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# **Marin Clean Energy – Integrated Resource Plan: 2015 Update**

October 2015

Approved by MCE Board of Directors on 10/15/2015

# MCE Integrated Resource Plan: 2015 Update

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## Introduction

Marin Clean Energy (MCE), formerly known as the Marin Energy Authority, provides retail electric generation services to customers within its service area, which comprises the political boundaries of Marin County, unincorporated Napa County, the cities of Richmond, San Pablo and El Cerrito (all of which are located in Contra Costa County) and the City of Benicia (located in Solano County). MCE provides service to nearly eight out of ten electricity customers within these communities and is the default electric generation provider for any new or relocated customers therein. MCE strives to provide electric services to its customers at stable and competitive rates, utilizing the cleanest possible sources of electric energy. With these objectives in mind, MCE plans for and secures commitments from a diverse portfolio of electric resources to reliably serve its customers' electric energy needs over the near-, mid- and long-term planning horizons. This Integrated Resource Plan (the "IRP") documents MCE's resource planning objectives over the upcoming ten year planning period. This IRP will be updated and approved by MCE's Governing Board on an annual basis in consideration of applicable legislative and regulatory requirements, current policy objectives, customer participation, anticipated electricity sales and related energy product requirements, planned inclusion/expansion, new procurement activities, and any other known or reasonably anticipated considerations that may affect the manner in which MCE carries out its resource planning functions.

## Purpose of Resource Plan

The IRP has three primary purposes: (1) quantify resource needs over the planning period; (2) prioritize resource preferences and articulate relevant energy procurement policies; and (3) provide guidance to the energy product procurement processes undertaken by program management. In practical terms, the IRP documents the energy procurement policy guidelines established by MCE's Governing Board ("MCE Board") to which program management adheres when carrying out MCE's day-to-day energy planning and procurement activities.

Highlights of this IRP include the following:

- MCE will manage a portfolio of electric resources to maintain a minimum renewable energy content of 50% during the ten-year planning period, keeping in mind MCE's long term goal of increasing such renewable content to 100%.
- MCE currently manages a portfolio of twenty active energy contracts with twelve different energy suppliers and anticipates managing an increasing number of energy contracts in administering the IRP.
- For the next several years, MCE's existing supply commitments are generally sufficient to fulfill the expected energy product requirements of its customers:
  - MCE has contracted for most of its projected renewable energy needs through 2019;

- MCE’s non-renewable, or “conventional”, energy requirements are also substantially addressed via contractual commitments that are in place through 2017, and MCE is actively soliciting offers for conventional and carbon free resources to fill open positions that exist in calendar year 2018 and beyond;
  - Required reserve capacity is substantially addressed under contractual commitments extending through the 2016 calendar year;
  - Due to favorable market conditions, MCE has contracted for higher than expected bundled renewable energy volumes, which will displace the use of un-bundled renewable energy products (also referred to as “unbundled renewable energy certificates” or “unbundled RECs”) during the ten-year planning period.
- MCE currently has more than 5,300 customers participating in its Net Energy Metering (NEM) Tariff option; the smaller-scale renewable generating projects that have been installed by such customers represent more than 35,000 kW (or 35 MW) of local renewable generating capacity<sup>1</sup>. MCE aspires to increase total customer-sited NEM generating capacity within its service area to approximately 47,000 kW (or 47 MW) by 2021.
  - MCE is planning for an additional 25,000 kW (25 MW, above and beyond the aforementioned increases to NEM generating capacity) of locally situated photovoltaic solar (PV) generation by 2021. To support the achievement of this planning objective, MCE began promoting in-area distributed generation in June of 2013 through direct investment in pre-development permitting for new projects, subject to MCE Board approval. Currently MCE has 10.5 MW of local Solar PV under development in the city of Richmond, CA, has identified two additional development sites, and is completing predevelopment due diligence. These sites could support up to 150MW of Solar PV.
  - MCE’s feed-in tariff program (FIT) continues to promote additional local renewable project buildout through the availability of a standard offer (meaning, non-negotiable) contract with eligible renewable energy projects. Specific terms and conditions for the FIT program have been approved by the MCE Board and are readily available on MCE’s website. Eligible projects may participate on a first come, first served basis, subject to MCE’s aggregate participatory cap of 15,000 kW (15 MW). To date, MCE’s FIT has supported completion of the 972 kW (≈1 MW) San Rafael Airport solar project, which began producing renewable energy for MCE customers on October 23, 2012. Since the San Rafael Airport project commenced operations, MCE has entered into several additional FIT contracts, totaling approximately 6,700 kW (6.7 MW) of new generating capacity; such projects are expected to begin producing electric power over the next 24 months.

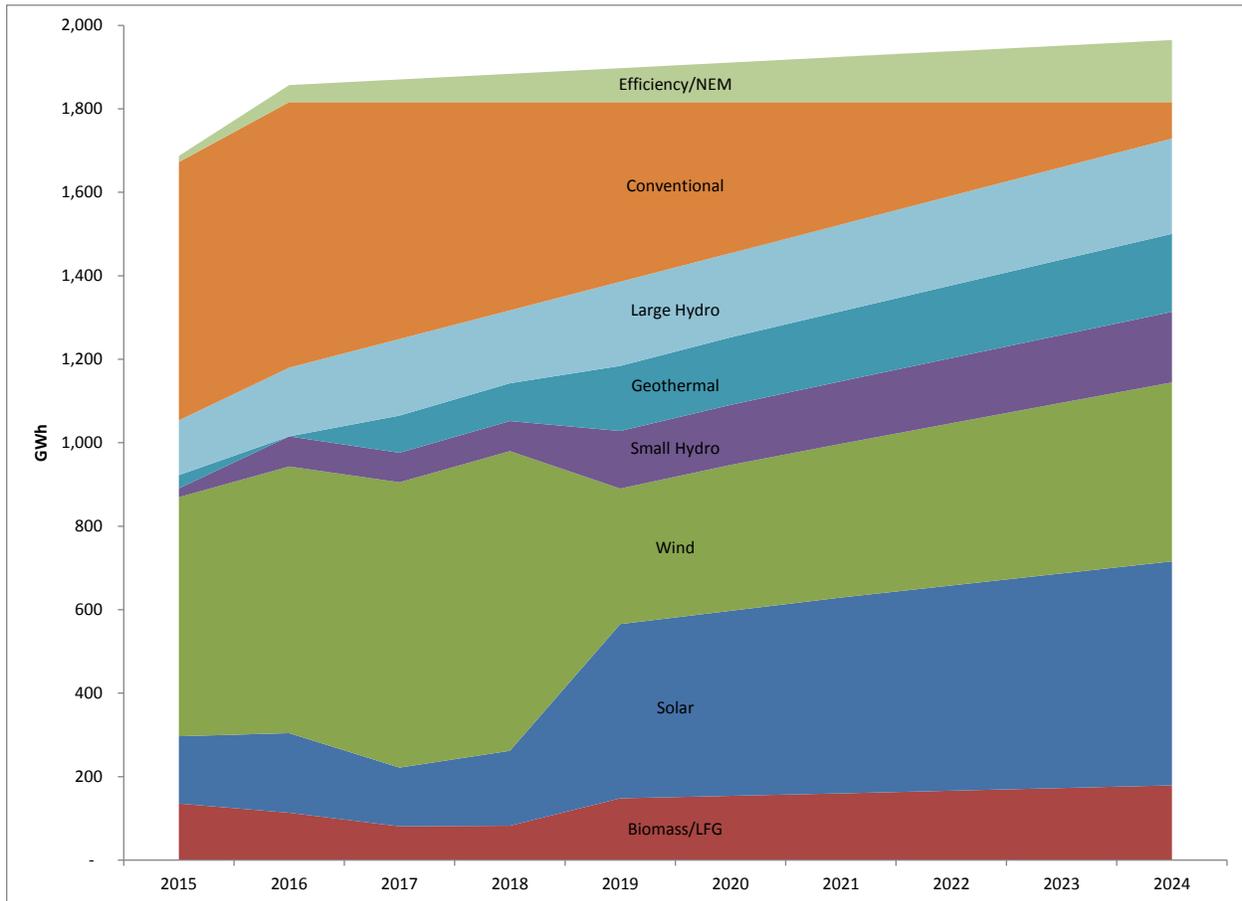
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<sup>1</sup> NEM statistics include customer-sited generation as of May 2015 (impacts associated with the February 2015 Napa expansion and the May 2015 San Pablo expansion are reflected in such totals).

- MCE is working towards a long term goal of relying on energy efficiency (EE) and distributed generation programs to offset MCE’s annual energy and capacity requirements by approximately 2%. MCE is applying to the California Public Utilities Commission (CPUC) to significantly ramp up the ratepayer funded EE programming and has incorporated targets for the next ten years based on this upcoming application. MCE is also working to develop capacity in demand response programs, with a goal of offsetting MCE’s annual capacity requirements by 5%. MCE is developing an Automated Demand Response Pilot Program for up to 200 residential customers and is exploring behavioral demand response programs for small commercial customers. Depending on the outcome of these pilot programs, MCE may ramp up its demand response programs and / or seek funding from the CPUC for more robust programs in this sector.
  
- During the ten-year planning period, MCE will procure requisite energy products through various mechanisms, including bilaterally negotiated agreements, public solicitations (such as the annual Open Season process), and standard offers (such as the FIT).
  
- Specific authorities for entering into energy procurement contracts are allocated among management, the MCE Board, and subsets of the MCE Board, depending upon the term of the resource commitment and whether the procurement is consistent with the adopted IRP.

Figure 1a illustrates the projected resource mix during the period covered by this IRP. The projected mix is illustrative; actual resource utilization will depend upon market conditions and resource availability at the time MCE engages in additional energy procurement.

Figure 1a: MCE Resource Mix, 2015-2024



### Regulatory Considerations

On October 7, 2015, Governor Brown signed Senate Bill 350, the Clean Energy and Pollution Reduction Act of 2015. Key provisions of SB 350 increase California’s RPS procurement target to 50% by 2030 amongst other clean-energy initiatives. Many details regarding implementation of SB 350 will be developed over time with oversight by applicable regulatory agencies, including the CPUC. With regard to MCE’s ongoing resource planning efforts, SB 350 includes certain procedural changes that will be directly relevant during the development of MCE’s future IRP documents. In particular, SB 350 requires that CCAs submit Integrated Resource Plans to the CPUC for certification while retaining the governing authority and procurement autonomy administered by each CCA’s respective governing board. While the specific elements of this process, including applicable timing and IRP content requirements, have not yet been defined, it is reasonable to assume that MCE may need to incorporate certain changes in the form and content of its IRP. As additional information becomes available regarding the details of SB 350 implementation, staff will update MCE’s Governing Board. SB 350 also includes specific resource planning and procurement requirements, which will be imposed on CCAs. However, these requirements should not materially impact MCE, as existing planning objectives are substantially responsive to anticipated SB 350 requirements. In particular, SB 350 requires that: 1) beginning in 2021, CCAs must

have at least 65% of their RPS procurement under long-term contracts of 10 years or more; and 2) CCA energy efficiency programs will be able to count towards statewide energy efficiency targets. Again, based on the planning elements reflected in this IRP, MCE does not anticipate any requisite adjustments to its future procurement practices as a result of SB 350 implementation.

