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**Comments are Due February 7, 2018.**

**Comments shall be no longer than 5 pages.**

**Comments should be submitted to [LDBPcomments@ebce.org](mailto:LDBPcomments@ebce.org)**

# Energy Efficiency Assessment

*for*

***East Bay Community Energy***

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# I. Introduction

Energy efficiency (EE) is a vital resource for any load-serving entity, and the California legislature and regulators have made EE a top priority in energy procurement policies for decades<sup>1</sup>. The State's Energy Action Plan (EAP), State legislation such as Senate Bill 350 (SB350- De Leon)<sup>2</sup>, and recent California Public Utilities Commission (CPUC) Decisions<sup>3</sup> have reaffirmed this commitment to meeting California's growing energy needs "through all available energy efficiency and demand reduction measures that are cost effective, reliable, and feasible." This commitment to EE as a priority resource has kept California's per capita energy consumption flat and stable despite significant growth in the population and economy, saving Californian's billions of dollars and reducing energy-related environmental impacts greatly over this period of time.

The benefits of EE have been largely realized through programs (i.e., financial incentives, marketing and education, technical assistance, and direct install programs) that are regulated by the CPUC and funded through surcharges on customer energy bills known as Public Goods Charges (PGC), which raise more than \$1 billion to support EE programming statewide each year. By leveraging those PGC dollars, investor-owned utilities (IOU's) have contributed significantly to achieving California's aggressive energy efficiency goals through Local Government Partnerships (LGP's) and Third Party (3P) programs that have implemented various EE programs over the years.

More recently, the state has empowered Regional Energy Networks (REN's) and Community Choice Aggregators (CCA's) to administer PGC supported EE programs in the territories they serve. This has led to some innovation in EE programming, as REN's and CCA's work to reach underserved and/or hard to reach market segments and implement new approaches to EE programs. As CCA's scale up rapidly in California over the next few years, the focus on finding ways to leverage the value of energy efficiency as a primary resource will surely increase.

This element of the East Bay Community Energy (EBCE) Local Development Business Plan (LDBP) seeks to a) assess the potential for EE to support the achievement of EBCE's mission and goals, b) illuminate a pathway for EBCE to integrate with the existing EE programs serving the East Bay community in ways that create synergy and optimal outcomes for all stakeholders, and c) to identify opportunities for EBCE to implement innovative, cost-effective EE programs that support and enhance the CCA's stability while yielding measurable value and benefits for the community it serves.

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<sup>1</sup> See: California Energy Action Plan- [http://www.energy.ca.gov/energy\\_action\\_plan/](http://www.energy.ca.gov/energy_action_plan/) ; SB 1037 (the State Energy Resources Conservation and Development Act)- [http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=200520060SB1037](http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060SB1037) ; and AB 995: [http://www.energy.ca.gov/renewables/documents/ab995\\_bill\\_20000930\\_chap.html](http://www.energy.ca.gov/renewables/documents/ab995_bill_20000930_chap.html)

<sup>2</sup> See SB 350 (the Clean Energy and Pollution Reduction Act): [http://www.energy.ca.gov/sb350/doubling\\_efficiency\\_savings/](http://www.energy.ca.gov/sb350/doubling_efficiency_savings/)

<sup>3</sup> See CPUC Decision 04.12.148: [http://docs.cpuc.ca.gov/PublishedDocs/Published/WORD\\_PDF/FINAL\\_DECISION/43224.PDF](http://docs.cpuc.ca.gov/PublishedDocs/Published/WORD_PDF/FINAL_DECISION/43224.PDF) ; and Decision 12.11015: <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M034/K299/34299795.PDF>

## II. Energy Efficiency in the CCA Context

The value proposition of energy efficiency programs is not the same for California’s Investor-owned Utilities and Community Choice Aggregation programs, and it is important to understand the differences and relative competitive advantages involved with that distinction.

### Investor-owned Utility Advantages

Since 1982 IOU’s supplying electricity in California have been “decoupled”, which means that they make their profits from capital investments in the energy infrastructure instead of from selling units of electricity (kilowatt hours). This effectively removed the disincentive for IOU’s to implement load-reducing energy efficiency programs that had previously existed in California’s electricity market. It allowed IOU’s to work to support the State’s aggressive EE goals without compromising their ability to deliver a return on investment for their shareholders. To further incentivize the IOU’s, in 2007 the CPUC implemented a new regulatory framework—known as “decoupling plus”—that offers the utilities a sizable financial incentive for meeting or exceeding these aggressive EE goals. This was meant to provide a way for IOU shareholders to earn a comparable return on investments in EE vs. “steel-in-the-ground” capital infrastructure investments, and it allows IOU’s to see energy efficiency as a profitable resource<sup>4</sup>.

Another competitive advantage that the IOU’s have enjoyed over emerging EE program administrators (i.e., REN’s and CCA’s) is that they are the default administrators of the ratepayer surcharges for EE programing known as “Public Goods Charges” (PGC). This means that the IOU’s are able to plan and implement EE programs using substantial sums of ratepayer funds each year, thereby reducing the need to use shareholder dollars to meet EE targets and receive the rewards from the decoupling plus incentives<sup>5</sup>.

The CPUC has put policies in place to ensure a positive return on this annual investment by California ratepayers. The CPUC assesses the cost-effectiveness (CE) of the administration of PGC funded EE programs in a number of ways, including something known as the Total Resource Cost (TRC) test, which gauges EE program CE by essentially dividing the all-in costs of those programs by the number of megawatt hours (MWh) they reduce (aka- “negawatts”). The TRC is widely considered to be an onerous process that strictly judges the CE of these programs against standard generation resources (i.e., a natural gas power plant). The TRC test has the practical effect of incentivizing so-called “cream-skimming” behavior on the part of affected EE administrators by forcing them to focus on the lowest hanging fruit with the highest return on investment (ROI) to ensure a favorable TRC score. This leads to greater short term gains in efficiency at the expense of more substantial load reductions that are achievable in the long-run by doing deeper EE retrofits that bundle the high-ROI measures with low-ROI measures to achieve a satisfactory return over a longer period of time.

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<sup>4</sup> [https://fishnick.com/pge/Decoupling\\_Explained.pdf](https://fishnick.com/pge/Decoupling_Explained.pdf)

<sup>5</sup> Insert References to: R.09-11-014, CPUC EE Policy Manual, accessed here:  
[http://www.cpuc.ca.gov/uploadedFiles/CPUC\\_Public\\_Website/Content/Utilities\\_and\\_Industries/Energy\\_-\\_Electricity\\_and\\_Natural\\_Gas/EEPPolicyManualV5forPDF.pdf](http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/EEPPolicyManualV5forPDF.pdf)

Though the TRC may be an onerous test for EE administrators, it too provides another competitive advantage for IOU's. That is because the TRC is assessed across the entire portfolio of EE programs an entity administers, which provides a potential advantage for IOU's who have significant economies of scale, larger portfolios of EE programs, and the ability to average poorly performing programs with those that perform better.

## **What About Community Choice Aggregation Programs?**

The business model for Community Choice Aggregators is quite different from that of their IOU counterparts, in that they receive revenue almost exclusively from the retail sale of electricity supply (kWh). Furthermore, CCA's are not responsible for building or maintaining transmission and distribution infrastructure, and so they do not earn a guaranteed return on such capital investments (like the IOU's do). On the surface, that makes CCA's appear to be somewhat similar to IOU's before California implemented decoupling, in that they would seem to have an intrinsic disincentive to reduce load (retail sales) and in effect diminish their primary source of revenue.

So why then would CCA's be at all motivated to implement EE programs designed to reduce their load and thereby diminish revenues? The answer to that question is complex and multifaceted, but it begins with the fact that CCA's are non-profit organizations, and as such they are not required to seek to maximize profits unlike the IOU's. As public agencies established to serve local energy needs and provide enhanced community benefits, they are free to view the provision of energy services as a public good rather than a simple commodity. Providing valued services to customers that help lower their utility bills, increase comfort in their homes and offices, and enhance their overall customer experience can support long-term customer satisfaction and retention and ultimately fulfills a core part of any CCA's mission. This is an important priority for EBCE. CCA's are also in a position that allows them to see beyond the simple economic value of energy as a commodity, and place value on non-energy benefits (NEB's) based on the identities, value systems, needs, and priorities of their constituencies. In other words, CCA's are not businesses seeking to maximize profits, but rather public agencies seeking to maximize community benefit by leveraging the local market for energy services.

This is really the essence of the CCA movement, and it lies at the heart of EBCE's Local Development Business Plan. All of the existing and emerging CCA's in California have expressed overarching goals that include providing:

- **Competitive/Stable Retail Rates-** Maintaining competitive rates is considered a paramount goal for CCA's, due to the high potential for customers to opt-out of the program if rates are higher than the incumbent utility provider.
- **Cleaner Energy Portfolios-** Providing a portfolio with higher renewable content (i.e., exceeding minimum RPS compliance), lower carbon-intensity (i.e., GHG reductions to support local Climate Action goals), and lower criteria air pollutants (i.e., reducing negative health impacts, and supporting local Air Quality Plans) is a primary goal for CCA's as well.
- **Economic Benefits-** Reducing cost for customers, creating and retaining jobs, and driving new investments in clean energy development are also focal points for CCA goals.



EBCE’s foundational document—its Joint Power Authority (JPA) Agreement<sup>6</sup>—goes further by detailing a strong commitment to delivering maximum benefits to the local community by prioritizing the use and development of local clean energy assets and supporting local workforce development. It underscores those commitments by expressly calling for the creation of a Local Development Business Plan (of which this Energy Efficiency Assessment is part of) that provides a detailed *“roadmap for the development, procurement, and integration of local renewable energy resources,”* and promotes *“an energy portfolio that incorporates energy efficiency and demand response programs and has aggressive reduced consumption goals.”*

Viewed in this context, we are able to see that for CCA’s the energy efficiency value stack is indeed very different than it is for IOU’s. EE programs can support the CCA’s efforts to provide cleaner energy portfolios and deliver meaningful economic benefits to customers and community stakeholders. EE programs can reduce the need for fossil fuel-based electricity production, improving local air quality and reducing GHG emissions. These programs also support a healthy local workforce by providing demand for high quality, skilled labor. It is also true that well-designed EE programs that make use of data analytics and granular load profiling to target loads that are most expensive for the CCA to serve (i.e., peak-coincident loads) can reduce procurement costs and improve the CCA’s overall financial performance. All the benefits of energy efficiency programming can be further enhanced by programs that deploy demand response, energy storage, and other dispatchable assets that can shift supply and demand to reduce peak-coincident loads. This ultimately supports the overarching goals of maintaining stable and competitive rates and delivering cost savings to customers who need it most, and thus it can provide enhanced value and satisfaction to the entire customer base.

To support the maximization of these community benefits, it is recommended that EBCE apply the Community Benefit Adder (CBA) approach consistently across all DER program offerings, including energy efficiency. The CBA mechanism can be applied as either additional cash incentives for EE implementation that meets benefit criteria outlined here and throughout the LDBP, or as point adders in evaluation scoring criteria for procurement of EE services (i.e., Request for Proposals/Offers/Qualifications).

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<sup>6</sup> The EBCE Implementation Plan filed with the CPUC can be accessed here:  
[http://ebce.org/wp-content/uploads/EBCE\\_JPA\\_Agreement\\_12\\_1\\_16.pdf](http://ebce.org/wp-content/uploads/EBCE_JPA_Agreement_12_1_16.pdf)

### **III. Existing Energy Efficiency Programs serving Alameda County**

It is important to understand that the Greater Bay Area has a high concentration of established energy efficiency program administrators serving the East Bay, and that customers throughout the EBCE territory already have access to a wide range of EE program offerings. These programs enjoy the benefits that come with a sustained market presence, including strong brand recognition, extensive stakeholder networks, robust relationships with local governments, deep connections to contractors (program implementers), and sustained ratepayer funding. As a new market participant in the local energy efficiency market, EBCE must navigate carefully to chart a course that creates opportunities for synergy, minimizes duplication, and leads to mutually beneficial outcomes for all stakeholders.

The California Public Utilities Commission (CPUC) oversees the administration of ratepayer-funded energy efficiency programs using funds collected through a surcharge on consumer utility bills commonly referred to as Public Goods Charges (PGC). The PGC raises more than one billion dollars for energy efficiency programs each year, which is allocated to the approved EE administrators to support implementation of beneficial and cost-effective energy efficiency programs. There are three distinct organizations currently administering ratepayer (PGC) funded energy efficiency programs to electricity customers in Alameda County, including PG&E, East Bay Energy Watch (EBEW), and Bay Area Regional Energy Network (BayREN). StopWaste Energy Council also plays a vital role in the administration, facilitation, and implementation of these programs in the EBCE territory, and convening stakeholders around various related topics and issues regularly. Each of these important market participants are serving multiple counties, and thus not focused strictly on Alameda County customers.

Over the course of the past decade these organizations have built trust and brand recognition with EBCE's customers and stakeholders, and have established strong track records of success delivering EE programs in the counties they serve. Furthermore, each has expressed an interest in collaborating with EBCE on energy efficiency initiatives that expand access to these cost-saving measures, enhance outcomes and overall satisfaction for participating customers, and support the achievement of the State's aggressive climate and clean energy goals.

#### **Pacific Gas and Electric Third-party Programs and Local Government Partnership**

PG&E has been serving the electricity ratepayers of Alameda County with energy efficiency programs for many years. Through their Third-party (3P)<sup>7</sup> and Local Government Partnership (LGP, aka- Energy Watch)<sup>8</sup> programs PG&E has not only helped local governments, businesses, and residents reduce their energy bills through cost-saving energy efficiency measures, but has also contributed significantly to the achievement of California's nation-leading efforts to curb load growth and reduce carbon intensity in the energy system.

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<sup>7</sup> See complete details of PG&E's 3P EE program offerings here: [https://www.pge.com/pge\\_global/common/pdfs/save-energy-money/contractors-and-programs/find-partner-programs/ThirdPartyPrograms.pdf](https://www.pge.com/pge_global/common/pdfs/save-energy-money/contractors-and-programs/find-partner-programs/ThirdPartyPrograms.pdf)

<sup>8</sup> For more details about PG&E's Local Government Partnership programs, see here: [https://www.pge.com/en\\_US/business/save-energy-money/contractors-and-programs/community-partnerships/community-partners.page](https://www.pge.com/en_US/business/save-energy-money/contractors-and-programs/community-partnerships/community-partners.page)

PG&E's 3P programs are offered to commercial and residential customers throughout the utility's service territory, and they provide a range of EE services through contracted industry specialists selected by PG&E<sup>9</sup>. These programs are designed to offer industry-specific resources and expertise, and deliver energy savings through installation of low or no-cost energy efficiency equipment. The 3P programs address opportunities for efficiency in the following market segments: Agriculture and Food Processing, Builders (construction), Health Care, Hospitality, Industrial, Residential, Retail, Schools and Colleges, and Small Businesses.

The East Bay Energy Watch<sup>10</sup> (EBEW) program is the PG&E Local Government Partnership program that has been providing cost-saving energy efficiency measures throughout Alameda County (and neighboring Contra Costa County) for over a decade. EBEW provides customized energy solutions to local governments, nonprofits, businesses, and residents that help participating customers lower their energy bills and increase comfort in their homes and offices. EBEW has established a widely recognized and trusted brand as an EE provider throughout the East Bay, and their staff and contractors have developed the technical expertise and vital customer relationships necessary to penetrate challenging market segments and deliver cost-effective load reduction measures year after year. The EE programming administered by EBEW have reduced local energy consumption, supported local greenhouse gas reduction and climate protection goals, and helped sustain the local workforce and economy.

## **The Bay Area Regional Energy Network**

In 2013 the CPUC invited local governments to work together to develop and submit proposals for a new model for administering energy efficiency programs outside the existing LGP and 3P framework, which was a new construct called Regional Energy Networks (REN's). Based on the CPUC's 2013-2014 Energy Efficiency Portfolio decision that approved this new mechanism for EE, the REN's were to be regionally focused pilot programs that a) avoided duplication with existing ratepayer funded EE programs, b) introduced new and innovative EE initiatives to those markets, and c) leveraged local government resources and expertise to fill gaps and penetrate hard-to-reach market segments with cost-saving EE measures.

The San Francisco Bay Area Regional Energy Network (BayREN)<sup>11</sup> was one of two REN's approved to administer PGC funding (the other being SoCalREN, serving the Los Angeles County region), and it has been providing energy efficiency programs in Alameda County since 2014. BayREN is led by the Association of Bay Area Governments (ABAG), and it involves a collaboration of several regional and public agencies including the nine ABAG counties that represent approximately half of PG&E's service territory and 20% of California's entire population. The programs developed and implemented by BayREN are intended to support and enhance existing ratepayer-funded EE programs without duplication, and they leverage PGC funds to provide additional services such as water efficiency measures and financing mechanisms that extend the reach and impact of those dollars.

