	893	4	404	499	55	182	23
Sonoma	3,140	2,234	31	37	439	2	147	253	39	74	10
Solano	1,253	775	13	11	203	5	84	98	13	60	12
BAY AREA	27,967	19,635	209	260	4,354	31	1,568	2,566	275	805	99

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⁶ Data pulled from California State Licensing Board, 2014.

Codes & Standards Strategies and Tactics

BayREN C&S Activities are intended to address specific market barriers with actionable strategies that engage and leverage the resources of key program stakeholders. Problem statements and market barriers have been identified through the 2013-14 CPUC C&S Compliance Improvement Process Evaluation, BayREN’s work with 15 building departments as part of the 2014-15 Permit Resource Opportunity Program (PROP)⁷, research of 63 Bay Area permitting agencies, participation in the 2019 T24 code development process, and ICC Chapter Engagement.

Problem	Market Barriers	Strategy and Tactics
Regular updates to the energy code means compliance and enforcement requirements are constantly evolving.	Building professionals must meet client expectations for cost and timeline while also striving to comply with T24; building departments must prioritize structural, health, and safety code related issues while also striving to enforce T24.	S1. Wrap Around Services CS1. Integrate electronic and web-based compliance tools into local permit systems and common systems providers
	Responsibilities for achieving and verifying compliance are impacting more building professionals and shifting to new actors in the compliance chain.	S1. Wrap Around Services CS2. Develop and promote energy code and best-practice trainings consistent with State code updates
Compliance requires engaging a large and diverse group of Building Professionals that must navigate inconsistent permitting processes and requirements across Bay Area’s 110 Building Departments.	Building professionals, local government and building department staff, and regional and state agency staff and policy makers have limited venues engage on code and policy implementation.	S1. Wrap Around Services CS3. Engage local, regional, and state market actors with forums, workshops, and other joint collaborations.
	Energy code requirements vary by permit scope, climate zone, and building or site attributes, while energy code interpretation and enforcement varies by jurisdiction.	S1. Wrap Around Services CS4. Increase permit applicants’ and building departments’ use of vetted tools and mechanisms for energy code compliance.
It is difficult to effectively test, promote and implement policy and retrofit best practices necessary to achieve energy efficiency, ZNE, and Climate goals.	Siloed funding limits coordination between policy makers, policy implementers, and market actors.	S3. Innovative Deployment CS5. Test and promote advanced energy codes and policies including ZNE.
	There is a lack of accessible and transparent data for permitting and energy code compliance. It is difficult to disseminate existing information to key market actors and decision makers.	S3. Innovative Deployment CS6. Develop and promote tools and protocols to make energy-related permit data more accessible.

⁷ <https://www.bayren.org/codes/prop-final-report>

Strategy 1. Provide Wrap Around Services, Support and Financing

Tactic CS1. Integrate electronic and web-based compliance tools into local permit systems and common systems providers.

Tactic Objective: Key market actors use online interfaces powered by energy code analytic software for: permit application; plan review; inspection requirements and verifications; permit close out.

BayREN is working with local jurisdictions, the Statewide IOU Codes team, the CEC, and market actors including HERS providers/registries to identify, develop, and deploy tools and systems technologies for energy code compliance and permitting. Near and mid-term activities include:

- Local government online- and kiosk-hosted information tools for common projects that require permits, intended to educate permit applicants about project-specific local energy code requirements and associated incentives and best practices. (EBEE Action Plan Strategy 1.5.1.)
- Tablet-based/electronic design, plan check, and inspection software that can help building professionals and building department staff evaluate energy code requirements and compliance. (EBEE Action Plan Strategy 1.5.1.)
- Data systems aggregating project specifications and compliance information across multiple jurisdictions. (EBEE Action Plan Strategies 1.5.5; 3.2; 4.2.)

For e-tools with demonstrated potential, BayREN will explore software add-ons that will allow these tools to more easily “plug-in” to common permitting systems such as Accela and eTrackIt, increasing the scale and scope of tool deployment. BayREN meets regularly with the Statewide IOU and CEC teams to inform tools development, coordinate implementation, and minimize overlap.

Tactic CS2. Develop and promote energy code and best-practice trainings consistent with State code updates.

Tactic Objective: Key market actors access relevant energy efficiency resources using online content and in person trainings

BayREN is working with local jurisdictions, the Statewide IOU team, market actors, and industry organizations including local chapters of the International Code Council (ICC), American Institute of Architects (AIA), California Association of Realtors (CAR), California Building Industry Association (CBIA), the US Green Building Council, Build It Green, and the Building Owners and Managers Association (BOMA) to identify, develop, deliver, and promote new and existing trainings for energy code compliance and permitting. Training material and other educational resources are leveraged from a number of training providers, including REN, IOU, CALBO, ICC, and similar providers, with the specific goal of helping building professionals and building department staff effectively navigate the parts of the energy code most relevant to them. Near and mid-term activities include:

- Delivery of BayREN’s existing T24 Part 6 trainings to complement and supplement existing IOU/EnergyCode Ace trainings, with short (60-90 minute) and long (4 hour) modules the focus on specific topics such as Residential Forms and Permit Submittals for Additions. (EBEE Action Plan Strategy 1.5.3.)
- Transitioning BayREN’s existing T24 Part 6 trainings to web-based modules available for on-demand use. (EBEE Action Plan Strategy 1.5.3.)
- Outreach through local government channels to engage building and real estate professionals on energy code requirements and policies, including evolving benchmarking and time-of-sale requirements. (EBEE Action Plan Strategies 1.2.3; 1.5.3)

BayREN’s initial training efforts were informed by needs identified in BayREN’s 2013 C&S survey of 144 Bay Area building professionals and building department staff. Subsequent work has been informed through monthly coordination with the Statewide IOU team, ongoing feedback through BayREN trainings and Regional Forums, and recommendations within the 2013-14 CPUC C&S Compliance Improvement Process Evaluation.

Tactic CS3. Engage local, regional, and state market actors with forums, workshops, and other joint collaborations.

Tactic Objective: Key market actors have regular opportunities to share common and best practices.

BayREN hosts and participates in a range of engagements and collaborations with key market actors and sector stakeholders.⁸ Near and mid-term activities include:

- Quarterly BayREN hosted Regional Forums to address energy and sustainability topics prioritized by stakeholders.
- Participation in local LGPs, Bay Area Green Business Program, and water agency planning groups.
- Expansion of current engagement with ICC Chapters, CALBO, BOMA
- Participation in code update processes

Key topics addressed in these collaborations include T24 Part 6 and Part 11 updates, common code interpretations, real estate engagement and building labeling, benchmarking and ZNE activities, and water conservation. BayREN works with stakeholders and partners to develop and distribute information resources associated with its energy code engagements and collaborations. The Regional Forums are web-hosted, and regularly have attendance from parties outside of the Bay Area. Presentation materials and supporting resources are posted on the BayREN website and distributed to all program contacts (the BayREN’s Codes & Standards contact list currently includes 2,449 individuals).

⁸ EBEE Action Plan Strategies 1.5.3; 3.3; 4.1; 4.2.

Tactic CS4. Increase permit applicants' and building departments' use of vetted tools and mechanisms for energy code compliance.

Tactic Objective: Key actors effectively leverage HERS, Acceptance Testing, benchmarking, and other strategies to deliver increased and streamlined compliance.