## General Resource Planning Principles

MCE's resource planning considers three planning horizons:

1. The long-term planning horizon addresses the electric energy requirements of MCE customers during the next ten years or longer;
2. The medium-term planning horizon addresses similar requirements during the next one to five years; and
3. The short-term planning horizon addresses MCE's electric energy requirements, which are expected to occur over the upcoming twelve months.

MCE also actively manages the operating horizon, which is focused on the immediate needs of MCE customers. The operating horizon is intended to address energy requirements that may occur as soon as the "Hour Ahead" market and the 90 days that follow – during this period all or virtually all resource commitments have been made and only adjustments necessary to address short term operating variability related to weather and other uncertainties are considered (e.g., production variations associated with intermittent renewable energy resources from which MCE may be purchasing power). While longer-term planning horizons typically reflect a combination of firm resource commitments and unfilled or "open" positions, such open positions are typically "filled" (i.e., addressed via contracts with qualified suppliers of requisite energy products) with firm resource commitments as the operating horizon approaches.

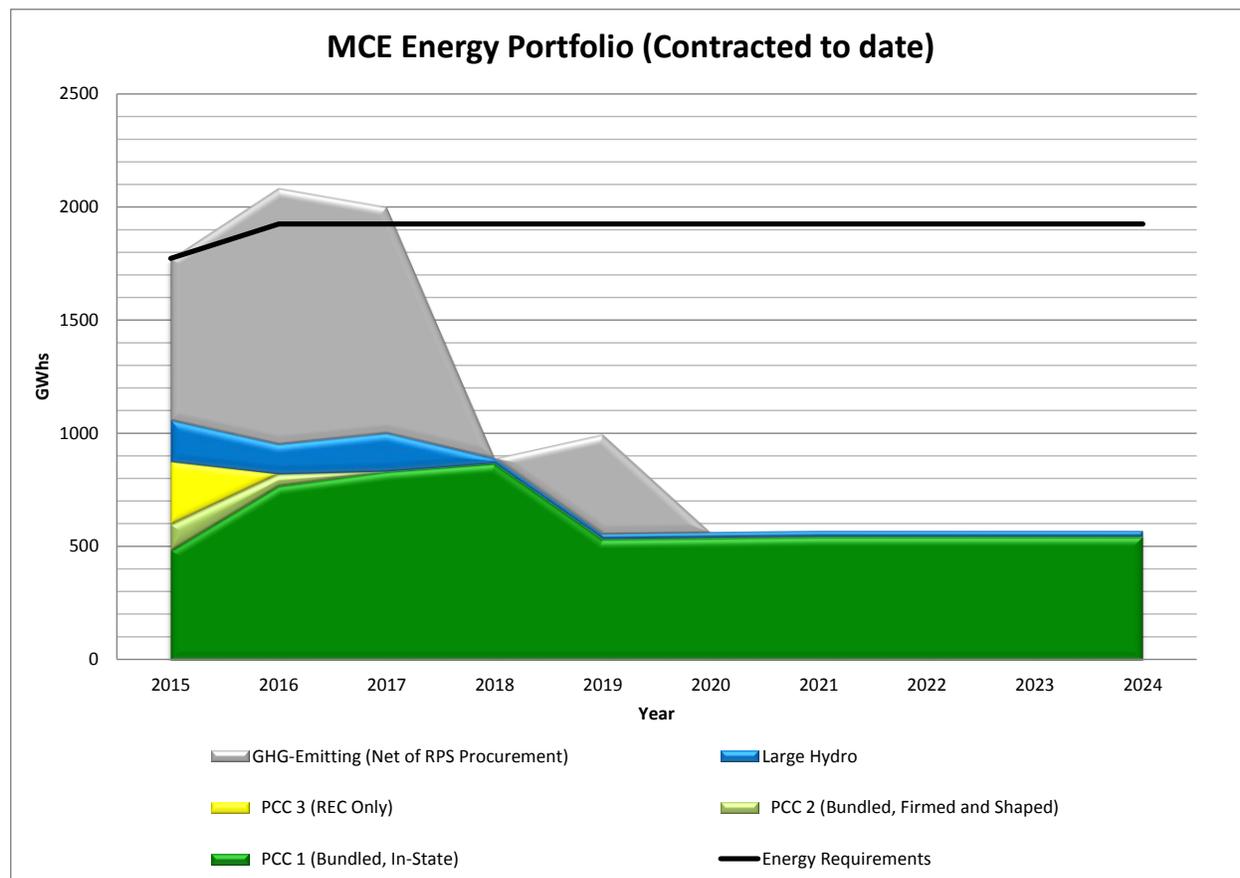
MCE policy, established by MCE's founding documents and directed on an ongoing basis by MCE's Board, guides development of the resource plan and the ensuing resource procurement activities that are conducted in accordance with the plan. MCE's key resource planning policies are as follows:

- Reduce green-house gas emissions and other pollutants associated with the electric power sector through increased use of renewable energy resources and reduced reliance on fossil-fueled resources.
- Maintain competitive electric rates and increase control over energy costs through management of a diversified resource mix.
- Benefit the area's economy through investments in local infrastructure and energy programs.
- Help customers reduce energy consumption and electric bills through investment in and administration of enhanced customer energy efficiency, cost effective distributed generation and other demand-side programs.
- Enhance system reliability through investment in supply and demand-side resources.

The IRP translates these broad policy objectives into more specific plans for the use of various types of electric resources, taking into consideration MCE's projected customer needs and MCE's existing

resource commitments. MCE has benefited from recent market conditions, securing additional bundled, “Bucket 1” renewable energy supply from resources located within California. The price premium associated with such incremental renewable energy volumes has been relatively modest, approximating \$10/MWh relative to conventional supply alternatives, namely market purchases or “system power”. Greenhouse Gas Free (“GHG-Free”, “Carbon-Free”, or “Carbon Neutral”, a term which is also used to categorize power resources that do not impose additive, adverse environmental impacts during electric power production) resources are also proving to be available at nominal price premiums ranging from \$1 -\$2/MWh relative to conventional supply alternatives.

Figure 2b: MCE Energy Portfolio, contracted to date



**Increasing Renewable Energy volumes to 80% by 2025**

Over the ten-year planning period addressed by the IRP, MCE plans to gradually replace the conventional energy content in its overall resource portfolio by advancing procurement of additional renewable energy supplies.

In this year’s IRP, MCE’s Governing Board has elected to increase the agency’s Light Green product content from 50% to 80% of its energy requirements from renewable energy resources by 2025. MCE plans to achieve this goal through incremental annual procurement increases as outlined in the table below. The specific proportions of renewable products may vary based on resource availability and prevailing market prices with the goal of achieving an 80% overall renewable supply portfolio no later

than 2025. Under this strategy, Deep Green and Local Sol customers will continue to receive 100% renewable energy, consistent with applicable product descriptions.

MCE will continue to administer its annual Open Season procurement program in an attempt to cost-effectively fill open positions for various energy products. With regard to renewable energy procurement, MCE continues to pursue a “balanced” product portfolio, utilizing various bundled and unbundled renewable energy products to increase overall renewable energy content at cost-competitive rates. However, MCE plans to limit the use of unbundled RECs, otherwise known as “Bucket 3” RECs under the product definitions relating to California’s RPS program, to no more than 3% of retail energy supply, beginning in 2016. To promote progress towards its 80% overall renewable energy procurement objective, MCE plans to replace previously specified Bucket 3 volumes with incremental bundled renewable energy supply (meeting delivery specifications pertaining to the Bucket 1 and Bucket 2 product options, as defined under California’s RPS program) during the ten-year planning period, as reflected in the following table.

**Table 1a: MCE’s 10 Year Portfolio Mix Targets**

<b>10 Year Portfolio Mix (%)</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>
<b>Bucket 1</b>	30%	35%	38%	40%	43%	45%	48%	50%	53%	55%	58%
<b>Bucket 2</b>	5%	12%	13%	14%	14%	15%	16%	17%	17%	18%	19%
<b>Bucket 3</b>	15%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
<b>Large Hydro</b>	11%	11%	12%	12%	12%	13%	13%	14%	14%	15%	15%
<b>System/Conventional Energy</b>	39%	39%	35%	31%	28%	24%	20%	16%	13%	9%	5%

## Electric Sales Forecast

MCE’s long term sales forecast is primarily influenced by certain structural or macro variables related to the number of customers receiving service under the MCE program. These macro variables include the potential for expansion/inclusion of new member communities within the MCE service footprint and expected customer participation/opt-out rates (with inclusion of the cities of Benicia and El Cerrito being the most recent examples). These macro variables are the primary drivers of the load forecast and tend to dominate the effects of typical load influencing micro variables related to weather, economic cycles, population growth, and changes in customer consumption patterns. The long-term load forecast incorporates impacts of the macro variables as well as seasonal electricity consumption patterns of MCE’s customer base, while the other, micro variables are considered in MCE’s short-term operational load forecasts used for day-to-day scheduling of loads and resources.