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<sup>9</sup> *ibid*

<sup>10</sup> To learn more about East Bay Energy Watch, see here: <http://www.ebew.org>

<sup>11</sup> To learn more about BayREN, see here: <https://www.bayren.org>

## StopWaste Energy Council

StopWaste is a Joint Powers Authority (JPA) that represents the 15 jurisdictions of Alameda County, which supports local schools, businesses, and residents with cost-saving waste reduction and water and energy conservation measures. StopWaste is governed by three Boards: the Alameda County Waste Management Authority, the Alameda County Source Reduction and Recycling Board, and the Energy Council. Formed in 2013, the StopWaste Energy Council is also a JPA, which serves its member agencies by seeking funding for energy efficiency, clean energy, and climate protection initiatives.

The Energy Council acts as a convener, bringing together its members and a diverse range of stakeholders to build technical capacity for cost-effective implementation of energy efficiency programming, and to explore innovative ways to achieve local clean energy and climate protection goals. The organization also sits on the 10-member governing committee for BayREN, and it conducts stakeholder outreach and engagement for BayREN’s EE programs. The Energy Council also plays the role of EE program implementer for some of BayREN’s key programs serving Alameda County.

| ORG.   | TERRITORY                       | SINGLE FAMILY  | MULTIFAMILY   | COMMERCIAL   | MUNICIPAL  | CROSS-CUTTING  |
|--------|---------------------------------|--|---|--|--|--|
| PG&E   | No. CA                          | <ul style="list-style-type: none"> <li>Advanced Home Upgrade</li> <li>CA Advanced Homes</li> <li>Energy Savings Assistance</li> <li>Plug Loads &amp; Appliances</li> <li>Residential HVAC</li> </ul> | <ul style="list-style-type: none"> <li>Multifamily Upgrade</li> <li>Multifamily EE Rebates</li> <li>CA Multifamily New Homes</li> </ul> | <ul style="list-style-type: none"> <li>HVAC Optimization</li> <li>Savings by Design</li> </ul>   |  | <ul style="list-style-type: none"> <li>Energy Advisor</li> <li>Calc/Deemed Incentives</li> <li>Direct Install</li> <li>Continuous Improvement</li> <li>On-Bill Financing</li> <li>Codes and Standards</li> </ul> |
| EBEW   | Alameda & Contra Costa Counties | <ul style="list-style-type: none"> <li>California Youth Energy Services</li> </ul>   | <ul style="list-style-type: none"> <li>California Youth Energy Services</li> </ul>  | <ul style="list-style-type: none"> <li>East Bay Energy Watch Program</li> <li>Your Energy Manager</li> <li>Building Operator Certification</li> <li>EnergyWatch Microloan</li> </ul> | <ul style="list-style-type: none"> <li>Municipal Implementation Team</li> <li>Civic Spark</li> <li>Lucid Connected Cities</li> <li>Automated DR Pilot</li> </ul> |  |
| BayREN | 9 Bay Area Counties             | <ul style="list-style-type: none"> <li>Home Upgrade</li> <li>Advanced Home Upgrade</li> <li>Home Upgrade Advisor</li> <li>Home Energy Score</li> </ul>   | <ul style="list-style-type: none"> <li>Bay Area MF Building Enhancements</li> <li>Bay Area MF Capital Advance Program</li> </ul>        |  | <ul style="list-style-type: none"> <li>ZNE Assistance</li> </ul>   | <ul style="list-style-type: none"> <li>Codes and Standards</li> <li>PAYS On-Bill Financing</li> </ul>  |

Figure 1: Summary of ratepayer-funded energy efficiency programs serving Alameda County ratepayers. (Source: East Bay Energy Watch "Navigating the Changing Landscape of Energy Efficiency Programs in the East Bay"<sup>12</sup> white paper)

<sup>12</sup> See East Bay Energy Watch- Navigating the Changing Landscape of Changing Energy Efficiency Programs in the East Bay (October 2017), accessed here: [http://www.ebew.org/s/Energy-Efficiency-Paper\\_Final\\_2-pnnd.pdf](http://www.ebew.org/s/Energy-Efficiency-Paper_Final_2-pnnd.pdf)

## Property Assessed Clean Energy Financing

Commercial and residential customers in Alameda County also have access to Property Assessed Clean Energy (PACE) financing programs, which allow businesses and residents to install water and energy efficiency and renewable energy generation equipment on their properties with no out-of-pocket costs. Participating customers can borrow money to cover up to 100% the cost of energy efficiency improvements with no money down, and they repay the loan amount through a fixed charge on their property tax bills with extended payback terms of up to 30 years. Interest rates are highly competitive, and the loans can be transferred to new owners if the property is sold prior to repaying the full loan amount. This approach to financing energy efficiency removes a number of significant barriers, and allows customers to implement comprehensive measures that achieve deep-retrofits and significant utility bill-savings that often go well beyond standard incentive-based energy efficiency programs.

There are many PACE programs and providers, and the summaries below represent only a sampling of some of the programs currently available in Alameda County jurisdictions. They are provided as brief illustrative examples for context, and are not an exhaustive accounting of all available options.

### **Example: CaliforniaFIRST- Commercial and Residential PACE Program**

CaliforniaFIRST<sup>13</sup> is a PACE program administered by Oakland-based Renew Financial (originators of the PACE concept), which is available to commercial and residential customers throughout EBCE's service territory. CaliforniaFIRST is a government approved program that uses qualified, registered contractors to install high-quality water and energy conservation measures at customer-owned properties with zero money down financing that covers 100% of project costs (up to 15% of the property value, with a maximum of \$250,000), including equipment and labor. The CaliforniaFIRST program boasts fast and easy loan applications and approvals at low, fixed rates.

### **Example: PACEDirect Commercial PACE Program**

The CleanFund Commercial PACE Capital, Inc. (based in Sausalito, CA) is another firm that is offering PACE programs to commercial customers throughout EBCE's service territory. CleanFund's core program is PACEDirect<sup>14</sup>, which provides funding to cover the cost of capital improvement projects (including energy efficiency) at any type of commercial property. Loan amounts range from \$100,000 to \$25,000,000 (up to 20% of property value) at competitive fixed interest rates, and repayment terms range from 20 to 30 years. One unique feature offered by PACEDirect is the ability to defer loan payments for up to 2 years.

### **Example: Home Energy Renovation Opportunity- Residential PACE Program**

Renovate America currently offers PACE financing to homeowners in EBCE's service territory through a program called Home Energy Renovation Opportunity (HERO).<sup>15</sup> The HERO program touts a simple, end-to-end process for homeowners to access capital for comprehensive energy efficiency and conservation improvements at low, fixed rates. Approval is based primarily on

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<sup>13</sup> For more information about CaliforniaFIRST, see here: <https://renewfinancial.com/product/californiafirst>

<sup>14</sup> For more information about PACEDirect, see here: <http://www.cleanfund.com/pacedirect/>

<sup>15</sup> For more information about the HERO program, see here: <https://www.renovateamerica.com/financing/hero>

home equity (not FICA credit scores), and applications are submitted online with same-day approvals in most cases. The program connects participating homeowners with qualified local contractors, and participating contractors have access to resources and capital to help them increase local business. Another feature offered by the HERO program is that government agencies have access to a dedicated HERO representatives who provide education, technical support, and access to resources like interactive maps displaying local projects and outcomes (i.e., customer bill savings, number of projects completed in each community, and cumulative energy savings).

## **IV. Energy Efficiency Programming Options for EBCE**

The intent of the Local Development Business Plan is to evaluate opportunities for EBCE to accelerate local deployment of distributed energy resources (DER's) in ways that benefit the organization and the community it serves, and to provide actionable recommendations that help the organization achieve its goals through cost-effective development of those resource opportunities. Energy efficiency is a valuable local resource for EBCE, which can play a vital role in the organization's energy portfolio. Understanding the options for implementing EE programs is crucial, and this section explores a range of approaches to support EBCE's goals through energy efficiency initiatives.

### **Support Existing Energy Efficiency Programs**

Given the robust ecosystem of energy efficiency programs that already serve EBCE's customer base, one viable option to consider is simply supporting the existing EE programming and infrastructure that is already in place in Alameda County. Supporting these existing programs would require a minimum investment of staffing and financial resources, but could enhance program outcomes and build trust and brand recognition for EBCE through partnership with established EE administrators and implementers. This would initially involve engaging and collaborating with PG&E, EBEW, BayRen, and the StopWaste Energy Council to build awareness and understanding of the existing program offerings, how they work, and what the goals and reduction targets for those programs are. EBCE's customer service representatives (CSR's) and account managers would receive education and training, which would provide the necessary foundation for EBCE staff to effectively promote uptake and participation in the existing EE programs to its customers. EBCE could co-brand and actively market these programs across its customer engagement platforms, including its website, television and print media, special events, and outbound calls from CSR's and key account managers.

Working closely with the existing EE program administrators serving Alameda County would provide an invaluable opportunity to create synergy and mutual benefit, while constraining cost and complexity for EBCE. It would also allow EBCE to develop strong working relationships with key stakeholders (including established EE implementers and contractors and their networks), and gain critical insights into the costs and benefits of energy efficiency programs overall. Existing EE programs serve municipal, commercial, nonprofit, and residential customers (including low-income account-holders), which means that EBCE could leverage those programs to help customers of all classes access beneficial, cost-saving energy efficiency measures. This experience

would help EBCE staff identify what is working well and what gaps may exist, and thereby support the organization's efforts to develop and implement cost-effective EE programs of its own. In these ways, supporting existing EE programs would be an efficient way to enter the local energy efficiency market.

### **Example: Sonoma Clean Power**

Sonoma Clean Power (SCP) has been a highly successful CCA program that has established a strong and positive brand within the industry by providing cleaner energy and high-caliber programs and customer service, while also delivering substantial rate reductions and utility bill savings for its customers. SCP is a good example of a CCA supporting existing energy efficiency programs serving their service territory. SCP has not sought ratepayer funding to administer EE programs itself, choosing instead to encourage their customers to take advantage of those existing programs already funded by a surcharge (the Public Goods Charge) on their energy bills. SCP has collaborated with the EE Program Administrators providing energy efficiency services in the communities they serve (i.e., BayREN).

SCP has even found ways to provide reciprocal value to those Program Administrators by sharing resources that cannot be funded by the ratepayer surcharge such as electric vehicle technology and program training, essentially transferring the valuable insights and resources developed as part of SCP's innovative and successful EV Pilot incentive programs to BayREN's staff and consultants in the process. This demonstrates an understanding of the potential for synergy, mutually beneficial collaboration, and enhanced customer experiences. It is also a highly cost-effective means of delivering the value of energy efficiency programs without siphoning precious program revenues, or subjecting the CCA to the CPUC rules and regulations governing ratepayer-funded EE programs.

### **Using EBCE Revenues to Implement New Energy Efficiency Programs**

Another option to consider is the potential for EBCE to use its own revenues to develop and implement new EE programs for its customers, which can be both beneficial and cost-effective if managed carefully. Since the business model for CCA's is selling kilowatt hours of electricity, the business case for energy efficiency is not as clear as it is for their "decoupled"<sup>16</sup> Investor-owned Utility (IOU) counterparts who do not make money from the sale of kilowatt hours.<sup>17</sup> Therefore, CCA's that opt to use their own revenue to implement programs that effectively reduce kilowatt hour sales (thereby also reducing revenues) must design the programs carefully to ensure cost-effectiveness (CE) and maintain cost-competitiveness with the incumbent IOU rates.

While it is true that any/all load reductions achieved by CCA EE programs lead to reduced procurement cost and related risk factors, targeting the most expensive loads for the CCA to serve through cost-causation based analytics will lead to better CE ratios and yield greater financial benefit from revenue-based EE programs. A cost-causation approach depends on robust, integrated data analysis that illuminates the true cost of service for the CCA through granular load-profiling and hot-spot analysis to determine the best opportunities for load

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<sup>16</sup> For detailed information about California's utility revenue decoupling policies, see here: [https://fishnick.com/pge/Decoupling\\_Explained.pdf](https://fishnick.com/pge/Decoupling_Explained.pdf)

<sup>17</sup> To learn more about how decoupling affects PG&E's business model, see here: [https://www.pge.com/en\\_US/residential/rate-plans/how-rates-work/learn-how-rates-are-set/how-pge-makes-money/how-pge-makes-money.page](https://www.pge.com/en_US/residential/rate-plans/how-rates-work/learn-how-rates-are-set/how-pge-makes-money/how-pge-makes-money.page)

reductions. Having the integrated data platform, staffing resources and expertise to manage this internally on an iterative and ongoing basis would support optimal outcomes for EBCE, but it could also be outsourced to third-parties that specialize in load research and cost of service analysis.

A clear benefit to this sort of revenue-based approach to EE programming is that EBCE would be free to design innovative approaches to delivering energy efficiency measures to its customers, without the burden of bureaucracy that comes along with using Public Goods Charge (ratepayer) funding. As described below, EE programs that utilize PGC funding are subject to fairly onerous CPUC requirements that can tend to stifle innovation and make achieving deep retrofits problematic. CCA's are free to use their own revenue streams to offer local energy programming including: rebates and incentives, financing, education and training, direct installation programs, etc., without adhering to the strict requirements attached to PGC funding. This means that EBCE could focus on hard-to-reach market segments, and achieving deeper retrofits that deliver meaningful load reductions and more significant greenhouse gas emission reductions using its own revenue to support targeted energy efficiency programs.

### **“Apply to Administer” Ratepayer-funded Energy Efficiency Programs**

Community Choice Aggregators in California may also seek to administer a portion of the Public Goods Charge funding collected from its customers for energy efficiency programming (see Table 1 below for a summary of funds collected in EBCE's service territory in 2016). Under Section 381.1 of the California Public Utilities Code,<sup>18</sup> CCA's are eligible to Apply to Administer (ATA) cost-effective, ratepayer-funded energy efficiency and conservation programs under the auspices of the CPUC. Under the ATA process, CCA's may develop their ratepayer-funded EE programs independently and submit an application to the CPUC, who reviews those applications separately from the IOU programs.

The CPUC has established the rules and regulations that detail how ratepayer-funded CCA EE programs work in subsequent decisions (D.03-07-034<sup>19</sup>, D.14-01-033<sup>20</sup>, and R.09-11-014<sup>21</sup>), which specify that ATA EE programs are subject to the same rules as those for the IOU programs.<sup>22</sup> This means that under the ATA rules the EE programs must be cost effective, pass the Total Resources Cost (TRC) test (which weighs the net program benefits against the total cost to the program administrator and its customers), and be subject to periodic evaluation, measurement and validation (EM&V) review. The CPUC also stipulated that CCA's who offer ratepayer funded EE programs a) minimize duplication of existing EE programs and target gaps in those offerings, b) provide innovative technologies and approaches to EE programming, and c) target hard-to-reach market segments, including multi-family residential and small commercial.

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<sup>18</sup> For more information about Section 381.1 of the California Public Utilities Code, see here:

[http://leginfo.legislature.ca.gov/faces/codes\\_displaySection.xhtml?sectionNum=381.1.&lawCode=PUC](http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=381.1.&lawCode=PUC)

<sup>19</sup> For details about CPUC Decision 03-07-034, see here: [http://docs.cpuc.ca.gov/PublishedDocs/WORD\\_PDF/FINAL\\_DECISION/27974.PDF](http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/27974.PDF)

<sup>20</sup> For details about CPUC Decision 14-01-033, see here: <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M086/K532/86532124.PDF>

<sup>21</sup> For details about CPUC Ruling 09-11-014, see here:

[http://www.cpuc.ca.gov/uploadedFiles/CPUC\\_Public\\_Website/Content/Utilities\\_and\\_Industries/Energy\\_-\\_Electricity\\_and\\_Natural\\_Gas/EEPPolicyManualV5forPDF.pdf](http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy_-_Electricity_and_Natural_Gas/EEPPolicyManualV5forPDF.pdf)

<sup>22</sup> The CPUC CCA Background Paper can be accessed here:

[http://www.cpuc.ca.gov/uploadedFiles/CPUC\\_Public\\_Website/Content/About\\_Us/CCABackgroundPaperv2.pdf](http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/CCABackgroundPaperv2.pdf)



The CCA's develop their ratepayer-funded EE programs independently and submits an application to the CPUC, who reviews those applications separately from the IOU programs. These requirements do present certain challenges to CCA's that pursue this route, as the costs associated with administering ATA EE programs coupled with the relatively small portfolio of projects can make it difficult to pass the TRC test.

