



Notes regarding submitting comments on this Draft Work Product:

Comments are Due February 7, 2018.

Comments shall be no longer than 5 pages.

Comments should be submitted to LDBPcomments@ebce.org

Net Energy Metering (NEM) Strategy

for

East Bay Community Energy

Prepared by:

Optony Inc.
2855 Kifer Road, Suite 201
Santa Clara, CA 95051
www.optonyusa.com



The Offset Project
126 Bonifacio Place, Suite F
Monterey, CA 93940
www.theoffsetproject.org



January 2018

Table of Contents

INTRODUCTION	3
BACKGROUND	3
NEM FOR EBCE	5
1) EBCE’s customer demand curve is different than the statewide curve:	6
2) The problem isn’t just the duck belly (where there is still 12 GW of California demand shown for 2020), but also the duck neck and tail:	7
3) Storage and other solutions can help, and can be incented through a NEM program:	8
NEM EXPORT ADDERS	8
Baseline Enhanced NEM Adder	8
Additional Adders	9
Category 1: Community Benefit Adders	9
Category 2: Workforce Adder	11
Category 3: Supply-shift Adders	12
Future opportunities	14
NEM BUDGETARY PLANNING	14
Community Benefit Adders	15
Workforce Adder	16
Supply-Shift Adders	16
BENEFITS OF PROPOSED NEM PROGRAM	17
ADDITIONAL DETAILS OF PROPOSED NEM PROGRAM	21
PLANNING FOR NEM SUCCESSOR PROGRAM	22
RECOMMENDATIONS	24
CONCLUSION	24
APPENDIX: References	25
ABOUT OPTONY	26

Table of Figures

Figure 1. 2016 Residential NEM export energy in EBCE’s service territory (Item 16 and 17)	4
Figure 2. California Duck Curve, from CAISO (2013).	6
Figure 3. Average hourly load curve for EBCE’s service territory, based on 2016 data (Item 13)..	7
Figure 4. Alameda County poverty heat map	10
Figure 5. CalEnviroScreen 3.0 results, indicating locations of disadvantaged communities	11
Figure 6. Residential and non-residential energy consumption by month in EBCE’s service territory	19
Figure 7. EBCE’s estimated resource capacity and reserve requirements by month	20
Figure 8: EBCE’s estimated local capacity resource adequacy requirements	20

INTRODUCTION

Alameda County’s Community Choice Aggregation (CCA)—East Bay Community Energy (EBCE)—has made the development of local distributed energy resources (DERs) a priority through strong commitments in its Joint Powers Agreement (JPA). Balancing the need for low energy-procurement costs and competitive customer rates with the goal of developing a potentially higher-cost local clean energy supply presents some challenges, which require a multifaceted portfolio approach to local DER development.

A strategy that has been used to stimulate growth in renewable energy development in California¹ and in many states across the country is Net Energy Metering (NEM). Under the NEM program, investor-owned utilities in California are required to pay “full retail price” for energy produced by installed and interconnected solar photovoltaic (PV) systems.² This full retail price means that energy produced and used on-site fully offsets pricing for energy that would have otherwise been supplied by the utility. Additionally, excess energy produced and exported to the utility grid is credited at the same price as the utility would charge for energy use at the same time. With NEM, the grid effectively serves as a financial battery—excess generation is exported to the grid, bill credits are accrued, and customers can use those bill credits at times when their solar systems are not producing energy.

BACKGROUND

Throughout its history, NEM has been recognized as an effective means for stimulating on-site, or distributed, solar development for utility customers around the country.³ As part of its efforts to further stimulate growth in distributed solar, the U.S. Department of Energy (DOE) has consistently included NEM as a key policy driver to push at the state level.⁴ In California, NEM has been a required offering for the investor-owned utilities (IOUs) since 1996, and has continued with minimal adjustments up to the current time. In 2016, several changes to NEM program rules and parameters, a re-structuring commonly known as NEM 2.0, were implemented by the IOUs.⁵ These changes largely kept the format of NEM the same, while identifying several types of utility charges that would no longer be eligible for “netting out”. Under the original NEM program, all of the various energy and program charges that make up a bundled rate would be offset by DER output. With NEM 2.0, “non-bypassable” charges for community programs can no longer be offset by export credits.

CCAs such as EBCE are not required to offer NEM programs, but, to-date, most or all California CCAs have chosen to effectively mirror their incumbent utilities’ programs, but sometimes with customized bonus offerings. For example, MCE (formerly Marin Clean Energy) offers a NEM program with the same parameters as PG&E’s NEM offering, but with a bonus “export credit”.⁶ At any point when the interconnected solar system produces more energy than the facility can

¹ See website: ftp://www.leginfo.ca.gov/pub/95-96/bill/sen/sb_0651-0700/sb_656_bill_950804_chaptered.html

² See website: <http://www.cpuc.ca.gov/General.aspx?id=3800>

³ See website: <https://www.nrel.gov/technical-assistance/basics-net-metering.html>

⁴ See website: <https://www.nrel.gov/docs/fy13osti/56428.pdf>

⁵ See website: <http://www.cpuc.ca.gov/General.aspx?id=3934>

⁶ See website: https://www.mcecleanenergy.org/wp-content/uploads/NEM_Tariff.12.11.13.pdf

use, the system exports the energy to the general utility grid. Under normal NEM, this export energy is given a value that equates to the rate schedule and Time-of-Use (TOU) period that the facility regularly uses. Under MCE’s NEM program, this export energy receives an additional \$0.01/kilowatt-hour (kWh) credit. This export credit is also separate from the NEM credits, meaning that it is paid out or rolled over monthly, even when the facility is an annual net consumer of energy or otherwise nets out almost its entire bill. For the nearly 22,000 residential NEM accounts in EBCE territory, annual exports total around 62 million kWh (see Figure 1 below), which would equate to a value of \$620,000 under MCE’s export credit program.

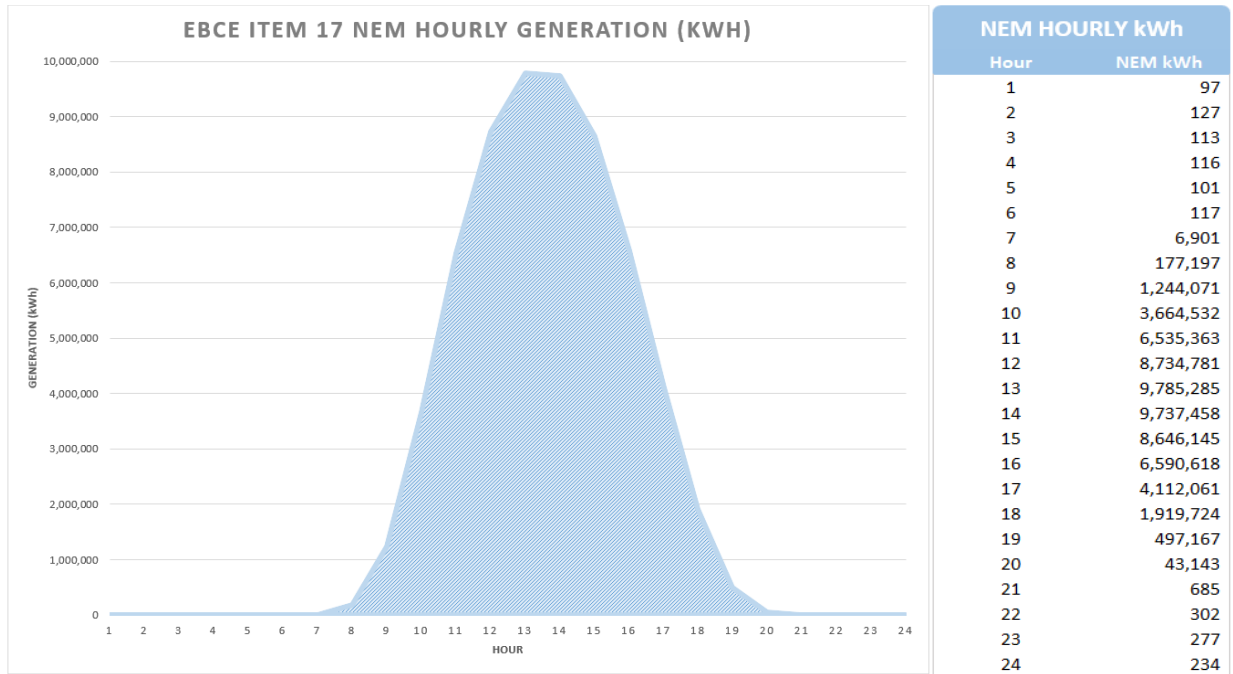


Figure 1. 2016 Residential NEM export energy in EBCE’s service territory (Item 16 and 17)