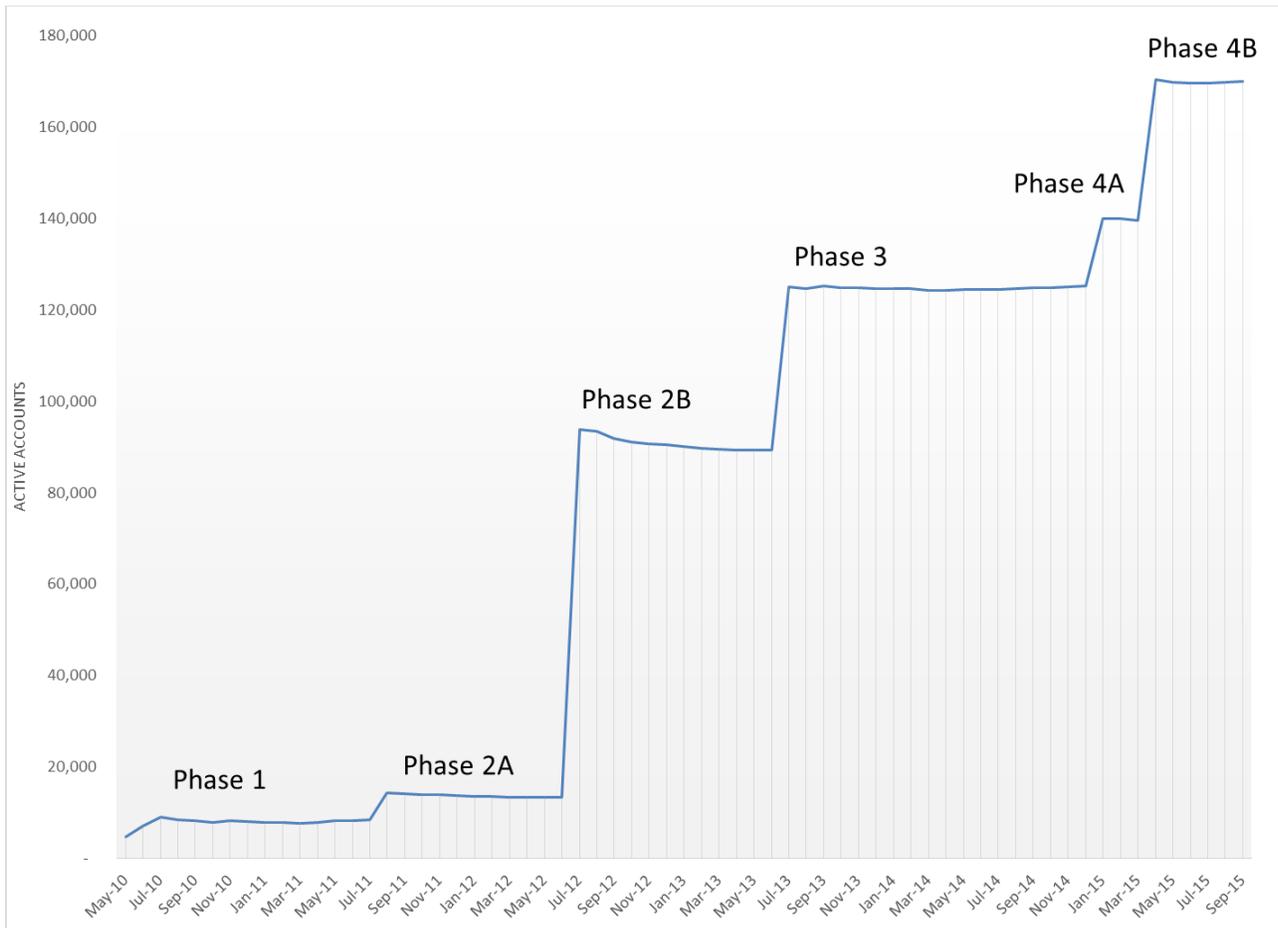
## Enrolled Customers

MCE currently serves approximately 170,000 customers. Additional membership inclusion may take place during the ten-year planning horizon, if supported by the MCE Board. The resource planning effects of increased MCE membership are addressed prior to related membership decisions by MCE’s Board – the results of such an analysis will be quantified, including anticipated budgetary and environmental impacts related to the prospective expansion, and presented to the Board with opportunity for discussion and public comment. Any impacts related to future inclusion/expansion activities will be addressed in future updates to this IRP.

Customer participation rates are measured in consideration of the proportion of customers that have been offered MCE service without voluntarily opting to return to the incumbent utility, Pacific Gas & Electric (PG&E). Today, the customer participation rate associated with MCE's initial membership (based on jurisdictional participation as of May 2010) is approximately 77%. The vast majority of customer "opt-outs" tend to occur during the period of time surrounding MCE enrollment. Typically, such decisions are made by customers prior to customer enrollment or within 120 days thereafter - during this period of time, prospective and enrolled customers receive multiple notices, which explain their respective service options and provide information regarding opt-out procedures (i.e., the process by which customers may elect to discontinue MCE service and return to PG&E). Following the initial opt-out period, MCE's customer base tends to stabilize, with new customers generally offsetting the effects of customer attrition. It is noteworthy that customer participation rates have increased in subsequent MCE enrollment phases: 81% of customers who were offered service following inclusion of the City of Richmond have continued with MCE; and 89% of customers included in MCE's subsequent processes (to unincorporated Napa County as well as the cities of Benicia, San Pablo, and El Cerrito) have continued with MCE. This trend is very positive, reflecting the impacts of MCE's highly effective outreach programs, increased awareness of the MCE brand, and general familiarity with the CCA service model, which continues to expand throughout California.

Figure 2 shows the recorded numbers of active customers since MCE's Phase 1 launch in May, 2010. The customer base shows considerable stability between the phased expansions that occurred in May, 2010 (Phase 1A), July, 2010 (Phase 1B), August, 2011 (Phase 2A), July, 2012 (Phase 2B), July, 2013 (Phase 3), February, 2015 (Phase 4A) and May, 2015 (Phase 4B). The downward trend immediately following phased enrollments is an indication of customer opt-outs which gradually taper off during the post enrollment period.

Figure 3: Active MCE Customers



### Deep Green Program Participation

MCE offers a voluntary 100% renewable energy option for customers through its Deep Green program. Participation in the Deep Green program ultimately determines the incremental renewable energy volumes that must be procured to supply such customers. Historically, the energy requirements of Deep Green customers were supplied from MCE’s portfolio of renewable energy resources and through incremental purchases of Green-e Energy eligible renewable energy certificates to achieve an overall 100% renewable energy content for the Deep Green product. In this year’s IRP, MCE’s Governing Board has elected to procure the energy requirements of Deep Green customers with increasing levels of bundled renewable energy supply throughout the planning period, subject to eligible resource availability as well as economic and operational constraints. Currently, 3,248 customers are enrolled in the Deep Green program, equating to 1.9% of MCE’s total customer base. The participation rate has increased slightly from 1.7% in 2014. The expected Deep Green participation rate is expected to increase to 5% over the ten-year planning period as MCE continues to market this program. On a kWh basis, Deep Green participation currently represents 0.72% of annual residential electricity sales, and 2.06% of annual commercial electricity sales.

Table 1b: MCE Deep Green Participation, 2015

	Total Accounts/Sales	Total Deep Green	Residential Deep Green	Commercial Deep Green
<b>Number of Customers</b>	170,343	3,248	2,761	487
		1.90%	1.62%	0.29%
<b>Retail Sales net of NEM Surplus Generation (kWh)</b>	1,424,390,343	39,581,312	10,167,990	29,413,322
		2.78%	0.71%	2.06%
<b>Total Retail Sales (kWh)</b>	1,434,685,473	39,969,319	10,380,372	29,588,947
		2.79%	0.72%	2.06%

### Baseline Customer and Consumption Forecast

MCE’s electricity forecast starts with a forecast of customers by end-use classification (residential, commercial, etc.). Class-typical monthly energy consumption, derived based on historical data, is applied to yield a monthly energy forecast by customer class. Hourly class-specific load profiles are used to further break down the monthly energy forecast into hourly values for purposes of deriving time-of-use and peak demand values. Certain adjustments are incorporated in the base forecast to account for factors not reflected in the historical data. MCE also makes explicit adjustments to this forecast to account for the load impacts of its energy efficiency, NEM, and demand response programs.

### Energy Efficiency

As referenced in the MCE Implementation plan, studies have indicated that a reasonable long-term goal for energy efficiency programs in MCE’s service area is to reduce overall annual energy consumption by approximately 2%. MCE’s 2015 peak demand forecast is 329 MW, and annual consumption is forecasted to be 1,687,000 MWh; 2% of which is 34,000 MWh. Achieving this level of savings will require development of specific programs, the requisite funding, and time to deploy the efficiency measures.

MCE has received ratepayer funding under the auspices of the CPUC for energy efficiency programs for 2013-2015. MCE’s accomplishments to date are reported below in Table 1c<sup>2</sup>.

Table 1c: MCE Energy Efficiency Impacts

	MWh	MW (summer peak)
<b>2013</b>	414	0.035
<b>2014</b>	1,626	0.109

MCE has applied to the CPUC for a much more robust set of programs, building on the steady ramp-up in activities since 2013. MCE has applied to offer energy efficiency programs in each customer sector and is looking at a tenfold increase in funding and associated targets. The application is pending at this time and the targets are reflected in MCE’s procurement planning.

<sup>2</sup> Savings associated with the single family program are included here but are subject to confirmation following the *ex post* evaluation from the CPUC.

## Net Energy Metering Program

MCE provides among the strongest incentives in the nation to promote customer-sited distributed generation through its NEM program. During periods in which surplus energy production occurs, the MCE NEM program pays eligible customer-generators their respective full retail generation rate plus an additional 1 cent per kWh incentive. There are currently more than 5,300 customers participating in MCE's NEM program, which have collectively installed a total of approximately 35,243 kW (35.2 MW) of local renewable generation; only 30 MW of this installed solar capacity reduces MCE's resource adequacy requirements because of the reduced capacity factor of solar generation during the peak demand month of June.<sup>3</sup> MCE anticipates increasing NEM participation to approximately 47,000 kW (47 MW) over the next ten years. During the planning period, management will periodically evaluate MCE's NEM program to balance the achievement of MCE's long-term distributed generation goals, overall budgetary impacts resulting from NEM incentives and related impacts to MCE's electric rates.

## Demand Response Program

MCE does not yet administer a demand response program, although MCE customers are eligible for many of the programs administered by PG&E. MCE also receives capacity credits related to PG&E-administered demand response programs, which are allocated by the CPUC due to the fact the MCE customers participate in the funding of such programs through various PG&E charges. These capacity allocations marginally reduce MCE's need to procure resource adequacy capacity. Currently, demand response programs provide 2% of MCE's resource adequacy requirements. MCE's goal for the planning period is to meet 5% of its total capacity requirements through demand response programs that will be operated directly by MCE or through utility administered programs for which MCE customers are eligible. MCE requested participation in a CPUC administered demand response pilot program in August, 2013. However, due to various issues and cost burdens associated with the current demand response market as well as limitations affecting the availability of real-time customer usage data, MCE has placed this specific pilot program on hold until MCE's advocacy efforts promote fair and equitable treatment for MCE customers. MCE continues to research demand response alternatives and is working with third-party program vendors to develop an effective pilot program that will benefit MCE customers.

## Resources

This section discusses MCE's resource needs during the planning period, taking into account the projected energy requirements of MCE customers and existing contractual commitments for such resources. The MCE supply portfolio consists of a diverse resource mix, which has been designed to promote the achievement of MCE's overarching policy objectives as well as compliance with applicable legal and regulatory requirements.

## Existing Resource Commitments

MCE actively manages a portfolio of twenty unique power purchase commitments, which provide requisite conventional and renewable energy and unbundled RECs. Such contracts vary in term length

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<sup>3</sup> NEM customer data includes the February 2015 Napa expansion and the May 2015 San Pablo expansion

based on a variety of considerations related to the specific products purchased thereunder. MCE's current portfolio of contracts is further described below.

