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ALAMEDA MUNICIPAL POWER
A Department of the City of Alameda

To: Honorable Public Utilities Board

Submitted by: _____
Rebecca Irwin
AGM – Customer Resources

From: Meredith Owens
Energy Management Supervisor

Approved by: _____
Glenn O. Steiger
General Manager

Subject: Accept Alameda Municipal Power's SB 1037 Energy Efficiency Report for FY 2015

RECOMMENDATION

By motion, accept Alameda Municipal Power's (AMP) Senate Bill (SB) 1037 Energy Efficiency Report for Fiscal Year (FY) 2015. The report serves as the annual report to customers and to the California Energy Commission (CEC) of the utility's investment and results in energy efficiency programs.

BACKGROUND

Enacted into law in September 2005, SB 1037, Section 9615, requires the following of all publicly owned electric utilities:

1) Each publicly owned electric utility, in procuring energy, shall first acquire all available energy efficiency and demand reduction resources that are cost effective, reliable, and feasible.

2) Each publicly owned electric utility shall report annually to its customers and to the Commission (CEC), its investment in energy efficiency and demand reduction programs. The report shall contain a description of programs, expenditures, and expected and actual energy savings results.

Since 2006, AMP has reported to the CEC its investment in energy efficiency programs as part of a collaborative effort of the California Municipal Utilities Association (CMUA), Northern California Power Agency (NCPA), and the Southern California Public Power Authority (SCPPA). Approximately 40 publicly owned electric utilities across the state participate in this effort. The collaborative process ensures consistency in energy efficiency measure savings quantification and reporting formats.

As part of the collaboration to comply with SB 1037, CMUA retained the consulting firm Energy & Resources Group to develop a Technical Resource Manual - May 2014 (TRM) to standardize the energy savings based upon existing widely accepted sources such as the CEC and the Pacific Gas and Electric Company working papers. The TRM provides the methods, formulas, and default assumptions used for estimating energy savings and peak demand impacts from energy efficiency measures. The energy savings estimates are used to report program accomplishments and measure progress towards program goals.

Additionally, the consulting firm Energy and Environmental Economics (E3) was retained to update their software tool to measure energy efficiency program savings and cost effectiveness to provide results in the CEC reporting format. The TRM May 2014 data is in the E3 tool used for FY 2015 reporting.

AMP is required to notify the CEC and AMP customers of its investment in energy efficiency programs on an annual basis. This Administrative Report is part of the notification process and information will also be available on AMP's website. The final SB 1037 report, which will include the results from all California municipal utilities, will be submitted by NCPA to the CEC on March 15, 2016.

The goals of AMP's energy efficiency programs are to:

1) Meet Board-approved annual energy efficiency targets and comply with California Assembly Bill (AB) 2021.

2) Acquire all available energy efficiency and demand reduction resources that are cost effective, reliable, and feasible.

3) Enhance customer satisfaction.

4) Reduce greenhouse gas emissions due to energy efficiency programs in the City of Alameda, as listed in the city's "Local Action Plan for Climate Protection."

5) Comply with all state policies.

6) Provide equal opportunity for all customers to participate.

AMP provides energy efficiency programs and services to all residential and non-residential customers.

The residential sector includes the following AMP rate schedules:

- D-1 Residential Service
- D-2 Multi-Family Residential Service (Master Meter)

The non-residential sector includes the following AMP rate schedules:

- A-1 General Service
- A-2 General Service – Demand Metered
- A-3 Medium General Service – Demand Metered
- A-4 Large General Service – Demand Metered
- CT General Service – Demand Metered
- OL Outdoor Street and Area Lighting
- MU1 – Municipal Electric Service – except street lighting
- MU2 – Municipal Electric Service – street lighting
- MU3 – Municipal Electric Service – AMP accounts

DISCUSSION

Energy Efficiency Results - 2015

For FY 2015, the actual net energy savings of 2,391 megawatt hours (MWh) meets 217 percent of the FY 2015 target of 1,101 MWh. The energy savings represents 0.7 percent of energy sales and the AMP energy efficiency portfolio has a Total Resource Cost (TRC) ratio of 1.3. The TRC measures the cost and benefits of an energy efficiency measure based upon the total cost of the measure to the utility and its customers, including both the program participant costs and the utility costs. A ratio higher than one indicates the measure passes the test. The actual TRC of 1.3 for FY 2015 is above the 1.0 threshold.