Similarly, other regional CCAs, such as Silicon Valley Clean Energy (SVCE), Peninsula Clean Energy (PCE), and Sonoma Clean Power (SCP) offer customized NEM programs that provide credits for energy generation that exceeds usage for any TOU period and on a month-to-month basis. In the case of SVCE,⁷ over-generation receives an export credit at the full generation-only retail rate that the customer would otherwise pay, with a \$0.008/kWh additional credit if the customer has upgraded his or her account to the “GreenPrime” premium offering 100% renewable energy. This arrangement is then settled on a monthly basis, rather than at an annual true-up as done by PG&E and MCE, creating probable significant bill credits during summer months, while winter months likely see some remaining bills. PCE’s⁸ and SCP’s⁹ NEM programs are similar to MCE’s, with a standardized export credit of \$0.01/kWh for energy sent to the utility grid during any TOU

⁷ See website: <https://www.svcleanenergy.org/files/managed/Document/649/ELECTRICSCHEDULENEM-SVCE.pdf>

⁸ See website: <https://www.peninsulacleanenergy.com/our-power/solar-net-metering/>

⁹ See website: <https://sonomacleanpower.org/netgreen/>

period and month. Like SVCE, both PCE and SCP forego the traditional annual NEM true-up in favor of monthly billing, with any credits rolling over to succeeding months, and a once-annual cash-out for the customer to receive a check for remaining credits. The CCAs offering monthly bills and an annual cash-out made these programmatic decisions based on significant customer survey efforts, and EBCE is advised to mirror this popular enhanced NEM program structure.

NEM FOR EBCE

Based on the results of our analysis of data provided by PG&E under the CCA Info Tariff, as well as extensive stakeholder outreach and engagement conducted as part of the Local Development Business Plan process, the authors recommend that EBCE offer a NEM program at the start of its customer operations. NEM is an expected product offering that is an important program for reducing opt-outs, as it provides an incentive to current solar photovoltaic (PV) owners, and potential future PV owners, to remain as EBCE customers after their automatic enrollment in the CCA. If EBCE did not offer NEM, it should be expected that many customers would opt-out to ensure that the values of their existing or planned solar investments would not be lost. The authors have contemplated a NEM-structured program for on-site solar, wind, and energy storage; other renewable energy sources can be added to the program as technologies and opportunities develop.

As EBCE considers NEM and other programs to incent the development of local DERs, the question arises: Is it actually a good idea to incent local DERs? As the oft-reported California energy demand “duck curve” shows (see Figure 2 below), the growing proliferation of solar energy onto the electrical grid will lead to conditions under which customer demand drops significantly during the peak solar-producing hours in the late morning and early afternoon. This is typically followed with a dramatic upswing in demand in the late afternoon and early evening, as solar production ebbs and home-based energy use increases. This rapid upswing in energy demand (often referred to as the “evening ramp”) then requires an equivalent “fast-ramping” upswing in power supply—an increase that many traditional power generators (i.e., natural gas power plants) are unable to provide efficiently, if at all. With this duck-curve issue, adding more solar to the California grid threatens to further lower the “duck belly”, while doing nothing to reduce the “duck neck” in the late afternoon and early evening. This is a real concern for grid operators, as well as for load-serving entities (LSEs) in California, like EBCE, through high locational marginal pricing (LMP) for power procurements during the evening ramp hours.

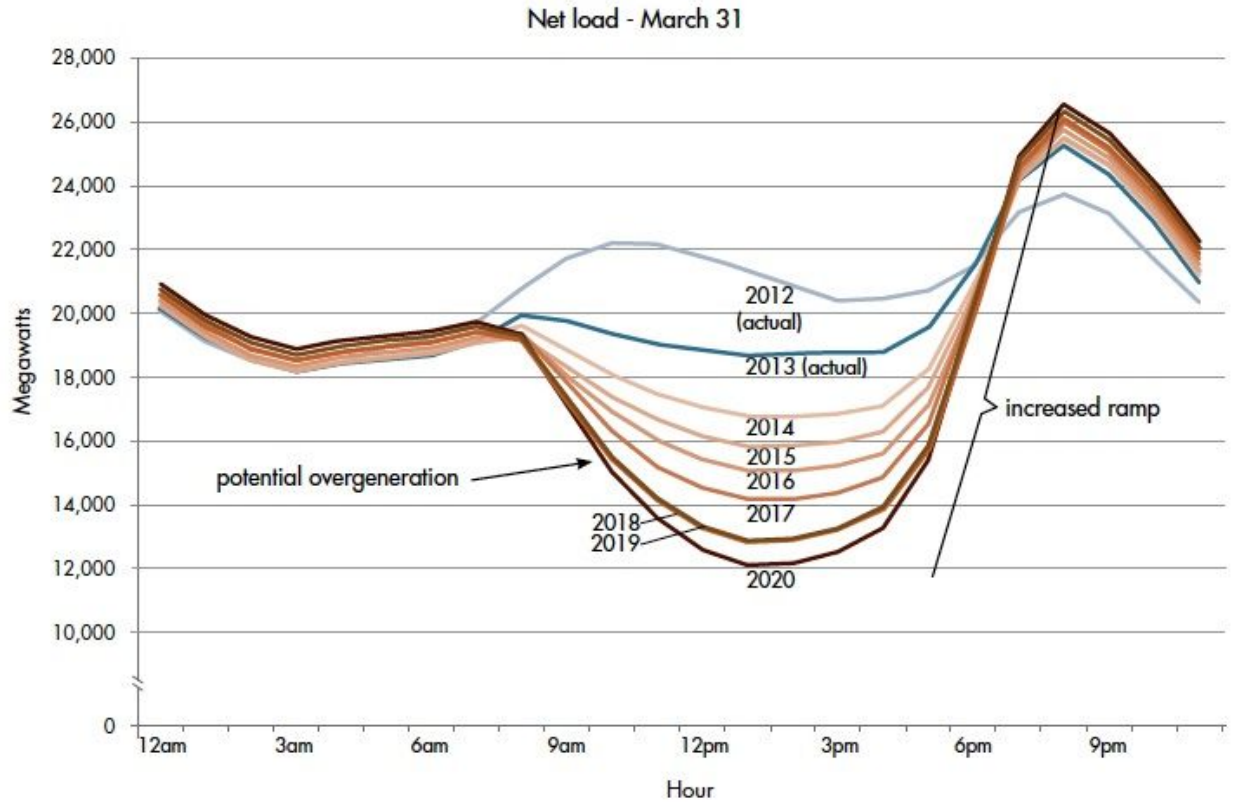


Figure 2. California Duck Curve, from CAISO (2013).¹⁰

However, in EBCE territory, a carefully-structured NEM program may actually be able to avoid contributing to the broad disparity between the duck belly and the duck neck, while still satisfying local demand for self-generated energy. Several arguments can be made to support this proposition: 1) EBCE’s customer demand curve is different than the statewide curve; 2) the problem isn’t just the duck belly (where there is still 12 GW of demand shown for 2020), but also the duck neck and tail; and 3) storage and other solutions can help, and can be incented through a properly-designed NEM program.

1) EBCE’s customer demand curve is different than the statewide curve:

The authors were able to access and begin processing the immense data-set of EBCE-territory demand (kW or MW) and usage (kWh or MWh) meter information points. As can be seen in Figure 3 below, the recent average hourly demand curve for EBCE customers more closely matches CAISO’s 2012 demand curve than its projected 2017 curve. This is not to say that the duck-curve problem does not exist in EBCE territory—it does, and it presumably has already changed how this same load curve would have looked in 2012 or before. The important takeaway is that recent data indicate that EBCE’s service territory is not a major contributor to California’s duck-curve problem at the current time, and, with strong programs and careful planning, EBCE

¹⁰ Image taken from: Lazar, Jim. “The Duck Curve on California’s Grid Will Encourage Innovation and Creative Thinking”. *Greentech Media*. 17 February 2016. <https://www.greentechmedia.com/articles/read/californias-duck-curve-will-encourage-innovation#gs.6QvwNf4>

can potentially maintain its position “ahead of the duck curve”, and be a beneficial market actor for helping to balance the grid and even out more dramatic curves in other geographic locations. EBCE’s demand curve also serves as a reminder that over-generation from net-metered sources, specifically solar, only becomes a problem if there is no neighbor to take that export energy.