BayREN works with key stakeholders to meet the wide range of needs across the region's multiple jurisdictions. The resources offered by these stakeholders are numerous; the challenge is getting those resources to the right market actors. Near and mid-term activities include:

- A prioritized focus in trainings and other joint collaborations to increase building departments' use of third party verifiers and associated registries (i.e., HERS) to verify compliance. (EBEE Action Plan Strategies 1.5.1; 2.1.3.)
- BayREN coordination with the Statewide IOU team and CEC to promote Energy Code ACE and the On-line Resource Center resources to building professionals and building department staff. (EBEE Action Plan Strategies 1.5.1; 1.5.3.)
- BayREN coordination with market actors including building managers and realtors to understand benchmarking and disclosure requirements, enabling technologies, and associated benefits and value-adds. (EBEE Action Plan Strategies 1.4.1; 1.4.2; 2.1; 4.1.)

BayREN is specifically interested in helping market actors and stakeholder leverage existing resources, tools, and compliance mechanisms to their greatest potential. For example, as HERS raters and acceptance test technicians are increasingly relied upon for third party verification of building projects, BayREN will work with local governments and the HERS/ATTC providers to increase the transparency and accountability of these third parties. BayREN will work with the Statewide IOU team and program evaluators to appropriately track and report on cross promoted activities and metrics.

Strategy 3. Test and Demonstrate Innovative Deployment Methods

Tactic CS5. Test and promote advanced energy codes and policies including ZNE and Benchmarking.

Tactic Objective: Local governments contribute research and findings on advanced building concepts (i.e., ZNE; benchmarking) and infrastructure supports for policy implementation.

BayREN is uniquely positioned to directly apply local government resources, expertise, and funding to explore and respond to challenges and opportunities in the implementation of energy codes and energy policies. For identified challenges and opportunities, BayREN seeks to facilitate responsive test projects that can be scaled with success. Reach code adoption will be coordinated with other BayREN subprograms, including single and multifamily, commercial, and public. Near and mid-term activities include:

- BayREN support for the implementation of the Berkeley Energy Saving Ordinance (BESO) and the development of a regional wide network for Home Energy Score (HEScore) eligible assessors and educated realtors to support similar time of sale ordinances in other jurisdictions. (EBEE Action Plan Strategy 1.7; 4.1.)
- BayREN coordination with the Statewide IOU Reach Code team to develop and track local energy policy and reach code implementation, including reach code tracking tools and local solar ordinances that integrate energy efficiency.
- BayREN coordination with San Francisco Department of the Environment and City of Berkeley on benchmarking requirements and the development of energy performance indexes. (EBEE Action Plan Strategies 1.8.2; 1.8.3; 4.1.)
- BayREN coordination with local governments to provide technical analysis and procurement supports for municipal buildings to more easily achieve ZNE goals while also maximizing the opportunity for efficiency. BayREN is proposing as part of the Municipal/Public Sector Chapter of this Business Plan that this initiative be expanded into a stand alone “Systems Integration for Early Adoption of ZNE” program.

In addition to ratepayer funded activities, BayREN’s work with test and demonstration projects is supported by other funding streams including local government funds, California Energy Commission, U.S. Department of Energy Grants, and Department of Water Resources Grants. BayREN is also leveraging regional relationships with the Bay Area Regional Collaborative and the Bay Area Air Quality Management District to fund codes related activities. BayREN County agencies have additional local partnerships which expand the region’s capacity to develop and promote advanced energy codes and policies.

Tactic CS6. Develop and promote tools and protocols to make permit data relevant to energy use more accessible.

Tactic Objective: Key market actors have access to regionally aggregated database of local permit information.

BayREN jurisdictions hold a vast amount of building data, much of which is in different formats and has varying levels of “reporting readiness”. It is critical to respect how a local jurisdiction’s data for any constituent’s building project may be used and accessed. However, BayREN sees significant value and opportunity in aggregating this data into regional databases to inform energy policy development and implementation at the state, regional, and local level. This data can also support efforts to increase the building industry’s valuation of energy code compliance and help maximize the benefits of building data and energy performance for permit applicants and building owners and operators. Near and mid-term activities include:

- BayREN engagement with CEC to understand how building department and permit information could be integrated into regional databases. (EBEE Action Plan Strategies 1.2.3; 1.8.3; 4.1.)
- BayREN recruitment of partner jurisdictions to enter into data sharing agreements. (EBEE Action Plan Strategies 1.8.2; 1.8.3; 3.2.1; 4.1.)

- Data analysis and feedback loops to inform local and regional policy development and market understanding, including BayREN’s ZNE supports for municipal buildings and Bay Area jurisdictions’ evaluation and adoption of various approaches to asset ratings and working with requests from local building professionals to understand costing estimates and impacts for evolving services (i.e., average costs for a CalGreen inspection). (EBEE Action Plan Strategies 1.2.3; 1.4; 1.5.1; 3.1.2; 3.2.1; 4.1.)

Data for building activity is tracked at the local level. State and regional agencies and local and regional market actors will benefit from investing in mechanisms to effectively aggregate, rather than duplicate, these data sources.

Coordinating Activities

Leveraged Resources

Additional content to be provided in future drafts.

EM&V Efforts

BayREN is actively involved in EM&V working groups and planning exercises with the CPUC and Statewide IOU C&S team.

Responses to the 2013-14 Compliance Improvement Process Evaluation

Recommendations for Permit Resource Opportunity Program (PROP): BayREN’s 2013-15 Compliance Improvement work was focused principally on the the Permit Resource Opportunity Program (PROP). The findings from this work has significantly informed current C&S activities for Energy Code Compliance Tools and Services. This includes more focused and resource-efficient efforts to distribute information tools and resources, and a shift to testing and demonstrating strategies for electronic and web-based compliance tools.

Recommendations for BayREN Trainings and Regional Forums: Since 2015, the BayREN and IOU C&S teams have maintained more regular coordination activities to ensure trainings and forums address areas of non-compliance and code changes while engaging as large of an audience as possible. All of BayREN’s 2016 forums have been offered by webinar and training modules are currently being transitioned to webinar format. In 2016 BayREN also became an ICC preferred training provider allowing for Continuing Education Units.

Increased engagement with ICC Chapters, CALBO, AIA, and other professional groups through trainings, forums, workshops, and other collaborations has also increased BayREN’s ability to use these organizations and their networks to distribute information and resources for energy code compliance, energy code update processes, and general energy policy and energy efficiency announcements.

BayREN Trainings, Forums, and other joint collaborations are a critical channel for input and feedback from market actors and stakeholders. This not only helps establish a record to inform state and regional policy development, but also ensures C&S activities remain responsive to existing and evolving needs.

Recommendations for BayREN Tools: BayREN compliance improvement tools reviewed for the 2013-14 Evaluation were paper based (or PDF) checklists and guides, developed to address needs expressed by building department staff and building professionals in the 2013 BayREN C&S Survey and 2014 PROP work. BayREN has sought to increase the use of these tools through several strategies, including mailing campaigns and webinars to make the paper tools more immediately accessible to users and working with the CEC to include links to the tools in the CEC's Online Resource Center. BayREN has also worked with the CEC to contribute content from certain checklist and guides to the 2016 T24 Compliance Manual. Content for the checklists and guides has also served as the informational foundation for BayREN's current and proposed online- and kiosk-hosted information tools for common projects requiring permits (i.e., residential water heater replacement).