Some AMP programs have a TRC less than 1.0; for example, the residential Energy Star Refrigerator/Freezer and Recycle program has a TRC of 0.8 and the My Energy Program has a TRC of 0.6. Typically, residential programs do not perform as well as non-residential programs in terms of cost-effectiveness. The energy savings are lower and the cost to develop and implement residential programs is higher on a per kWh basis.

AMP offers the Energy Star Refrigerator/Freezer and Recycle Program, although it has a lower TRC, to encourage customers to buy Energy Star appliances. Usually the biggest single electric user in a home is the refrigerator. The expectation is that if a customer buys an Energy Star refrigerator and sees the reduction in their electric bill, they will continue to buy Energy Star appliances. The reported energy savings are based upon the incremental savings of the standard efficiency unit compared to the Energy Star unit, not upon the energy use of the customer's existing refrigerator.

AMP's My Energy Program has a lower TRC because the cost of the program is high and the energy efficiency savings are low on a per customer basis – 97 kWh/year per participant. Although the cost-effectiveness of these two programs is lower than other programs, all AMP customers must contribute to energy efficiency programs via their electric rates, therefore all customers should have equal opportunity to participate.

The following Table 1 is a summary of AMP's net energy efficiency savings for the past years of SB 1037 reporting and the projected savings for FY 2016. Net energy savings consist of total savings reduced from the gross to account for equipment failure, equipment that is never installed or removed before the end of its lifetime, and free riders—customers who would have installed the measure without the utility incentive**.** Table 2 provides a comparison of the target and actual energy savings per year.

Table 1 – Actual Net Energy Savings by Year

Fiscal Year	Net Energy Savings (MWh/Year)	Total Expenditures	Total Resource Cost Test (TRC)	Greenhouse Gas Reduction (Metric Tons CO2e)**
Actual 2006	279	$175,926	1.23	95
Actual 2007	923	$414,382	1.77	313
Actual 2008	2,136	$415,455	*6.21	724
Actual 2009	2,211	$510,067	1.93	750
Actual 2010	1,326	$579,068	1.77	450
Actual 2011	1,433	$653,816	1.46	486
Actual 2012	2,527	$882,494	2.34	857
Actual 2013	3,076	$1,080,782	1.59	1,043
Actual 2014	941	$791,244	0.80	319
Actual 2015	2,391	$1,176,585	1.3	811
Projected 2016	4,208	$1,692,404	*TBD*	1,427

** The very high TRC in FY 2008 is attributable to a large energy efficiency retrofit of the U.S. Coast Guard base, of which the available data is unverified and extremely limited due to security reasons and the availability of only second-hand information on this project.*

*** The emissions factor of 0.339 MT/MWh is used and is based upon California grid non-specified sources which will be the first electricity sources AMP will lay off as a result of energy efficiency.*

The 2,391 MWh savings achieved is equal to the annual energy use of 590 average Alameda residential customers. The resulting annual greenhouse gas emissions reduction from the 2015 energy efficiency programs is 811 metric tons of equivalent carbon dioxide (CO2e), which equates to the annual emissions of 231 cars.

Table 2 provides a comparison of AMP's targeted savings and actual energy savings per year.

Table 2 – Target vs. Actual Energy Savings by Year

Fiscal Year	EE Target (net MWh/year)	Actual EE Savings (net MWh/year)
2008	760	2,136
2009	760	2,211
2010	760	1,326
2011	1,574	1,433
2012	1,675	2,527
2013	1,771	3,076
2014	1,154*	941
2015	1,101*	2,391

** The targets vary from year to year depending upon AMP's forecasted load and particularly the impact of changes in energy building codes and appliance efficiency standards.*

Tables 3 and 4 provide a breakdown by customer sector of the FY 2015 customer rebates and energy savings to customers.