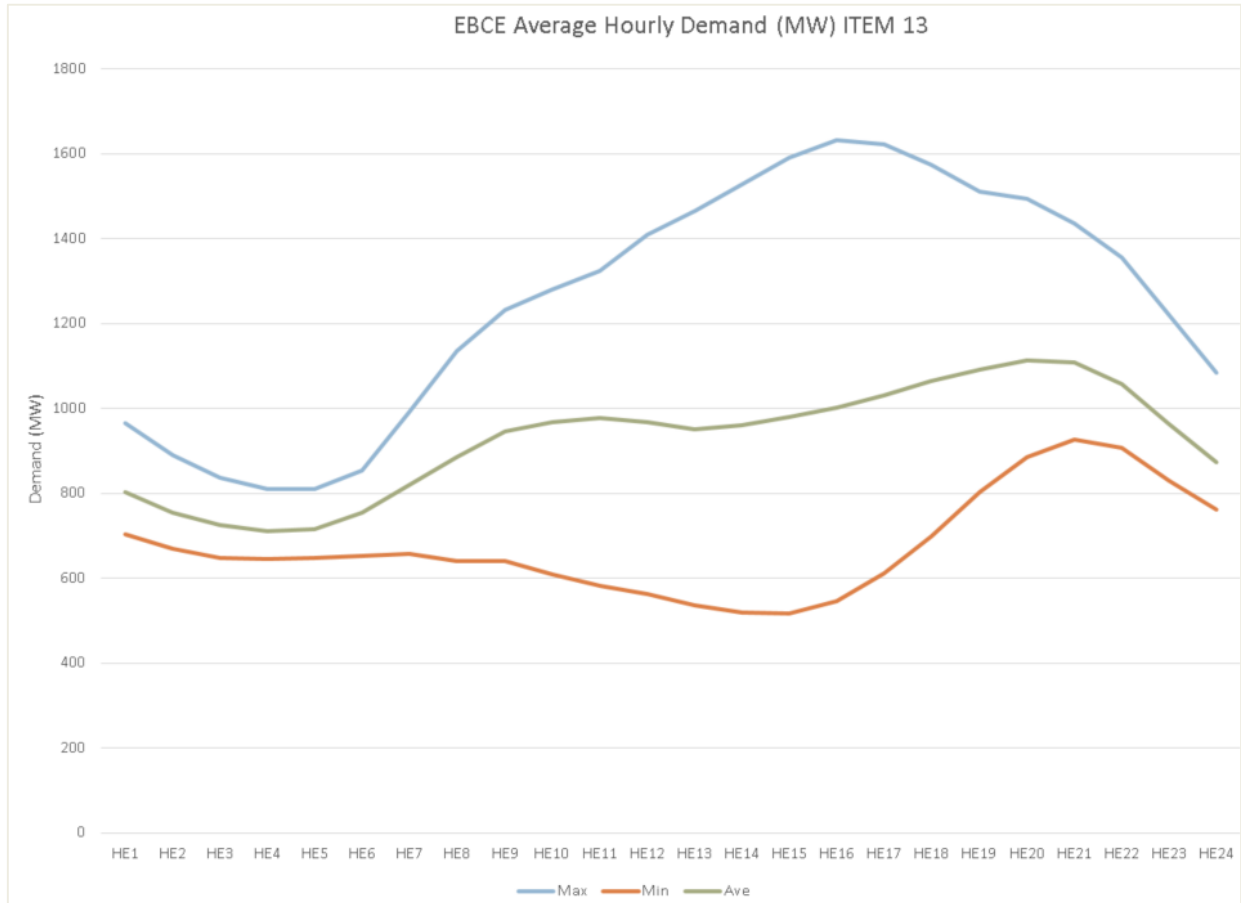


Figure 3. Average hourly load curve for EBCE’s service territory, based on 2016 data (Item 13).

2) The problem isn’t just the duck belly (where there is still 12 GW of California demand shown for 2020), but also the duck neck and tail:

As a JPA representing multiple East Bay municipalities and their citizens, EBCE is in a different position than a typical utility in regards to ensuring a clean, reliable power supply. To help its customers meet municipal greenhouse-gas emissions reductions goals, EBCE will be better served by focusing on reducing the future demand peaks of the duck neck and duck tail through targeted peak-load reductions, instead of focusing on trying to avoid further lowering of the future duck belly. If the duck belly in EBCE territory were to threaten to drop below zero, over-generation could be managed with smart, dispatchable energy storage, or perhaps through

regional transmission solutions that could include export to other western states. With a minimum demand over 500 MW in EBCE territory (Figure 3), and over 12,000 MW in the state (Figure 2), there is still a bit of time before EBCE or California need to worry about NEM production causing a significant localized duck belly problem. In the nearer term, EBCE needs to focus on the reduction of demand during the duck neck and tail time periods through cost-effective demand-side management (DSM) programming—reducing local peak demand and the associated grid strain during those times, so that the differential from demand at duck-belly times is reduced and the need for expensive fast-ramping reserves is minimized.

3) Storage and other solutions can help, and can be incented through a NEM program:

By combining NEM deployment with incented energy storage or other supply-shift mechanisms, EBCE can work to stay ahead of future duck-belly problems and focus on reducing the steepness of demand peaks through reductions of demand at duck neck and duck tail times. The CCA has the exciting opportunity to drive development of the program designs and technologies that can help flatten the demand curve—by using NEM as a customer incentive to benefit EBCE and its customers, as well as its neighbors and the larger grid overall. Discussion of these supply-shift mechanisms follows below.

NEM EXPORT ADDERS

To further incentivize DER deployment and community benefits, and/or to incent certain programs or goals, additional values can be provided for net-metered export energy, such as the NEM programs offered by MCE, SVCE, PCE, SCP and other CCAs, as referenced above. This enhanced NEM arrangement also enables the creation of a more active or transactive relationship between EBCE and its customers, helping to build brand awareness, trust, and collaboration, which can be utilized for reducing opt-outs and for rolling out future energy programs.

Program design can even incentivize outcomes that support future programming capabilities, such as EBCE only providing a credit for battery storage export if the customer agrees to allow the CCA to access and control up to 20% (for example) of the storage system's capacity in times of need as part of a future Demand Response (DR) program. Other CCAs are already deploying this strategy in pilot DER programs, including Sonoma Clean Power's recent electric vehicle pilot that gave free grid-enabled EV charging stations to qualified customers who signed up for a future DR program. Such an arrangement could easily be paired with a pilot program for virtual power plants (VPP), wherein participating customers receive an energy storage system, with NEM export credit adder, at no cost to the customer, in exchange for enabling full CCA control of the charge or discharge rates and times through VPP software and control systems.

Baseline Enhanced NEM Adder

As a standard offering in line with other Bay Area CCAs, EBCE could provide a \$0.005/kWh export credit for all existing NEM customers. This credit will give existing solar owners an incentive to reject opting out, by providing an obvious upside, while also sending a clear signal that EBCE's intention is to prioritize the development of *new* DER installations or customer retrofit add-ons

that more directly support EBCE’s needs, provide meaningful benefit to the community, and enhance general grid stability. While a \$0.005/kWh export credit is lower than some CCAs are offering, customers who have already invested in solar don’t need additional motivation, but would clearly appreciate any level of unplanned perks and benefits for accepting their default enrollment in EBCE as their energy generation provider (i.e., not opting out). Such customers can also serve as a potent positive “word-of-mouth” testimonial of the benefits of DERs—and relative upside of EBCE services for DER owners—to neighbors, co-workers, and other peers who may be deciding between accepting EBCE as an energy provider or opting out.

Additional Adders

For new DER development, certain clear adders to the standard baseline \$0.005/kWh credit for export energy would be an innovative way to drive targeted DER deployment. Similar to the Feed-in Tariff (FIT) program recommended in the Local Development Business Plan, these credits would be accumulative in order to fully incent the types of installations that would support EBCE’s goals, portfolio needs, and overall financial stability. These adders would fall into 3 separate groupings: Community Benefit, Workforce, and Supply-Shift, with adders limited to 1 per grouping (e.g., if a project meets the requirements of 2 adders in the community benefit grouping, it is still only eligible for 1 adder in that category).

Category 1: Community Benefit Adders

The Community Benefit adders are intended to stimulate equitable DER development, and provide enhanced support for customers who may have a harder time affording solar on their homes, or for tax-exempt organizations and municipal agencies who provide community services but are unable to directly access federal tax benefits.

Income-qualified: EBCE is unique among California CCAs in its level of commitment to supporting social justice and economic equity. The CCA could offer an additional incentive to income-qualified residential customers who may otherwise not be able to access solar installations on their homes. Tipping-point analysis is difficult, but an export credit at \$0.005/kWh over 20 years would be similar to the \$0.02/kWh over 5 years that was the final step of the California Solar Initiative rebates.¹¹

Alameda County is home to several census tracts that exhibit high levels of residents living on incomes below the poverty line (see Figure 4 below, created by the authors with county-wide census tract data), and a significant number of customers who qualify for the discounted utility rate program known as CARE, or California Alternate Rates for Energy. Many residents may also have incomes over the poverty line and may own their homes, but still struggle with monthly bills, and for whom the idea of energy investments is a foreign reality. These residents have often been left behind in the growth of solar development, and EBCE’s support could help remedy that problem. With an export adder that makes the solar-buying decision more financially attractive, and therefore, easier, more projects that would otherwise not get built would indeed get installed. EBCE could, and should, take credit for offering this real support to its community by hosting neighborhood ribbon-cuttings for projects that are eligible for this adder, complete with

¹¹ See website: http://www.gosolarcalifornia.ca.gov/documents/CSI_HANDBOOK.PDF

guests such as politicians or sports personalities. These events would, of course, double as opportunities for EBCE to market NEM, Energy Efficiency, Demand Response, and other programs to local attendees.