However, this option has some distinct advantages as well. CCA's who follow the Apply to Administer pathway can leverage a new, external revenue stream to cover the entire cost of implementing approved EE programs, thereby minimizing any potential risk and negative budget and/or rate impacts. CCA's are also able to offer valuable, cost-saving ATA energy efficiency programs to any ratepayers, including bundled customers served by the incumbent IOU (though careful coordination with the IOU is required to avoid potential double counting of energy savings), providing an opportunity for customer win-back scenarios and increased market presence. Participation in the CPUC Energy Efficiency Portfolio process also provides an opportunity for CCA's who pursue the ATA option to more fully engage in the statewide discourse about energy efficiency funding and program design decisions that directly impact their customers, and all California ratepayers. Establishing cost-effective, ratepayer-funded energy efficiency programs that meet or exceed the CPUC's onerous requirements also helps to demonstrate maturity in the emerging CCA industry, and a commitment to supporting the State's aggressive energy conservation, climate protection, and social justice goals.

| Customer Classes    | 2016 Electric Average Rate (\$/kwh) | 2016 Energy Efficiency Portion of Electric Average Rate (\$/kwh) | 2016 Usage (kWh) | Estimated EE Revenue |
|---------------------|-------------------------------------|--|------------------|----------------------|
| Residential         | \$0.19468                           | \$0.00483  | 2,370,217,394    | \$ 11,448,150        |
| Commercial - Small  | \$0.22378                           | \$0.00530  | 942,260,575      | \$ 4,993,981         |
| Commercial - Medium | \$0.19662                           | \$0.00438  | 1,007,949,773    | \$ 4,414,820         |
| Commercial - Large  | \$0.16812                           | \$0.00386  | 2,522,095,707    | \$ 9,735,289         |
| Streetlights        | \$0.21420                           | \$0.00523  | 52,502,873       | \$ 274,590           |
| Agricultural        | \$0.17000                           | \$0.00359  | 23,185,379       | \$ 83,236            |
| <b>TOTAL</b>        |                                     |  |                  | <b>\$ 30,950,066</b> |

Figure 2: Table indicating estimated Public Goods Surcharges collected in 2016 for the EBCE service territory by rate class.<sup>23</sup>

### Example: MCE Clean Energy

MCE Clean Energy (MCE, formerly Marin Clean Energy) has been a pioneer in many ways within California's rapidly emerging CCA industry, and they have certainly set the bar in terms of CCA implementation of energy efficiency programs. MCE has been administering ratepayer-funded energy efficiency programs since 2012, and they are the first and only CCA to go through the Apply to Administer process and demonstrate the CCA's can in fact deliver cost-effective

<sup>23</sup> Constructed from Item 2 and Item 15 data provided by PG&E under the CCA Info Tariff.

Note from included in Item 2 report provided by PG&E to EBCE: "As a reminder, a CCA may seek to establish an EE program under PU Code Section 381.1(e) or Section 381.1(a) – (d). This data represents the gross energy efficiency revenues collected from the sources indicated. The energy efficiency funds available to a CCA will depend on which program option it chooses, CPUC action, and other factors."

ratepayer-funded EE programs in coordination with the incumbent IOU (PG&E), the local LGP programs (Marin County Energy Watch and East Bay Energy Watch), and the Regional Energy Network (BayREN).

MCE is also the first CCA to develop a comprehensive Energy Efficiency Business Plan<sup>24</sup> to provide a detailed public roadmap for the organization’s vision for the evolution of its EE programming. MCE has developed EE programs that serve residential, commercial, and industrial sectors, including programs that provide cost-saving measures to low-income customers. Another important innovation that MCE has demonstrated as part of its ever-evolving EE program portfolio is that it secured approval from the CPUC to administer a multi-family efficiency program that included natural gas (therm) reduction targets.<sup>25</sup> The CPUC directed PG&E to enter into a contract to provide MCE with commensurate funding adequate to achieve the therm reduction goals in the proposed program, setting a relevant and interesting precedent that EBCE should consider.

### **“Elect to Administer” Ratepayer-funded Energy Efficiency Programs**

The CPUC provides an alternate pathway for CCA’s who wish to administer energy efficiency programs using ratepayer (PGC) funding with less onerous rules and regulations, which is referred to as the Elect to Administer (ETA) option. The primary distinction is that, unlike the ATA option outlined above, under the ETA alternative CCA’s may only offer the ratepayer-funded EE programs to their own customers. ETA programs approved by the CPUC are subject to a much lighter regulatory burden, and do not need to pass the TRC test or undergo periodic EM&V review. These programs must only a) follow the basic requirements outlined in the Commission’s General Order 96-b<sup>26</sup>, b) adhere to the standards in the Public Utilities Code Section 381.1.e-f<sup>27</sup> that require the CCA to submit a plan demonstrating cost-effective program designs with embedded EM&V, and c) undergo periodic financial audits.

This alternative pathway greatly reduces the staff time, costs, and risks involved with implementing ratepayer-funded EE programs. Specifically, the fact that ETA EE programs are not required to pass the TRC test means that CCA’s that pursue this route would be free to design programs that support a range of sustainability goals, and that penetrate hard-to-reach market segments with deep retrofits. The main trade-off with the ETA approach is that, because CCA’s that use this option are not able to offer ETA EE programs to non-CCA customers (i.e., bundled customers served by the incumbent IOU), the opportunities for customer win-back scenarios and

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<sup>24</sup> The MCE EE Business Plan can be accessed here: [https://www.mcecleanenergy.org/wp-content/uploads/2017/01/EE-BusinessPlan2017\\_20160105\\_filing.pdf](https://www.mcecleanenergy.org/wp-content/uploads/2017/01/EE-BusinessPlan2017_20160105_filing.pdf)

<sup>25</sup> For more information, see here: <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M129/K228/129228024.pdf>

<sup>26</sup> For details on the CPUC’s General Order 96-b, see here: [http://docs.cpuc.ca.gov/word\\_pdf/GENERAL\\_ORDER/164747.pdf](http://docs.cpuc.ca.gov/word_pdf/GENERAL_ORDER/164747.pdf)

<sup>27</sup> For more information regarding Section 381.1.e-f of the California Public Utilities Code, see here: [http://leginfo.legislature.ca.gov/faces/codes\\_displaySection.xhtml?sectionNum=381.1.&lawCode=PUC](http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=381.1.&lawCode=PUC)

increased market presence and penetration are sacrificed. Nearly all of the other benefits that CCA's can attain through the ATA option can be realized through the ETA approach.

It has been reported that Lancaster Choice Energy has filed an Advice Letter with the CPUC, initiating the process to become the first CCA in the State to be an ETA EE Program Administrator as part of the current CPUC energy efficiency planning process.<sup>28</sup>

## V. Risks and Mitigations

While the returns on investments in energy efficiency as a resource can be significant for EBCE, and the benefits of cost-effective EE programming to EBCE's customers can be substantial, there are some inherent risks that should be considered and addressed. This section explores some of the potential risks at play, and offers some strategies for minimizing and/or mitigating those risks.

### Political Risks

East Bay Community Energy has made clear commitments to providing energy efficiency programs to its customers in its JPA Agreement, the foundational governing document for the CCA. This has reinforced stakeholder expectations that EBCE will provide new cost-saving EE programs to its customers, and fostered hope that EBCE will ultimately become an innovative leader in the energy efficiency space. This creates some risk, in that if EBCE does not offer EE programming, stakeholders (i.e., EBCE customers, labor organizations, community advocates, and local vendors and service providers) may be dissatisfied and/or critical of the organization for failing to live up to this commitment.

The fact that there are multiple energy efficiency Program Administrators (PA's) already serving customers in EBCE's service territory creates additional political risks. Organizations like East Bay Energy Watch, StopWaste Energy Council, and Bay Area Regional Energy Networks have all supported the local workforce and established strong market presence in EBCE's territory, and each have direct connections with EBCE's Board of Directors. The risks here involve the potential for EBCE to duplicate and/or supplant existing EE programming, as well as potentially displacing some of the existing staff that support those programs. If EBCE's implementation of EE programs has a negative impact on these established programs, that would likely translate into political tension at the Board level.

### Mitigation

The primary mitigation measure for these risk factors is proactive and sustained collaboration and coordination with the EE Program Administrators that are already serving the Alameda County community. Working closely with EBEW, StopWaste Energy Council, and BayREN will build trust and synergy, and allow EBCE to leverage the experience and existing EE infrastructure developed by these established programs. This will help EBCE develop programs that minimize duplication and maximize the benefits of energy efficiency programming for all stakeholders. Collaboration with these vital organizations will also provide meaningful opportunities for joint

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<sup>28</sup> See East Bay Energy Watch- Navigating the Changing Landscape of Changing Energy Efficiency Programs in the East Bay (October 2017), accessed here: [http://www.ebew.org/s/Energy-Efficiency-Paper\\_Final\\_2-pnnd.pdf](http://www.ebew.org/s/Energy-Efficiency-Paper_Final_2-pnnd.pdf)

community outreach and education, which can provide a foundation for driving customer adoption of EBCE's EE programs and help ensure that stakeholders see that EBCE is actively promoting energy efficiency and conservation.

## **Operational Risks**

As outlined in a previous section of this document, energy efficiency implementation has different implications for CCA's than for their (decoupled) IOU counterparts. This stems from the fact that the business model for CCA's (i.e., how they generate the revenue necessary to sustain the program) is selling kilowatt hours of electricity, which means that reducing energy consumption through concerted EE program implementation also reduces revenue. This risk is intrinsically offset to some degree by the reduced procurement costs and risk that also results from the associated load reductions. However, cost-effectiveness should be a primary concern to all CCA's, who operate in a highly competitive and dynamic market and must offer and maintain competitive rates vs. the incumbent IOU, or risk increased opt-out rates that could jeopardize the stability of the CCA program itself.

Reducing loads that are most expensive for the CCA to serve (i.e., accounts that contribute the most to the CCA's peak demand and/or use substantial amounts of electricity during peak pricing periods) will deliver maximum benefit to the CCA and its customers. While reducing the loads that are the least expensive to serve (i.e., accounts that mostly consume energy during off-peak periods) can actually have a negative impact on the CCA's fiscal performance. Therefore, cost-effectiveness of EE programs in the CCA context depends on understanding the cost of service for all the loads served by the CCA at a fairly granular level, and targeting the optimal loads for reduction. Without data-driven targeting, a CCA risks negative returns on any investments in energy efficiency program implementation

## **Mitigation**

EBCE can effectively manage this risk using several distinct, but interrelated strategies. First and foremost, EBCE should work to develop the internal capacity for granular load analysis to help the staff identify and target problem load areas for reduction, and match appropriate energy efficiency technologies and program ideas to reduce those loads cost-effectively. This is referred to as a cost-causation based approach to energy efficiency program design, and the LDBP Project Team has applied this approach using the historical data that was available at the time of this study. The analysis that has been conducted as part of the LDBP project is meant to provide a starting point, but it is intended to be an ongoing and iterative process that will benefit from data from actual EBCE operation. Subsequent refinements and analysis could be outsourced to external vendors initially, including EBCE's data and portfolio managers. However, to be sustainable in the long-term it is recommended that EBCE develop an in-house, integrated data platform with embedded analytics designed for this specialized type of energy analysis.

It is also recommended that EBCE commission a detailed cost of service (COS) study from a qualified vendor after a minimum of one full year of operation of the CCA at full enrollment. This requires an experienced and highly-specialized skillset and sophisticated modeling tools and resources to produce the most accurate and actionable insights necessary to minimize risk exposure. Over time, EBCE could develop the internal capacity to update and maintain the COS model to keep up with changing load patterns and dynamic market conditions.

Another viable strategy for mitigating the operational risks associated with EE program design and implementation would be for EBCE to leverage external funding sources, and minimize the use of its own revenue for these purposes. This would most likely entail seeking to administer ratepayer (PGC) funds through either the ATA or ETA processes described above. Either of these options would greatly reduce the operational risk exposure because EBCE would not be tapping its own revenue and existing operational budget to invest in load reductions. The addition of PGC funding to EBCE's operating budget would at least partially offset any lost revenue associated with those load reductions.

The final recommendation here is for EBCE to utilize a Pay-for-performance (P4P) approach to procuring energy efficiency as a resource. This would build on the recommendations to commission a detailed COS study and develop a robust, in-house data platform. The COS study would illuminate expensive, problem load areas that would be desirable for EBCE to attack with energy efficiency. That information could form the basis of a Request for Proposals (RFP), which would essentially stipulate the desired load-shape adjustment (i.e., the desired amount of load reduction, during specific times of day, in certain months). A vendor of energy efficiency technologies and services that can achieve such load reductions could be selected through that competitive procurement process, and contractual terms could be negotiated that compensate the vendor fairly for the actual load reductions that are realized. EBCE would measure and validate the kilowatt hours reduced using Advanced Meter Infrastructure (AMI) Interval data processed in the in-house data platform. The data analytics and performance contract models necessary to facilitate this are readily available to EBCE in the market now, and will be detailed in later sections of this document. The P4P approach to EE program design and implementation eliminates significant operational risks by ensuring that the CCA only pays for load reductions that are cost-effective and deliver value to the CCA and its customers.

## **Regulatory Risks**

If EBCE opts to pursue approval from the CPUC to administer ratepayer-funded EE programming, it will be subject to the rules and regulations governing those programs. The regulatory burden is substantially greater under the Apply to Administer option than it is with the Elect to Administer alternative. Passing the Total Resource Cost test can be especially challenging for new Program Administrators with relatively smaller EE program portfolios, which makes failure a regulatory risk for EBCE if it chooses to pursue the ATA pathway.

The ATA option also introduces some risk associated with the requisite periodic evaluation, measurement and validation processes, which would ultimately publish a summary report with any poor performance metrics or other negative findings. Under the ETA option, CCA's would carry less risk exposure. Though these programs do still need to demonstrate cost-effectiveness, undergo some level of EM&V, and undergo periodic financial audits. So the risk of underperformance or negative findings in the financial audit is still a concern for CCA's administering ETA programs

## **Mitigation**

In either case, the recommended mitigation strategy is the same. To ensure cost-effectiveness, pass the TRC test, and achieve positive outcomes from EM&V processes, CCA's who administer ATA or ETA EE programs must focus strictly on achieving the greatest load reduction (kilowatt

hours) at the lowest possible costs. In essence, this means harvesting the lowest hanging fruit by implementing low-cost, high-return efficiency measures (i.e., lighting upgrades, occupancy sensors, etc.). This is an effective means of maintaining high cost-effectiveness ratios.

## VI. Assessment of Energy Efficiency Opportunities for EBCE

Next to its customers, data is a CCA's most valuable resource and mining that data to extract that value is of critical importance to EBCE and successful implementation of the LDBP. To assess the opportunities for energy efficiency programs to benefit EBCE and the customers and communities it serves, the LDBP Project Team assembled a robust integrated data platform using a comprehensive energy data management system called Solvryn Enterprise<sup>29</sup>. Using this advanced, open architecture suite of tools, the LDBP Team built a sophisticated analytical foundation that leverages a massive historical energy consumption data set received from PG&E under the CCA Info Tariff<sup>30</sup> (including 2 full years of AMI interval data), along with historical local weather station data, CAISO market (Day Ahead and Locational Marginal) pricing data, County parcel data, portfolio and rate structure data, geospatial data, socioeconomic data, and environmental indicator data to provide extraordinary load profiling, DER targeting and energy "hot-spot" (higher than average energy use patterns that constitute opportunities for DER deployment) identification capabilities.

Using this integrated data analytics platform enabled a detailed study of the unique energy supply and demand dynamics within Alameda County that has identified significant opportunities for cost-effective EE programs that deliver substantial value for EBCE and its customers. The analysis made use of nearly all of the data available to EBCE under the CCA Info Tariff, especially the AMI Interval data that facilitated the development of granular load profiles and hourly/sub-hourly analysis of load data down to the customer level. A summary overview of key findings is provided below. The complete findings and resources produced by this study, which includes customer-specific data protected by strict state-mandated consumer protection confidentiality rules<sup>31</sup>, will be provided to EBCE staff to support recommended EE program outreach and implementation.

### Summary of Analysis Results

The purpose of the analysis of energy supply and demand dynamics that was conducted as part of the LDBP project was to provide actionable information that can assist EBCE in developing strategies, programs and policies that create organizational, ratepayer and community benefits. Energy consumption patterns vary across space, sociodemographics, industry types, and climates. Understanding the specific consumption patterns of EBCE territory thus enables strategic, targeted, and tailored decision-making that maximizes benefits and reduces risk. This

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<sup>29</sup> For details about Solvryn Enterprise (provided by GPT), see here: <http://greenplanet.tech/index-2.html>

<sup>30</sup> Note- all references to Item 1-17 data refers to specific data points provided under the mandated CCA Info Tariff, which can be accessed here: [https://www.pge.com/tariffs/tm2/pdf/ELEC\\_SCHS\\_E-CCAINFO.pdf](https://www.pge.com/tariffs/tm2/pdf/ELEC_SCHS_E-CCAINFO.pdf). See Appendix A: Data Sources of this report for information about the CCA Info Tariff data requested and received from PG&E to support the Local Development Business Plan analyses.