***Shell Energy North America (SENA): energy, bundled renewable energy, GHG-free energy, capacity and scheduling services***

The SENA agreement and associated confirmations (there are a total of three unique transaction confirmations under the master SENA agreement, each of which includes specific quantities of the aforementioned energy products) require SENA to provide scheduling coordinator services for MCE as well as specified quantities of energy, capacity, and renewable energy. Under the confirmations, scheduling services will be provided through September 2016 while conventional energy deliveries extend through December 2017. SENA is also obligated to deliver certain quantities of reserve capacity through December 2015 as well as various bundled renewable energy products through December 2016. Through a series of related letter agreements, certain conventional energy volumes under the SENA agreement were replaced with GHG-free, hydroelectric production – the specific resources providing GHG-free supply to MCE are generally located within the Pacific Northwest but are delivering power to California on MCE's behalf. Following MCE's commencement of service in May 2010, the SENA agreement provided for all of MCE's resource requirements, but MCE's supplier relationships have substantially diversified since that time. This streamlined contracting strategy (at the time of MCE's launch) increased administrative simplicity during MCE's early operating history. Over the course of MCE's relationship with SENA, the proportion of energy deliveries from this supplier has diminished as MCE incrementally augmented its resource portfolio with a diverse mix of other power supply options.

***Genpower LLC (Landfill Gas to Energy): bundled renewable energy***

The Genpower agreement extends for a twenty-year term, which commenced on the commercial operation date of February 13, 2013. The generating resources supplying renewable energy under this agreement include a previously existing 2.4 MW landfill gas to energy project located in Lincoln, California which was subsequently expanded, adding 2.4 MW of additional generation capacity at the landfill – a total of 4.8 MW of potential renewable generating capacity currently produces electricity for the benefit of MCE customers. MCE is currently accepting delivery of energy production and renewable attributes from both engines at an average capacity of 3.55 MW. Starting in 2016, capacity attributes will be associated with the facility. Annual Energy deliveries are estimated at 27,000 MWh.

***G2 Energy LLC (Landfill Gas to Energy): bundled renewable energy***

MCE has two agreements with G2 Energy LLC, each relating to a unique renewable generating project located within California's Central Valley. The first agreement, G2 Hay Road, extends for a twenty-year term from the commercial operation date. The second agreement, G2 Ostrom Road, extends for an eighteen-year term from the commercial operation date. The Hay Road agreement supported the development and construction of a new, 1.6 MW landfill gas to energy project located in Solano County, California; commercial operation commenced on July 2, 2013. The Ostrom Road agreement supported the development and construction of a 1.6 MW capacity addition (to an existing 1.6 MW landfill gas to energy project) located in Yuba County, California; commercial operation commenced on September 11, 2013. MCE is scheduling and taking delivery of energy production from both engines and receiving the associated renewable attributes. Starting in 2016, capacity attributes will be associated with both of the

G2 Facilities. Aggregate energy deliveries for the projects are projected to average approximately 23,000 MWh per year during the contract term.

***Cottonwood Solar LLC (PV Solar): bundled renewable energy and capacity***

The Cottonwood agreement extends for a twenty-five year term, which commenced on May 22, 2015. In aggregate, the Cottonwood power purchase agreement provides MCE customers with renewable energy production from three new renewable generating projects located within California: 1) the City of Corcoran Solar project, located in Kings County, is a 11 MW power plant, which commenced commercial operation on May 22, 2015; 2) the Goose Lake Solar project, located in Kern County, is a 12 MW power plant, which commenced commercial operation on May 22, 2015; and 3) the Marin Carport solar project, located in the City of Novato, is a 1 MW power plant that is expected to achieve commercial operation in advance of May 23, 2016. MCE is currently scheduling and taking delivery of renewable energy production from the Corcoran and Goose Lake projects and is also receiving associated renewable attributes; capacity attributes are expected to become available in July 2016. Energy deliveries are projected to average approximately 64,000 MWh per year during the term.

***Kansas LLC (PV Solar): bundled renewable energy and capacity***

The Kansas agreement, originally a two year short term power purchase agreement (PPA) achieved commercial operation in November 2014, adding an additional year of renewable energy production from this new 20 MW project located in Kings County, California. MCE is currently scheduling and taking delivery of energy produced by the facility, including associated renewable and capacity attributes. Energy deliveries are projected to average approximately 51,000 MWh per year during the contract term. The original PPA contract with Recurrent Energy was transferred to Dominion Solar Holdings, LLC upon commercial operation.

***U.S. Western Area Power Administration (“WAPA”, Large Hydroelectric): GHG-free energy***

Under the WAPA agreement, MCE will receive a specified allocation of hydroelectric energy produced by the federally owned Central Valley Project. The use of hydroelectric energy, including the deliveries received from WAPA, helps reduce the emissions intensity of MCE’s supply portfolio, as the power provided by WAPA is produced by a carbon-free fuel source. Deliveries commenced in January 2015 and will continue for a ten-year term. Energy deliveries are projected to average 25,000 MWh per year during the contract term; however, due to current drought conditions, expected 2015 energy deliveries were reduced to 12,500 MWh.

***Calpine Energy Services (Geothermal): bundled renewable energy and capacity***

Under the master agreement and associated confirmations with Calpine, MCE will receive a specified allocation of geothermal energy produced by the Northern California-based Geysers Project. Pertinent confirmation agreements specify delivery of 10 MWs of energy, produced/delivered during each hour of the day, and capacity commencing in January of 2017 and continuing for a ten-year term. An additional agreement for 30,000 MWh of energy from the Geysers was executed during 2015. Energy deliveries are projected to approximate 30,000 MWh for 2015 (though a fire in the area may force a reduction in expected deliveries), and 88,000 MWh per year during the 2017 to 2026 term. MCE also executed a

purchase conventional energy from Calpine through a resource-specific (natural gas) purchase agreement for deliveries during 2015-2017.

***Exelon Generation Company (Firm Energy; Wind), firm energy and bundled renewable energy***

Under the agreement with Exelon, MCE will receive a firm and shaped allocation of RPS-eligible bundled wind energy produced by existing renewable generating resources located within the Western Electric Coordinating Council (WECC). Renewable energy is expected to be sourced from two Washington state generators: White Creek Wind and Nine Canyon Wind. During the two year delivery period (2014 and 2015), 25 MWs of energy will be delivered during the months of July through December. A subset of these deliveries will be RPS-eligible renewable energy volumes, totaling 60,000 MWh in 2014 and 50,000 MWh in 2015. In addition to the aforementioned renewable energy volumes, MCE recently executed a 50 MW “block” purchase of “system” energy with Exelon; energy will be produced and delivered during the 2018 and 2019 calendar years replacing a portion of system energy deliveries previously contracted through SENA.

***EDP Renewables LLC (Wind): bundled renewable energy***

The EDP agreement is a four-year, short term power purchase agreement with the Rising Tree Wind Farm III facility, a new 99 MW generating project located in Kern County, California, which commenced commercial operation on June 25, 2015. MCE is scheduling and taking delivery of energy produced by the facility and is also receiving associated renewable attributes. Energy deliveries are projected to average approximately 180,000 MWh in 2015, and 340,000 MWh per year between 2016 and 2018.

***RE Mustang LLC (PV Solar): bundled renewable energy and capacity***

The RE Mustang agreement, is a fifteen-year power purchase agreement that will support the development of a new, 30 MW generating project located in Fresno County, California. The projected commercial operation date for this facility is December 2016. MCE will begin receiving energy and associated renewable attributes produced by this project January 1, 2018. MCE will assume scheduling responsibilities for all energy production, which is expected to average 86,000 MWh per year during the term. The project is currently under development.

***Waste Management – Redwood Landfill (Landfill Gas to Energy): bundled renewable energy and capacity***

The Redwood Landfill agreement extends for a twenty-year term from the expected commercial operation date of December 2016. The new, 4 MW landfill gas-to-energy project is located in Novato, California and will be a state of the art low emissions facility. MCE will accept delivery of energy production, renewable attributes, and capacity attributes associated with this facility. Annual energy deliveries are expected to approximate 30,000 MWh. This project is currently under development.

***Direct Energy/Energy America, LLC (RPS-Eligible Hydroelectric, Biomass and/or Wind): bundled renewable energy***

The Direct Energy agreement is a short-term renewable energy supply commitment that will augment MCE’s 2015 renewable energy portfolio with 50,000 MWh of additional bundled (Bucket 1) renewable energy supply. A specified schedule of prospective renewable generating facilities, any of which may be

used to satisfy Direct Energy's delivery obligations, is included in the transaction confirmation. These facilities reflect a diverse mix of fuel sources, including RPS-eligible hydroelectricity, biomass and wind. Year-to-date energy deliveries are generally tracking with MCE's expectations.

***East Bay Municipal Utility District – Pardee and Camanche Reservoirs (RPS-Eligible Hydroelectric): bundled renewable energy***

The East Bay Municipal Utility District (EBMUD) agreement is a ten-year PPA with two, currently operating, California-based, RPS-eligible hydroelectric facilities that are actively delivering renewable energy to MCE. The facilities are located near the Amador-Calaveras county line, on the Mokelumne River. Both power plants are owned and managed by EBMUD. The resource is expected to provide between 20,000 MWh and 180,000 MWh per year, depending on annual rain and snow fall. For planning purposes, MCE has incorporated a relatively conservative annual energy production total of 70,000 MWh.

**Unbundled Renewable Energy Certificate Resources**

Starting in 2016, MCE will procure no more than 3% of its retail load from unbundled renewable energy resources.

***Cedar Creek (Wind): unbundled renewable energy certificates***

The Cedar Creek agreement provides for the delivery of RPS- and Green-e Energy-eligible renewable energy certificates during the 2015 calendar year. The specified product will be sourced from one or more wind facilities located within the WECC region. Specified volumes total 125,000 MWh during the 2015 calendar year. Deliveries will be completed by March 2016.

**Feed-In Tariff Projects: Contracted and Proposed**

***San Rafael Airport Feed-In Tariff Project (PV Solar): renewable energy***

The San Rafael Airport FIT agreement extends for a twenty-year term, which commenced on the facilities commercial operation date of October 23, 2012. The 972kW PV project is located in San Rafael, California. Energy deliveries offset MCE load and are in line with projected average generation of 1,800 MWh per year during the contract term.

***Cooley Quarry Feed-In Tariff Project (PV Solar): renewable energy***

The Cooley Quarry FIT agreement extends for a twenty-year term with an expected commercial operation date occurring during the first quarter of 2016. The project includes a 990 kW Local Solar PV project, which is now under contract with MCE, and a proposed 450 kW FIT PV project. Both projects are located in Novato, California. Energy deliveries offset MCE load and are projected to average 3,000 MWh per year during the contract term.

***Richmond Feed-In Tariff Projects (PV Solar): renewable energy***

Two proposed FIT projects are under development in Richmond, California. Both 998 kW agreements would extend for a twenty-year term with an expected commercial operation date of June 30, 2015.

Aggregate energy deliveries from the projects are expected to offset MCE load and are projected to average 3,600 MWh per year during the contract term.

***Larkspur Feed-In Tariff Project (PV Solar): renewable energy***

The 286 kW roof mounted FIT project is located in Larkspur, California. The agreement extends for a twenty-year term with an expected commercial operation date of November 30, 2015. Energy deliveries from the project are expected to offset MCE load and are projected to average 500 MWh per year during the contract term.