Table 3 - Energy Efficiency Savings by Customer Sector

Sector	Customer Rebates ($)	% of Total (Rebates)	Net Savings (MWh/ year)	% of Total (Savings)
Residential	**$389,369**	**80%**	**1,942**	**81%**
Non-Residential	**$98,961**	**20%**	**449**	**19%**
Total	**$488,329**	**100%**	**2,391**	**100%**

Table 4 – Energy Efficiency Savings by End Use

End Use	Energy Savings (MWh/year)
Residential Behavior	1,369
Residential Lighting	505
Residential Refrigeration	67
Non-Residential Lighting	400
Non-Residential Other	50
TOTAL	2,391

Table 5 provides a breakdown by year for the past three years for customer rebates, programs costs, net energy savings, and utility cost per kWh.

Table 5 – Utility Cost of Energy Efficiency Programs

Year	Rebates to Customers	Other Costs – Admin, Overhead, Marketing, etc.	Total Cost to Utility	Net Savings (MWh/year)	Utility Cost per kWh
2010	$115,465	$463,603	$579,068	1,326	$0.05
2011	$224,026	$429,790	$653,816	1,433	$0.06
2012	$427,182	$455,312	$882,494	2,527	$0.03
2013	$532,584	$548,199	$1,080,783	3,076	$0.04
2014	$124,271	$626,277	$750,548	941	$0.14
2015	$488,329	$688,256	$1,176,585	2,391	$0.10

The total AMP energy efficiency expenditures to acquire the savings, including overhead for FY 2015, was $1,176,585. This equates to a total utility cost for energy efficiency for FY 2015 of $0.10/kilowatt hour (kWh), which is the cost of the energy efficiency measure over the lifetime of the measure. The total utility cost of $0.10/kWh is higher than AMP's short-term avoided power generation cost of $0.085/kWh, a cost that includes power generation, transmission, distribution, and environmental externalities. The short-term cost of power is low due to the current low market price of natural gas. However, the long-term cost of power supplies is expected to increase and renewable power supplies cost more than non-specific California grid purchases. Also, AMP transmission costs are expected to increase by 70 percent from 2015 to 2025.

Analysis and Conclusions – FY 2015

Overall the costs and energy savings fluctuate from year to year depending upon the timing of programs, for example Bay Ship & Yacht is now doing some sizeable lighting projects cost and reliability of energy efficiency technologies, AMP's budget, building codes, appliance standards, and California state policies. The following is the analysis and conclusions of AMP's FY 2015 energy efficiency programs and services.

1.) Energy savings are increasing, but costs are increasing at a higher rate. The following are several reasons for these increases.

- Costs are up in general
  Although energy efficiency savings have increased, the cost to get those savings continues to increase as most of the low hanging opportunities have been completed. According to an April 2015 report by the Lawrence Berkeley National Laboratory, "The Total Cost of Saving Electricity through Utility Customer-Funded Energy Efficiency Programs," higher savings targets will increase costs. Furthermore, costs will increase because efficiency options are more costly to access, such as with comprehensive whole building retrofits, and program administrators spend more to encourage customers to participate in the programs.

- Cost of LEDs
  Nearly all the commercial lighting projects were LEDs. The cost of an LED retrofit can be much higher than retrofitting fluorescent fixtures, which contributes to lowering AMP's TRC ratio. These are situations where the entire fixture needs to be replaced. Also, with exterior lighting on a photocell, the photocell is usually replaced with a long-life photocell that matches the life of the new LED fixture. The cost of the new photocells for LEDs is about $60 compared with a standard photocell cost of about $10.

- Residential programs have higher costs
  The average cost of the residential programs is $0.125/kWh, the highest being the Energy Star Refrigerator Rebate & Recycle program at $0.23/kWh and the My Energy Program at $0.20/kWh. The average cost of the commercial programs is $0.068/kWh. Despite the cost difference, AMP provides energy efficiency programs to all customers because all customers must contribute to energy efficiency funds, therefore all customers should have equal opportunity to participate.

- Other costs – admin, overhead, marketing
  The two largest cost items in this category are AMP's labor overhead and the My Energy Program. AMP's labor overhead rate is 2.26459. AMP's labor overhead cost for energy efficiency ($214,574) and the cost of the My Energy Program ($215,249) is 63 percent of the total other costs. AMP's labor overhead rate includes all employee benefits and all AMP administrative costs. The AMP overhead rate is reviewed and updated every three years.

The other costs in this category (37 percent) are for are website tools, commercial and residential on-site audits, refrigerator recycling costs, program administrator for the Commercial Lighting Direct Install Program and residential refrigerator and recycling programs, and marketing costs.