<sup>31</sup> See CPUC Decision 11-07-056: [http://docs.cpuc.ca.gov/PublishedDocs/WORD\\_PDF/FINAL\\_DECISION/140369.PDF](http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/140369.PDF); and Decision 12-08-045: <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M026/K531/26531585.PDF>

is why the development of an integrated data platform that facilitated the analysis of multiple data streams that interact with and affect energy use patterns is crucial to EBCE’s successful implementation of the LDBP. The results of that integrated data analysis have greatly supported this energy efficiency assessment section of the LDBP, and should provide actionable insights that inform EBCE’s EE offerings over the first five years of its operation. This analysis is meant to provide a solid foundation for EBCE staff and contractors to build upon, and is intended to be the beginning of an ongoing and iterative process.

**Key Findings**

- Overall, EBCE’s load profile includes a diversity of load types distributed across a geographically and socioeconomically diverse region. EBCE’s total estimated annual load of ~7,000 GWh is distributed asymmetrically across ~560,000 accounts, with the bulk of the accounts being in the residential sector and the bulk of the load in the non-residential sector.

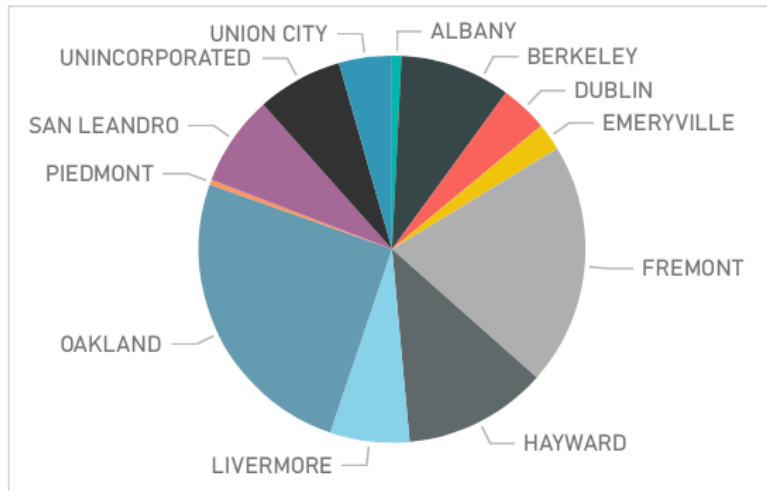


Figure 3: Annual electricity consumption in the EBCE service territory by jurisdiction.

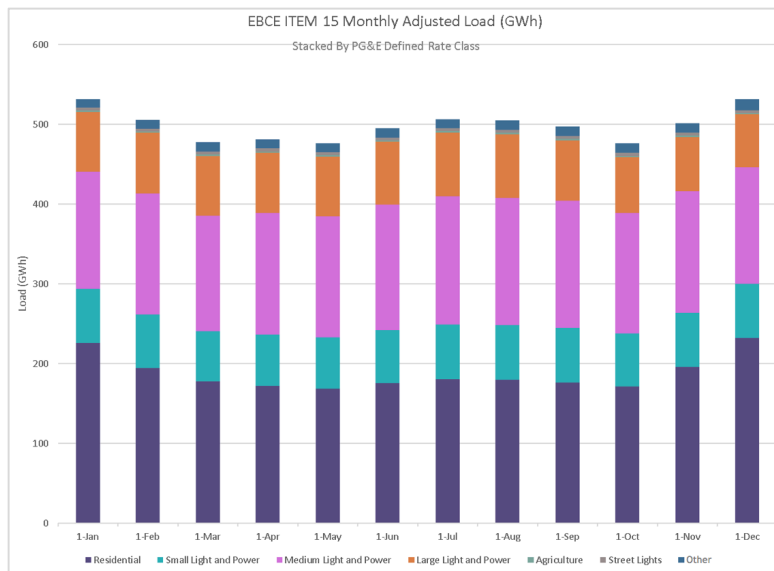


Figure 4: EBCE’s monthly loads stacked by rate class, based on Item 15 data.

- EBCE’s total estimated annual load of ~6,900 GWh is distributed asymmetrically across ~570,000 accounts, with the bulk of the accounts being in the residential sector. However, overall electricity consumption is highly skewed towards the non-residential sector, with a small number of high-consumption accounts consuming a disproportionately larger share of total kWh (~1% of all EBCE accounts represent ~15% of the total load, and ~10% of the accounts constitute ~65% of the total load).

|                    | Number of Accounts | EBCE Item 15 2016 (kWh) | % of EBCE Accounts | % of EBCE Total Load |
|--------------------|--------------------|-------------------------|--------------------|----------------------|
| Residential        | 512,846            | 2,370,217,394           | 90%                | 34%                  |
| Commercial- Small  | 45,684             | 942,260,575             | 8%                 | 14%                  |
| Commercial- Medium | 4,888              | 1,007,949,773           | 1%                 | 15%                  |
| Commercial- Large  | 2,707              | 2,522,095,707           | 0.48%              | 36%                  |
| Street Lights      | 3,666              | 52,502,873              | 0.64%              | 1%                   |
| Agriculture        | 146                | 23,185,379              | 0.03%              | 0.3%                 |
| <b>TOTALS</b>      | <b>569,938</b>     | <b>6,918,211,700</b>    | <b>100%</b>        | <b>100%</b>          |

Figure 5: Number of accounts and annual consumption by rate class, as well as percent of EBCE totals.

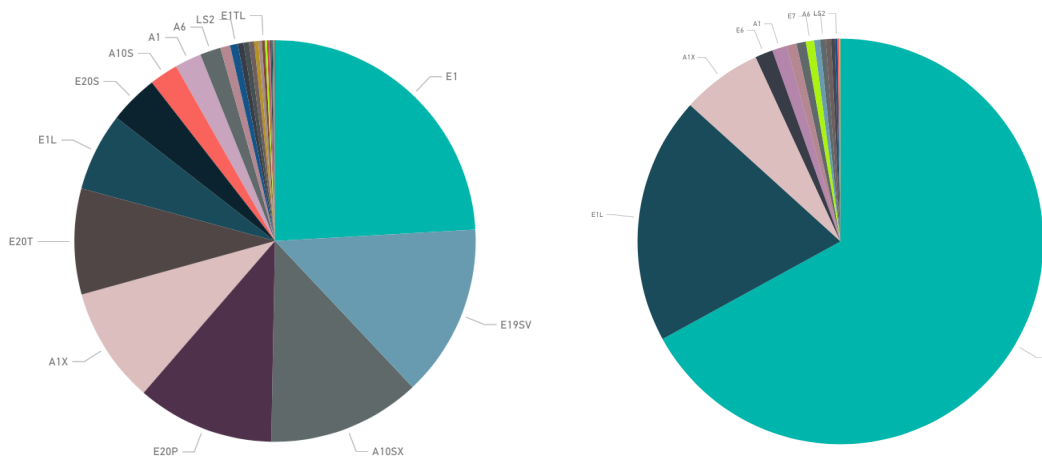


Figure 6: Number of accounts by rate code (Left), and annual consumption (kWh) by rate code (Right), based on data provided by PG&E under the CCA Info Tariff (Item 1).

|                        | EBCE ITEM 15 LOAD (GWh) |            |            |            |            |            |            |            |            |            |            |            |
|------------------------|-------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
|                        | 16-Jan                  | 16-Feb     | 16-Mar     | 16-Apr     | 16-May     | 16-Jun     | 16-Jul     | 16-Aug     | 16-Sep     | 16-Oct     | 16-Nov     | 16-Dec     |
| Residential            | 275                     | 242        | 223        | 219        | 215        | 225        | 233        | 232        | 228        | 221        | 247        | 283        |
| Small Light and Power  | 80                      | 79         | 74         | 76         | 76         | 78         | 81         | 81         | 81         | 78         | 80         | 80         |
| Medium Light and Power | 147                     | 153        | 145        | 152        | 152        | 158        | 159        | 157        | 157        | 149        | 151        | 146        |
| Large Light and Power  | 102                     | 104        | 103        | 104        | 103        | 107        | 108        | 109        | 104        | 98         | 95         | 95         |
| Agriculture            | 2                       | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Street Lights          | 5                       | 4          | 4          | 4          | 4          | 4          | 4          | 4          | 4          | 4          | 4          | 4          |
| <b>Total</b>           | <b>610</b>              | <b>584</b> | <b>551</b> | <b>557</b> | <b>552</b> | <b>574</b> | <b>587</b> | <b>586</b> | <b>576</b> | <b>552</b> | <b>580</b> | <b>609</b> |

Figure 7: Monthly consumption (GWh) by rate class and total, based on CCA Info Tariff Item 15 data provided by PG&E.



- EBCE’s average hourly load shape is unique due to the diversity of load types, geography, and socioeconomic conditions, which means that its peak/non-peak coincident loads are not aligned with PG&E’s system wide load profile.

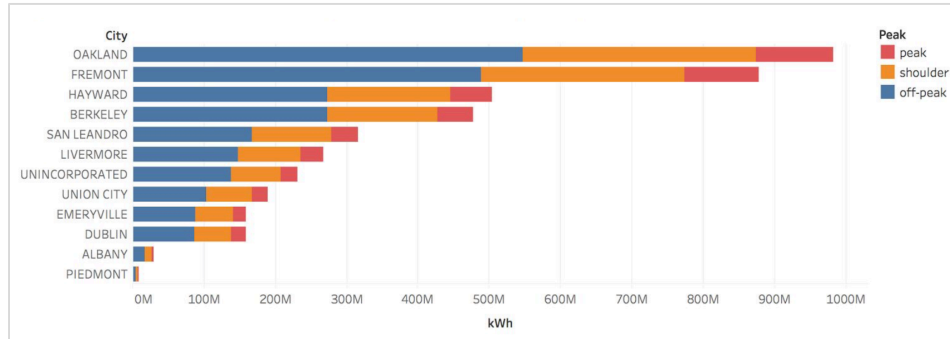


Figure 8: Analysis of peak, shoulder, and off-peak loads by jurisdiction, based on Item 15 data.

| Hour Ending at | DE_ANZA | CENTRAL COAST | DIABLO | EAST_BAY | FRESNO | HUMBOLDT | KERN | LOS PADRES | MISSION | NORTH_BAY | NORTH VALLEY | PENINSULA | SACRAMENTO | SAN FRANCISCO | SAN JOSE | SIERRA | SONOMA | STOCKTON | YOSEMITE | Weighted All |     |
|----------------|---------|---------------|--------|----------|--------|----------|------|------------|---------|-----------|--------------|-----------|------------|---------------|----------|--------|--------|----------|----------|--------------|-----|
| Summer         |         |               |        |          |        |          |      |            |         |           |              |           |            |               |          |        |        |          |          |              |     |
| 1:00:00 AM     | 0%      | 0%            | 0%     | 0%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 2:00:00 AM     | 0%      | 0%            | 0%     | 0%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 3:00:00 AM     | 0%      | 0%            | 0%     | 0%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 4:00:00 AM     | 0%      | 0%            | 0%     | 0%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 5:00:00 AM     | 0%      | 0%            | 0%     | 0%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 6:00:00 AM     | 0%      | 0%            | 0%     | 0%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 7:00:00 AM     | 0%      | 0%            | 0%     | 0%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 8:00:00 AM     | 0%      | 0%            | 0%     | 0%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 9:00:00 AM     | 0%      | 0%            | 0%     | 0%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 10:00:00 AM    | 1%      | 0%            | 0%     | 1%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 1%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 11:00:00 AM    | 3%      | 0%            | 0%     | 4%       | 0%     | 0%       | 0%   | 1%         | 0%      | 0%        | 0%           | 3%        | 0%         | 5%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 1%  |
| 12:00:00 PM    | 5%      | 1%            | 0%     | 5%       | 0%     | 1%       | 1%   | 3%         | 1%      | 0%        | 0%           | 6%        | 0%         | 7%            | 0%       | 0%     | 1%     | 0%       | 0%       | 0%           | 2%  |
| 1:00:00 PM     | 5%      | 2%            | 0%     | 6%       | 1%     | 2%       | 2%   | 4%         | 2%      | 1%        | 0%           | 6%        | 0%         | 8%            | 2%       | 0%     | 2%     | 0%       | 1%       | 0%           | 2%  |
| 2:00:00 PM     | 7%      | 4%            | 1%     | 9%       | 3%     | 5%       | 5%   | 7%         | 6%      | 3%        | 1%           | 8%        | 1%         | 10%           | 5%       | 1%     | 5%     | 2%       | 3%       | 0%           | 5%  |
| 3:00:00 PM     | 8%      | 8%            | 4%     | 11%      | 7%     | 7%       | 8%   | 10%        | 9%      | 6%        | 3%           | 8%        | 3%         | 12%           | 9%       | 4%     | 8%     | 5%       | 6%       | 0%           | 7%  |
| 4:00:00 PM     | 9%      | 14%           | 8%     | 10%      | 13%    | 9%       | 12%  | 11%        | 12%     | 11%       | 5%           | 10%       | 6%         | 13%           | 12%      | 10%    | 13%    | 10%      | 10%      | 0%           | 11% |
| 5:00:00 PM     | 9%      | 17%           | 21%    | 8%       | 18%    | 12%      | 14%  | 13%        | 14%     | 14%       | 13%          | 11%       | 14%        | 9%            | 17%      | 18%    | 16%    | 17%      | 15%      | 0%           | 14% |
| 6:00:00 PM     | 9%      | 20%           | 22%    | 2%       | 18%    | 13%      | 15%  | 10%        | 14%     | 18%       | 18%          | 11%       | 20%        | 4%            | 17%      | 20%    | 17%    | 20%      | 17%      | 0%           | 15% |
| 7:00:00 PM     | 10%     | 12%           | 24%    | 1%       | 18%    | 13%      | 16%  | 9%         | 9%      | 16%       | 24%          | 6%        | 24%        | 0%            | 13%      | 24%    | 13%    | 21%      | 20%      | 0%           | 14% |
| 8:00:00 PM     | 8%      | 8%            | 14%    | 3%       | 12%    | 13%      | 13%  | 6%         | 7%      | 10%       | 23%          | 4%        | 19%        | 0%            | 7%       | 15%    | 10%    | 13%      | 14%      | 0%           | 10% |
| 9:00:00 PM     | 7%      | 2%            | 6%     | 4%       | 8%     | 10%      | 9%   | 5%         | 5%      | 2%        | 10%          | 3%        | 9%         | 0%            | 4%       | 6%     | 4%     | 8%       | 9%       | 0%           | 6%  |
| 10:00:00 PM    | 3%      | 1%            | 0%     | 2%       | 3%     | 5%       | 4%   | 2%         | 2%      | 1%        | 3%           | 0%        | 2%         | 0%            | 1%       | 1%     | 2%     | 3%       | 4%       | 0%           | 2%  |
| 11:00:00 PM    | 0%      | 0%            | 0%     | 0%       | 0%     | 1%       | 1%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |
| 12:00:00 AM    | 0%      | 0%            | 0%     | 0%       | 0%     | 0%       | 0%   | 0%         | 0%      | 0%        | 0%           | 0%        | 0%         | 0%            | 0%       | 0%     | 0%     | 0%       | 0%       | 0%           | 0%  |

Figure 9: Peak Capacity Allocation Factors (PCAF's) by PG&E sub region<sup>33</sup>. Note that the East Bay peak capacity requirement is shown at 3pm-4pm, which differs from the predominant 5pm-8pm peak demand system-wide in PG&E’s service territory.

<sup>33</sup> Source: PG&E, February 26, 2016- What Factors Should Affect Selection of Time- of-Use (TOU) Periods?. Accessed here: [www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=12347](http://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=12347)

- Peak electricity consumption days in both non-residential and residential sectors correspond with large differentials between minimum and maximum temperature fluctuations and high average locational marginal pricing, indicating a significant opportunity for improved efficiency in the HVAC technology category.