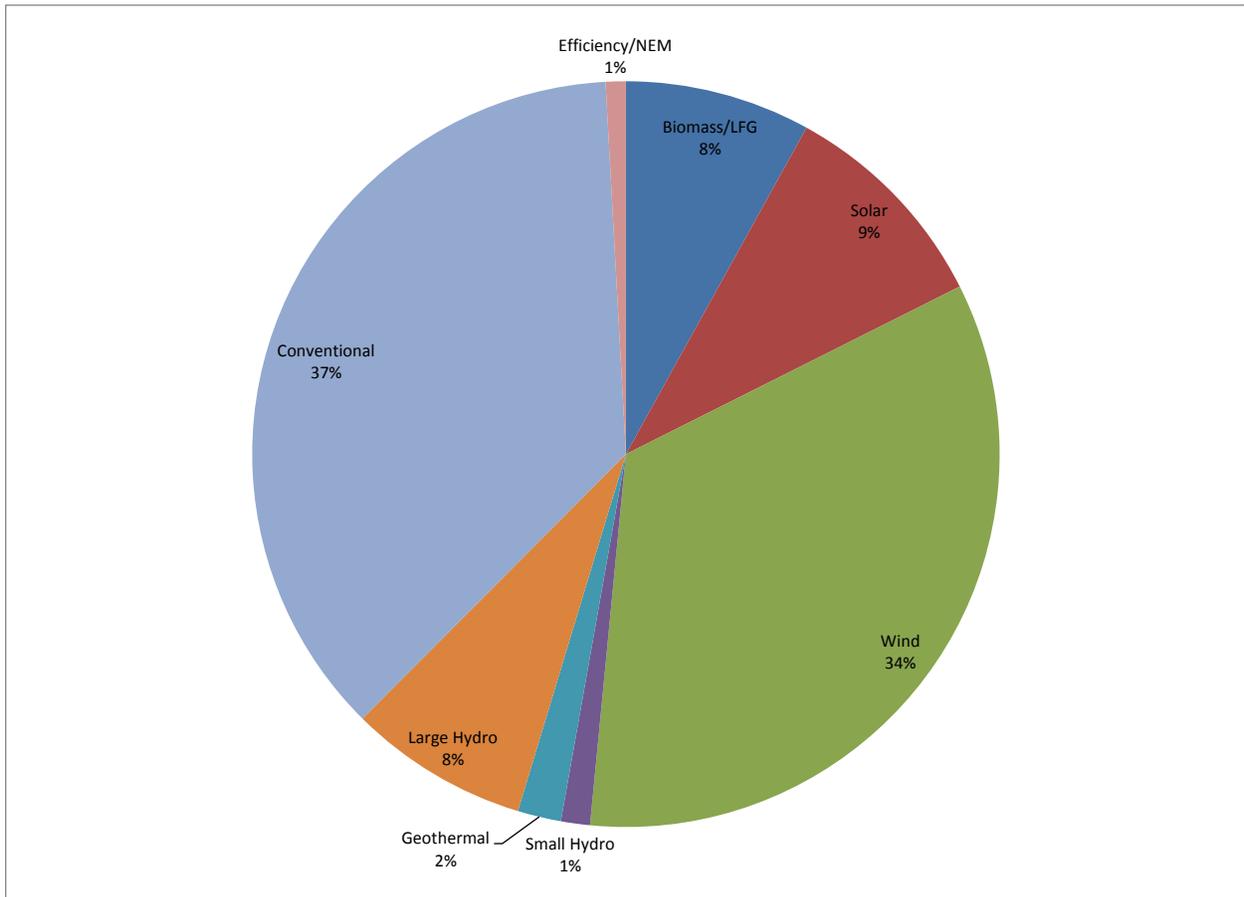
***Binford Storage Feed-In Tariff Project (PV Solar): renewable energy***

A proposed building-integrated 990 kW PV project is under development in Novato, California. The agreement would extend for a twenty-year term with an expected commercial operation date of September 30, 2015. Energy deliveries from the project are expected to offset MCE load and are projected to average 1,800 MWh per year during the contract term.

**Current Resource Mix**

MCE's current resource mix contains among the highest proportions of renewable energy (51%) when compared to other utilities in California. Figure 3 shows the current mix of resources attributable to the MCE Program.

Figure 4: MCE 2015 Resource Mix [estimated]



### Resource Needs

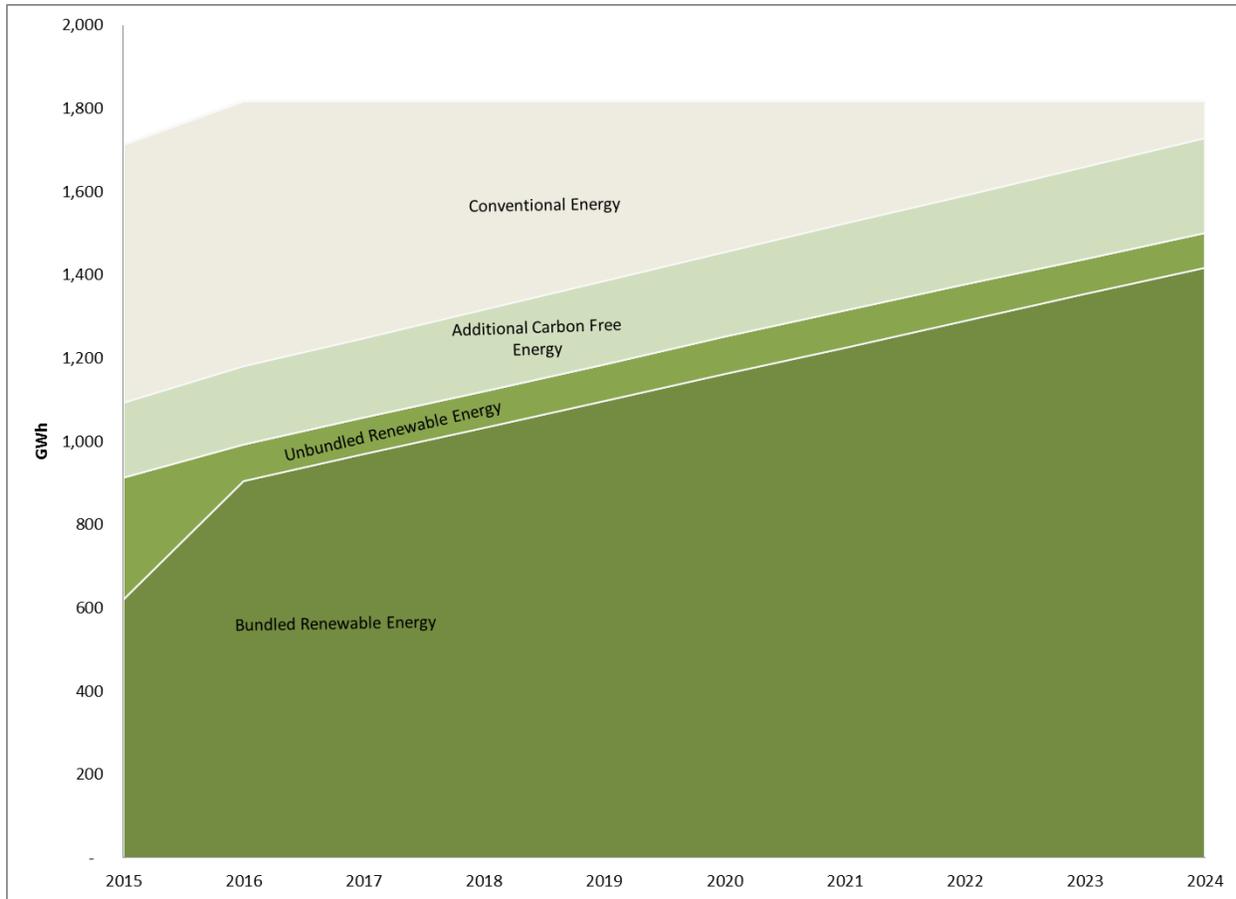
MCE will procure additional energy products to meet its resource targets. This section sets forth MCE’s planned resource volumes and quantifies the net resource need or “open position” that remains after accounting for production from MCE’s existing resource portfolio. MCE has established resource targets for the supply portfolio’s overall renewable energy content as well as subcategories of renewable energy procurement, carbon neutral renewable resources, capacity resources, and other system resources.

### Renewable Resources

MCE has committed to providing all of its customers with energy that meets a minimum 50% overall renewable energy content; incremental renewable energy supply will also be procured to ensure that the energy requirements of all customers participating in the voluntary Deep Green 100% renewable energy program will be served with appropriate quantities of renewable energy. MCE’s renewable

energy requirements are fulfilled with a combination of RPS-eligible energy products.<sup>4</sup> As Figure 4 illustrates, the proportion of MCE’s resource mix supplied by bundled renewable energy products is expected to significantly increase during the ten-year planning period, displacing purchases of unbundled RECs, while trending towards an overall 80% renewable energy content. MCE will seek to procure additional bundled renewable energy sources to contribute towards meeting MCE’s longer-term goal of 80% renewable energy supply, subject to economic and technical feasibility.

**Figure 4: MCE Renewable and Non-renewable Energy Volumes, 2015-2024**



**RPS Requirements**

MCE’s renewable power content significantly exceeds the state’s minimum RPS requirements and will continue to do so during the ten-year planning period. According to applicable rules, California’s RPS requirements can be met with a variety of renewable resource technology types and procurement methods. Under the currently effective RPS program renewable energy procurement requirements gradually increase from 20% to 33% by 2020; under Senate Bill 350, which was signed by Governor Brown on October 7, 2015, California’s RPS will increase to 50% by 2030 – specific details related to SB 350 implementation, including rules related to eligible renewable energy products and scheduled

<sup>4</sup> Certain of MCE’s renewable energy volumes are produced by facilities that are both RPS-eligible and Green-e Energy-eligible, according to eligibility criteria established in the Green-e Energy National Standard: <http://www.green-e.org/docs/energy/Green-eEnergyNationalStandard.pdf>.

increases in renewable energy procurement obligations, have yet to be developed; MCE staff will remain engaged in related proceedings/discussions to ensure effective implementation of any applicable procurement requirements related to this legislation. Under California's currently effective RPS program, eligible renewable fuel sources include the following:

- Biodiesel
- Biogas
- Biomass
- Conduit hydroelectric
- Digester gas
- Fuel cells using renewable fuels
- Geothermal
- Hydroelectric incremental generation from efficiency improvements
- Landfill gas
- Municipal solid waste
- Ocean wave, ocean thermal, and tidal current
- Photovoltaic
- Small hydroelectric (30 megawatts or less)
- Solar thermal electric
- Wind

RPS compliance can be met with procurement from renewable resources located within or deliverable to the state ("Bucket 1"), and with certain quantity limitations, procurement of shaped and firmed renewable energy ("Bucket 2") as well as unbundled RECs from RPS-eligible resources ("Bucket 3").