2.) The residential energy savings are much higher than the non-residential savings in FY 2015. The non-residential savings are usually higher than residential, with commercial lighting retrofits typically being 60 percent of AMP's energy efficiency portfolio. There are several reasons for this.

- The ramp-up time for the commercial lighting direct install program took several months. Also, once a program has started it takes time for customers to start and complete projects. The minimum time for a lighting direct install project is 6 to 8 weeks. The program started in the second quarter of FY 2015 and concluded in the second quarter of FY 2016. The bulk of the energy savings from this program will occur in FY 2016.

- The My Energy Program provided most of the residential savings (70 percent). The lifetime of the energy savings of this behavioral program is one year compared with a

lifetime of 10 to 15 years for most LED lights. The energy savings are provided to AMP by the program vendor, Opower. Opower reported the energy savings for FY 2014 as 44 kWh/participant, and for FY 2015 the energy savings more than doubled to 97 kWh/participant. Opower stated that the reasons for the differences between FY 2014 and FY 2015 are the program ramp-up time and a change in methodologies regarding the savings from their "post-only" model.

At the Board's request, staff used a net to gross ratio of 1.0 for the My Energy Program. The net to gross ratio is applied to gross energy savings to account for free ridership - that is customers who would have done the measure regardless of a utility program, equipment failure, and equipment never installed.

- Another large energy savings program for the residential sector was the mailing of two LEDs to every residential customer. A total of 56,656 LEDs were mailed to residential customers.

3.) The 2013 Title 24 Building Energy Efficiency Standards (T24), which went into effect on July 2014, now applies to lighting retrofits in existing non-residential buildings. Typically 60 percent of AMP's energy efficiency portfolio is non-residential lighting retrofits. The 2013 T24 has become a barrier to many customers and has decreased the scope of many retrofits and increased the cost of doing retrofits. This also makes it more difficult for utilities to achieve their energy efficiency targets. The impacts are:
   - Longer time and increased costs for lighting installers to do audits and compliance for projects that trigger the T24 code
   - The lighting controls that are required by the 2013 T24 are costly.
   - Customers are not doing comprehensive retrofits and are opting for smaller projects that do not trigger code. For example, a customer decreased the scope of their lighting retrofit projects by almost 70 percent.
   - According to lighting retrofit vendor that has done work with AMP customers, the costs for projects that trigger T24 code have doubled.

Program Highlights – FY 2015

AMP has committed to spending the funds from the short-term sale of AMP's renewable energy credits (RECs) not needed for compliance with the State's Renewable Portfolio Standard (RPS) and Cap & Trade funds on efforts that reduce City of Alameda greenhouse gas emissions.

The Cap & Trade-funded My Energy Program produced 1,369 MWh in energy savings. The REC-funded residential LED mailing and commercial lighting direct install programs produced 528 MWh in energy savings. Collectively, these programs will reduce AMP's emissions by 643 metric tons of CO2e per year. The following is a summary of the highlights of FY 2015.

- My Energy Program - The goal of the Cap & Trade-funded My Energy Program is to encourage behavioral changes to improve energy efficiency by sending customers Home Energy Reports (HERs) five times during the program year that compares their energy use to their neighbors and provide tips on how they can reduce their energy use. The residential customer base was split in half: one group receives five HERs in the

mail each year (the test group), while the other half does not receive a HER in the mail (the control group).

All residents have access to the My Energy web portal, an online tool that provides similar information to the mailed report, such as comparisons to similar sized homes in Alameda, energy efficiency tips, and goal setting for reducing use. Nearly 600 Alameda residents set up accounts through the My Energy portal, which was visited nearly 4,500 times. Customers checked that they did, or would, complete 1,718 energy-saving tip actions. Customers with electric vehicles and solar are not included in the data sets for either group.

- Residential LED Programs
  The FY 2015 residential LED program started out as a customized program with a rebate rate of $0.20/kWh to encourage customers to try LEDs. In April 2015 the program was updated to a prescriptive rebate program. Participation increased from three to five applicants per month to 200 applicants in three months. Also, LEDs were given to customers who received onsite energy audits. Collectively, nearly 3,000 LEDs were installed through these programs providing 46,948 kWh/yr. (net) energy savings.