Anticipated EM&V Study Needs

BayREN will continue to contribute to the EM&V Roadmaps and Plans with input and feedback from key market actors and C&S stakeholders. Specific topic areas that should be addressed in these plans include:

- The increasing interplay of energy codes and energy policy as relates to energy efficiency, solar electric systems, solar hot water, battery storage, and electric vehicle infrastructure. To effectively support T24 updates and development and energy policy implementation, activities within the Energy Efficiency Portfolio must be able to recognize this interplay and address it appropriately.
- The opportunity to leverage local government permit data to inform assumptions and methodologies for measure costs, cost-effectiveness, code impacts, and reach code adoption.

BayREN is also interested in working with CPUC and the Statewide IOU team to determine the best ways to evaluate and learn from test projects and other demonstrations conducted by BayREN. For instance, there is opportunity for BayREN and the IOUs to coordinate more closely on Code Readiness projects, piloting of new code language, and reach code cost effectiveness studies and impact tracking. BayREN is eager to work with Energy Division to establish appropriate expectations, protocols, levels of rigor, and response times for this type of EM&V approach.

Marketing, Education & Outreach

BayREN's unique organizational structure as a collaboration of the 9 Bay Area counties has enhanced the success of its programs through our perception as trusted messengers. As local governments, we are known and trusted by the local communities and have a long track record of delivering successful program and services. Codes & Standards Outreach is conducted directly through known contacts with program staff in the 101 local agencies and through the County-level BayREN representatives. Each County's representative works with:

- Chief building officials and building department staff at local jurisdictions

- Planning and sustainability staff with local jurisdictions
- Local ICC Chapter leaderships and membership
- Building professionals and building owners and managers participating in other BayREN programs

In addition to the County representatives, BayREN C&S uses its website (with over 5,000 unique page views since October, 2013) and its email contact list (over X,ABC contacts) to regularly engage its audience. BayREN uses these outreach channels to share updates from the BayREN, local jurisdictions and partners, the Statewide IOU team, the CEC, and other stakeholders.

Workforce Development, Education and Training

One of BayREN Codes & Standards’ primary activities is to provide training to building professionals and building department staff to increase compliance with the energy code and ensure energy efficiency measures have been installed by a skilled and trained workforce. This is consistent with the overall focus of Codes & Standards’ activities and the overarching vision of enabling key market actors use tools and technologies that optimize and validate energy code compliance and energy efficiency in a regionally consistent market.

Cross Cutting

Additional content to be provided in future drafts.

Key Partners/Coordination

From the launch of the program in 2013, the BayREN has made significant progress in clarifying its role and the value it offers to key partners and stakeholders. The table below summarizes current coordination activities, with highlights including but not limited to:

- Closer coordination with the Statewide IOU and PG&E C&S teams to more effectively deploy non-duplicative resources and activities
- Regular engagement with the CEC Standards Development and Education and Outreach teams
- Regular attendance of Bay Area ICC Chapter meetings and open communication channels with CALBO

BayREN Cross Sector Coordination		
Other REN Subprograms	Coordination Mechanism	Expected Frequency
Single Family	BayREN Executive Cmt	Bi-weekly

Multifamily	BayREN Executive Cmt	Bi-weekly
Commercial	BayREN Executive Cmt	Bi-weekly
Public Sector	BayREN Executive Cmt	Bi-weekly
IOU Programs	Coordination Mechanism	Expected Frequency
PG&E C&S Team	Coordination calls	Monthly
Statewide IOU C&S Program	Coordination calls	As needed
Coordination Partners Outside the Commission	Coordination Mechanism	Expected Frequency
CEC	Coordination calls	Monthly
Local ICC Chapters	Chapter meeting attendance	Monthly/Bi-Monthly
CALBO	Coordination calls	As needed
Bay Area Air Quality Management District	Coordination meetings	Quarterly
BOMA (Easy Bay and San Francisco Chapters)	Chapter meeting attendance	Quarterly
BIA - East Bay	Chapter meeting attendance	Quarterly
American Institute of Architects (Bay Area Chapters)	Chapter meeting attendance	Quarterly
Bay Area Energy Watches	Coordination calls; shared staffing/roles	Ongoing

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Section 6
WATER BILL SAVINGS

Introduction

The Water Bill Savings Program (formerly the PAYS® On Water Bill Program¹) works with partner municipal water utilities and their water customers to make the customer's use of water more efficient. BayREN provides partner utilities with model tariffs, on-bill programs designs, and technical assistance. The goal is to build utility commitment and capacity to provide eligible customers with optional and voluntary services and property improvements for water and energy efficiency. Participating customers pay for services through a monthly tariffed "efficiency charge" which is a line item on their utility bill and is attached to their utility meter.

Work to date has allowed the Town of Windsor, the City of Hayward and East Bay Municipal Utility District (EBMUD) to provide single family and multifamily water customers with services to install high efficiency indoor plumbing fixtures, convert lawns to drought tolerant landscapes, and repair and upgrade irrigation systems. These cost-effective on-bill improvements are intended to produce total utility bill savings that exceed the efficiency charge. BayREN, partner utilities, and stakeholders are also refining the model tariff and program design to develop low to no up-front cost options for properties to pursue improvements required by code changes, time-of-sale requirements, or emergency drought regulations.

This Water Bill Savings Program Business Plan Chapter provides further detail and context for the Cross Cutting discussion in the BayREN Residential and Commercial Sector Chapters. It builds upon existing activities that BayREN and the Sonoma County Regional Climate Protection Authority (a BayREN Member Agency that first implemented Windsor Efficiency PAYS® in 2012) are conducting with current Partner Utilities, feedback from water customers and contractors participating in these Partner's programs, and feedback from other industry stakeholders including realtors, apartment associations, and the PG&E finance team.

Ten Year Vision, Outcomes and Budget

Vision: *Water utility customers can opt to pay for cost effective and/or required efficiency improvements as part of their utility service*

Outcomes:

- *XX% of Bay Area water utilities offer on-bill efficiency services to their customers*

Ten year budget (total): *\$8.4 M*

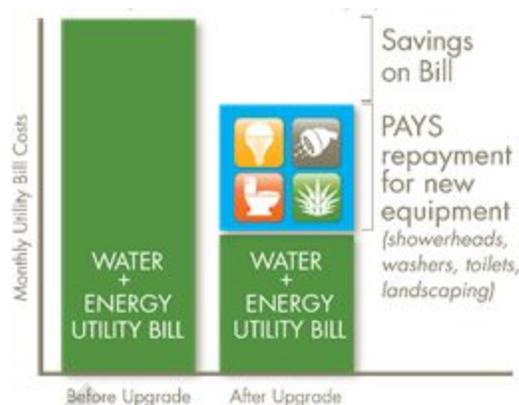
¹ BayREN original Program Implementation Plan that authorized this work in 2013-16 used the trademarked name of the Pay As You Save® (PAYS®) model. To enable further program evolution consistent with the PAYS® model but also aligned with the California market, BayREN is proposing to rename this already approved program to the Water Bill Savings Program.

Market Context

The model tariffs and on-bill program designs developed by BayREN can be deployed by any Bay Area municipal water utility that has the authority to establish a tariff and the ability to add and track line-item charges on its customers' water bills. For these utilities, on-bill efficiency improvements can be provided to eligible customers on an optional and voluntary basis as part of their utility service. Utility bill savings are greatest for customers with volumetric (rather than flat) water and sewer rates.

While any customer class with a municipal water utility account can participate in a Water Bill Savings Program, BayREN's programs to date have principally served single family and multifamily residential customers. The PAYS® model has also been deployed to serve commercial and municipal customers.