Income eligibility for this adder can be adjusted to ensure that it is achieving the intended results effectively, but it is recommended here that it be initially implemented at a level of household income under the “Low income limit”, according to the U.S. Department of Housing and Urban Development,¹² and that it also include all residents of disadvantaged communities, defined as census tracts that score over 75 on CalEnviroScreen 3.0 (see Figure 5 below).¹³

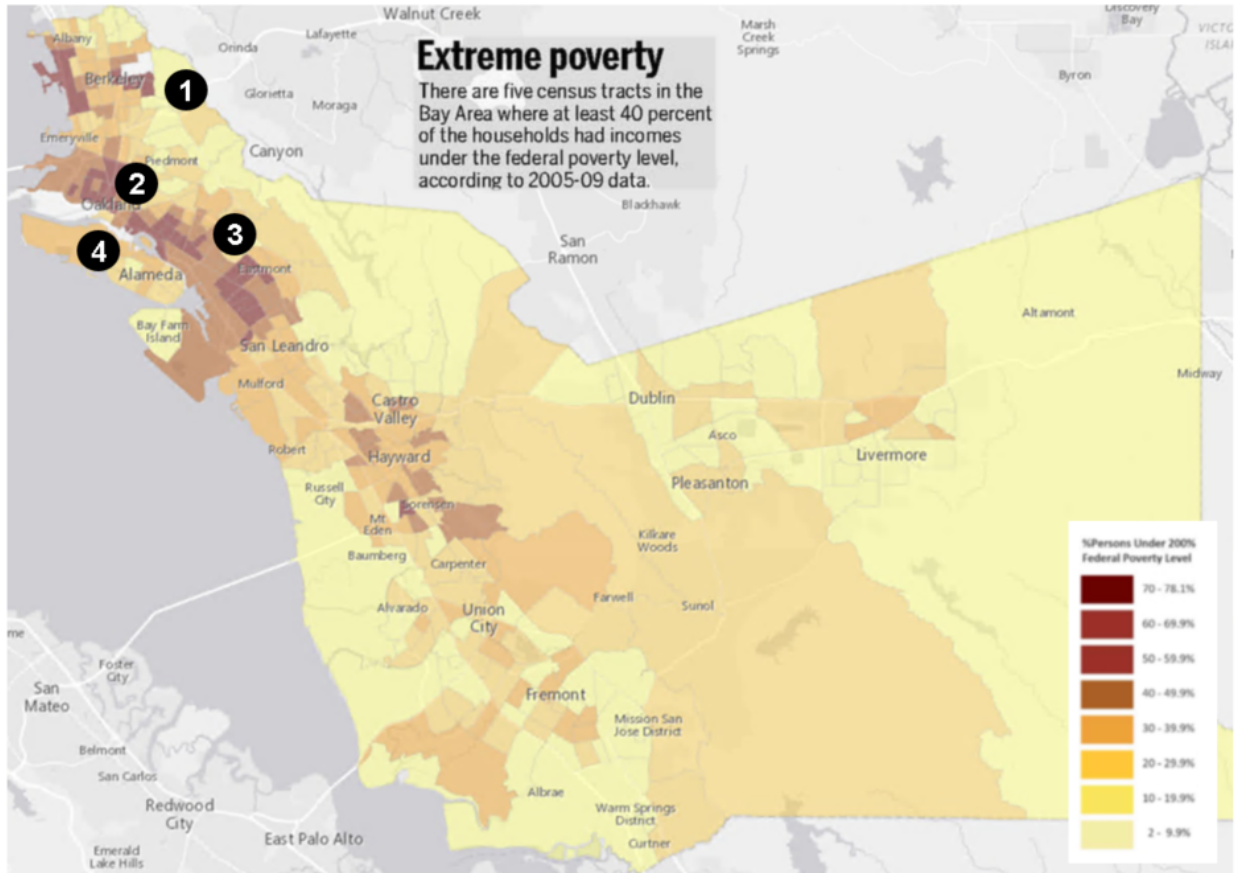


Figure 4. Alameda County poverty heat map indicating extreme levels of poverty in several communities served by EBCE

¹² Sciacca, Annie. “In costly Bay Area, even six-figure salaries are considered ‘low income’”. *The Mercury News*. 22 April 2017. Bay Area News Group. <https://www.mercurynews.com/2017/04/22/in-costly-bay-area-even-six-figure-salaries-are-considered-low-income/>

¹³ See website: <https://oehha.ca.gov/calenviroscreen/maps-data>

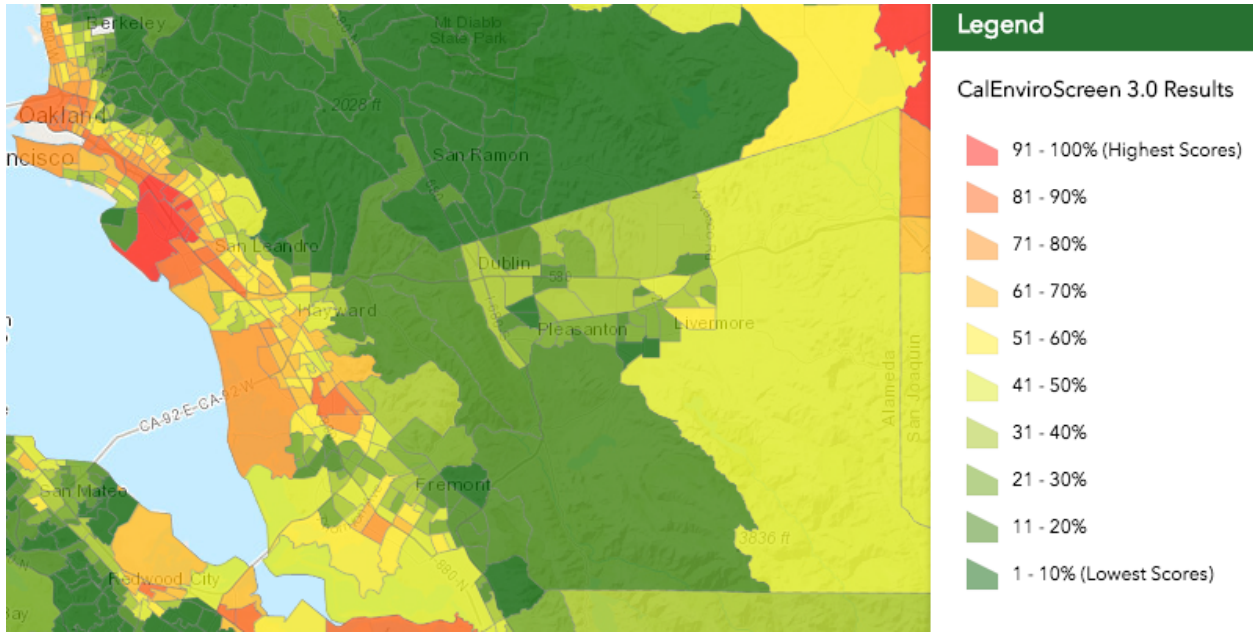


Figure 5. CalEnviroScreen 3.0 results, indicating locations of disadvantaged communities in the EBCE service territory

Additionally, the budget for this income-specific benefit could potentially derive from the various pools of funds that are collected by the utilities, the California Public Utilities Commission (CPUC), the state, or related organizations, and are earmarked for customer groups meeting the requirements of this adder. Combined with local “green-collar” workforce development initiatives, an income-qualified export credit would give EBCE the opportunity to establish itself as a national leader in energy economic equity issues.

Tax-exempt non-profit or government institutions: Similar to residents of modest means, non-profit and governmental entities often lack financial resources, including meaningful access to tax-related incentives, to pursue and develop DERs. An export credit of \$0.005/kWh would serve as an additional incentive to support the government agencies in the EBCE service territory in meeting their long-established environmental and planning goals, as well as supporting the vibrant non-profit and faith communities that create the character of the East Bay. Again, outside state or federal funds could potentially be accessed and leveraged to support this export credit, which would directly and indirectly lead to benefits for the organizations that support State goals and provide services to broad swathes of East Bay residents.

This recommendation of providing additional support for tax-exempt customers has precedent in the California Solar Initiative (CSI), which offered higher solar rebates to such host customers. With the higher incentives, the tax-exempt institutions are better able to achieve financially viable projects.

Category 2: Workforce Adder

This adder addresses the pressing desire in the EBCE community to incent projects that use skilled local labor paid at livable wages.