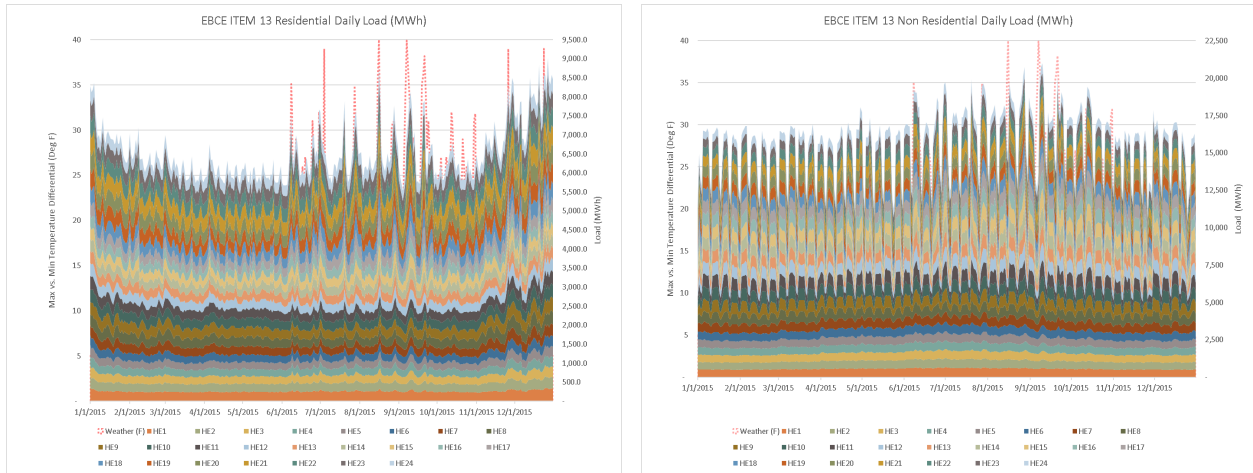


Figure 10: Daily Load for residential and non-residential customers, overlaid with high temperature differentials between maximum and minimum temperature (i.e., substantial swing from evening low temps and daytime highs, indicated by the dotted red lines).

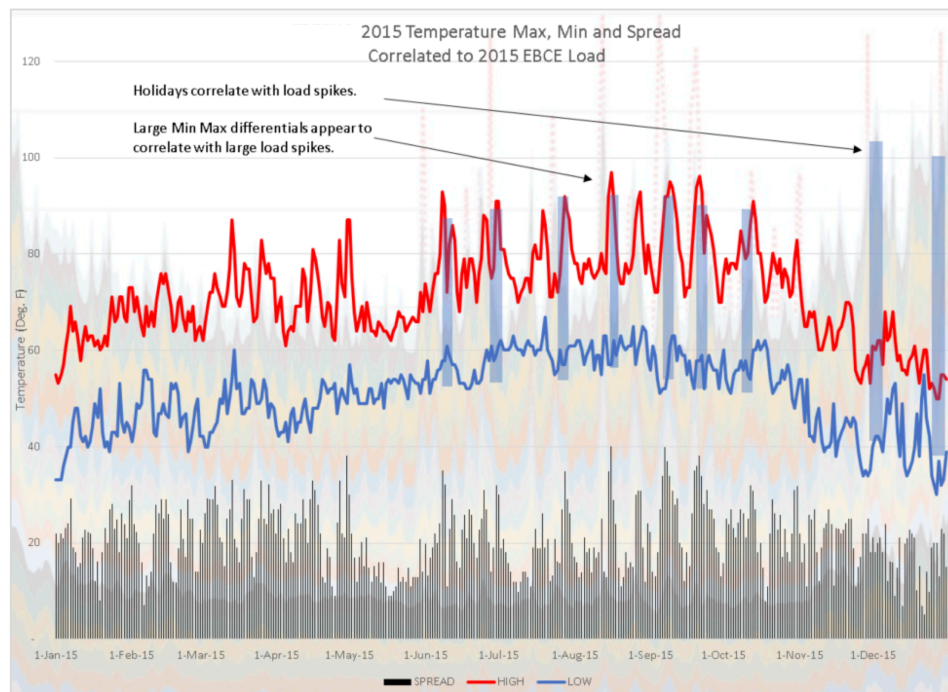


Figure 11: Overlay of EBCE's total daily load curve with maximum and minimum temperatures, and Max-Min temperature differentials. Note strong correlation between high temperature swings and peak load days, as well as major holidays, indicating a strong potential for meaningful energy efficiency opportunities in the HVAC technology category.

- Based upon NAICS code data provided by PG&E<sup>35</sup>, non-residential customers in the following six categories comprise ~15% of EBCE’s total load: colleges and universities, automobile manufacturing, multi-tenant offices, supermarkets and other grocery, data centers, and hospitals. Therefore, these industry segments represent significant opportunities for cost-effective energy efficiency deployment that is manageable within EBCE’s staffing and resource constraints.

| NAICS Code | NAICS Description              | % of EBCE Load |
|------------|--------------------------------|----------------|
| 611310     | Colleges and Universities      | 3%             |
| 336111     | Auto Manufacturing             | 3%             |
| 531123     | Multi Tenant Offices           | 2%             |
| 445110     | Supermarkets and Other Grocery | 2%             |
| 518210     | Data Services                  | 2%             |
| 622112     | Medical and Surgical Hospitals | 2%             |

Figure 12: Summary of top NAICS code categories representing ~15% of EBCE's total annual load.

- In the non-residential sector, large commercial and industrial accounts exhibit a strong correlation between peak energy consumption and heating degree days, indicating opportunities for beneficial and cost-saving efficiency improvements in the refrigeration and HVAC technology categories.

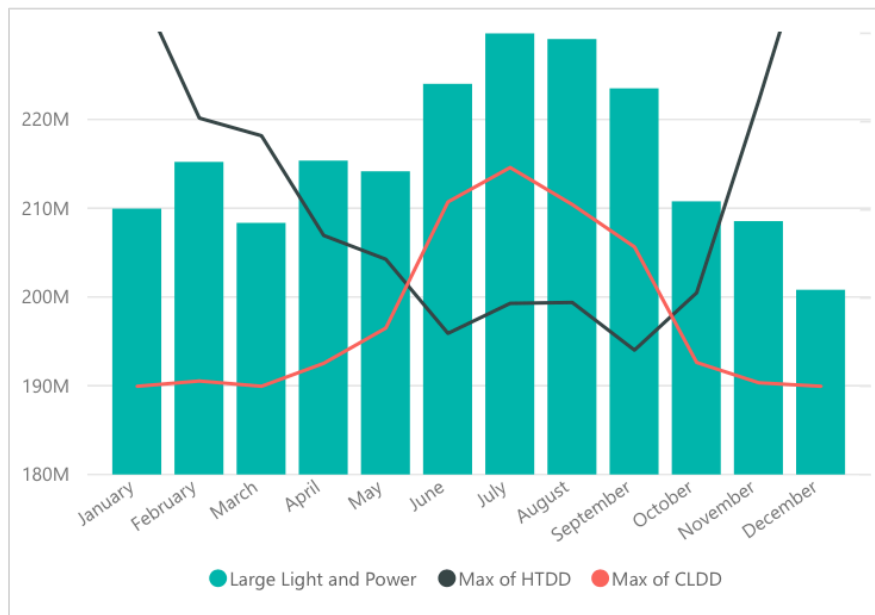


Figure 13: Analysis of monthly consumption (kWh) in EBCE's non-residential sector in relation to heating/cooling degree days. Note strong correlation between cooling degree days and peak demand, indicating an opportunity for beneficial energy efficiency in the HVAC and Refrigeration technology categories.

- In the residential sector there is a strong correlation between peak energy consumption and cooling degree days, indicating high use of electric space heating technologies and opportunities for beneficial and cost-saving efficiency improvements in the HVAC technology category.



Figure 14: Analysis of monthly consumption (kWh) in EBCE's residential sector in relation to heating/cooling degree days. Note strong correlation between heating degree days and peak demand, indicating high usage of electric space heating equipment and opportunities for beneficial energy efficiency in the HVAC technology category.

- Higher income residential areas in the east side of EBCE's territory use more electricity per service address than those on the west side, but due to higher population total consumption is higher near the Bayshore sub region (the densely populated inner East Bay, adjacent to the San Francisco Bay) where poverty is more prevalent.

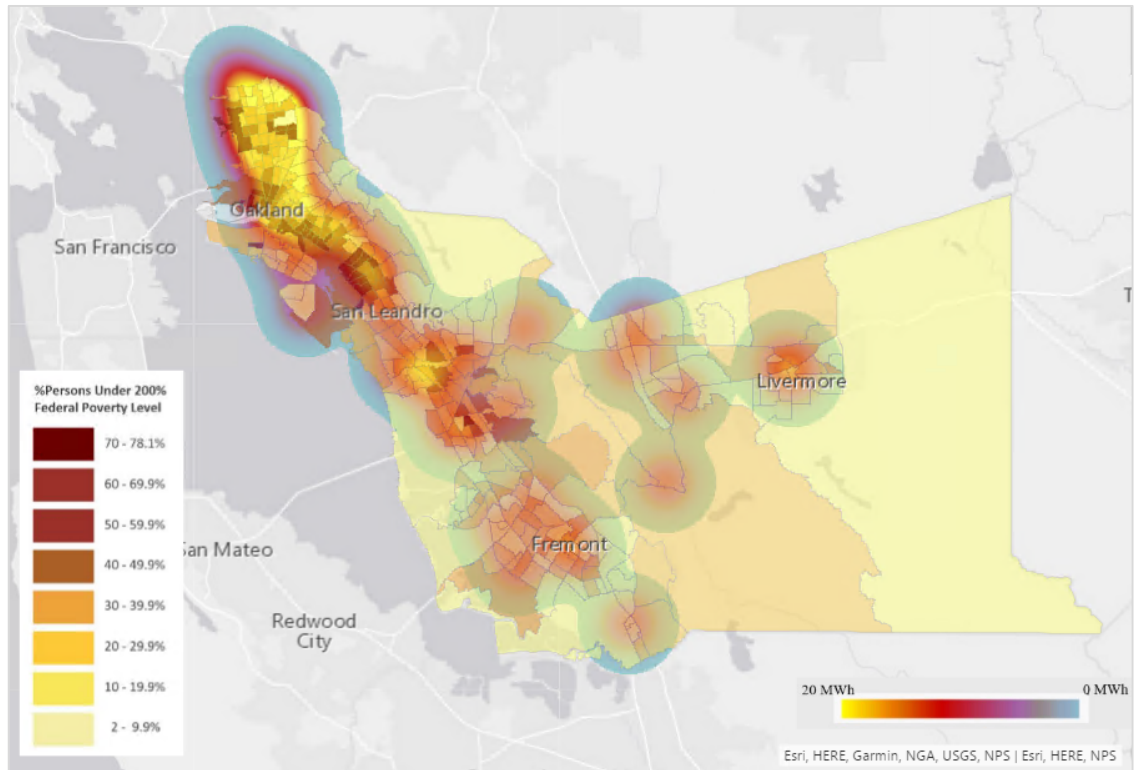


Figure 15: Heat-map showing overlay of extreme poverty (the darker rectangular shapes) and high energy consumption (the brighter orange/yellow areas), indicating that the highest concentrations of poverty tend to be in the areas of highest energy consumption.

- The EBCE territory includes several communities that suffer from extreme poverty, and has a high concentration of low-income customers participating in the discounted utility rate program known as CARE, representing ~6% of EBCE’s total load.

| Total 2016 CARE Accounts |        | Total 2016 CARE kWh |             |
|--------------------------|--------|---------------------|-------------|
| ALBANY                   | 662    | ALBANY              | 2,104,533   |
| BERKELEY                 | 6,013  | BERKELEY            | 19,168,010  |
| DUBLIN                   | 1,685  | DUBLIN              | 7,437,586   |
| EMERYVILLE               | 857    | EMERYVILLE          | 2,967,503   |
| FREMONT                  | 8,847  | FREMONT             | 41,054,670  |
| HAYWARD                  | 14,557 | HAYWARD             | 70,987,547  |
| LIVERMORE                | 3,454  | LIVERMORE           | 20,331,661  |
| OAKLAND                  | 47,317 | OAKLAND             | 180,471,352 |
| PIEDMONT                 | 78     | PIEDMONT            | 343,801     |
| SAN LEANDRO              | 8,274  | SAN LEANDRO         | 37,867,687  |
| UNINCORPORATED           | 12,149 | UNINCORPORATED      | 55,966,164  |
| UNION CITY               | 4,427  | UNION CITY          | 23,899,994  |

Figure 16: Tables indicating distribution of low-income CARE customers, as well as annual consumption (kWh) for CARE customers presented by EBCE member jurisdiction.

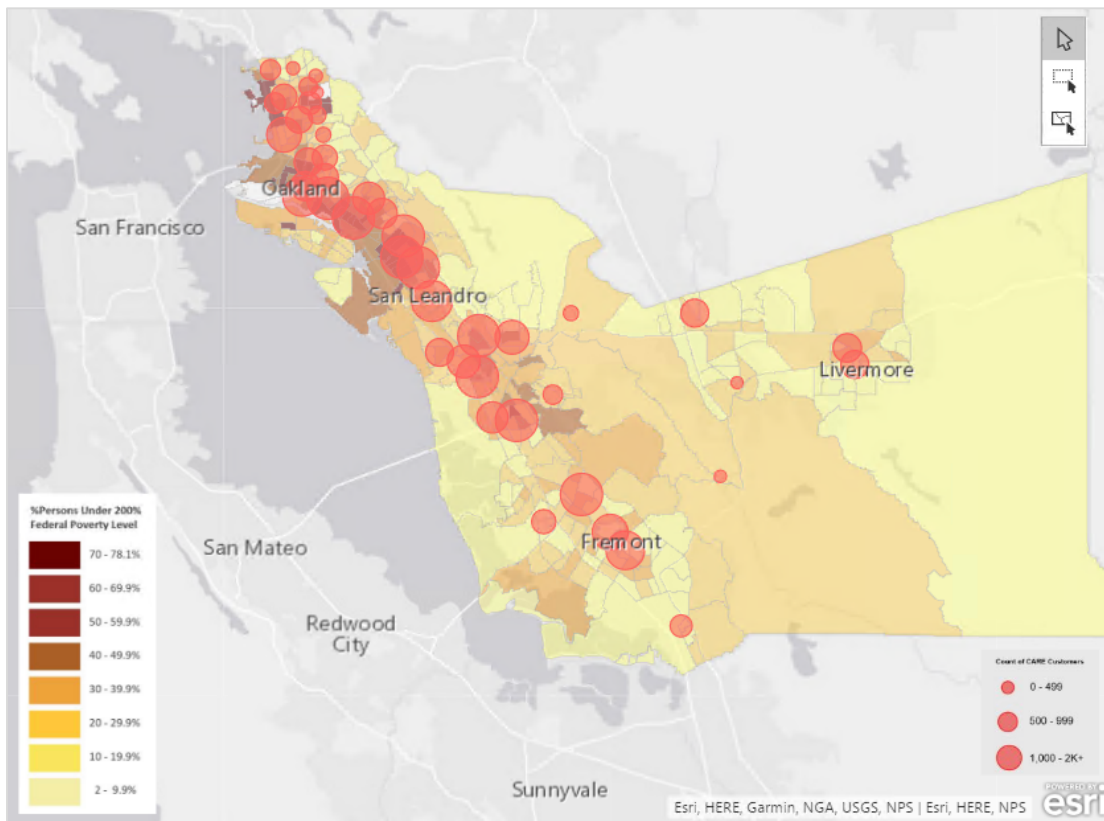


Figure 17: Heat-map showing overlay of high-poverty areas and geographical distribution of CARE customers.

- Due to relatively high solar PV adoption in the residential sector, EBCE’s residential load (i.e., customers on the E1 residential rate schedule) curve exhibits the classic “duck-curve,” with a pronounced early evening ramp up in demand during typically high locational marginal price periods (particularly in the Winter months), which underscores an opportunity for beneficial and cost-effective load reductions targeting peak loads in the residential sector through energy efficiency strategies.