An analysis of the Bay Area's 72 water utilities indicates that 66 may be able to offer cost effective on-bill improvements to single family and or multifamily customer classes, with potential markets of 1,360,000 single family homes² and 480,000 multifamily housing units³. Eligible improvements would include basic indoor plumbing fixtures (high efficiency toilets, showerheads, and aerators) and could be expanded in certain areas to include lawn conversion to drought tolerant landscaping. Costs for these improvements typically fall below common thresholds for other financing mechanisms, such as PACE that typically has a minimum project value of \$5,000. BayREN on-bill program designs are intended to address barriers these other financing mechanisms have related to certain participant and improvement eligibility requirements (i.e., being the property owner or not allowing sheet mulching, a common water efficient landscaping practice).



Graphic text to be updated

Sector Summary

Partner Utilities operating BayREN facilitated on-bill program designs offer their customers the opportunity to voluntarily install cost-effective improvements on their property and repay for that service over time on their water bill. Efforts are made to provide a simple path to provide these services with:

- No up-front cost, no new debt obligation, no credit checks, and no liens
- A utility-approved monthly efficiency charge that is lower than the generated utility (water, sewer, and energy) bill savings
- Repayment required only while the participant is a utility customer at the project location
- A guarantee that failed measures are repaired or the payment obligation is terminated

² 2010-2014 American Community Survey 5 year Estimates. Number of housing units, residents per unit, vacancy rates, building sizes and age. Single family housing= 1 unit detached built before 2014

³ 2009-2013 American Community Survey 5-Year Estimates. Number of housing units, residents per unit, vacancy rates, building sizes and age. Multifamily housing =5 or more units built before 2000

These four assurances provide an opportunity for any customer type to benefit from efficiency as part of their utility service. Thus, the Program provides BayREN and California ratepayers with a model that:

- Promotes an efficiency service specifically designed to provide customers with measures, upgrades, and consumer protections that result in net utility bill savings
- Serves typically hard to reach sectors (e.g., multifamily) and allows existing rebate funds to be repurposed for more strategies purposes by increasing the potential for cost-effective project costs to be paid by customers over time on their utility bill
- Provides an on-ramp to efficiency and long term program and contractor relationships
- Can be used to pursue property improvements required by code changes, time-of-sale requirements, or emergency drought regulations

While there is opportunity for various property improvements to be facilitated by program services and the associated efficiency charge, a “Basic” cost-effective measure package has been used by Partner Utilities to date as an initial entry point to program services. As Partner Utilities are currently all municipal water utilities, this Basic Package includes:

- A 1.06 gallon per flush or better toilet with a Maximum Performance (MAP) rating of 600 grams or more
- A 1.5 gallon per minute showerhead
- A 1.0 gallon per minute bathroom faucet aerator
- A 1.5 gallon per minute kitchen faucet aerator

The Basic Measure package meets or exceeds requirements of the Water Conservation Act of 2009 (SB X7-7)⁴ and can be used to ensure properties comply with the pending 2017 (multifamily) and 2019 (single-family) time of sale requirements created by SB 407 (Padilla)⁵

Evolving Approaches

Water Bill Savings Program will continue to evolve over the next ten years, consistent with guidance from the Commission, EM&V Evaluations, other state water agencies as appropriate, and the needs of Bay Area water utilities and water customers. We will continue to pursue partnership opportunities with the Statewide IOU Finance Team, local building and landscape professionals, and local building and planning departments. BayREN will continue to focus efforts on activities that meet the needs of these stakeholders, do not duplicate efforts of other program administrators, and test innovative services and tools that could be scaled to larger regional or statewide efforts.

Over the long term, these activities are intended to significantly expand the opportunity for Bay Area water customers to pay for cost effective and/or required efficiency improvements as part of their utility service rather than as an out-of-pocket expense. Short and medium term efforts are intended to:

⁴ http://leginfo.legislature.ca.gov/faces/billCompareClient.xhtml?bill_id=200920107SB7

⁵ http://leginfo.legislature.ca.gov/faces/billCompareClient.xhtml?bill_id=200920100SB407

- Share lessons learned from Partner Utility on-bill programs (at the Town of Windsor, the City of Hayward and East Bay Municipal Utility District [EBMUD]) to inform ongoing market and technical adjustments within each Utility’s offering
- Develop a regional program model that would centralize funding and administration under a Joint Powers Authority (JPA) that would allow:
 - Easier opt-in for utilities and their water customers
 - Greater access to capital to pay for up-front project costs
 - Better alignment with BayREN and PG&E energy efficiency programs (rebate, technical advising, and financing), providing participating customers with more pathways to pursue water and energy property retrofits
- Grow a financing marketplace with tariffed efficiency services and improvements, enabling qualified contractors and building professionals to deliver turnkey water and energy efficiency projects.

These proposed activities will be informed by ongoing stakeholder engagement, including work with multifamily property owners and groups, the real estate industry, the finance industry, and efficiency-as-a-service companies (ESCOs) and organizations.

Figure 1. Water Bill Savings Program Achievements

	2013	2014	2015	2016 (as of 9/30)
# Municipal Utility Partners	3	3	3	3
# Program Designs In-field	1	1	2	3

These past achievements have focused on providing individual partner utilities with the following supports:

- Town of Windsor - Windsor Efficiency PAYS®: Residential field services since October 2012 for single and multifamily. Services include indoor plumbing fixtures and outdoor turf conversion to drought tolerant landscapes. Commercial landscaping services launched in December 2014. Services include installation of weather based irrigation controllers and irrigation system repairs.
- City of Hayward - Green Hayward PAYS®: Multifamily residential indoor and multifamily/commercial landscaping field services since August 2015. Services include indoor plumbing fixtures, common area energy measures that deliver savings to the property owner (lighting, hot water distribution, etc.), and weather-based irrigation controller installation.
- East Bay Municipal Utility District - EBMUD WaterSmart On-Bill Program: Multifamily residential indoor and single family/multifamily/commercial landscaping components approved for test projects, with field services available since July 2016.

To date these programs have delivered retrofits to 230 single family homes and 310 multifamily units.

Vision, Intervention Strategies and Objectives

The Water Bill Savings Program activities are aligned with BayREN’s overarching intervention strategies to advance energy efficiency with wrap around services and supports. Activities address key policy directives and fill gaps not currently met in the portfolios of program administrators. If successful, the program will demonstrate a functional model to rapidly scale cost effective and necessary property improvements for water and energy efficiency.

Intervention Strategy and Estimated Budget Allocation	Tactic	Objective
<p><i>S1. Provide Wrap Around Services and Support.</i></p> <p><i>Estimated % of annual budget: 100%</i></p> <p><i>Non-resource for 2017</i></p>	<p>WS1. Create municipal utility partnerships to scale service delivery</p>	<p><i>Partner Water Utilities join similar and or aligned programs to increase size of on-bill market and access to capital for water efficiency projects</i></p>
	<p>WS2. Facilitate adoption of model tariffs and on-bill program design for market consistency</p>	<p><i>Regionalized efficiency services streamline program delivery and increase property owners’ and market actors’ ability to participate in utility-facilitated efficiency services at scale</i></p>
	<p>WS3. Provide technical assistance to refine program components to meet efficiency needs specific to target customer classes</p>	<p><i>Customers and utilities have ongoing support to ensure on-bill services deliver expected resource savings and provide exceptional customer experiences with efficiency</i></p>

These tactics are aligned with key State policy directives:

- **The California Long Term Energy Efficiency Strategic Plan** directs State agencies to “develop innovative and affordable financing options for energy efficient buildings and retrofits.” Across multiple sectors, innovative financing is identified as an essential aspect of overcoming challenges such as split-incentives and rental property occupant turnover. The Pay As You Save® (PAYS®) approach taken by BayREN’s Program creates financing for improvements that remain with the property through owner-occupant turnover and that fully reflect the savings in monthly operating costs from efficient homes.
- **SB 350 (De Leon)** establishes bold new goals for energy efficiency of buildings that will only be reached through a diverse and innovative portfolio of tools such as assessments, ratings, education, workforce investment, and financing. The bill also requires that State programs

address barriers to participation by low-income customers, and on-bill financing has been identified as a tool to do so. The SB 350 Barriers Study Draft Report found that⁶:

- *“On-bill financing may appeal to low-income customers because the cost of the energy upgrade is simply incorporated into a monthly utility bill. On-bill financing programs have the potential to address a range of barriers, including lack of confidence in energy savings, split incentives, long payback periods, and high up-front costs (Zetterberg and Ng, 2013). Addressing the split incentive, Behles (2013) notes that “if on-bill financing stays with the property, it can provide a way for renters to pay the capital necessary to make upgrades” without investment from the property owner. Evaluating the potential for on-bill financing pilots is an item on the AB 758 Action Plan.”*
- *It also found that: “On-bill financing still requires an outlay of capital, and financiers are likely to require that potential debtors meet a certain FICO threshold. Furthermore, on-bill financing may require permission from the landlord, and could be problematic because successor tenants would be obligated to continue payments for a financed improvement they did not agree to. A variant of on-bill financing called PAYS (Pay As You Save) might be more suitable, particularly for low-income customers. Under this model, the utility finances the energy installation and passes along savings to the customer (Ottinger and Bowie, 2015). The advantage of this model is that it obviates the need for the customer to pass a credit check or, in the case of low-income homeowners, take a lien on the property.”*
- **Executive Order B-29-15** identifies the lasting and projected future impacts of the drought as a driver for heightened collaboration to combat threats to water supply. BayREN’s Water Bill Savings Program provides an opportunity for municipal water utilities to collaborate on a regional scale to finance lasting property improvements to reduce customer demand and provide benefits to ratepayers at the water-energy nexus.
- **The Global Warming Solutions Act (AB 32 and SB 32) Climate Change Scoping Plan** presents a comprehensive strategy for reducing greenhouse gas emissions (GHGs) in California that puts great emphasis on resource efficiency in energy, water, and waste. The 2014 update identified innovative local government financing strategies as an essential tool⁷:
 - *“The development of long-term revenue streams and creative local financing mechanisms and incentives can accelerate emission reductions. For instance, local financial incentives can spur retrofits of the existing building stock, net-zero energy or carbon projects, and other voluntary GHG emission reductions. The expansion of PACE financing programs, the creation of incentive opportunities under various policies and planning efforts, and the formation of new mechanisms are all options that should be explored to continue progress toward reducing emissions across our communities.”*
- **The Water Conservation Act of 2009 (SB X7-7)** established a statewide water conservation target of 20% by 2020, and the methodologies by which urban water suppliers to achieve compliance including the process for determining eligible water demand reduction measures. The BayREN Water Bill Savings Program complies with and advances the goals of SB X7-7.

⁶ California Energy Commission, SB 350 Barriers Study Draft Report, Docket 16-OIR-02, 2016.

⁷ California Air Resources Board, AB 32 Scoping Plan Update, 2014.

- SB 409 (Padilla)** requires that all non-water conserving plumbing fixtures be replaced with a fixture that complies with the current building standard applicable to new properties of the same type by 2017 in single-family properties and by 2019 in multifamily properties. Compliance with the requirement must be disclosed at the time of sale and is also a requirement before obtaining a permit for certain building alterations or renovations. The Water Bill Savings Program provides municipal governments a tool with which to help property owners comply with SB 409.

Summary Metrics and Budget

The following Metric Table aligns with the Intervention strategies outlined in the previous pages and indicates anticipated short, mid- and long-term targets for each program area. A full metrics table is detailed at the end of this chapter.

Intervention Strategy	Market Effect Metrics	Baseline	Metric Source	Short Term Target (1-3 years)	Mid Term Target (4-7 years)	Long Term Targets (8-10+ years)
Strategy 1. Provide Wrap Around Services and Support. Estimated % of annual budget: 100% Non-resource for 2017	Outcome: Number of partner water utilities offering on-bill efficiency services	2015 Baseline - 3 partners	Program Tracking Data	10 partner utilities (~11% of Bay Area Water Utilities)	20 partner utilities (~22% of Bay Area Water Utilities)	40 partner utilities (~43% of Bay Area Water Utilities)

Budget (\$)	2016*	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Non-Incentive	401,718	1,170,000	1,370,000	971,000	678,000	653,000	673,000	693,000	712,000	734,000	757,000
Incent	0	0	0	0	0	0	0	0	0	0	0
Total	401,718	1,170,000	1,370,000	971,000	678,000	653,000	673,000	693,000	712,000	734,000	757,000

* 2016's actual budget is included for reference. 2017 budget is proposed as year 1 of the 10 year Business Plan. BayREN has also included an annual cost of living adjustment in the proposed budgets for 2018-2026. The 2017 Advice Filing submitted on September 1, 2016 is intended as a placeholder only until this Business Plan is approved.

The increased budget is requested to support the activities proposed, with an expanded ramp in years 1-3 to recruit partner utilities to the Regional JPA program model and ensure program designs and model tariffs meet the needs of all appropriate customer classes.

Market Characterization

The Bay Area is served by 91 water utilities. BayREN performed an analysis of the 72 water utilities that served large and medium sized Bay Area communities, and found that customers at 66 of these water utilities pay water, sewer, and energy rates that would allow for cost effective installation of the current Basic Package of measures identified, and that cost effective savings persist by installing the basic measure package, even in newer properties. For example, though Windsor is a newer community where

many homes have toilets rated at 1.6 gallon per flush, actual measured flush volume averaging 2.2 gallons per flush meant many properties could cost effectively upgrade these fixtures. Combined, the 66 utilities identified could provide cost-effective indoor plumbing fixture retrofits for nearly 1,360,000 single-family homes⁸ and 480,000 multifamily housing units⁹.