Livable wage: EBCE is also unique as a CCA in its unparalleled dedication to supporting the local workforce. Rather than attempting to require all local DER installers to pay prevailing or livable wages, EBCE could offer another additive export credit for projects built with labor rates meeting a specified minimum standard. For example, if an installer can show, through a certified payroll report or submitted attestation to EBCE, that its laborers were paid at a livable wage for a specified project, that project would be eligible for an additional \$0.005/kWh export credit. Using solar as the default DER, this credit is calculated with the assumption that payment of livable wages adds approximately \$0.05-0.07/Watt in cost of an installed system (assuming an average hourly differential of \$7 at approximately 8-10 work-hours/kW).

As an example, a 10-kW solar system would then cost roughly \$560-700 more to install. For this additional cost to be repaid to the PV system purchaser over a 20-year investment term, approximately \$28-35 of annual additional incentive would be required. For this example system, of the approximate annual output of 15,000 kWh, an estimated 40%, or 6,000 kWh, would be exported at the time of production. To achieve the required “make-whole” level of incentive, an export credit of \$0.0047-0.0058/kWh would be necessary.

As with the income-qualified adder, a workforce adder would potentially create a new precedent for CCAs in supporting their local communities—not just in creating customer energy savings and helping to meet environmental goals, but also in spurring new local job creation at pay levels that support working families. Again, EBCE would be able to market this community collaboration at regional events, ideally with vocal support from local labor leaders and activists. Additionally, by using a “carrot” (incentive), rather than a “stick” (regulation), the CCA could maintain a more manageable competitive environment for small local DER installers and steer clear of potentially sticky legal issues.

Category 3: Supply-shift Adders

As referenced in the section above, the Supply-shift adders are focused on avoiding future duck-curve problems around over-generation during the middle of the day, or approximately 10am-2pm (the “belly” of the duck curve), when solar production typically peaks. These adders incent design and technology decisions that are more likely to provide energy to on-site users or to the grid during the late afternoon and early evening hours, reducing the sharp disparity between duck belly low demand and high peak demand times in the morning (duck tail) and early evening (duck neck).

West-facing solar: West-facing solar arrays (oriented at between 240 and 330 degrees, for example) achieve approximately 6-10% lower energy output than south-facing arrays, but the higher percentage of output in the afternoon, when grid demand is higher, is more valuable to the CCA. With utility-standard Time-of-Use rates moving toward specifying Peak periods in the late afternoon and early evening, west-facing arrays will already likely achieve higher benefits under NEM, but an additional export credit of \$0.005/kWh could further incent such installations and produce economic benefits for EBCE. Incenting west-facing installations also gently shifts customers away from south and east-facing PV installations, which are more likely to produce early-day exports that could further exacerbate the duck-curve problem. If EBCE were to offer alternate TOU periods or rate schedules in tandem with this strategy, such west-facing arrays could be further incented.

Small wind: Small wind energy systems can be installed on homes and commercial buildings for on-site use. Wind energy can be more intermittent than solar energy in urban and suburban California settings, but tends to reach daily wind-speed maximums in the early evenings. This timing works well with higher net demands at those times, so an additional \$0.005/kWh export credit could lead to more financially-viable small wind installations, and could be paired with a CCA-led pilot program to push such installations, either in partnership with equipment providers or with CCA-member municipalities.

Energy storage: Distributed energy storage is one of the key opportunities for enabling EBCE to manage current and future grid issues, such as resource adequacy and the need for spinning reserves. Energy storage is fast-becoming an economical solution to many energy issues, including the duck-curve and renewable energy intermittency, and it is a central element of the Local Development Business Plan (LDBP). By incenting energy storage in decentralized locations, combined with an agreement to allow CCA access (through off-site monitoring controls) to a specified percentage of storage capacity, the CCA can access a territory-wide network of dispatchable resources that provide the lowest-cost method of meeting resource adequacy and demand requirements.

With an export credit of \$0.005/kWh, the CCA would be creating a clear market signal that energy storage is a highly-desirable addition to any installed DERs within its territory. Again, the roll-out of this incentive could be paired with a pilot procurement and deployment initiative, such as a subsidized or on-bill-financed battery-storage equipment offering that includes virtual power plant (VPP) control technology and cooperative agreements for use of the installed kW capacity. It would also pair well with an EBCE-specific TOU rate structure designed to incentivize dispatchable DER adoption.

Eligibility for the energy storage adder would depend upon a set of operating parameters, similar to those proposed for the Dispatchability Adder in the LDBP Feed-in Tariff strategy. With some adjustment for the expected smaller system sizes of NEM projects, those operating parameters could include:

- 1) storage nameplate capacity at a minimum of 15% of the associated DER capacity or 3 kW, whichever is higher (no maximum);
- 2) storage capacity minimum of two hours of nameplate power capacity (no maximum);
- 3) agreement to allow EBCE to control charge or discharge of 20% of the storage capacity as needed; and
- 4) software controls to enable EBCE to utilize this capacity allowance. Output controlled by the CCA would be subject to the normal NEM valuation, whether used on-site to reduce demand of the facility, or exported to meet demand requirements elsewhere on the grid.

These parameters could change over time, as EBCE finds itself in greater or less need of distributed energy storage, or depending upon program performance and overall impact. Similarly, the NEM export incentive for storage could be increased to further stimulate the installation of a network of dispatchable assets for the CCA. Increasing CCA-accessible energy storage represents one of the key strategies for EBCE to stay ahead of duck-curve problems.

Additionally, implementing a NEM export adder for storage systems creates a potential mechanism for residential and commercial customers to monetize ancillary grid benefits from their systems, a major energy industry conversation topic and goal across the state and country. It also creates a stronger local market for energy storage, benefiting local vendors and contractors serving this emerging market segment. This adder also opens the opportunity for EBCE to engage with existing NEM customers to promote participation in a NEM-focused energy storage program designed to further incentivize beneficial storage deployment in EBCE's territory. This can lead to further reductions in EBCE's overall cost of service, as shifting existing NEM production away from the duck-belly (mid-day) hours and into the higher priced duck-neck (early evening) hours will result in lower procurement costs, helping EBCE maintain low and stable rates for all customers.

Future opportunities

The adders recommended above serve as an incentive tool for EBCE to drive local DER development in ways that would be most beneficial to the CCA and to the local community. As noted, implementing an adder mechanism through NEM creates a pro-active contractual relationship between the CCA and its customers, opening the door to a multitude of future programs and adjustments of adder levels to achieve various goals. If desired, a more targeted "Locational Benefit" adder could be offered for geographical locations where power demand hot-spots or congestion occur, in segments as small as neighborhood-level, providing a further opportunity for EBCE to leverage NEM export credits to drive targeted DER installations where the CCA or the incumbent utility could best benefit.

For example, a neighborhood with a high concentration of industrial plants may experience a demand curve that peaks in the middle of the day, when manufacturing processes are maximized. The energy supply and distribution to such a neighborhood may benefit more from installed, net-metered, on-site solar energy than a residential neighborhood with low day-time energy use. EBCE could roll out temporary incentive programs for such identified locations as a pilot to test this concept, which could serve to drive installation actions that would support resource planning for the utility and help the CCA continue to be a good partner to PG&E, by providing value through grid services and deferral of costs relating to unnecessary transmission and distribution system upgrades.

NEM BUDGETARY PLANNING

The potential costs of a NEM export credit program would depend upon the uptake of customers, the dollar amount of each adder, and the contract term associated with payment of the credits. Cost estimates below are based on roughly-assumed project installation rates and indefinite terms of payment, though only the first six years of operation are shown. Budgets also assume that outside funds are not used to cover or supplement program costs to the CCA. Changes to these assumptions would clearly change budget requirements.

Existing NEM accounts: Existing NEM accounts in Alameda County are estimated at 177 MW, all or nearly all solar PV. Assuming 1,500 kWh/kW for solar production and a 40% export rate, a total of approximately 106,000,000 kWh would be eligible for the \$0.005/kWh credit upon becoming

EBCE customers. This would require \$530,000 of budgeted credits for EBCE, with 50% of such customers estimated for on-boarding in Year 1 and the remaining 50% in Year 2 (see Table 1 below). Assuming annual growth in NEM installations at 30 MW of solar per year (based on 29.7 MW interconnected on 3,678 Alameda County accounts in 2017)¹⁴ and a negligible but growing number of small wind systems, this budget would need to be increased by \$90,000 per year, starting in Year 1, throughout the term of availability of NEM export adders under EBCE.