- LED mailing to residential customers - AMP mailed two free LEDs to every residential service address in February – March 2015. Many customers called and emailed with their support for the program and gratitude for AMP's "gift." AMP expects to see a flattening in its load curve during peak winter evenings as a result of the 56,832 LEDs that were delivered, due to the huge savings – 457,924 kWh per year (net savings). This program was funded by REC funds.

- Commercial Lighting Direct Install Program - In October, FY 2015, AMP started the REC-funded Commercial Lighting Direct Install Program, administered by a third-party vendor. The availability of REC funding made a program of this scale feasible for AMP because it requires significant staffing, back-office support, and software to assure quality work, fair pricing of materials and labor, and assured energy savings. The goals of the program are to remove customer barriers to lighting retrofits, such as knowledge of lighting technologies, project management, quality of contractors and fair pricing, first costs, compliance with Title 24, and reach customers that have not participated in energy efficiency programs previously. More than 70 percent of the participants were small commercial customers who had never participated in AMP's energy efficiency programs before. The program concluded on December 31, 2015 and the estimated energy savings from this program are 1,629,371 kWh/year (gross savings). Starting in January 2016, AMP will expand this program to include all non-residential customers and HVAC and refrigeration measures.

2016 Energy Efficiency Forecast

The target net energy savings for FY 2016 is 1,158 MWh, which is based on AMP's 10-year energy efficiency target for FY 2014 to FY 2023, approved by the Board at the January 2013 meeting. Staff expects to exceed this target largely due to additional REC funding, which will be used for energy efficiency projects and programs, specifically the conversion of the majority of

Alameda's streetlights to LEDs, completion of the Commercial Direct Install Program, and the start of a Non-Residential Direct Install Lighting, HVAC and Refrigeration Program.

The following is a summary of expected energy efficiency programs for FY 2016.

1) Residential Energy Efficiency Programs

- Mid-year, staff will finalize the development of an online marketplace for customers to find Energy Star products that qualify for AMP's rebates and access the rebate application online. A third-party program administrator will manage rebate submission, verification, processing, payment, and reporting. Rebates will be for high efficiency LED lighting and fixtures, refrigerators, freezers, electric clothes dryers, electric heat pump water heaters, and washing machines.

- Through NCPA, staff is developing an upstream LED program. Through this program the cost of LEDs will be reduced at the retail level. AMP expects local retailers to participate.

- Continuance of the My Energy program from Opower.

- Staff expects to develop a multifamily energy efficiency program in 2016. The scope of this program is to be determined.

2) Non-residential Energy Efficiency Programs

- Commercial Lighting Program – Direct Install
  The current program ended December 2015. The expected energy savings are 1,629 MWh. More than 80 percent of the program participants were small commercial customers who have never participated in an AMP program before. The two largest participants were Bay, Ship, &Yacht—one of the largest employers in Alameda—and the South Shore Shopping Center.

- Non-Residential Direct Install Lighting, HVAC, and Refrigeration Program

  This program will start in January 2016 and will expand the Commercial Lighting Direct Install Program to include all non-residential customers and HVAC and refrigeration measures.

- Proposition 39 energy efficiency projects for the College of Alameda and the Alameda Unified School District (AUSD) will be completed in FY 2016. The College will complete a lighting retrofit of the library and AUSD will complete a lighting retrofit project begun in 2015.

- LED Street Light Conversion
  AMP started the retrofit of all City of Alameda cobra head and shoe box street lights with LEDs in June 2015. This REC-funded project will be completed in January 2016 and will provide estimated energy savings of 853,587 kWh/year. The remaining historic lights will be retrofitted in future years. The expected completion for all street lights is 2019.

Impact of California Policies

The following recent policies will impact AMP's energy efficiency effort in FY 2016 and subsequent years.

"Existing Buildings Energy Efficiency Action Plan" (Plan), September 2015
Required by CA AB 758 (2009) the Plan provides a 10-year framework to transform California's existing building stock into high-performing energy-efficient buildings. The vision of the Plan is a doubling of the energy savings in California's buildings. This is equivalent to a 20 percent reduction in statewide building use by 2030 compared to the projected level of energy use. Some highlights of the Plan are the expectation that public buildings will lead by example, an emphasis on energy benchmarking, energy use metrics using the Energy Star Portfolio Manager, ongoing building performance monitoring, greater use of smart meter data and analytics, and the alignment of policies between agencies.
The refinement and implementation of these goals will occur over the next 10 years. The installation of the advanced metering infrastructure in the AMP service area will be a valuable asset to AMP in implementing the Plan.