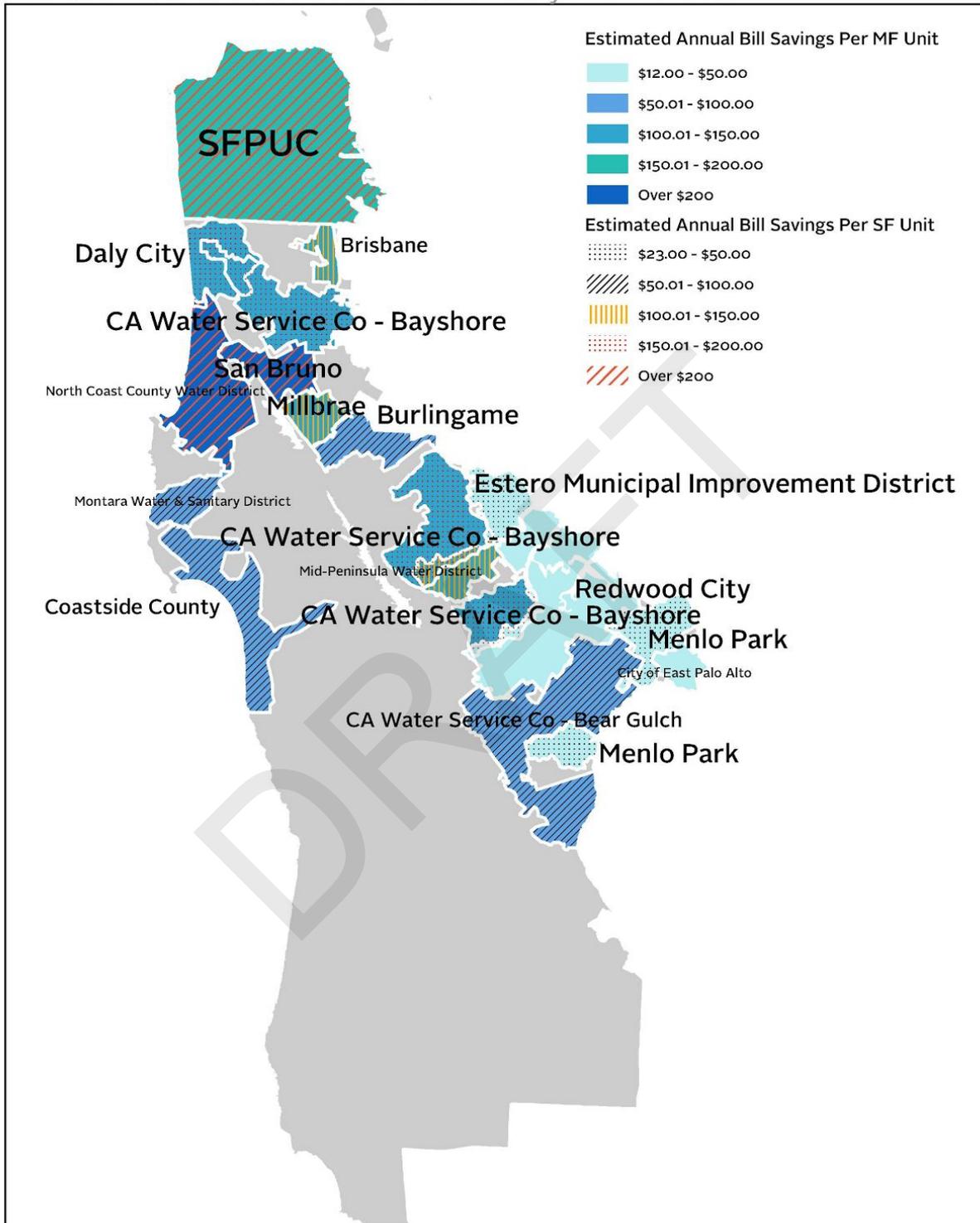
The measures included in the Basic Package are toilet, showerhead, bathroom faucet aerator and kitchen faucet aerator. While the Basic Package is best suited for residential customers (single and multifamily), other cost-effective measures are appropriate for commercial properties, including irrigation and other improvements for large commercial landscapes and upgrades to commercial kitchens. Additional potential measures include common area lighting, in-unit LED lighting, and landscaping. The following maps further details the Bay Area water providers whose customers can cost effectively pay for the installation of efficiency improvements through an on-bill efficiency charge.

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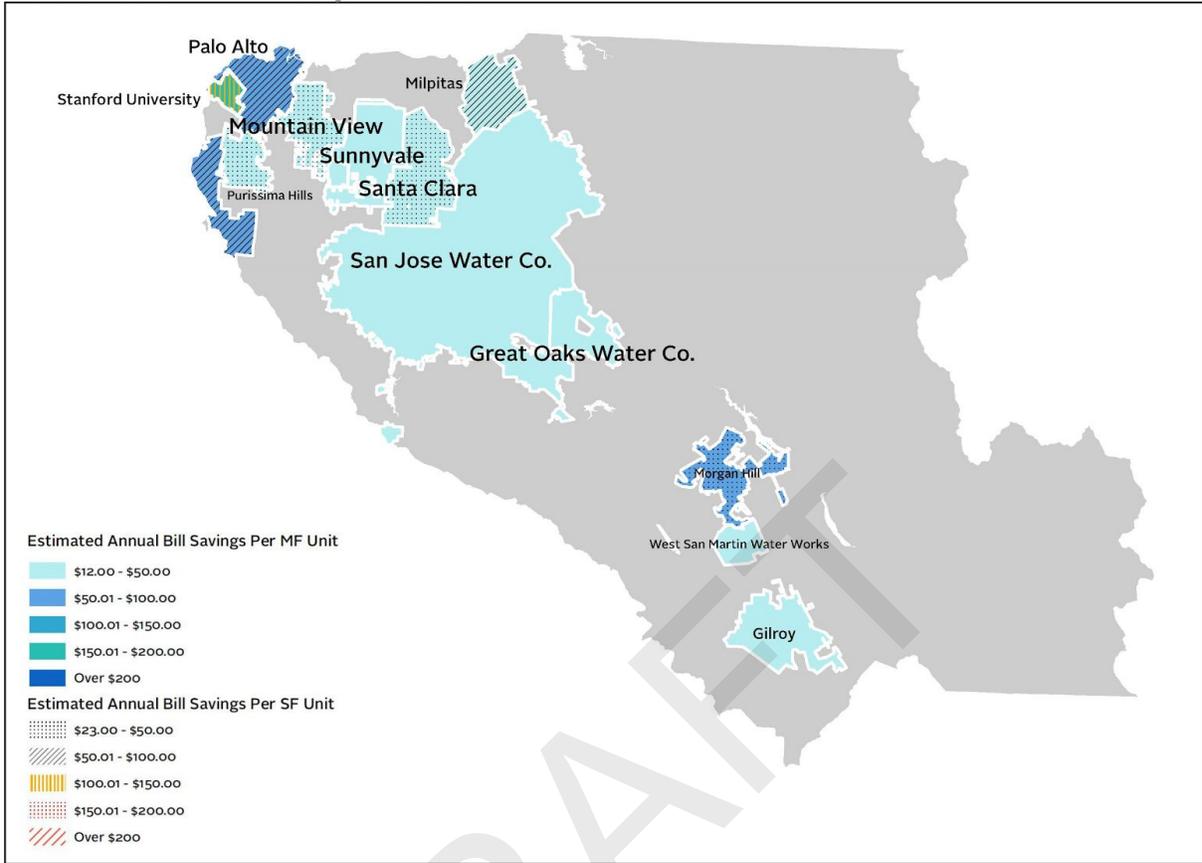
⁸ Based on 2010-2014 American Community Survey 5 year Estimates, Bay Area water utility fixture studies, and prevailing wage calculations. ACS data included review of number of housing units, residents per unit, vacancy rates, building sizes and age. Single family housing = 1 unit detached built before 2014

⁹ Based on 2009-2013 American Community Survey 5 year Estimates, Bay Area water utility fixture studies, and prevailing wage calculations. ACS data included review of number of housing units, residents per unit, vacancy rates, building sizes and age. Multifamily housing = 5 or more units built before 2000.