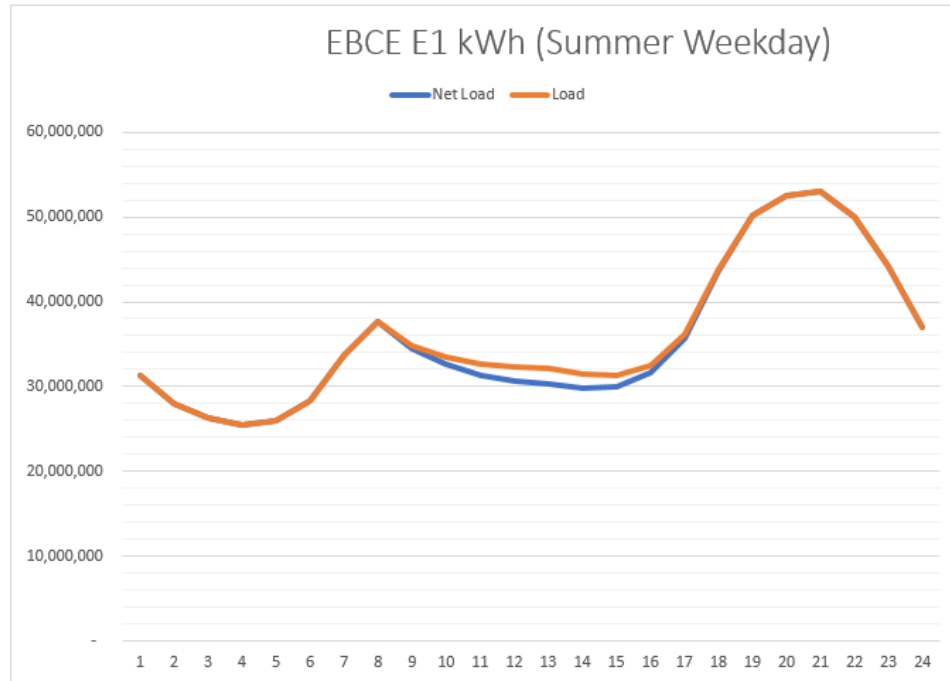


Figure 18: EBCE's E1 customer loads exhibit the classic "duck-curve" indicating the impact of mid-day peak solar production on overall load, and the mismatch with peak demand during early evening hours.

- EBCE can cost-effectively achieve its goals for energy efficiency implementation in its early years of operation by focusing on deploying targeted EE programming in the following rate categories: E1 (Residential), E1L (Residential CARE), E19SV (Large Commercial), E20P (Industrial), and A10SX (Small/Medium Business).

## **VII. Energy Efficiency Opportunities for EBCE**

The following rate categories were identified by the LDBP analysis as recommended targets for EBCE's energy efficiency program during the first five years of operation. These categories were selected due to their substantial contributions to EBCE's energy supply and capacity procurement needs, and with the exception of the E1 category they each have a relatively low number of accounts, making them manageable in terms of general staffing and resource constraints that EBCE will likely have in this initial five-year period.

The LDBP Project Team will deliver the comprehensive accounting of customers and load data for each of these categories to EBCE staff, which will contain protected confidential data not suitable for publication. This more detailed, supporting information can guide EBCE's efforts to promote its EE program offerings directly to identified customers, thereby improving efficiency and cost-effectiveness and enhancing overall outcomes. These initial results could be further refined through subsequent analyses, especially a thorough Cost of Service (COS) study based on at least one full year of EBCE operations and cash flow data.



## E1- Residential

The E1 residential rate schedule is the largest singular rate category, both in terms of number of accounts and energy consumption. With approximately 385,000 accounts, and a total annual load of approximately 1,730 GWh's (nearly 35% of EBCE's total annual load), the potential for impactful load reductions from energy efficiency strategies is immense. While it is also true that the large number of accounts can present some logistical challenges in terms of customer outreach and engagement to drive participation in any EE programs that EBCE implements to serve these customers, the potential for EBCE to collaborate with existing EE Program Administrators (PA's) already serving this market segment (including: EBEW, BayREN, and StopWaste) presents opportunities to leverage the existing knowledge, experience, and infrastructure that those organizations have already built to serve Alameda County residents. There are many "tried-and-true" EE programs already in place that EBCE could access through collaboration with the existing PA's, and EBCE could provide value to them in return through its unique access to data and relationships with other public agencies who serve residents in the E1 rate schedule.

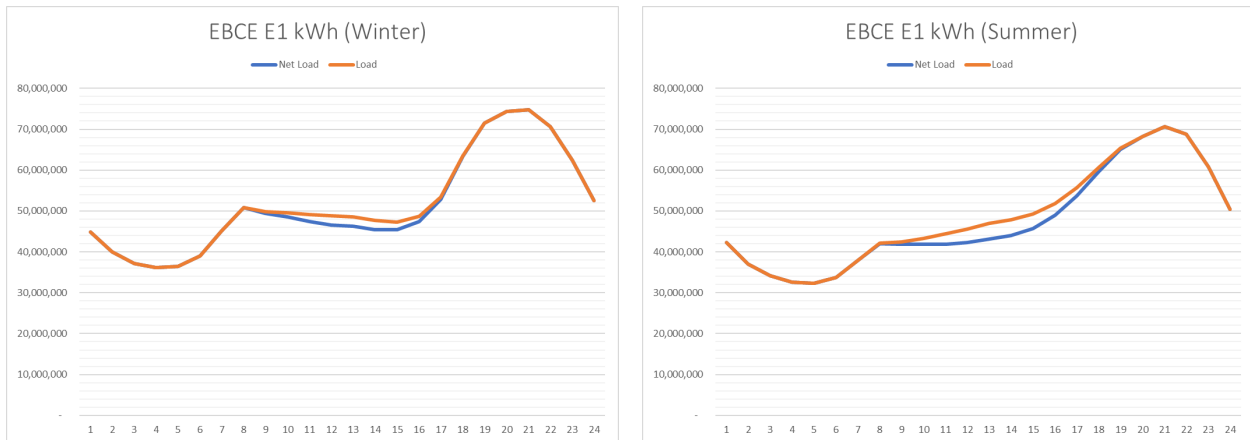


Figure 19: Above are the average hourly load shapes for the E1 rate schedule in Winter and Summer months, which were developed using the Item 17 AMI Interval Data provided by PG&E under the CCA Info Tariff. Note the distinctive "duck-curve" load shape, which is indicative of high penetrations of solar photovoltaics, and represents an opportunity for significant cost-savings for EBCE and its customers in this category through energy efficiency due to the high costs of energy during the evening ramp hours.

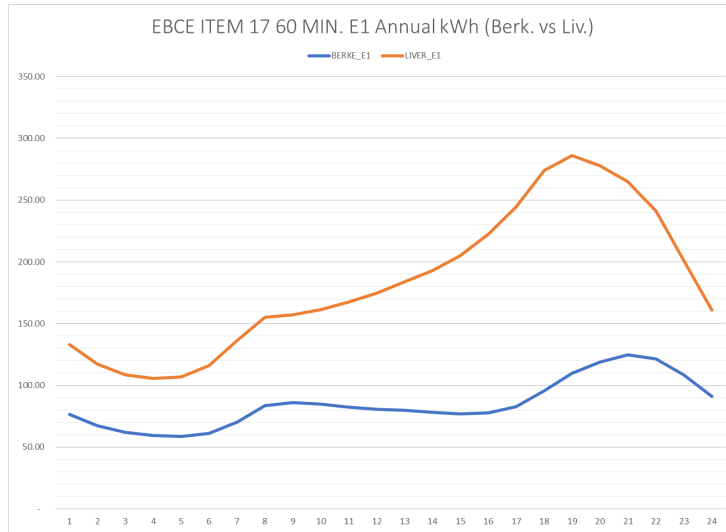


Figure 20: It is important to note that there is variation in the hourly load curves between the different EBCE jurisdictions, due to geography, microclimate weather patterns, urban density, and socioeconomic factors. This graph illustrates this by showing the E1 hourly load curves for Berkeley and Livermore, indicating a stronger opportunity for cost-saving peak load reduction through energy efficiency in Berkeley’s E1 rate category.

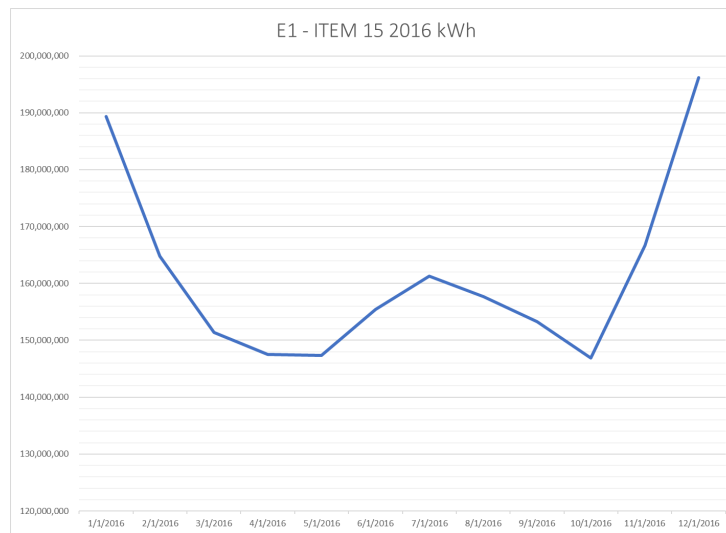


Figure 21: This is the annual load curve for E1 customers in EBCE's service territory. Note the peak loads in the Winter months, which indicate a strong correlation to heating degree days and likely high usage of electric space heating, which is indicative of substantial opportunities for energy efficiency in the HVAC technology category.

## E1L Low-income Residential

The other recommended area for EBCE to focus on in the residential sector is the E1L rate schedule, which is by far the largest rate category receiving the discounted rate CARE program. With approximately 106,500 accounts (~98% of total CARE accounts in EBCE’s service territory), E1L is responsible for ~450 GWh of consumption annually (more than 6% of EBCE’s total annual load, and more than 97% of the total CARE customer consumption). These customers should be a priority concern for EBCE given its public service-oriented mission and strong commitments to social justice and cost-savings for disadvantaged customers and communities. This is another opportunity for EBCE to collaborate with the existing EE PA’s that have been serving this important market segment for many years. Again, through a collaborative approach EBCE can work to create synergy with the existing EE programs, and could support enhanced customer incentives and leverage its unique resources to drive higher customer participation rates and increased community benefits for all stakeholders.

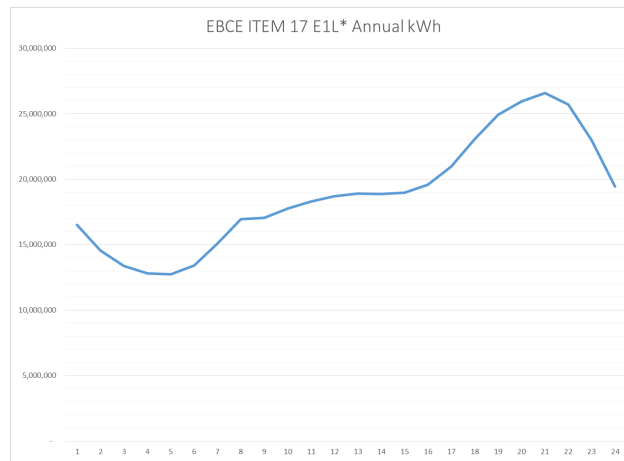


Figure 22: This hourly load curve for the E1L rate category was constructed using the Item 17 interval data in conjunction with Item 15, and it indicates a significant opportunity for EBCE procurement cost-savings due to the coincidence with the peak LMP pricing periods in the Day Ahead and Real Time CAISO markets.

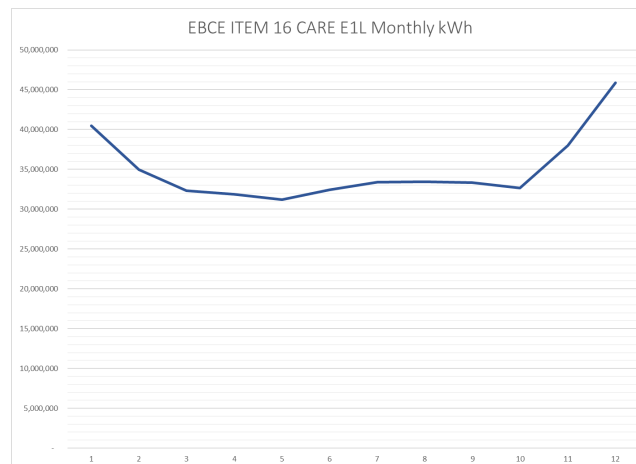


Figure 23: The monthly load curve for E1L indicates peak usage in the cooler Winter months, indicating likely high use of electric space heating equipment and an opportunity for beneficial EE in the HVAC technology category.

## E19SV Non-residential- Large Commercial

In the non-residential sector, one significant opportunity for load reduction through EE programming is the E19SV rate category, which serves large commercial customers. E19SV has approximately 2800 accounts, and is responsible for ~999 GWh's of consumption annually (nearly 15% of EBCE's total estimated load). These are high use accounts that contribute substantially to EBCE's peak loads, and thereby represent an excellent opportunity for cost-saving for both the CCA and customers who participate in any EE programs offered by EBCE. This market segment is not currently served by EBEW, BayREN, or StopWaste, which means that any programs that EBCE offers to serve this rate category would be valuable to customers.

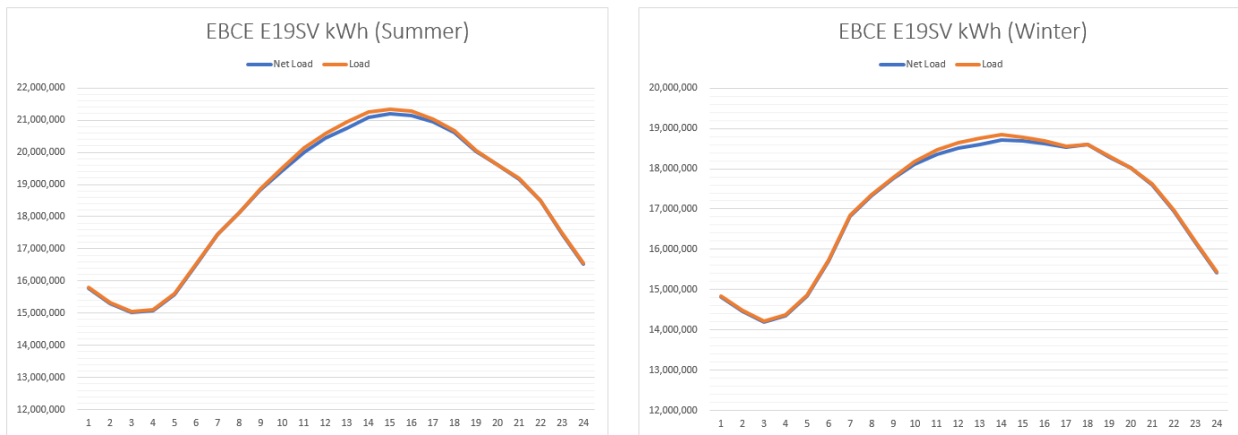


Figure 24: Here are the average hourly load curves for the E19SV rate category, developed using Item 17 Interval Data. Note the relatively consistent curve, which does coincide with EBCE's overall peak demand periods and overlap with peak price time periods in the early evening hours. This indicates a good opportunity for EE cost-saving measures for EBCE and the customers in E19SV.

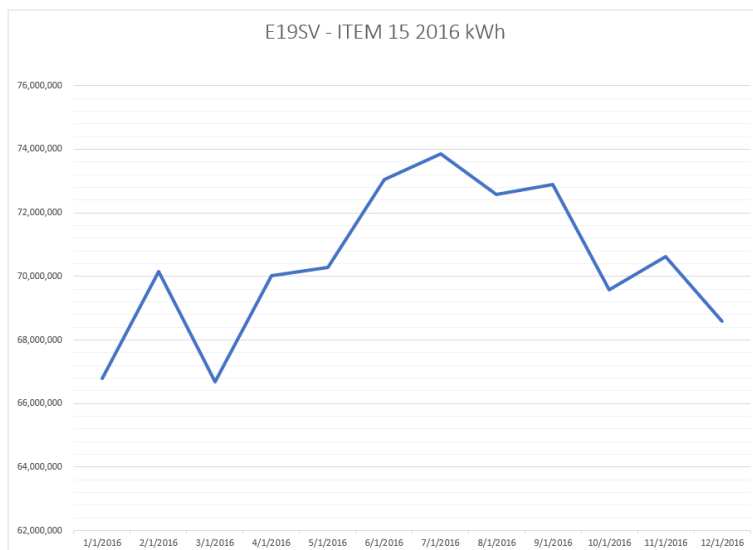


Figure 25: Note that the monthly load curve for E19SV exhibits a peak in the Summer months, indicating a correlation between peak usage and cooling degree days and a likely opportunity for load reduction through HVAC and Refrigeration efficiency improvements.

## E2OP Non-residential- Industrial

Another key opportunity for EBCE’s non-residential energy efficiency programming is found in the E2OP rate category, which serves industrial customers. There are only ~75 accounts in the E2OP category, yet they represent roughly 800 GWh’s of annual load for EBCE (more than 10% of total annual load). This provides an attractive area for EBCE to focus on for EE program deployment, since it would be manageable for EBCE staff to do outreach and engagement with each of the 75 customers directly. This market segment is not currently being served by EBEW, BayREN, or StopWaste, and any 3P programs offered by PG&E could be supported by EBCE to enhance penetration, uptake, and program outcomes. EBCE could also reduce procurement cost and risk through load reductions in the E2OP category through customized EE programming, particularly through metered energy efficiency approaches and pay-for-performance contracting strategies that ensure cost-effectiveness for EBCE.