MCE has a sufficient supply of RPS-eligible renewable resources to meet a 50% procurement standard in calendar years 2015 and 2016, well in excess of the 2016 procurement requirement of 25% (and generally equivalent to the new RPS standard of 50%, which will apply in 2030). MCE plans to incrementally increase its RPS eligible power content to 80% by 2025. MCE intends to continue exceeding the environmental performance standards mandated by state regulations with respect to renewable energy and GHG emissions.

#### ***RPS Open Positions***

MCE has substantially focused its procurement efforts on long term PPAs with new RPS-eligible generation facilities located within California. Such generators produce the highest value renewable energy product, Bucket 1, which is not subject to procurement limitations under California's currently effective RPS program. In accordance with state regulations, a minimum of 65% of required RPS procurement must be sourced from Bucket 1 products (in Compliance Period 2, which extends from January 1, 2014 through December 31, 2016), which are generally produced by California-sited renewable generating projects. MCE engages in shorter term contract arrangements for the more readily available Bucket 2 and Bucket 3 product options. As shown in Table 2-A, MCE has secured contracts for renewable energy volumes well in excess of applicable RPS requirements through 2018; beginning in 2019, MCE's resource balance reflects a need for additional RPS-eligible renewable energy supply to support regulatory compliance and voluntary renewable supply commitments.

**Table 2-A: MCE RPS Compliance Energy Balance, 2015-2024**

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
<b>Retail Sales (GWh)</b>	1,672	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816
<b>State RPS %</b>	23%	25%	27%	29%	31%	33%	35%	36%	38%	40%
<b>RPS Energy Required (GWh)</b>	390	454	490	527	563	599	630	661	692	723
<b>RPS Energy Contracted (GWh)</b>	847	703	715	750	418	423	428	428	428	428
<b>Net Short/(Long)</b>	(457)	(249)	(225)	(224)	145	176	202	233	264	295
<b>Category 1 Required (GWh)</b>	253	295	368	395	422	449	473	496	519	542
<b>Category 1 Contracted (GWh)</b>	484	652	715	750	418	423	428	428	428	428
<b>Net Short/(Long)</b>	(231)	(357)	(347)	(355)	5	27	44	68	91	114

### **Voluntary Renewable Open Positions**

Voluntary renewable energy volumes reflect purchases that are necessary to exceed applicable RPS mandates. In particular, voluntary renewable energy purchases are necessary in order to fulfill MCE’s commitment to deliver a minimum 50% renewable energy supply to Light Green customers as well as 100% renewable energy supply to Deep Green customers. Prior to 2015, voluntary renewable energy requirements were generally met with short-term purchases of unbundled RPS- and Green-e Energy-eligible RECs. Based on the success of recent renewable energy procurement activities, which were administered for the purpose of displacing unbundled REC volumes, MCE has contracted for increased quantities of bundled renewable energy for 2015 and beyond. Such purchases will support a transition away from unbundled renewable energy products, resulting in significant increases<sup>5</sup> to the proportion of voluntary renewable energy volumes sourced from bundled renewable products. The remaining open positions related to meeting MCE’s voluntary renewable energy targets for the Light Green and Deep Green retail energy product offerings are shown in Table 2B and Table 3.

**Table 2-B: MCE Light Green Renewable Energy Balance, 2015-2024**

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
<b>MCE RPS Procurement Goal %</b>	50%	50%	53%	57%	60%	63%	67%	70%	73%	77%
<b>RPS Energy Target (GWh)</b>	886	962	1,027	1,091	1,155	1,219	1,283	1,347	1,412	1,476
<b>RPS Energy Contracted (GWh)</b>	847	703	715	750	418	423	428	428	428	428
<b>Net Short/(Long)</b>	39	260	311	340	737	796	855	919	983	1,048

**Table 3: MCE Deep Green Renewable Energy Balance, 2015-2024**

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
<b>Targeted Renewable Energy Volume (GWh)</b>	27	31	31	30	29	33	31	29	27	25
<b>Renewable Energy Under Contract (GWh)</b>	27	-	-	-	-	-	-	-	-	-
<b>Net Short/(Long)</b>	(0)	31	31	30	29	33	31	29	27	25

### **GHG-Free Resources**

Prior to 2016, MCE policy generally specified that MCE’s annual attributed portfolio emissions rate, which reflects the proportionate use of GHG-emitting power sources, would be lower than the similar annual emissions rate published by PG&E. Recently, MCE established a goal to achieve a 95% carbon-free supply portfolio by 2025. With respect to MCE’s emissions calculation methodology, MCE utilizes

<sup>5</sup> Estimated to account for an average of 25% of MCE’s voluntary renewable energy targets per year between 2015 and 2018

industry standards, such as the reporting conventions established by The Climate Registry, to quantify attributed GHG emissions associated with its supply portfolio. To promote achievement towards its voluntary longer-term portfolio emission goals, MCE will require additional carbon-free/neutral energy in 2018 and beyond.

**Table 4: MCE Carbon-Free Energy Balance, 2015-2024**

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
<b>Retail Load (Net of EE/DG)</b>	1,672	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816
<b>Carbon Free Target</b>	61%	61%	65%	69%	72%	76%	80%	84%	88%	91%
<b>Carbon Free Targeted Volumes</b>	1,022	1,110	1,178	1,247	1,316	1,384	1,453	1,521	1,590	1,659
<b>CF Under Contract</b>	1,062	837	886	775	443	448	453	453	453	453
<b>Future Generic Renewables</b>	39	290	342	370	766	829	887	949	1,011	1,072
<b>Open Position, Carbon Free</b>	<b>(79)</b>	<b>(18)</b>	<b>(50)</b>	<b>101</b>	<b>107</b>	<b>107</b>	<b>113</b>	<b>120</b>	<b>126</b>	<b>133</b>

### Capacity Resources

MCE meets California’s resource adequacy standards by procuring qualifying capacity sufficient to meet MCE’s projected peak demand plus a 15% reserve margin. In addition to this general requirement, MCE must ensure that mandated proportions of such capacity resources are procured from local reliability areas defined by the California Independent System Operator (CAISO). MCE has a need for capacity purchases to meet resource adequacy obligations beginning in 2016. It is noteworthy that resource adequacy purchases are typically conducted via shorter-terms transactions without a great deal of lead time. MCE is already engaged in procurement processes related to the open position existing in 2016 and expects to fill such position during the balance of 2015. In addition, MCE has long-term capacity rights under several of its PPAs, which will provide a portion of MCE’s local resource adequacy needs during the ten-year planning period.

**Table 5: MCE Resource Adequacy Capacity Balance, 2015-2024 (MW)**

	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>
<b>Load</b>										
Peak Demand	337	345	346	348	349	351	352	354	355	357
New DG and Efficiency	(8)	(16)	(21)	(25)	(30)	(35)	(39)	(44)	(49)	(53)
Net Peak Demand	329	329	326	323	319	316	313	310	306	303
<b>RA Requirements</b>										
Greater Bay Area	35	38	38	38	38	38	38	38	38	38
Other PG&E Area	66	74	73	72	71	70	69	68	67	66
System	200	164	162	160	158	156	154	152	150	148
Flexible	79	35	35	35	35	35	35	35	35	35
<b>RA Contracted</b>										
Greater Bay Area	35	38	-	-	-	-	-	-	-	-
Other PG&E Area	66	74	45	32	32	32	32	32	32	32
System	201	164	-	-	-	-	-	-	-	-
Flexible	79	35	-	-	-	-	-	-	-	-
<b>Net Short/(Long)</b>										
Greater Bay Area	0	-	38	38	38	38	38	38	38	38
Other PG&E Area	(0)	-	29	41	40	39	38	37	36	35
System	(1)	-	162	160	158	156	154	152	150	148
Flexible	-	-	35	35	35	35	35	35	35	35

### System Energy

The remaining energy supply, after accounting for renewable and additional GHG-free energy supplies, can be met with unspecified system energy purchases or specified purchases of conventional generation (within California, conventional generation generally refers to power sources that rely on the combustion of natural gas to produce electric energy). MCE policy prohibits unit-specific purchases from coal or nuclear generation facilities. MCE supplies its remaining load through a combination of short- to medium-term, fixed priced power purchases with specified conventional generators and short-term purchases from the CAISO markets. MCE has contracts in place to supply virtually 100% of its load (at fixed prices) through the end of 2017. Any remaining energy balancing is conducted through the CAISO market, via purchases and sales during the operating horizon, and other variable priced supply contracts. Based on current forecasts, MCE has significant system/conventional resource needs in 2018 and beyond, following expiration of the SENA supply agreement. MCE is actively engaged in planning and procurement discussions to address significant portions of this expected open position.

**Table 6: MCE System Energy Balance, 2015-2024 (GWh)**

<b>Load</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>
Retail Sales	1,687	1,857	1,870	1,884	1,897	1,911	1,924	1,938	1,951	1,965
DG and Efficiency	(14)	(19)	(24)	(28)	(33)	(38)	(43)	(47)	(52)	(57)
Distribution Losses	100	109	109	109	109	109	109	109	109	109
<b>Total Load Requirement</b>	<b>1,773</b>	<b>1,947</b>	<b>1,956</b>	<b>1,964</b>	<b>1,973</b>	<b>1,982</b>	<b>1,991</b>	<b>1,999</b>	<b>2,008</b>	<b>2,017</b>
<b>Less Renewables/Carbon Free</b>										
Existing and Planned Renewables, Bundled	620	905	969	1,033	1,097	1,161	1,226	1,290	1,354	1,418
Existing and Planned Renewables, Unbundled	293	89	88	88	87	91	89	87	85	82
Existing and Planned Other Carbon Free	109	116	121	126	132	132	138	145	151	158
<b>Total Existing and Planned Carbon Free Energy</b>	<b>1,022</b>	<b>1,110</b>	<b>1,178</b>	<b>1,247</b>	<b>1,316</b>	<b>1,384</b>	<b>1,453</b>	<b>1,521</b>	<b>1,590</b>	<b>1,659</b>
<b>Total System/Null Energy Requirements</b>										
Null Energy Associated with Unbundled RECs	293	89	88	88	87	91	89	87	85	82
Remaining System Energy Requirement	751	837	777	717	657	598	538	478	418	358
<b>Less System/Null Energy Contracted</b>										
	1,083	1,198	1,065	438	438	-	-	-	-	-
<b>System/Null Energy Net Short/(Long)</b>	<b>(39)</b>	<b>(272)</b>	<b>(200)</b>	<b>367</b>	<b>306</b>	<b>689</b>	<b>627</b>	<b>565</b>	<b>503</b>	<b>441</b>

## New Resource Requirements

Integration of additional intermittent renewable energy resources on the California electricity grid in order to meet the state’s 50% renewable energy target has presented new energy scheduling challenges for the CAISO. Due to the influx of renewable generating resources, particularly large-scale solar and wind generators, historical load patterns and peak consumption hours have shifted, requiring increased responsiveness for certain generators that must be dispatched to promote ongoing load and resource balances. These changes have necessitated the consideration of two new resource types within the MCE resource plan: flexible capacity and energy storage.