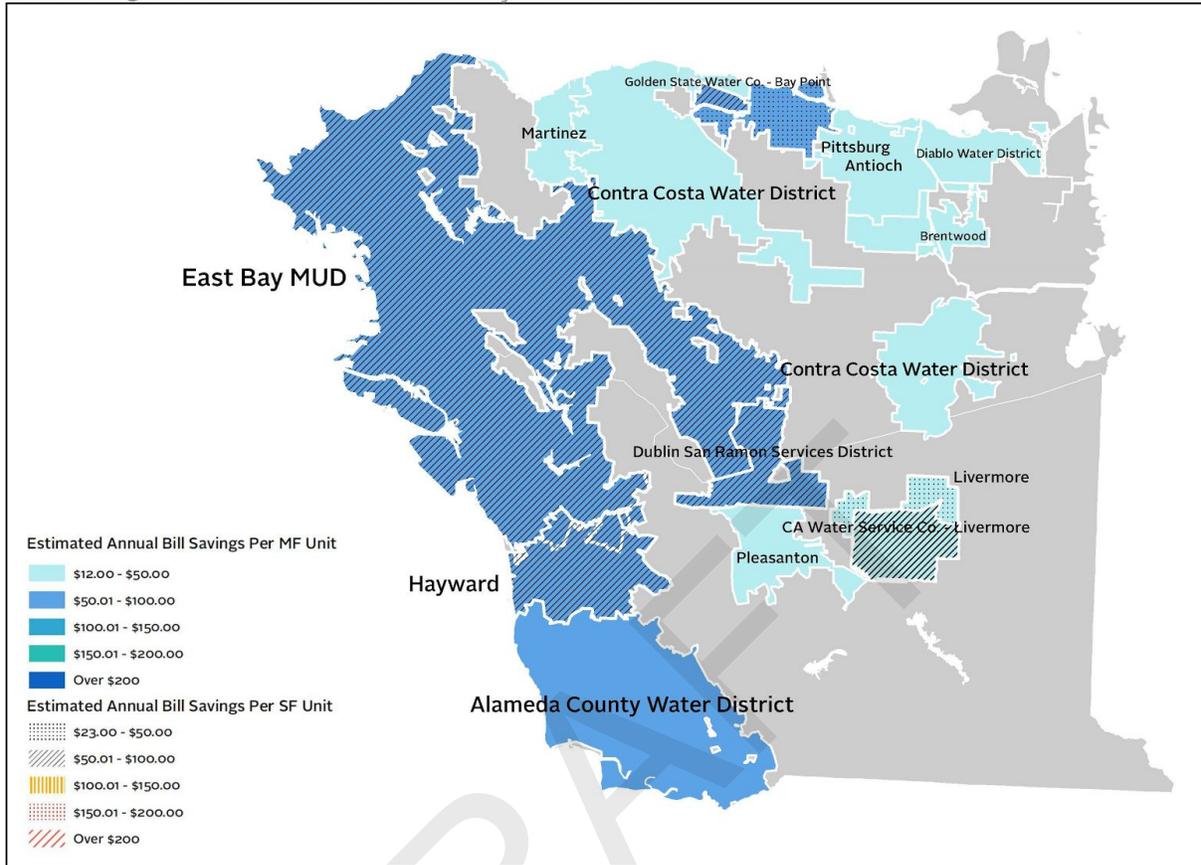
Quadrant #1: San Francisco and San Mateo County Water Utilities



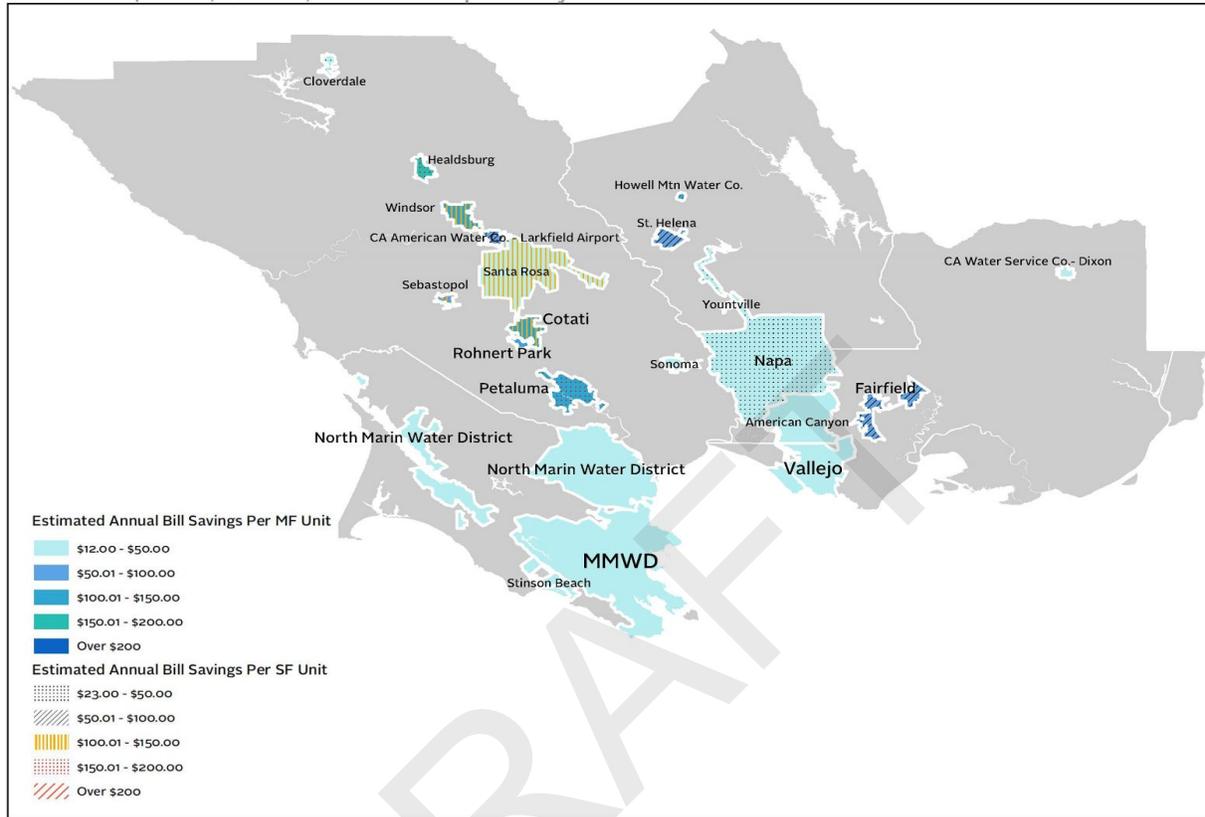
Quadrant #2: Santa Clara County Water Utilities



Quadrant #3: Alameda and Contra Costa County Water Utilities



Single Family Cost Effective On-bill Opportunities
 Quadrant #4: Marin, Sonoma, Solano and Napa County Water Utilities



Water Bill Savings Program Strategies and Tactics

The BayREN Water Bill Savings Program is based on the use of a utility tariff to offer efficiency improvements and bill savings to any utility customer with cost-effective potential. With this effort, BayREN is providing a tool to access underserved market sectors and increase participation in other programs, including those administered by both BayREN and other PAs.

Problem	Market Barrier	Strategy and Tactic
<i>Water & energy efficiency services are siloed across a diverse landscape of over 91 water utilities and 4 energy utilities, all with different capacities for efficiency programs.</i>	Building professionals lack access to streamlined high volume customer efficiency programs for water	S1. Wrap Around Services WS1. Create municipal utility partnerships to scale service delivery
		S1. Wrap Around Services WS2. Facilitate adoption of model tariffs and on-bill program design for market

		consistency
<i>Many utility customers are prevented from enjoying the benefits of efficiency and or face challenges in meeting requirements to make water efficiency improvements</i>	Many customers are excluded from programs because they lack property ownership, capital, information about savings potential, or time to participate	S1. Wrap Around Services WS3. Provide technical assistance to refine program components to meet efficiency needs specific to target customer classes

Ultimately, BayREN’s Water Bill Savings Program will enable efficiency to become a core part of utilities’ customer services. Transitioning to a model where participating customers pay for retrofits out of their bill savings allows limited ratepayer funds to be leveraged strategically to continue pursuing deeper energy efficiency opportunities. The split incentive barrier is overcome when efficiency is extended to any customer as part of utility service.