Table 1. Estimated EBCE Budget Impacts for Enhanced NEM Export Adder Credits

NEM Export Adders (\$/kWh exported)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Standard (\$0.005)	\$355K	\$710K	\$806K	\$902K	\$998K	\$1.09M
Community (\$0.005)	\$18K	\$36K	\$54K	\$72K	\$90K	\$108K
Workforce (\$0.005)	\$18K	\$45K	\$81K	\$126K	\$180K	\$234K
Supply-Shift (\$0.005)	\$30K	\$63K	\$117K	\$180K	\$264K	\$363K
Annual Totals	\$421K	\$854K	\$1.06M	\$1.28M	\$1.53M	\$1.80M

Community Benefit Adders

Income-qualified: An estimated 15% of solar installations may qualify at income levels necessary to be eligible for low-to-moderate income (LMI) export credits. Data are scant to indicate income levels of current NEM customers, but income-level thresholds could be adjusted as necessary to enable this 15% eligibility level, or targeted marketing efforts could be made if this level were not being reached. This level of adder eligibility would equate to 4.5 MW and 2,700,000 kWh of eligible export energy. At \$0.005/kWh export level, the EBCE budget per year would need to be \$13,500. As suggested, if uptake were lower than desirable, EBCE program administrators could either increase the export credit or decrease the income-qualifying standard to make the credit available to more customers. As noted above, if outside funds were available to be applied to this program, EBCE internal program funds could be left untouched, and benefits offered could potentially be significantly increased.

Non-profit or government institutions: Qualifying non-profit institutions represented 3% of Alameda County NEM installations in 2017 and 8% in 2016. At an average of roughly 5% of total installed solar capacity, eligible projects for this adder would equate to 1.5 MW and 900,000 kWh of exported energy. At \$0.005/kWh, the budget for this offering would need to be \$4,500 per year. If EBCE pursued a dedicated collaborative procurement for public agencies (see Agency as Developer strategy), this projected budget would likely need to be increased. As with LMI export credits, funds from outside pools or initiatives may be accessible for use in creating a budget for this credit.

¹⁴ See website: <https://www.californiadgstats.ca.gov/charts/>

Workforce Adder

Livable wage: For union-scale, prevailing or livable wage labor installations, the authors estimate that approximately 20% of total solar projects would qualify in Year 1 of the NEM program. However, this number would be expected to grow as installers learned that their installers could earn higher wages on Alameda County projects, which could be passed on their customers, who would then be repaid over time through the workforce NEM export adder—which is exactly the intent of the incentive. Project eligibility has been estimated to grow by 10 percentage points per year, up to 60% in Years 5 and 6. In Year 1, at 20% eligibility, approximately 6 MW of capacity and 3,600,000 exported kWh would qualify. At a \$0.005/kWh credit, the Year 1 budget would need to be \$18,000 to support a livable wage for local laborers, growing to \$54,000 annually by Year 5.

Supply-Shift Adders

West-facing solar: NEM PV systems with azimuths from 240 to 330 degrees accounted for approximately 25-30% of total installations in 2016 and 2017. With this new incentive driving more designs into this orientation, approximately 30% of Year 1 installations may qualify for this adder. At 30 MW of new solar installation per year, approximately 9 MW would be west-facing, necessitating \$27,000 of new annual budget for associated export credit payments. By Years 3 and 4, the percentage of qualifying projects may have risen to 40% (\$36,000 budget), as installers and owners become better aware of the program, and then up to 50% (\$45,000 budget) in Years 5 and 6.

Small wind: Small wind systems would be expected to be a small portion of NEM installations in the first years of EBCE operations (approximated at 0 MW per year), but, by Year 3, with this incentive, might equal up to 2 MW per year. With typical wind turbines in reasonably strong-wind areas in Alameda County producing approximately 2,000 kWh/kW, a total new output of 4,000,000 kWh from wind sources could be expected per year for Years 3 through 6. Assuming that the wind production slightly better matches on-site energy usage, roughly 30% of energy production may be exported. At this level, a \$0.005/kWh export credit would necessitate a budget of \$6,000 per year, starting in Year 3. Naturally, a higher export credit could be offered to further stimulate this early-stage market.

Energy storage: Uptake in energy storage installations is expected to grow rapidly due to upcoming changes to TOU schedules, improving cost-effectiveness of technology, availability of rebates, and, potentially, monetization mechanisms such as this adder. Assuming 3.3% of NEM projects would include energy storage in Year 1, growing every year to reach over 50% of NEM projects by Year 6, 1 MW of NEM storage capacity would be installed in Year 1, reaching 16 MW installed in Year 6 (cumulatively, 41 MW—see Table 2 below). At a \$0.005/kWh credit, the eligible export energy would be 600,000 kWh in Year 1, requiring a \$3,000 budget. In Year 6, new installations would require \$48,000 in additional budget, added to previous allocations.

At the deployment rates modeled in the scenarios above, EBCE would support the achievement of significant DER deployment, serving as a model for formative CCAs and for the state, region, and nation, in general (see Table 2 below).

Table 2. Projected New DER Deployment in EBCE Service Territory Supported by EBCE’s Enhanced NEM

Technology Installed – Cumulative New NEM (MW)	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
Solar PV	30	60	90	120	150	180
Small Wind	0	0	2	4	6	8
Energy Storage	1	3	7	14	25	41
Total New Power Capacity (MW)	31	63	99	138	181	229
Total New Production (MWh)	45K	90K	139K	188K	237K	286K

Growing from a starting point of 177 MW of net-metered solar to a total of 406 MW of renewable or storable energy within 6 years would be an impressive testament to the vision and commitment of EBCE to meeting economically-viable sustainability goals within the local communities. Within this 406 MW, 41 MW and at least 82 MWh would be dispatchable storage, with 20% of the energy storage capacity—8.2 MW and 16.4 MWh—controlled by the CCA under coordinated usage agreements with residents and local business owners.

With an extensive network of DERs, EBCE would likely also be a leading contender for microgrid and virtual power plant pilot projects and grants available at the state and national levels. Additionally, these numbers would include 27 MW of installed solar capacity for income-qualified residents, reducing energy bills for the neediest customers and potentially improving their quality of life significantly. These projections also include 9 MW of installed solar capacity at governmental and non-profit institutions, who would then be able to redirect budget to essential community-benefitting programs.

BENEFITS OF PROPOSED NEM PROGRAM

Financial benefits of such a targeted and supported program would accrue to a range of stakeholders, including the local economy and workforce, DER developers, and, of course, EBCE.

With the installation of an additional 229 MW of solar, wind, and energy storage technology, the local economy would see approximately \$634 million of project development in the region (assuming, roughly, 188 MW of solar and wind micro-turbines @ \$2.50/W and 41 MW of energy storage at \$4/W). Some of that investment would filter through to local support services (e.g., restaurants, gas stations, logistics companies), and would also result, directly and indirectly, in approximately 480 new local jobs per year, according to a generalized analysis with the Jobs and Economic Development Impact (JEDI) Model created by the National Renewable Energy Laboratory (NREL). With an estimated 20-60% of all NEM projects incented to use prevailing or union-scale wages, many of these new and existing positions would have a high-likelihood of being career placements paying a livable wage.

With approximately \$634 million of new project investment in the East Bay in the first 6 years of modeled EBCE operation, local DER developers would have new opportunities to flourish, offsetting expected customer-acquisition challenges due to changes in Time-of-Use periods and reductions in federal tax incentives. Since approximately 95% of the projected installed projects would be owned by taxable entities, investments in the region could leverage over \$300 million in federal tax incentives related to the Investment Tax Credit (decreasing after 2020) and accelerated depreciation.

Benefits to EBCE would be numerous:

- Mission progress: Firstly, true progress toward EBCE founding goals would be visible and publicly obvious. Projected levels of new, supported DER deployment and community benefits would lead to regional and national recognition that would position EBCE as a model for CCAs and utilities around the state and country.
- Community relationship-building: EBCE would set itself up as the trusted energy advisor for customers in its territory, limiting opt-outs and opening doors for private partnership on future energy programming and for seeking outside funds for innovative programs.
- Reduced energy procurement costs and risks: With more locally-built distributed energy resources, EBCE would need to procure less outside energy for its customer base. EBCE could reduce the number of resource contracts it pursues and executes, lowering costs and, perhaps more significantly, lowering risks associated with energy purchases at remote plants. Additionally, by incentivizing dispatchability through energy storage and increasing export to the grid during the evening peak load period, EBCE can reduce risk of imbalance penalties during those high-use periods, which can reduce overall operating expenses.

- Reduction in Resource Adequacy purchasing requirements: To meet CPUC requirements to ensure that the CCA purchases enough energy capacity to its maximum demands, a Resource Adequacy (RA) requirement is set at 115% of peak load, which for most (including EBCE) is in the month of August. As seen in Figures 6-8 below, EBCE energy consumption (in MWh) peaks in the month of August, meaning that RA requirements for the rest of the year are set by the highest month. With additional DERs, consumption and demand in the summer months will be reduced, lowering the August peak load and reducing RA costs for the CCA. Additionally, accessible energy storage can be used to lower the required RA number, further reducing procurement costs.