CA SB 350, October 2015
In keeping with Governor Brown's goal of "double the efficiency of existing buildings," CA SB 350 directs the California Energy Commission (CEC) to set annual statewide targets by November 2017 to achieve a doubling of energy savings by 2030.

CA SB 350 uses the "Existing Buildings Energy Efficiency Action Plan" as the path to achieve statewide targets. CA SB 350 does not replace the existing CA AB 2021, the policy that required utilities to establish annual energy savings targets for a period of 10 years. However, it does allow the CEC to critique a utility's targets. The extent and enforcement of this critique is not known at this time. There is much to be determined in this policy, such as the base case for the statewide energy efficiency targets, cost effectiveness, feasibility, and enforcement. AMP staff expects annual energy efficiency targets to increase as a result of this policy.

CA AB 802, October 2015
CA AB 802 replaces AB 1103 and will be effective January 2016. This policy requires utilities to maintain the energy use data of all buildings they serve, and provide that data to the customer or to the customer's account in the Energy Star Portfolio Manager. Benchmarking of commercial and multifamily buildings over 50,000 ft2 is part of the policy and the details on this are to be determined.

Other Considerations

- In FY 2015 AMP started installing advanced metering infrastructure (AMI). Advanced meters have been installed on all medium and large commercial customers as of November 2015. AMI customers have access to a portal with their energy use data, which includes 15-minute interval data, kW, kWh, kVA, power factor, and weather

data. This data will help customers to better manage their energy use. Complete build out for all AMP customers will be completed in 2017.

AMP electric sales and the average residential energy use have been declining annually since 2011. This trend is similar to other utilities both in California and nationally. This downward trend is likely due to several factors.

- Increase in customer energy efficiency
- Increase in customer-owned distributed generation
- Increase in energy efficiency in codes and standards, particularly CA Title 24, the CA Building Standards, and Title 20 the 2012 Appliance Efficiency Regulations
- Consumer technology trends have decreased energy use also. For example LED TVs, which use 130 watts, have largely replaced plasma TVs, which used 400 watts. Also laptop computers, which use five watts, have largely replaced desktop computers, which used 32 watts.
- Increase in the efficiency requirements for the Energy Star label

Electric Sales and Average Residential Electric Use

Year	Actual Electric Sales (MWh/yr.)	Residential Average Annual Electric Use (kWh/yr.)
2011	382,634	4,651
2012	373,787	4,555
2013	363,444	4,434
2014	353,913	4,265
2015	342,203	4,053

FINANCIAL IMPACT

There was no direct incremental cost to AMP to prepare the SB 1037 report, except staff time to provide data and reporting. Consulting services for the development of the Measure Quantification Methodology and the software tool (E3) to measure energy efficiency program savings and cost effectiveness were funded by the NCPA member services budget.

Staff time and consulting costs to comply with California and federal policies are not insignificant. To prepare all the required annual reports to comply with SB 1037 takes one full-time AMP staff person one to two weeks per year. Support for the E3 modeling tool used in the reporting is handled by NCPA and the cost varies from year to year. AMP's share of the E3 modeling support is approximately $3,000 per year.

NCPA takes the larger part of the burden of the reporting by contracting for the consultants, meeting with CEC staff and legislative staff, compiling all the data from the utilities, and preparing and filing the final report to the CEC. The cost to NCPA for doing the SB 1037 report and the AB 2021 report—the energy efficiency target setting policy—includes staff time from the Member Services Manager and the Regulatory Affairs Manager as well as consulting costs. The NCPA staff time required for this consumes about one-fourth of an NCPA staff person per year.

LINK TO KEY RESULT AREAS AND GOALS

KRA 1: Customer Programs and Experience
Goal 1.2: Increase customer energy efficiency

EXHIBITS

A. FY 2015 Energy Efficiency Actual Summary Report
B. FY 2015 AMP SB1037 Narrative Report

Note: *All of the exhibits will be submitted to NCPA and incorporated into the final report from CMUA, NCPA, and SCPPA and will be sent to the CEC.*