The program will provide a different mechanism to deliver efficiency improvements that directly supports the goals of SB 350 to serve low-income and disadvantaged communities. It will also demonstrate a model that can serve municipal utilities in achieving other community goals – such as rental property condition and safety, greenhouse gas reductions, and water conservation targets.

Strategy 1. Provide Wrap Around Services, Support and Financing

WS1. Create municipal utility partnerships to scale service delivery

Objective: Partner Water Utilities join similar and or aligned programs to increase size of on-bill market and access to capital for water efficiency projects

BayREN is working with local water utilities to develop scalable opportunities for the delivery of efficiency services through an on-bill model. Near and mid-term activities include:

- Engaging potential Partner Utilities with billing system functionality to add line-item charges to a utility bill to develop a regional program model
- Enrolling Partner Utilities based upon commitment to implement the program; utility tariff authority and billing structures; and willingness to participate in regional program administration and service delivery mechanisms
- Development of a regional program model that meets the needs of committed Partner Utilities and centralizes funding, administration, and service delivery under a Joint Powers Authority (JPA).

The regional approach has been identified by current Partner Utilities and BayREN staff as way to enable JPA member utilities to be pooled into a single entity that could then raise capital (through the issuance of bonds for example) to facilitate the delivery of program services – installation of water and energy upgrades – to member utilities and their customers.

WS2. Facilitate adoption of model tariffs and on-bill program design for market consistency

Objective: Regionalized efficiency services streamline program delivery and increase property owners' and market actors' ability to participate in utility-facilitated efficiency services at scale

By engaging multiple municipal water agencies in a regional program model, the Water Bill Savings Program will contribute a water-specific mechanism for tariffed efficiency services and improvements to the growing marketplace of retrofit financing products. Near and mid-terms activities include:

- Continuing refinement of model tariffs and on-bill program designs to address critical issues of disclosure and transferability of efficiency charges and long term ability of on-bill services and improvements to provide persistent savings
- Engaging multifamily property portfolio owners, managers, housing associations, and community organizations on strategies and opportunities to enroll eligible properties throughout the region in BayREN and complimentary efficiency programs and project financing
- Engaging contractors and building professionals to provide them accessible paths to participate in on-bill programs while maintaining contractor performance and accountability for delivering high quality services that produce persistent resource savings
- Increasing participating customers' and contractors' ability to pursue additional retrofit opportunities through aligned BayREN, PG&E and CCAs' efficiency programs to deliver maximum benefit to participating water utility customers

WS3. Provide technical assistance to refine program components to meet efficiency needs specific to target customer classes

Objective: Customers and utilities have ongoing support to ensure on-bill services deliver expected resource savings and provide exceptional customer experiences with efficiency

BayREN's partnerships with water utilities represents a commitment to provide ongoing support and resources to help refine in-field program services and ensure participating water utility customers receive intended benefits through the term of their on-bill repayment. Near and mid-terms activities include:

- Growing the list of eligible improvements to provide increased opportunities for deeper retrofits while maintaining quality performance and cost effectiveness
- Providing an "on-ramp" to efficiency services that allow low and moderate income customers to make their homes and businesses more water efficient
- Developing on-bill opportunities, with sufficient consumer protections, for customers to pursue property improvements required by code changes, time-of-sale requirements, or emergency drought regulations
- Working with property owners, water customers, realtors, water regulators, and other stakeholders to maximize the potential for on-bill water efficiency improvements instead of rebates and product give-aways

Coordinating Activities

Leveraged Resources

The BayREN, as a collaboration of local government implementers, is uniquely positioned to address the needs of water customers seeking to make efficiency improvements. The majority of Bay Area communities are provided water and sewer services by their local Department of Public Works, while others are served by a special district or other municipal water agency. These water providers are closely connected to other local activities, often providing assistance with community development, planning, and permitting. These agencies work closely with water utility customers through a range of activities including community events, property visits and inspections, and regular communications for billing and utility specific updates.

Staff with BayREN member agencies have significant opportunity to engage with and collaborate with their counterparts at these municipal water utilities. This includes direct participation by BayREN member agencies in water utility working groups such as the Bay Area Integrated Regional Water Management Plan, jointly hosted events for general conservation activities and emergency drought response, and outreach and engagement through activities like the Bay Area Green Business Program. The Water Bill Savings Program offers an additional mechanism for municipal water utilities to participate in a comprehensive strategy to provide water and energy efficiency services and make progress towards regional and state efficiency goals.

EM&V Efforts

Additional content to be provided in future draft.

Marketing, Education & Outreach

The Water Bill Savings Program will be aggressively promoted through aligned existing BayREN and other Bay Area local government marketing, outreach, and education (ME&O) for customers, stakeholders, and partners in the single family, multifamily, and commercial sectors. ME&O will target existing and potential lender clients and customers (conventional, credit union, and foundational) to raise community awareness and define the program as a strategically placed driver to increase customer demand, facilitate streamlined (electronic) processes for program application and enrollment, and provide multiple options for project funding (which may cross-cut and leverage each other).

Workforce Development, Education and Training

Additional content to be provided in future draft.

Cross Cutting

The Water Bill Savings Program is closely aligned with the BayREN Single Family, Multifamily, and Commercial sectors to ensure coordinated delivery of services and stakeholder engagement. To date that opportunity has been necessarily limited to coordinating activities within the Town of Windsor, the City of Hayward, and in the service territory of East Bay Municipal Utility District. However, these partnerships have allowed for refinement of protocols for program referrals and coordination to complementary BayREN programs such as BAMBE and Green Hayward PAYS® projects. The Water Bill Savings program also works with BayREN's Codes & Standards program to address overlapping areas of opportunity, including retrofit requirements tied to mandates for Water Efficient Landscapes and property retrofits as required by SB 409 (see above).

This coordination primarily happens within the BayREN Water Bill Savings Program monthly meeting and within the BayREN Coordinating Circle.

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Key Partners/Coordination

Outside of BayREN, key partners and stakeholders include the following organizations and interests:

BayREN Coordination with External Partners and Stakeholders		
IOU Programs	Coordination Mechanism	Expected Frequency
PG&E Finance Team	Coordination calls	Quarterly
Coordination Partners	Coordination Mechanism	Expected Frequency
Local Water Districts	Outreach meetings; Coordination calls	As needed; Quarterly
Community Based Organizations	Outreach meetings; Coordination calls	As needed; Quarterly
Real Estate Professional/Associations	Meeting attendance	Quarterly
Professions and trades, e.g., real estate brokers, mortgage officers, appraisers, government building and permitting departments	Meeting attendance	Quarterly
Professional Building Trade Associations; Specialized trades contractors	Outreach meetings; Coordination calls	Ongoing
Department of Water Resources	Coordination calls	Quarterly

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Section 7
APPENDICES

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A. Supplemental Sector Information

Additional content to be provided in future draft.

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B. Acronyms and Abbreviations

Additional content to be provided in future draft.

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C. Glossary - Program Administrator Dictionary

Additional content to be provided in future draft.

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D. Procurement and Contracting Activities

Additional content to be provided in future draft.

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E. CAEECC Issues Tracker

Additional content to be provided in future draft.

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