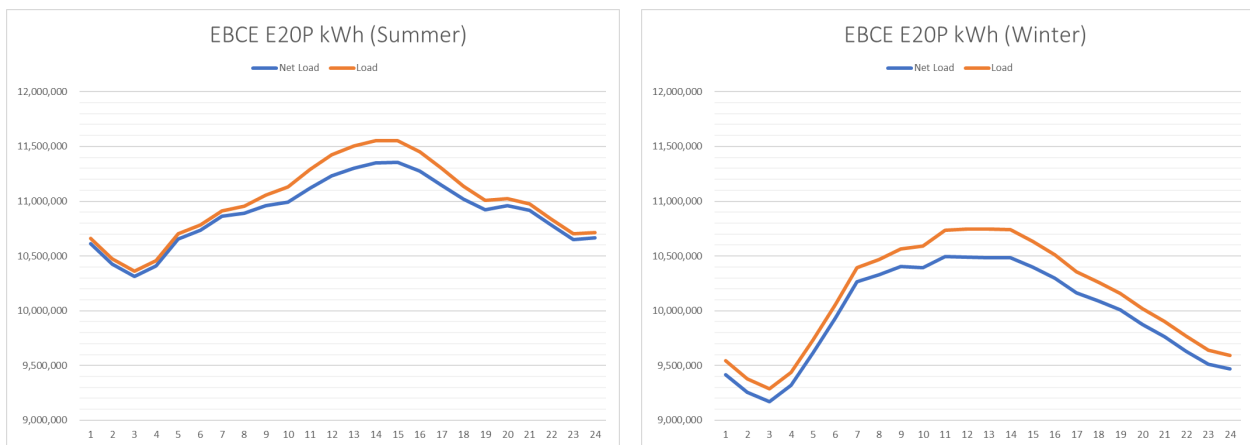


Figure 26: The hourly load curves for E2OP in Summer and Winter, using the 2016 Item 17 Interval Data. The mid-day peaks occur at typically low LMP market pricing periods, however there is also substantial consumption that coincides with EBCE’s peak loads and system-wide peaks that are far more expensive to serve. Substantial cost-saving opportunities for EBCE and its customers through cost-effective EE measures exist in the E2OP category.

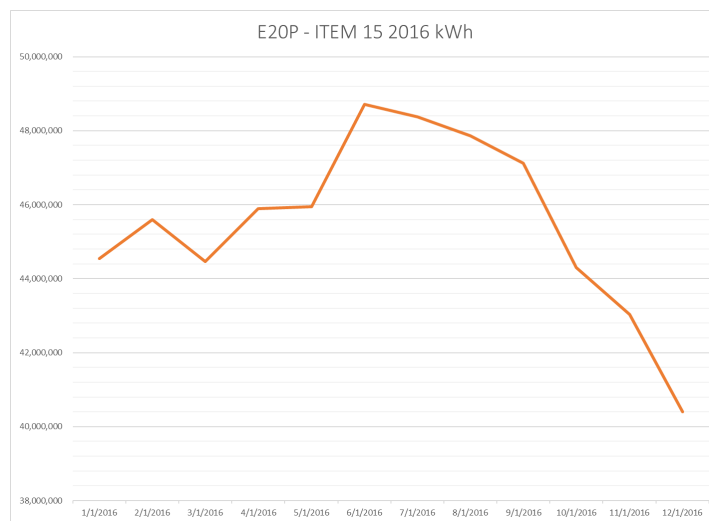


Figure 27: In the monthly load curve for E2OP there is a notable peak in the summer months that represents an opportunity for targeted load reductions through EE in Process Cooling and Industrial HVAC categories.

## A10SX- Small/Medium Business

The A10SX rate category, which serves small and medium business accounts, is another good place for EBCE to look for load reductions through energy efficiency program deployment. Here we note ~4,300 A10SX accounts that collectively use approximately 890 GWh's of electricity each year (nearly 13% of EBCE's total annual projected load). The A10SX category includes a fair amount of year-round peak-coincident loads that will contribute substantially to EBCE's annual procurement costs. This is another good opportunity for targeted EE measures and pay-for-performance contracting strategies that would allow EBCE to reap the benefits of peak load reductions through smart energy efficiency program design and implementation.

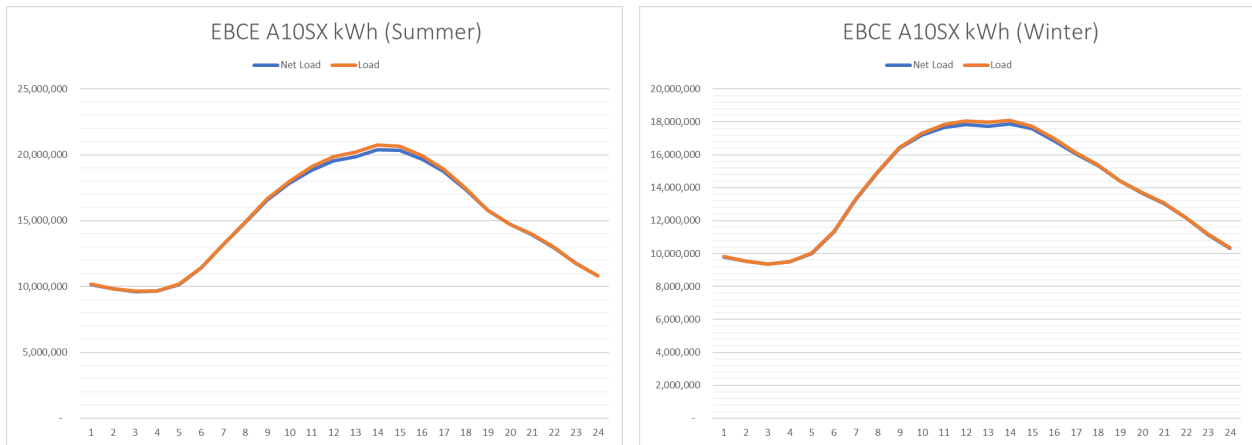


Figure 28: In these hourly load curves for A10SX we note the peak-coincident loads that overlap with EBCE's 3-4pm peak, as well as the more expensive LMP pricing periods in the early evening hours. EE strategies targeting A10SX will save EBCE and its customers money.

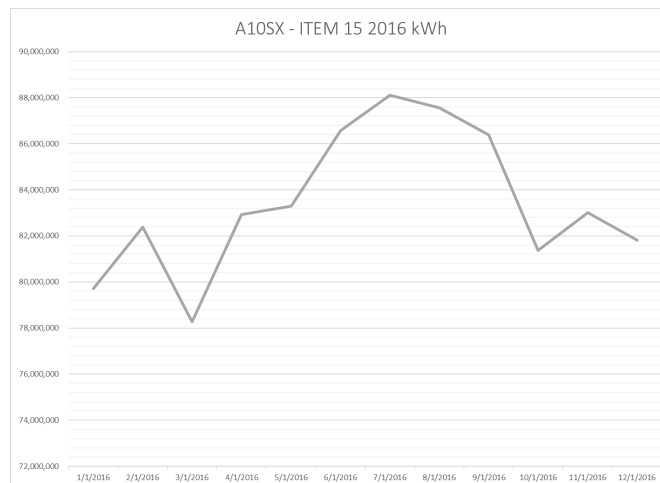


Figure 29: The monthly load curve for A10SX also indicates a strong correlation between peak usage and cooling degree days due to the significant peak in the summer months. Any significant reductions that reduce EBCE's overall peak load in the summer months (esp. August) will not only reduce supply procurement costs, but also resource adequacy procurement costs as well.

## Procuring Energy Efficiency as a Resource

When we refer to procuring “energy efficiency as a resource” in this document, we are essentially defining efficiency as an energy resource capable of yielding energy and demand savings that can displace electricity generation from traditional supply-side resources such as electricity produced by natural gas, or even renewable sources like wind and solar. We are saying that energy efficiency can meet the same requirements for reliability, forecasting, and scheduling on the CAISO market. However, while State legislative and regulatory mandates relating to utility procurement of energy resources dictate that energy efficiency should be procured as the first resource in the loading order, realizing that vision in the real-world marketplace has been hindered by a number of technical and financial issues.

In order for load-serving entities (LSE’s) like CCA’s to be able to depend on energy efficiency in the same way they do other resources in their portfolios, these challenges must be addressed and overcome. The EE resource needs to be reliable enough to be factored into load forecasts and scheduled in the same way as more traditional energy resources. This means that innovations are needed to enable the measurement of time and locational-specific impacts of EE on the project and programmatic level, unlock investment capital, and support more cost-effective pay-for-performance approaches to securing bankable outcomes from energy efficiency measures.

Broadly speaking, EE is a means to using less energy to provide the same level of service (or better). Most people think of high efficiency appliances, lighting, or HVAC equipment when they think of energy efficiency technology. However, today’s EE includes highly-sophisticated building energy management systems, data analytic platforms and services, and dispatchable energy devices such as smart thermostats that deliver a wide range of benefits to customers and load-serving entities alike. Those benefits are of keen interest to EBCE and its Local Development Business Plan, because they include cost-savings and empowerment for EBCE’s customers, reduced energy procurement costs and risk exposure, enhanced grid reliability, and local job creation. Furthermore, the cost of a megawatt hour of energy efficiency (often referred to as a “negawatt” hour) can be less than the average cost of generation for an entity like EBCE to procure. A recent study by the East Bay’s own Lawrence Berkeley National Laboratory<sup>36</sup> values the total cost of customer-funded utility EE programs at \$46/MWh, but also indicates that the cost to the utilities that administer the programs are only just over \$20/MWh. That makes EE potentially the most cost-effective resource for meeting some of EBCE’s portfolio needs.

But in order for EBCE to reap the fullest measure of benefits from energy efficiency, it must be able to procure EE in much the same way as it procures other energy supply and resource adequacy commodities. In order to do this, it is recommended herein that EBCE focus on pay-for-performance (P4P) contracting strategies for the bulk of its EE procurement. This is typically achieved by either a) standard-offer programs, in which EBCE would set a standard price that it would pay EE vendors for each MWh of energy efficiency savings, or b) solicitations like Request for Offers (RFO’s), Request for Bids (RFB’s), or Requests for Proposals (RFP’s) that would allow EBCE to select vendors through a competitive procurement process, and pay the price that selected vendors bid for every verified MWh of reductions. In either case, this requires a robust, integrated data platform that facilitates accurate, transparent, and auditable measurement and

verification of energy savings that typically rely on AMI Interval data analytics. This also requires some sophistication relating to contracting and deal structures, though there are emerging best practices that EBCE can integrate into its EE programming strategies (as outlined below).

### **Pay-for-performance vs. Deemed Rebates for Energy Efficiency**

The traditional approach to utility EE programming involves providing customer incentives in the form of “deemed” rebates, which essentially means paying a set cash incentive to customers for eligible energy efficiency measures based on expected (deemed) energy savings based on third-party analysis of average savings for those measures. This approach is inefficient because the program implementer does not usually have the ability to track or verify actual EE project outcomes, and many post-facto measurement and verification studies have found that the installed EE measures fall short of the expected performance, meaning neither the customer nor the utility is realizing the savings they paid for. This creates an environment of uncertainty surrounding the actual performance of deemed rebate approaches to EE, which undermines the ability of an organization like EBCE to procure EE as a resource using this approach.

However, P4P approaches to EE implementation allow implementers to pay only for desirable load reductions based on actual, metered performance of installed EE measures. This minimizes risk and maximizes benefits for EE program implementers, and allows them to bank on EE procurement in the same way they do with other energy resources in their portfolio. The P4P approach also allows utilities to include EE as a resource in their future energy load forecasting and rate setting activities, due to the increased reliability associated with a metered approach energy efficiency.

It is recommended that EBCE rely primarily on P4P contracting strategies for procurement of energy efficiency as a resource, allowing for full integration into portfolio forecasting and procurement functions. This will require the implementation of a metered energy efficiency approach, which will rely on an integrated data platform with robust interval data analytics capable of providing a weather normalized baseline (pre), and at least monthly measurement of actual reductions achieved (post). EBCE may wish to augment its EE programming with supplemental (deemed) rebates to incentivize high-impact EE measures that deliver significant value and savings to the CCA and its customers.

#### **Example: CalTRACK**

CalTRACK<sup>37</sup> is a multi-stakeholder initiative led by PG&E, which led to the development of a metered energy efficiency platform and dashboard, that utilizes weather data and AMI meter data to and facilitates a weather-normalized billing analysis and P4P EE programs. The resulting system provides a transparent and granular methodology and open source code, which provides the basis for a reliable P4P payment structure that addresses many of the most important challenges relating to procuring EE as a resource outlined above.

The CalTRACK platform is being field tested and refined by a number of participating stakeholders, and it is the basis for PG&E’s innovative residential P4P pilot.<sup>38</sup> It is expected that the CalTRACK open source platform can be used by EE Program Administrators (and/or 3<sup>rd</sup>-party



implementers) to support the management of P4P EE projects, programs, portfolios, and performance contracts. This is intended to provide a common methodology and reference point, backed by rigorous and replicable analysis of weather and AMI interval data to enable a robust P4P EE market in California.

### **Example: OpenEEmeter**

OpenEE is a Bay Area-based organization that is working to advance metered energy efficiency and P4P contracting strategies for EE, and the developers of another relevant and open source metered EE platform known as OpenEEmeter<sup>39</sup>. Originally funded by the California Energy Commission (CEC), OpenEEmeter leverages the procedures and algorithms developed through the aforementioned CalTRACK process and provides a complete solution for implementing the CalTRACK methodology to calculate energy savings by comparing pre-project and post-project, weather normalized, building-level energy consumption interval data to net out actual outcomes of EE projects at the individual building, programmatic, and portfolio levels. The OpenEEmeter system requires only minimal inputs—such as project dates, historical energy consumption, and location—in order to calculate energy savings, and it can track savings on a single meter all the way up to millions of meters across an entire portfolio of EE programs.

OpenEE also offers an optional software-as-a-service (SaaS) package that allows for full customization and integration of the OpenEEmeter software with existing systems, including API integration and advanced blockchain functionalities. The OpenEEmeter platform also offers data analytics to support program development, technology selection, and customer acquisition. Participating utilities, load-serving entities (like EBCE), investors, contractors, and customers all have access to the OpenEEmeter dashboard, allowing for full transparency and stakeholder confidence in the resulting calculated energy savings achieved by the EE projects and programs.

The OpenEEmeter platform is a tool that CCA's can take advantage of to support their EE programming with minimal investment, given that the basic functionalities are available through the open source package at no-cost, and advanced functionalities are also accessible through the optional SaaS package. This presents a scalable, off-the-shelf option for supporting procurement of EE as a resource through cost-effective P4P contracting strategies.

### **Example: Metered Energy Efficiency Transaction Structure**

One of the issues that was raised in an earlier section of this document was the fact that since CCA's are not decoupled, and their business model is the sale of kWh's the value proposition of load reductions through energy efficiency is more complex since reducing loads indiscriminately can also reduce revenues. This could theoretically lead to a death-spiral problem, whereby the CCA reduces its revenue so much that rate increases are required to sustain the program, ultimately leading to increased customer opt-outs and further exacerbating the decreased revenue problem. The Metered Energy Efficiency Transaction Structure (MEETS)<sup>40</sup> was developed to address this problem, while providing a systematic approach for P4P EE implementation that

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ter here: <https://www.openee.io/open-source/how-it-works> ;  
and see a detailed report of methodologies and calculations used by OpenEEmeter here:  
[https://daks2k3a4ib2z.cloudfront.net/59949a230ffdc50001cc8198/59949a230ffdc50001cc81fa\\_eemeter\\_methods\\_v0.1b.pdf](https://daks2k3a4ib2z.cloudfront.net/59949a230ffdc50001cc8198/59949a230ffdc50001cc81fa_eemeter_methods_v0.1b.pdf)

<sup>40</sup> Learn more about MEETS and the MEETS Coalition here: <http://www.meetscoalition.org>

is capable of achieving deep and meaningful energy efficiency improvements and providing benefits to all participants, including retail load-serving entities such as CCA's. MEETS was designed to eliminate the risk of the death-spiral issue, protect EE Program Administrator revenues and retail rates, and provide bankable returns for investment capital to support regional deployment of deep retrofit EE programs in the non-residential market segment.