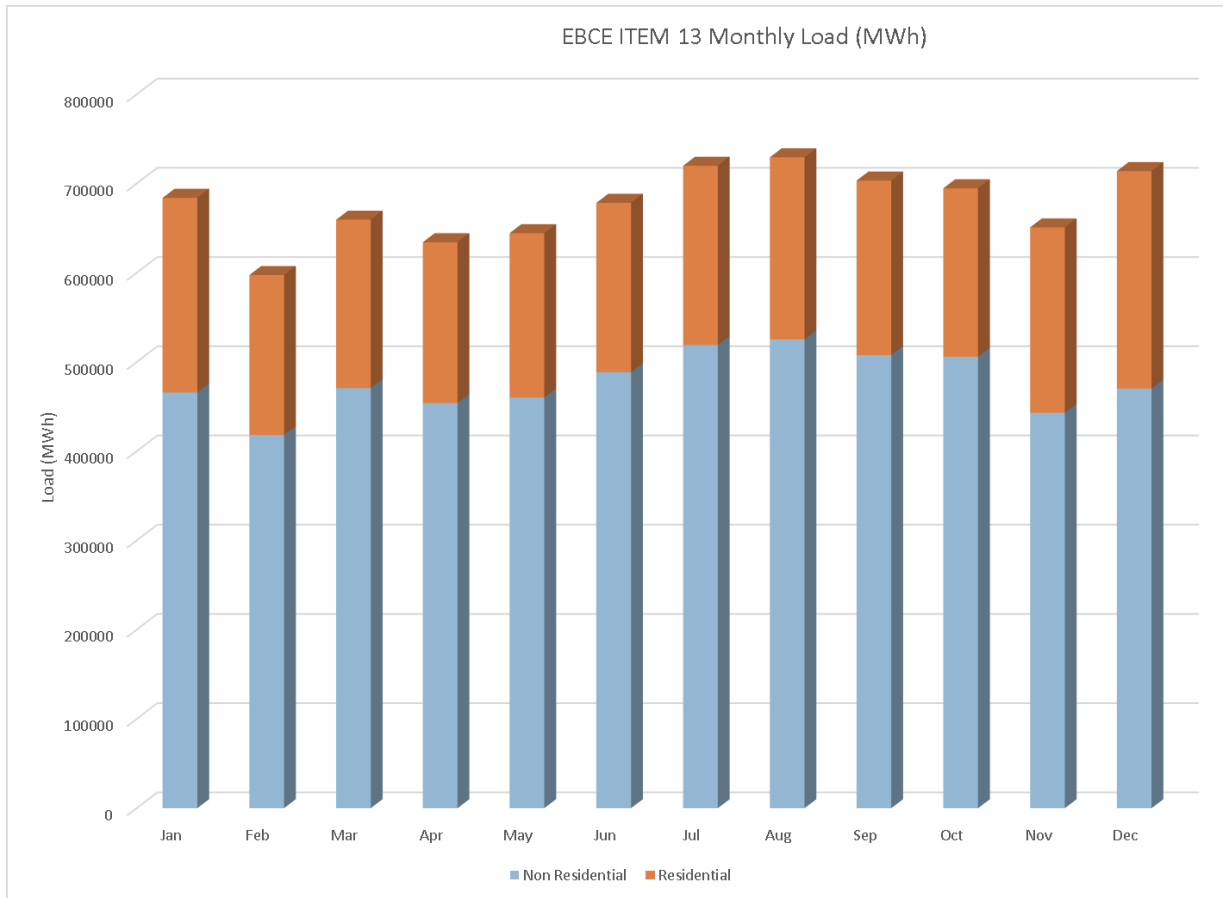


Figure 6. Residential and non-residential energy consumption by month in EBCE’s service territory

East Bay Community Energy Forward Capacity and Reserve Requirements (MW) 2018 to 2020			
Month	2018	2019	2020
January	0	1,229	1,232
February	0	1,250	1,256
March	0	1,125	1,127
April	0	1,172	1,175
May	28	1,124	1,126
June	34	1,381	1,384
July	34	1,392	1,395
August	34	1,416	1,419
September	831	1,271	1,274
October	736	1,134	1,136
November	750	1,212	1,214
December	706	1,231	1,234

Figure 7. EBCE's estimated resource capacity and reserve requirements by month (from EBCE Implementation Plan, 2017)¹⁵

East Bay Community Energy Local Capacity Requirements (MW) 2018 to 2027										
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
EBCE Peak	831	1,416	1,419	1,421	1,424	1,427	1,430	1,433	1,436	1,439
Local Capacity Req. (% of Peak)	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Greater Bay Area Share of Local Capacity	46%	46%	46%	46%	46%	46%	46%	46%	46%	46%
Other PG&E Areas Share of Local Capacity	54%	54%	54%	54%	54%	54%	54%	54%	54%	54%
EBCE Local Capacity Req., Greater Bay	189	322	323	324	324	325	326	326	327	328
EBCE Local Capacity Req., Other PG&E	226	385	386	387	388	389	389	390	391	392
EBCE Local Capacity Req., Total	415	708	709	711	712	714	715	716	718	719

Figure 8: EBCE's estimated local capacity resource adequacy requirements (from EBCE Implementation Plan, 2017)

¹⁵ See EBCE's Implementation Plan that was submitted to the CPUC in 2017 here: <https://ebce.org/wp-content/uploads/East-Bay-Community-Energy-Implementation-Plan.pdf>

- Reduction in likelihood of energy imbalance penalty fees from CAISO: The California Independent System Operator (CAISO) charges fees when an IOU, CCA, or municipal utility—all Load Service Entities, or LSEs—is unable to meet its consumption targets. By deploying dispatchable energy storage across its network, EBCE can avoid these costly penalties. Conversely, EBCE could also potentially use dispatchable resources to feed into the Energy Imbalance Market (EIM), selling excess capacity to other LSEs that are at risk of incurring fees.
- Increased Congestion Revenue Rights (CRR) revenues: By focusing increased DER deployment around high-congestion areas and by building a network of dispatchable energy storage resources with CCA accessibility, EBCE increases its ability to shed load or increase distribution-network generation. With planning and a robust management program, these improved abilities can be monetized through CAISO.
- Increased opportunities to collaborate with PG&E: EBCE can continue to be a good partner with PG&E by using targeted NEM export credits to partner on congestion-relief and infrastructure-improvement projects, demonstrating the mutually-beneficial potential of CCA’s working closely with the incumbent IOU.
- Increase in access to state and national grants: Grants related to microgrids, virtual power plants, social equity for energy, and other nationally-relevant topics are frequently available, and, with the proposed NEM program, can be pursued for pilot projects that could lead to further game-changing initiatives.

ADDITIONAL DETAILS OF PROPOSED NEM PROGRAM

Avoid true-up timing mistakes: In order to most effectively transition existing NEM customers to EBCE, special planning is necessary to ensure that the timing of the transition does not cause a premature “truing-up” event with PG&E. Accrued savings or bills are typically planned for a single annual true-up with the utility, with monthly credits and bills optimized by the solar installer to achieve the greatest savings for the customer. By triggering an immediate true-up at the transition time, significant customer savings can be lost, leading to disappointed and angry new customers. As some other CCAs, including PCE,¹⁶ have done, onboarding of current NEM customers can be scheduled to take place in the month of, or immediately after, the customer’s typical PG&E true-up month.

Monthly billing, with late spring cash-out: As noted above, these transitions of existing NEM accounts, along with the creation of new NEM accounts, are recommended to include a switch from an annual true-up to a monthly billing with an annual cash-out in the late spring. With this timing of a cash-out, solar customers are able to approach the high-output months of summer with a clean-slate, ready to generate a new credit to help offset winter bills. Conversely, a fall or winter cash-out would require several months of bill payment before summer credits would begin to accrue and then be paid back to the customer at the cash-out, leading to more payments needlessly moving back and forth between CCA and customers. New NEM accounts starting service in the fall or winter may experience this situation in their first partial year of service, but

¹⁶ See website: <https://www.peniculacleanenergy.com/our-power/solar-net-metering/>

after the cash-out date, would move onto the same annual cycle as all other NEM customers. As part of a standardized cash-out date in April or May, EBCE would need to budget for major cash outlays at that given time every year.

Length of NEM payout term: The term of the incentives should be aligned with state requirements around NEM offerings and grandfathering. To provide better cost clarity and benefits modeling for local solar installers, the availability of NEM benefits should be clearly stated, ideally with a specified planned change to a NEM successor rate, with a date certain. Installing solar is a long-term commitment for customers, so they need to understand the realistic timelines for program availability, which also supports a strong and responsible local development industry.

Co-locating NEM projects with FIT projects: Projects built through a NEM program can be combined with a Feed-in Tariff (FIT) or other export-based valuation program, as long as the interconnection points are monitored separately, and physical and electrical constraints of feeder wires and transformers are considered and addressed. In general, NEM customers are typically unlikely to be FIT customers, and vice versa, so the programs can co-exist separately, with minimal overlap.