### Flexible Capacity

The CAISO, in collaboration with the CPUC and other local regulatory authorities, must ensure that the energy supply has sufficient flexibility, including load following capabilities, to address unexpected system variability. Flexible capacity capabilities of resources such as distributed generation, demand response, and storage should ultimately count towards a load-serving entity’s (LSE) flexible capacity procurement obligation. Each LSE must demonstrate procurement of 90 percent of its flexible capacity requirement on its annual resource adequacy filing and 100 percent of the specified requirement on its monthly resource adequacy filings. Compliance mandates related to flexible capacity began in 2015, and MCE has been successful in satisfying such mandates.

**Table 7: MCE Flexible Capacity Targets, 2016**

<b>Results of Energy Commission Review and Adjustment to the 2016 Year-Ahead Load Forecast for MCE</b>											
<b>Monthly Flexible Capacity Targets (MW)</b>											
Jan - 16	Feb - 16	Mar - 16	Apr - 16	May - 16	Jun - 16	Jul - 16	Aug - 16	Sep - 16	Oct - 16	Nov - 16	Dec - 16
74	71	64	60	37	35	25	29	39	51	83	94

## Energy Storage

The California Energy Storage Bill, AB 2514, was signed into law in September of 2010, and as a result, the CPUC established energy storage targets for investor owned utilities, community choice aggregators (CCAs), and LSEs in September 2013. The applicable CPUC decision established an energy storage procurement target for CCAs and electric service providers equal to 1 percent of their forecasted 2020 peak load; this procurement target must also be satisfied by 2020. The decision will require MCE to install 3 MW of energy storage no later than 2024 based upon the current load forecast. Beginning on January 1, 2016, and every two years thereafter, MCE must file an advice letter demonstrating compliance with this requirement, progress towards meeting this target, and a description of the methodologies for insuring projects are cost-effective.

## Procurement

MCE will procure its net open positions using a combination of PPAs of various terms (short, medium, long), demand-side programs, and potentially MCE owned generation projects. This section describes the types of resources MCE may procure and discusses various considerations that may influence MCE's procurement efforts.

MCE is continuing a transition from the initial full requirements contract that was used to launch MCE, under which all supplies of energy, capacity and renewable energy were provided through a single agreement with a single counterparty. Subsequent to that initial contract, MCE has put into place a robust renewable energy buying program that now supplies the majority of the MCE renewable energy supplies from a variety of renewable energy providers. MCE is similarly developing an independent buying program for non-renewable energy and capacity. MCE intends to soon initiate the non-renewable resource buying program with purchases of resource adequacy capacity to begin filling its 2015 open positions. A non-renewable energy buying program will also be put into place during the next few years to begin filling the 2018 open energy positions.

## MCE Generation Development

MCE does not currently own any generation assets. MCE has historically utilized long term PPAs (typically 20-25 years) to obtain rights to renewable energy supplies at stable costs for its customers. MCE considers long term PPAs to offer similar benefits to asset ownership in regards to price certainty and supply security; however MCE does not have an explicit bias towards either PPAs or asset ownership. MCE examines opportunities for asset ownership on a case-by-case basis, considering such factors as risk allocation, asset location, technology, and, most critically, supply of electricity at the least cost to MCE ratepayers.

Current federal tax policy generally favors private versus public ownership of renewable assets due to the tax credits that are uniquely available to the private sector. These tax credit policies are set to expire at the end of 2016 and if they are not extended, renewable energy prices may see a 30% increase. MCE's experience has been that PPAs for production by privately owned renewable generation facilities have typically been the least cost option for MCE. MCE has secured buyout option provisions in some of its renewable PPAs, which provide a path to MCE asset ownership after a defined period of time when the tax benefits have been exhausted by the private developer. MCE will typically seek buyout option

provisions in its renewable PPAs, although not all projects are suitable for acquisition, and not all PPAs will contain such provisions.

Assessing a generation project's operational risk becomes more important for assets owned by MCE because MCE could be at risk for production shortfalls and for cost over-runs, which are risks typically absorbed by the developer under a PPA structure. With these risks in mind, MCE is most likely to own small, local PV projects as these projects are technologically proven, have relatively low operational and maintenance risks, and provide benefits to the local economy. MCE is targeting development of 10 MW of new PV within its service territory during the next ten years.<sup>6</sup> MCE may invest directly in these projects as necessary to ensure development of certain project opportunities that will promote the achievement of MCE's goals and objectives. MCE may consider ownership of other generation projects and will examine such opportunities on a case-by-case basis. Direct generation investment becomes an increasingly viable option during the planning period as MCE gains additional operational experience and more robust access to credit markets. As part of this approach, MCE may also consider joint ventures and turnkey development approaches to ensure appropriate allocation of project risks.

### **MCE Solar 1 – Local Solar Development**

In September of 2014, MCE entered into an option agreement to lease 60 acres from Chevron Products Company (CPC) at the Richmond oil refinery for the development of 2 to 12 MWs of photovoltaic solar generation. The initial evaluation of this brownfield development site by MCE staff yielded no significant development, permitting, or interconnection concerns. As a result, MCE is in the process of completing a site development plan, and expects the development to begin in late 2015. MCE's development of the Project will benefit the public by allowing MCE to provide electricity from local renewable resources to customers in alignment with MCE's role as a California Joint Powers Authority. MCE's status as a California Joint Powers Authority and the public benefit that will result from this Agreement and MCE's involvement in the Project were key factors in CPC's decision to lease the property to MCE on the terms of this Agreement.

### **Renewable Resource Power Purchases**

MCE uses a portfolio risk management approach in its power purchasing program, seeking low cost supply as well as diversity among technologies, production profiles, generation project sizes, project locations, counterparties, length of contract, and timing of market purchases. These factors are taken into consideration when MCE engages the market.

MCE continually manages its forward load obligations and supply commitments with the objective of balancing cost stability and cost minimization, while leaving some flexibility to take advantage of market opportunities or technological improvements that may arise. MCE monitors its open position separately for renewable resources (by compliance category), conventional resources, and on a total portfolio basis. MCE maintains portfolio coverage targets of up to 100% in the near-term (0 to 5 years)

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<sup>6</sup> The 10 MW local PV target is in addition to the 14 MW of distributed generation installed under the NEM program

and leaves a greater portion open in the mid to long term, consistent with generally accepted industry practice.

Generally, the renewable portion of the portfolio is met with longer term contracts, providing cost stability for the supply portfolio. MCE’s guidelines for long term, bundled renewable energy purchases are shown in Table 5.

**Table 8: MCE Renewable Energy Contracting Guidelines**

<b>Time Horizon</b>	<b>Contracting Guideline (Contracts/Total RE Need)</b>
<b>Current Year</b>	90% to 100%
<b>Years 2 – 3</b>	80% to 100%
<b>Years 4 – 5</b>	60% to 100%
<b>Beyond Year 5</b>	50% to 80%

MCE’s supply preference is for a mix of renewable energy technologies that will deliver energy in a pattern that is generally consistent with MCE’s load shape. Preferred purchase volumes from baseload (e.g., biomass, landfill gas, renewable fuel cells) and peaking renewable technologies (e.g., solar PV or CSP) is in rough proportion to the load profile (75% baseload/25% peaking), subject to adjustments for market conditions and technology price differentials that exist at the time of purchase. Recent market data suggests that peaking resources are likely to comprise a larger proportion of the renewable supply portfolio due to the recent rapid declines in prices for solar PV generation projects and the abundance of such projects in development. The actual renewable portfolio during the planning period will likely be more heavily weighted toward peaking energy production due to the prevalence of competitively priced solar projects. MCE may also engage in purchases from as-available renewable generation (e.g., wind) to the extent that energy prices reflect a lower value due to their intermittency.

MCE has no explicit policy preference for any specific qualifying renewable energy technology, apart from the pricing and production profile considerations described above.

In regards to generation project location, MCE places greater value on locally-sited renewable energy projects, particularly those located within the MCE service area. Of next highest preference are projects sited in the North Path 15 region followed by projects in the South Path 15 region and finally out-of-state resources.

### **Feed In Tariff**

MCE’s current Feed-In Tariff (FIT) program was established as a 2 MW pilot program. The program was expanded to 10 MW in aggregate capacity, with 6.7 MW currently under contract. MCE anticipates conducting a review of the FIT program once the cap is reached along with other refinements that may be made. This expansion will support achievement of MCE’s local renewable generation development objectives. MCE’s first FIT project, the San Rafael Airport FIT came online in October of 2012, and is producing 10% more renewable energy than originally estimated. Table 9 shows all existing and proposed MCE FIT projects and the associated capacity, annual output, and commercial operation date.

Table 9: MCE Existing and Proposed Feed-In Tariff Projects

Project Name	Project Status	Capacity (kW)	Annual Output (kWh)	Commercial Operation Date
San Rafael Airport	Operating	972	1,800	October 2012
Cooley Quarry 100% Local Solar	Under Contract	990	2,000	March 2016
Cooley Quarry	Under Contract	450	1,000	March 2016
Richmond NWC Goodrick	Under Contract	998	1,800	June 2016
Richmond Parkway	Under Contract	998	1,800	June 2016
Larkspur RE	Under Contract	261	500	November 2015
Binford Road Storage	In Queue	990	1,800	September 2016
<b>TOTAL</b>		<b>5,659</b>	<b>10,700</b>	

MCE established a 100% Local Solar program in 2014, which is a new community based program that diverts select FIT projects and enables subscribers to sign up for 100% local solar generation as an alternative to MCE’s Light Green 50% renewable or 100% Deep Green renewable programs. The 100% Local Solar program is not yet fully subscribed but is expected to be on line in early 2015.

### Carbon-Free Power Purchases

MCE anticipates that its GHG-free energy supplies will be substantially met through MCE’s renewable procurement policies, supplemented as necessary with short- and medium-term purchases of GHG-free energy sources, particularly large hydroelectric energy resources and, to a lesser extent, unbundled renewable energy certificates or verifiable environmental credit offset products. As previously noted, MCE will not engage in unit-specific purchases from nuclear generators to meet its GHG-free power supply objectives.

### System Resources and Specified Power Purchases

MCE may engage in purchases of unspecified system energy or unit specific purchases from natural gas-fueled generation. Energy products may include peak, off-peak, baseload, and shaped energy. MCE may purchase energy and/or capacity at fixed prices, indexed prices or through tolling agreements. Under a tolling agreement, MCE would obtain the right to electricity produced by a natural gas generation facility, and MCE would deliver the natural gas to the facility for conversion into electrical energy. Purchases of system energy will typically be for short and medium terms (< 5 years). Unit-specific and tolling agreements may be for short, medium and long terms. Natural gas purchases associated with tolling agreements will typically be for short to medium terms.