Utilities and retail load-serving entities (LSE's, including CCA's) that choose to administer the MEETS approach to P4P EE strategies basically shift their business models as relating to the participating customers, in that they essentially sell them energy services—such as heating, cooling, lighting, pumping, and fresh air—not kilowatt hours. An implementing CCA would enter into a standardized Power Purchase Agreement (PPA) with an Energy Service Company (ESCO) or project investor, and would initially continue to receive the same gross revenue from participating accounts that they would have if the building had been designed and operated to code, because the building tenants continue to pay for the combined energy usage plus the energy saved through installing the EE measures. The CCA would then pay a pre-negotiated amount per kWh reduced—as measured and reported by a sophisticated, investment-grade thermodynamic meter called the DeltaMeter<sup>41</sup>—to the energy service provider (referred to as the Energy Tenant) or project investors. The price paid by the CCA would The Energy Tenant (or investor) then pays a “rental payment” to the building owner out of a portion of their proceeds.

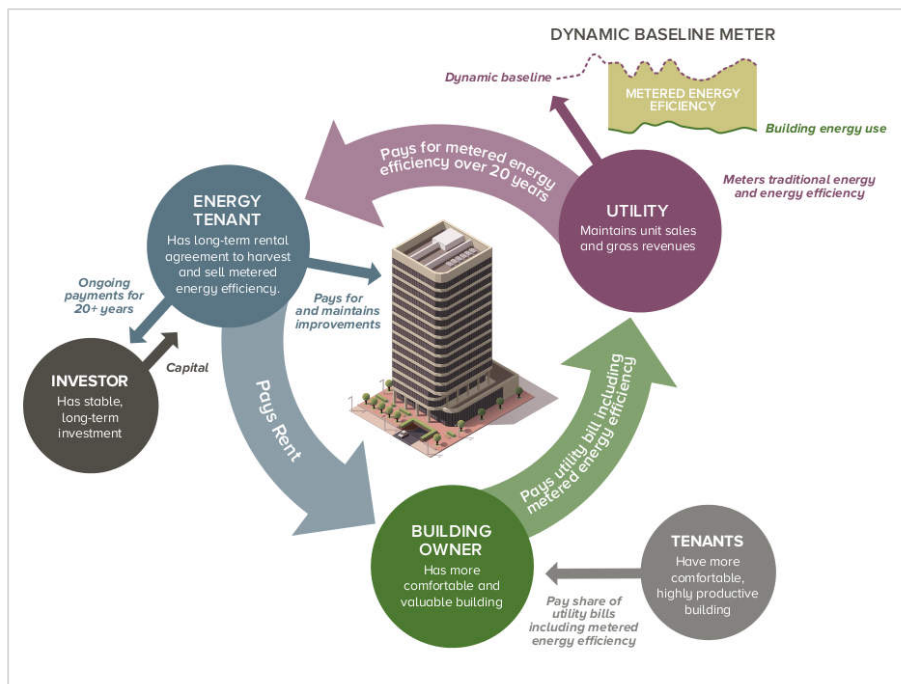


Figure 30: Infographic detailing how the MEETS pay-for-performance Energy Efficiency process works<sup>42</sup> to maintain stable revenues for the Program Administrator, while providing significant value for investors, building owners and energy efficiency contractors (referred to here as an “Energy Tenant”), while supporting energy conservation and decarbonization goals.

<sup>41</sup> See details about DeltMeter (made by Energy Resource Management Corporation) here: [http://www.wickedcleverlabs.com/en-rm/wp-content/uploads/2013/08/EnergyRM\\_DeltaMeter.pdf](http://www.wickedcleverlabs.com/en-rm/wp-content/uploads/2013/08/EnergyRM_DeltaMeter.pdf)

<sup>42</sup> Source: MEETS Coalition website, accessed here: <http://www.meetscoalition.org/how-meets-works/>

The MEETS PPA structure ensures that the CCA would pay less than the retail revenue received over the course of the contract. The energy reductions achieved would follow the CCA's load curve, and because the CCA would only pay for actual savings after they occur and are measured against a transparent baseline, any premiums paid per kWh would be amenable to the CCA and have minimal impact on the procurement budget.

This approach to cost-effective metered EE implementation creates a new and lucrative market for EE vendors (i.e., ESCO's), and program implementers, and would require outreach and training efforts on the part of EBCE to establish a qualified pool of contractors capable of supporting the related EE programming. This advanced P4P EE transaction structure has been piloted by the Seattle City Light utility at the recently constructed Bullitt Center in Seattle, Washington and initial measurement and verification results confirm significant, mutually beneficial energy efficiency outcomes for all stakeholders.<sup>43</sup>

## **VIII. Recommendations for EBCE Energy Efficiency Programs**

The following recommendations are intended to provide a roadmap for EBCE's efforts to fulfill its commitment to providing meaningful and cost-saving energy efficiency programming and opportunities to its customers in the most beneficial and cost-effective manner.

### **Phase I: Years 1-2**

It is recommended that during its first two years of operation, as EBCE is establishing itself and the infrastructure, staffing and financial resources it needs to scale up its LDBP implementation efforts, it follows the example set by Sonoma Clean Power and support existing EE programs offered by established EE Program Administrators already serving the Alameda County region (East Bay Energy Watch, BayREN, and StopWaste). The recommendation also extends to the existing PACE financing programs, which EBCE can promote as an option to finance beneficial EE measures to its residential and non-residential customers. Working to connect with these existing EE resources will involve initial coordination and planning to explore options for collaborative, mutually-beneficial strategies for leveraging the unique programs and resources available. EBCE can provide value in this equation by supporting deeper penetration and uptake of existing programs in the EBCE territory through customer outreach and referrals, and in return gain knowledge and insights and build customer trust and brand recognition by association with these well-regarded EE Program Administrators.

It is further recommended that during its first year of operation EBCE devote resources to the development of a robust, integrated data platform that will allow EBCE staff and administrators to extract the full value from the unique data resources it has access to. This data platform should combine all of the current and historical customer-level energy consumption and billing data with real-time weather station data, Day Ahead and Real Time CAISO market pricing data, socioeconomic and environmental data (i.e., CalEnviroScreen, Household Travel Survey data, CalEPA data, etc.), and geospatial data (i.e., municipal planning maps, ESRI/ArcGIS data, etc.) to

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<sup>43</sup> See the MEETS Pilot Interim Report here: <http://www.meetscoalition.org/download/795/>

provide a powerful engine for all of EBCE's DER planning, implementation, EM&V, and reporting efforts. EBCE staff can use this platform to conduct back-office analytics to support an iterative LDBP program planning process, and the identification of optimal targets for EE (and other DER) programming.

We recommend that EBCE also leverage the unique capabilities of its call-center service provider (Sacramento Municipal Utility District/SMUD) in regards to selection and training of highly-skilled Customer Service Representatives (CSR's) and in-house, outbound call-enabled Customer Service Center (CSC) to implement a best-in-class approach to customer engagement. This will provide EBCE with unique capabilities among its peers in the emerging CCA industry, and allow EBCE to drive customer participation in any EE program offerings through direct, targeted engagement strategies. It is also recommended that EBCE secure a Customer Relationship Management (CRM) system, which integrates with the integrated data platform and allows for tracking and escalation of customer interactions to connect customers with beneficial programs.

During this initial startup phase, but after its first complete year of serving its full load and customer base, it is also recommended that EBCE conduct Cost of Service (COS) study to provide further granularity to the preliminary cost-causation analysis offered herein, and will help identify the most beneficial load reduction opportunities. A detailed COS study will further inform and guide EBCE's decision making process, and help ensure that all EBCE EE program offerings yield maximum benefit to the CCA and the communities and customers it serves.

Finally, during this first phase, it is recommended that EBCE develop and release a Request for Qualifications designed to solicit input and ideas from qualified vendors of EE technologies and services, and to build a stable of pre-vetted contractors capable of supporting EBCE's EE programming in subsequent phases.

## **Phase II: Year 3**

By its third full year of operations, it is recommended that EBCE begin to implement revenue-based EE programming using its own retail revenues to target expensive parts of its load identified in the COS study. We recommend that EBCE utilize the P4P approach to ensure cost-effectiveness, and that it solicit the necessary software and services to enable this approach through a competitive Request for Proposals for metered EE tools and resources (i.e. OpenEMeter, or comparable). The Community Benefit Adder approach promoted throughout the EBCE Local Development Business Plan should be applied to provide meaningful opportunities for qualified local vendors and contractors who have offices and employees based in Alameda County.

It is also recommended that EBCE develop and implement an advanced metered energy transaction structure (i.e., MEETS platform) to support the implantation of targeted deep retrofit programs, particularly in the large commercial and industrial categories where substantial load reductions are desirable. This approach removes the risk of the death-spiral issue, and will ensure that EBCE maintains a stable revenue base to support reliable service sustainably.

### **Phase III: Year 4**

In EBCE's fourth year, it is recommended that the CCA prepare an application to the CPUC to Elect to Administer (Public Goods Charge) ratepayer-funded energy efficiency programs to EBCE customers. Care should be taken to coordinate with all stakeholders (including PG&E, EBEW, BayREN, and StopWaste) to ensure that no valued EE programs available to EBCE customers are displaced, and that any new ratepayer-funded EE programs developed by EBCE fill gaps and penetrate hard-to-reach market segments. These programs should all be developed using a cost-causation based approach that leverages EBCE's unique access to granular customer energy usage data to ensure beneficial, cost-effective outcomes for EBCE and participating customers. EBCE staff can manage lead generation, support customer engagement acquisition through its in-house call center, develop RFP's/RFQ's, track KPI's, validate performance and billing adjustments, and manage vendor and contractor relationships and agreements. Based on the preliminary load analysis conducted for this study, EBCE should explore opportunities for load reductions through EE programming in the E1, E1L, E19SV, E20P, and A10SX rate categories identified as priorities herein.

The final recommendation is to continually update the EE portfolio strategy based on the best available information and analytical resources available to EBCE. This is an intrinsically iterative process that will benefit from data from the actual operation of EBCE after full enrollment, and from further refinements to the analysis that will be made possible by that data.

## IX. Conclusion

A comprehensive energy efficiency plan will ultimately enable EBCE to support its long-term mission and goals and begin progress along a path towards innovative, beneficial and cost-effective energy efficiency programs. Given that energy efficiency programming at EBCE results in reduced energy sales, at first glance energy efficiency can appear to be a self-cannibalizing activity with the potential to negatively impact financial performance. However, positive outcomes can be maximized through the use of energy efficiency that not only result in improved financial outcomes, but also catalyze local development and equitable beneficial outcomes for the EBCE community at large.

Ultimately, energy efficiency can be a resource building activity for EBCE that unlocks reduced wholesale market procurement, costs, and risk. By developing a strong internal process that deploys the use of an integrated data platform, cost-causation based EE targeting, and in-house EM&V processes that enable pay-for-performance contracting strategies for EE implementation, EBCE's most expensive loads can be targeted and reduced through the implementation of internally developed or outsourced energy efficiency services. This can yield a lower cost portfolio for EBCE, allowing the organization to deliver enhanced customer experiences and outcomes while maintaining low and stable retail rates

Additionally, EBCE is positioned to begin operations within a well-established and robust environment of industry-shaping energy efficiency technology vendors and service providers and thought leaders in the California EE policy and programming arenas. As such, participation and collaboration with existing EE providers already serving EBCE's service territory will be essential to achieving EBCE's energy efficiency goals and advancing its core mission to provide clean, locally produced electricity and community benefits at a competitive price to its customers. Pay-for-performance contracting, and partnership with organizations supported by ratepayer (Public Goods Charge) funds provide an effective pathway to procuring energy efficiency services at little upfront cost.

By building on the programs, knowledge, and experience of the pioneering CCA's that came before it and leveraging the energy analysis provided in this report and throughout the Local Development Business Plan, EBCE can create the new standard on which future CCA energy efficiency programs will be defined, while creating positive environmental, social, and economic impacts for its customers and stakeholders.

## Appendix A: Data Sources

1. Data analysis was performed on the following datasets provided by PG&E under the CCA Info Tariff (California Public Utilities Code Sheet Number 32786-E)\*:

| CCA Info Tariff Item # | PG&E Data Description  | Years of Data Received |
|------------------------|--|------------------------|
| 1                      | Aggregate monthly usage (kWh) by rate schedule   | 2015, 2016             |
| 2                      | Annual proportional share of energy efficiency funds for a CCA's proposed territory as defined in the CPUC's energy efficiency policy manual   | 2015, 2016             |
| 3                      | System wide residential and nonresidential load shapes by climate band for the most recent year for which PG&E has completed information   | 2015, 2016             |
| 4                      | Standard system average load profiles by rate class also referred to as Dynamic Load Profiles & Static Load Profiles posted to PG&E's website  | 2015, 2016             |
| 5                      | Quarterly or monthly aggregated participation data already tracked for CPUC reports (for energy efficiency programs).  | 2015, 2016             |
| 6                      | Aggregate monthly usage (kWh) by rate schedule, first request is at no charge (See Item 1, above)  | 2015, 2016             |
| 7                      | Aggregate monthly usage (kWh) by zip code within a city code   | 2015, 2016             |
| 8                      | Public Goods Charge customer payment by city code  | 2015, 2016             |
| 9                      | Number of service agreements in each rate schedule within a CCA's territory or proposed territory  | 2015, 2016             |
| 10                     | Mapping of customer rate schedule to rate class  | 2015, 2016             |
| 11                     | Estimated annual generation revenues by CCA territory  | 2015, 2016             |
| 12                     | Estimation of peak coincident and non-coincident demands (provided by Items 1 and 3)   | 2015, 2016             |
| 13                     | Fitting CCA annual usage to climate band load shapes; estimation of peak coincident and non-coincident demands   | 2015, 2016             |
| 14                     | Total annual kWh loads of bundled and direct access customers on a monthly basis and secondly on a rate schedule basis within the CCA's territory  | 2015, 2016             |
| 15                     | Aggregated residential annual kWh usage for a particular year in a format by tier for each rate schedule. For the TOU rates, provide further separation by summer/winter peak, partial peak, and off peak periods and summer/winter period   | 2015, 2016             |
| 16                     | Customer-specific information from the current billing periods as well as prior 12 months consisting of the following billing information: meter number, service agreement number, name on agreement, service address with zip code, mailing address with zip code, telephone number, email address where available, monthly kWh usage, monthly maximum demand where available, Baseline Zone, CARE participation, End Use Code (Heat Source), Service Voltage, Medical Baseline, Meter Cycle, Bill Cycle, Balanced Payment Plan and other plans, HP Load and Number of Units, monthly rate schedule for all accounts within the CCA's territory, per request. In addition, PG&E will provide the CCA the following additional information regarding customers currently enrolled in its CCA service: current and historical billing information for non CCA services provided by PG&E or other service providers (provided on a cd rom/zipped file) | 2013, 2014, 2015, 2016 |
| 17                     | Customer-specific information consisting of: service agreement number, monthly interval meter data where available, and rate schedule for all accounts within the CCA's territory, per request (provided on a cd rom/zipped file)  | 2015, 2016             |

### **\*Notes Regarding Data quality**

Slight variations were noted between the various data sets provided by PG&E under the CCA Info Tariff (Items 1-17), including number of accounts, kWh's of energy consumption, energy demand, etc. These variations were within the marginal and expected ranges for data of this magnitude, and are likely attributable to standard issues with large data set comparisons, including rounding errors, data entry errors, data quality, query discrepancies, data system infrastructure limitations, etc. These variations may also be reflected in areas of this report due to the utilization of multiple CCA Info Tariff data sets in the analysis.

A number of ZIP codes either did not exist or were in areas outside of Alameda County, including Texas (78724) and Nebraska (68179) for example. These were most likely due to human error in data entry, but since they accounted for only 0.13% of total consumption, they were simply excluded from ZIP code heat-maps and no attempt was made to clean the data.

Approximately 10.7% of non-residential consumption came from customers with either "0 - Not Assigned" or "999900 - Unclassifiable" in the NAICS code field.

2. 2016 CAISO market data for DLAP and NP15, accessed from OASIS (<http://oasis.caiso.com/mrioasis/logon.do>), including the following data points:
  - Day Ahead Market Pricing (hourly and average)
  - Real Time Market Pricing (hourly and average)
  - Forecasted Load
  - Actual Load
  
3. Interval, hourly, daily, monthly, and annual weather data for 2013, 2014, 2015, and 2016, pulled from the following local weather stations: CIMIS #100, Fremont; NCDC #4997, Livermore; NCDC #6144, Newark; CIMIS #149, Oakland Foothills; CIMIS #191, Pleasanton; CIMIS #171, Union City. Includes the following data points:
  - Air Temperature, max/min: Daily max/min
  - Evapotranspiration: Calculated from CIMIS hourly values
  - Precipitation: Daily total measured in a 20 cm (8 in) diameter gauge
  - Relative Humidity, max/min: Daily max/min relative humidity
  - Soil Temperature, max/min: Daily max/min
  - Solar Radiation: Daily global radiation
  - Wind Speed/Direction, average: Daily average



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