PLANNING FOR NEM SUCCESSOR PROGRAM

With the benefits of NEM and export adders, EBCE is recommended to include a NEM program in its operational plans from Day 1. However, the CCA should not overlook the impending changes to NEM on the state-level as the CPUC prepares to consider successor rates in the coming years. At that time, the IOUs will be able to propose an alternate valuation mechanism for distributed energy production. With recent proposed and enacted NEM successor programs among California municipal utilities in Roseville and Alameda, as well as suggested guidelines from various CPUC stakeholders, the emerging strategy with the highest likelihood of acceptance is the hybrid instantaneous-netting/export-credit model. Known by various names and structures around the country, the likely NEM successor tariff will be referenced here as the Value of Distributed Energy Resources (VDER), after the program enacted in New York state in 2017.¹⁷ Under VDER, typical DERs will be interconnected on the customer side of the electric meter, as currently done, with on-site usage being offset as needed by on-site production, effectively serving as net metering for production used by the host facility. Exported energy, instead of receiving credits at full retail rates as under NEM, would be valued at a calculated “value of energy”, which would be determined as an avoided-cost, added-benefit dollar amount for installed DERs. In the case of the New York VDER, the calculation of the value included, broadly, Locational Marginal Pricing, distribution grid value, and external societal value.¹⁸

EBCE is recommended to work in the short-term to develop a valuation methodology for this VDER tariff, and to develop a specified date by which all DERs will either have the new tariff

¹⁷ See website: <http://www3.dps.ny.gov/W/PSCWeb.nsf/All/8A5F3592472A270C8525808800517BDD?OpenDocument>

¹⁸ Farrell, John. 2017. “Is New York’s ‘Compromise’ the Future for Net Metering?”. *CleanTechnica*, 6 March 2017, <https://cleantechnica.com/2017/03/06/new-yorks-compromise-future-net-metering/>.

available or will be forced to migrate to it. As much as possible, EBCE should continue to support NEM installations through a grandfathering process, to protect investments that were made prior to the shift to the VDER valuation methodology. To help reduce the number of customers being grandfathered, EBCE could offer a one-time financial incentive to help make customers whole, or nearly whole, for projected lost savings or revenues associated with the switch from NEM to VDER.

By setting the valuation methodology for VDER prior to it being developed and proposed for authorization by the IOUs, EBCE can again potentially create precedent statewide, as CCAs grapple with the IOUs and the CPUC to determine the “right” formula for valuing distributed energy exports. The formula should certainly include the offset of generation procurement that would no longer be necessary, but it should also include ancillary benefits such as those discussed briefly here, including reductions in RA procurements, reduced procurement costs and risks, reduced likelihood of imbalance penalties, increased CRR revenue potential, improved regional economic impacts, etc. The authors recommend that the EBCE VDER also consider Locational Marginal Pricing (LMP) to fully account for the ability of DERs to address locational issues around congestion relief and deferral of distribution infrastructure upgrades. Again, similar to the New York VDER, EBCE is recommended to include an accounting of the societal value of DERs, including greenhouse-gas reductions, health improvements, job creation, community resilience, and other benefits that are real measurable outcomes of locally-built DERs.

The NEM successor should be coordinated with the owner of the distribution network (PG&E) to consider interconnection-related changes, such as allowing for DER production over the limit of on-site usage, up to the current allowance of the applicable feeder and transformer sizes. To further prepare for high DER penetration, EBCE can work with PG&E to ensure that, when distribution upgrades are completed, they are done with the maximum DER potential of the serviced area in mind, so that future upgrades will not be necessary.

RECOMMENDATIONS

For EBCE to proceed on a Net Energy Metering program such as that outlined in this document, the following recommendations apply:

- Proceed directly to develop NEM program guidelines and export credit offerings for immediate marketing and for implementation at the first stages of customer on-boarding.
- Carve out monthly and annual budget requirements necessary to support NEM export credits and any associated marketing costs
- Develop internal programs and processes to track and allocate funds for NEM export credits to NEM customers
- Monitor and track uptake of various export credit programs, to enable adjustments in future-year allocations to better meet goals and budget parameter
- Explore opportunities for pilot programs around deployment of CCA-beneficial technologies, such as VPP-enabled energy storage or small wind systems
- Pursue opportunities for state or national grants related to pilot programs or supported initiatives
- Identify steps needed to obtain and manage allocations from outside sources for LMI, tax-exempt, or other target customer groups

CONCLUSION

EBCE has an outstanding opportunity to use an innovative Net Energy Metering program to reduce opt-out activity and build a strong relationship with its customers, while simultaneously working to reduce grid issues, better manage internal costs and risks, and fulfill its goals for local clean energy development and community benefit. With the proposed adders, EBCE can provide community leadership for multiple customer classes, while supporting local labor organizations, developers and DER technology and service providers.

EBCE can also use the proposed enhanced NEM program as a tool to develop a network of shared dispatchable resources supporting a long-term vision for the development of a virtual power plant strategy and transition to a transactive energy market in the East Bay community that supports a thriving local economy.

While implementing a NEM program, EBCE would be well-advised to also prepare for that program's eventual end, by developing a NEM successor tariff that values the full measure of benefits provided by distributed energy resources and can serve as a model best practice and a precedent for other CCAs, IOUs, and municipal utilities throughout the state and beyond. With dedication to its founding missions, EBCE is well-positioned to lead the East Bay into a stronger, cleaner, more hopeful future.

APPENDIX: References

1. California Legislative Info SB 651 website:
ftp://www.leginfo.ca.gov/pub/95-96/bill/sen/sb_0651-0700/sb_656_bill_950804_chaptered.html
2. California Public Utilities Commission Net Energy Metering website:
<http://www.cpuc.ca.gov/General.aspx?id=3800>
3. National Renewable Energy Laboratory Net Energy Metering website:
<https://www.nrel.gov/technical-assistance/basics-net-metering.html>
4. National Renewable Energy Laboratory NEM document website:
<https://www.nrel.gov/docs/fy13osti/56428.pdf>
5. California Public Utilities Commission NEM 2.0 website:
<http://www.cpuc.ca.gov/General.aspx?id=3934>
6. MCE Net Energy Metering website:
https://www.mcecleanenergy.org/wp-content/uploads/NEM_Tariff.12.11.13.pdf
7. California Legislative Info SB 65 website:
ftp://www.leginfo.ca.gov/pub/95-96/bill/sen/sb_0651-0700/sb_656_bill_950804_chaptered.html
8. Peninsula Clean Energy Net Energy Metering website:
<https://www.peninsulacleanenergy.com/our-power/solar-net-metering/>
9. Sonoma Clean Power Net Energy Metering website:
<https://sonomacleanpower.org/netgreen/>
10. Lazar, Jim. "The Duck Curve on California's Grid Will Encourage Innovation and Creative Thinking". *Greentech Media*. 17 February 2016.
<https://www.greentechmedia.com/articles/read/californias-duck-curve-will-encourage-innovation#gs.6QvwNf4>
11. California Solar Initiative Handbook website:
http://www.gosolarcalifornia.ca.gov/documents/CSI_HANDBOOK.PDF
12. Sciacca, Annie. "In costly Bay Area, even six-figure salaries are considered 'low income'". *The Mercury News*. 22 April 2017. Bay Area News Group.
<https://www.mercurynews.com/2017/04/22/in-costly-bay-area-even-six-figure-salaries-are-considered-low-income/>
13. CalEnviroScreen 3.0 maps website:
<https://oehha.ca.gov/calenviroscreen/maps-data>
14. California Solar Statistics website:
<https://www.californiadgstats.ca.gov/charts/>
15. Peninsula Clean Energy Net Energy Metering website:
<https://www.peninsulacleanenergy.com/our-power/solar-net-metering/>
16. New York Value of Distributed Energy Resources website:
<http://www3.dps.ny.gov/W/PSCWeb.nsf/All/8A5F3592472A270C8525808800517BDD?>
17. Farrell, John. 2017. "Is New York's 'Compromise' the Future for Net Metering?". *CleanTechnica*, 6 March 2017.
<https://cleantechnica.com/2017/03/06/new-yorks-compromise-future-net-metering/>

ABOUT OPTONY

Optony Inc. is a global research and consulting services firm focused on enabling government and commercial organizations to bridge the gap between clean energy goals and real-world results. Optony's core services offer a systematic approach to planning, implementing, and managing commercial and utility-grade renewable power systems, while simultaneously navigating the dramatic and rapid changes in the solar industry; from emerging technologies and system designs to government incentives and private/public financing options. Leveraging our independence, domain expertise and unique market position, our clients are empowered to make informed decisions that reduce risk, optimize operations, and deliver the greatest long-term return on their solar investments. Based in Silicon Valley, Optony has offices in Santa Clara, Chicago, and Beijing.

For more information, visit www.optonyusa.com