With respect to MCE’s total supply and load obligations, MCE will manage exposure to market price risk by executing forward electric supply commitments for its projected energy sales obligations. MCE considers a variety of factors including the desire to maintain cost stability for MCE customers, the need to maintain competitive rates relative to PG&E and other energy service providers, and cost minimization for MCE customers. MCE’s budgeting and rate setting processes benefit from maximizing cost certainty within the budgetary fiscal year and avoiding significant year-to-year changes caused by energy market volatility. However, it is appropriate to maintain flexibility for incorporation of new, but as yet unplanned, resources or load reducing programs and to maintain limited exposure to market

pricing in order to maintain relative cost parity with competing energy service alternatives offered by the incumbent utility. In light of these considerations, the following market price contracting guidelines shall be maintained during operation of the MCE program.

**Table 10: MCE Power Supply Contracting Guidelines**

<b>Time Horizon</b>	<b>Contracting Guideline (Contracts/Total Energy Need)</b>
<b>Current Year</b>	80% to 105%
<b>Year 2</b>	70% to 100%
<b>Year 3</b>	60% to 95%
<b>Year 4 and Beyond</b>	Up to 70%

As MCE continues to contract with additional counterparties for supply of system energy and capacity, the contracting guidelines in Table 10 help to mitigate forward price risk. The contracting guidelines also serve as an important hedging strategy as MCE continues to expand its membership over the next several years. Execution of master power purchase and sale agreements with multiple, credit-worthy counterparties in the near term will enable energy purchases through execution of transaction-specific confirmations at the appropriate time.

### **Reserve Capacity Purchases**

MCE may engage in purchases or sales of resource adequacy capacity from generation resources that qualify to meet resource adequacy requirements in accordance with CPUC and CAISO rules. Terms may range from one month up to ten years. Capacity is also often bundled with energy and renewable attributes under MCE’s renewable energy PPAs.

### **Procurement Methods and Authorities**

MCE may use a variety of procurement methods for energy and capacity products. Authorized methods include bilaterally negotiated agreements, competitive solicitations (request for proposals or “RFPs”), the Open Season process, and standard offer approaches, such as MCE’s FIT.

Energy procurement authority varies depending upon the nature of the energy product being procured and the financial commitment the purchase entails. The appropriate procurement method and procurement authority are generally defined by the term of the energy product purchase, consistency with an approved resource plan, and whether capital financing is required.

### **Procurement Methods**

For long term purchase commitments, MCE will typically use competitive solicitations which may take the form of an RFP, the Open Season or a similar process where a comparative analysis of proposals is made at a single point in time. An RFP may be used where a specific resource need has been identified, some degree of urgency exists in fulfilling the identified need, sufficient time exists to conduct an RFP, and management believes that an RFP would yield the most competitive outcome. For less urgent procurement needs, the annual Open Season process will typically be used. MCE annually conducts an Open Season where it accepts proposals for renewable power purchase opportunities. MCE evaluates

the proposals against each other and in the context of other market information available to MCE and may elect to negotiate PPAs with any number of respondents.

Bilaterally negotiated agreements in response to unsolicited proposals may be used for unique opportunities that are fleeting in nature such that timelines associated with an RFP or the Open Season process would prevent MCE from engaging in beneficial procurement opportunities.

Short and medium term power purchases will typically be negotiated on a bilateral basis or via independent energy brokers, particularly in markets with sufficient market price transparency to ensure competitive procurement outcomes. These markets include 1) system energy at a defined CAISO trading hub for peak, off-peak, or baseload products; 2) unbundled RECs; and 3) short term resource adequacy capacity. This process allows for maximum operational flexibility to manage supply and demand imbalances in an efficient manner.

### **Procurement Authorities**

The MCE Board establishes procurement policies and objectives through adoption of the resource plan. The MCE Chief Executive Officer (CEO) is authorized to execute certain contracts for energy products that are consistent with the approved resource plan, while other resource commitments require MCE Board pre-approval prior to execution.

For shorter term power purchases, it is appropriate for management to have discretion in contracting, consistent with its responsibilities and expertise in efficiently operating the MCE program. Time is often of the essence in such transactions, and these transactions are unlikely to raise policy considerations that require MCE Board input. For long-term commitments, it is appropriate for the MCE Board to exercise a greater degree of oversight. The various energy procurement authorities are as follows:

#### **Short-term contracts**

PPAs (energy, capacity, RECs) with terms of 12 months or less may be entered into on MCE's behalf by the CEO. The CEO will report all such contracts to the MCE Board on a monthly basis.

#### **Medium-term contracts**

PPAs (energy, capacity, RECs) with terms of greater than 12 months and less than or equal to 5 years and which are made pursuant to a MCE Board approved resource plan may be entered into on MCE's behalf by the CEO in conjunction with the MCE Board Chair. A committee of the MCE Board will be consulted prior to execution of any medium-term contracts. The CEO will report all such contracts to the MCE Board on a monthly basis.

#### **Long-term contracts**

PPAs (energy, capacity, RECs) with terms of greater than five years shall require Board approval prior to execution.

### **Capital Projects and Debt**

Contracts associated with MCE ownership of generation assets or the assumption of debt by MCE in support of generation projects or PPAs require MCE Board pre-approval.

### Other Energy Procurement

Any procurement of energy products that is inconsistent with or that is not addressed in the adopted resource plan requires MCE Board pre-approval.

## Appendix A-1: Load and Resource Tables

<b>Marin Clean Energy Resource Balance</b>										
Sep-15										
	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>
<b>Energy Requirements (GWh)</b>										
Retail Load	1687	1857	1870	1884	1897	1911	1924	1938	1951	1965
New Energy Efficiency	(0)	(22)	(31)	(39)	(48)	(57)	(66)	(74)	(83)	(92)
New Distributed Generation	(14)	(19)	(24)	(28)	(33)	(38)	(43)	(47)	(52)	(57)
Retail Load (Net of EE/DG)	1,672	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816
Distribution Line Losses and Unaccounted For Energy	100	109	109	109	109	109	109	109	109	109
<b>Total Energy Requirements</b>	<b>1,773</b>	<b>1,925</b>								
	34									
<b>Light Green Renewable Energy Content (%)</b>	50%	50%	53%	57%	60%	63%	67%	70%	73%	77%
<b>Light Green Portfolio Content Category Targets (% of Renewable Energy)</b>										
PCC 1 Target	60%	70%	70%	71%	71%	71%	72%	72%	72%	72%
PCC 2 Target	10%	24%	24%	24%	24%	24%	24%	24%	24%	24%
PCC 3 Target	30%	6%	6%	5%	5%	5%	5%	4%	4%	4%
Deep Green Participation	3%	3%	4%	4%	4%	5%	5%	5%	6%	6%
<b>Overall MCE Renewable Energy Content (Light Green and Deep Green)</b>	<b>52%</b>	<b>52%</b>	<b>55%</b>	<b>58%</b>	<b>62%</b>	<b>65%</b>	<b>68%</b>	<b>72%</b>	<b>75%</b>	<b>78%</b>
<b>Light Green Renewable Energy Volume Targets (GWh)</b>										
PCC 0 (SENA P1)	3	-	-	-	-	-	-	-	-	-
PCC 1 (Bundled, In-State)	529	674	723	772	821	871	920	969	1,018	1,067
PCC 2 (Bundled, Firmed and Shaped)	89	231	246	261	276	291	306	321	336	351
PCC 3 (REC Only)	266	58	58	58	58	58	58	58	58	58
<b>Subtotal, Light Green Renewable Energy Volume Targets</b>	<b>886</b>	<b>962</b>	<b>1,027</b>	<b>1,091</b>	<b>1,155</b>	<b>1,219</b>	<b>1,283</b>	<b>1,347</b>	<b>1,412</b>	<b>1,476</b>
<b>Deep Green Renewable Energy Volume Targets (GWh)</b>										
Deep Green Retail Sales	54	62	65	69	73	91	94	98	102	105
<b>Deep Green Incremental Renewable Energy Volume</b>	<b>27</b>	<b>31</b>	<b>31</b>	<b>30</b>	<b>29</b>	<b>33</b>	<b>31</b>	<b>29</b>	<b>27</b>	<b>25</b>
<b>Conventional Energy Requirements (includes energy w/ unbundled RECs)</b>	<b>1,152</b>	<b>1,020</b>	<b>956</b>	<b>892</b>	<b>828</b>	<b>764</b>	<b>699</b>	<b>635</b>	<b>571</b>	<b>507</b>
<b>Renewable Resources Under Contract (GWh)</b>										
Product Content Category 0	3	-	-	-	-	-	-	-	-	-
Product Content Category 1	482	652	715	750	418	423	428	428	428	428
Product Content Category 2	115	51	-	-	-	-	-	-	-	-
Product Content Category 3	248	-	-	-	-	-	-	-	-	-
<b>Subtotal, Light Green Renewable Resources Under Contract</b>	<b>847</b>	<b>703</b>	<b>715</b>	<b>750</b>	<b>418</b>	<b>423</b>	<b>428</b>	<b>428</b>	<b>428</b>	<b>428</b>
<b>Deep Green RECs Under Contract</b>	<b>27</b>	<b>-</b>								
<b>Open Position, Light Green Renewables (GWh)</b>										
Product Content Category 1	48	22	8	22	404	448	492	541	590	639
Product Content Category 2	(26)	180	246	261	276	291	306	321	336	351
Product Content Category 3	18	58	58	58	58	58	58	58	58	58
<b>Subtotal, Open Position, Light Green Renewables</b>	<b>39</b>	<b>260</b>	<b>311</b>	<b>340</b>	<b>737</b>	<b>796</b>	<b>855</b>	<b>919</b>	<b>983</b>	<b>1,048</b>
<b>Open Position, Deep Green RECs</b>	<b>(0)</b>	<b>31</b>	<b>31</b>	<b>30</b>	<b>29</b>	<b>33</b>	<b>31</b>	<b>29</b>	<b>27</b>	<b>25</b>
<b>Conventional Resources Under Contract (GWh)</b>										
	1,270	1,332	1,236	463	463	25	25	25	25	25
<b>Open Position, Conventional Energy (GWh)</b>	<b>(118)</b>	<b>(312)</b>	<b>(280)</b>	<b>429</b>	<b>365</b>	<b>739</b>	<b>674</b>	<b>610</b>	<b>546</b>	<b>482</b>
<b>Total Energy Under Contract (GWh)</b>	<b>1,869</b>	<b>2,035</b>	<b>1,951</b>	<b>1,213</b>	<b>881</b>	<b>448</b>	<b>453</b>	<b>453</b>	<b>453</b>	<b>453</b>
<b>Less Variable Price Contracts (GWh)</b>	<b>-100</b>	<b>-70</b>								
<b>Net Open, All Physical Energy (GWh)</b>	<b>4</b>	<b>(40)</b>	<b>44</b>	<b>782</b>	<b>1,114</b>	<b>1,547</b>	<b>1,542</b>	<b>1,542</b>	<b>1,542</b>	<b>1,542</b>
<b>Total Market Price Contract Coverage (%)</b>	<b>100%</b>	<b>102%</b>	<b>98%</b>	<b>59%</b>	<b>42%</b>	<b>20%</b>	<b>20%</b>	<b>20%</b>	<b>20%</b>	<b>20%</b>