City of Albany

Energy Action Plan

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Prepared By:
Strategic Energy Innovations

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1. EXECUTIVE SUMMARY

With the unprecedented energy challenges resulting from concerns about the supply of fossil fuels worldwide, and a public interest in energy conservation and sustainability, it is clear that action must be taken in cities throughout California. In order to address these concerns, the City of Albany is committed to reducing municipal energy use through the enactment of policies, strategies, and actions that are both cost-effective and environmentally sound.

The purpose of this Energy Action Plan is to provide guidance for the City of Albany to realize conservation goals that may also significantly reduce the impact of high energy costs and greenhouse gas emissions within the City.

The City's current energy action goal falls inside the broad Climate Action Plan goal to reduce greenhouse gas emissions by 25% below 2004 baseline levels by 2020. In 2004, there were 373 tonnes of GHG emissions associated with municipal operations. A 25% reduction from 373 tonnes is 280 tonnes. With growth projections in energy use of 2%, given current energy use and predicted PG&E emission factors[1], the City should be able to achieve this 25% reduction goal by implementing energy reduction projects that reduce GHG emissions by 14 tonnes (Table 4.1, Figure 4.1). SEI has also identified a second target based on usage reductions rather than emissions reductions. To achieve the 10% usage reduction target below 2005 levels, the City will need to reduce usage by 390,031 kWh (Table 4.1, Figure 4.2).[2]

This Energy Action Plan identifies potential municipal projects with total annual energy savings of approximately 46,838 kWh and 376 therms, and associated cost savings of approximately $11,089 and GHG emissions reductions of 14 tonnes CO_2e annually. The total estimated costs are $44,090, with the City being responsible for $40,752 after rebates and other funding opportunities. These projects are spread out over the 8 years between now and 2020.

The Energy Action Plan is intended to guide the City in making impactful, cost-effective energy decisions between now and 2020. City implementers should keep in mind that the plan is predicated on a number of estimates and assumptions; it lays out projections, not certainties. The City is encouraged to use the Municipal Energy Planning Tool to update the plan as necessary, and to further develop the Energy Action plan before implementing any specific action plan items.

[1] Electricity is expected to become "cleaner" over the upcoming years. PG&E emission factors will decrease such that emissions attributed to electricity consumption will decrease in the future, even if consumption remains constant.

[2] These numbers were calculated by subtracting the energy usage goals in Table 4.1 from the Business as Usual 2020 predictions listed in Table 3.1 (1,411,839 kWh – 1,021,809 kWh = 390,031 kWh and 18,580 therms – 19,788 therms = –1,208 therms).

2. INTRODUCTION

The City of Albany is committed to developing an Energy Action Plan that will address the future environmental and fiscal impacts of energy usage in municipal facilities, thereby promoting good stewardship through energy conservation and efficiency practices.

California Regulatory Context

Albany's Energy Action Plan is developed within the context of broader policies related to energy and climate change. California's major initiatives for reducing energy usage and subsequent greenhouse gas (GHG) emissions are outlined in the California Public Utilities Commission's Long-Term Energy Efficiency Strategic Plan (LTEESP)[3], and Assembly Bill 32 (AB 32)[4] Climate Change Scoping Plan Document. Both help to support the goal of AB32; reducing GHG emissions in California to 1990 levels by 2020[5]—a reduction of approximately 30 percent—and then to 80 percent reduction below 1990 levels by 2050.

One vision of the LTEESP is that by 2020 California's local governments will be "leaders in using energy efficiency to reduce energy use and global warming emissions both in their own facilities and throughout their communities." And although there are no specific reduction requirements for local governments, AB 32 also describes local governments as crucial partners who will have to lead by example and implement municipal energy reduction practices.

Energy Action Plan Overview

In support of these statewide policies many local governments, including Albany, have developed a Climate Action Plan. An Energy Action Plan is similar to a Climate Action Plan in that planning for reductions in energy use and reducing the impact on climate are very closely related, as greenhouse gases are produced when fossil fuel energy is consumed. Energy Action Plans are typically more focused on municipal energy activities, over which the city has direct operational control. This Energy Action Plan identifies and analyzes potential municipal facility retrofit opportunities for the next eight years, identifies project approval criteria, and outlines possible funding mechanisms. In addition to reducing greenhouse gas emissions, energy use reductions associated with Energy Action Plan implementation will also benefit local governments by reducing long-term operational costs, improving air quality, and demonstrating community leadership.

The Energy Action Plan that follows will:

- Outline baseline and current energy use conditions in the City (Section 3)
- Outline energy-use reduction goals the City has defined (Section 4)
- Outline the strategy to achieve energy-use goals given current conditions in the City (Section 5)
- Detail municipal facility retrofit opportunities and how they can help meet the City's energy usage reduction goals (Section 6)
- Provide information about relevant incentive programs and strategies (Section 0)

[3] http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/
[4] http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm
[5] To calculate 1990 levels, the California Air Resources Board also allows municipalities to use "current" (2005-2008) levels as the baseline.

3. BASELINE AND CURRENT CONDITIONS

3.1. Baseline Energy Usage in Albany

This plan uses the City of Albany's greenhouse gas emissions inventory and Pacific Gas and Electric Company's (PG&E's) Green Communities Data Portal information as the baseline for energy use and costs. Given the current conditions in the City, historical growth and projections developed for their Climate Action Plan, we estimate that growth in energy use has, and will continue to increase about 2% annually. With this projection, we have calculated expected energy usage and GHG emissions under a business-as-usual scenario. That is, what would occur if the City does nothing to curb current energy usage trends.

Table 3.1: Baseline Energy and Emissions Inventory, and Business as Usual Calculations for 2011 and 2020

Commodity	Unit	2004 GHG Emissions (tonnes CO_2e) *	2005 Energy Usage	2005 GHG Emissions**	2011 Energy Usage	2011 GHG Emissions ***	2020 Energy Usage ****	2020 GHG Emissions*****
Electricity	Usage (kWh)	?	1,135,343	252	1,181,364	289	1,411,839	185
Natural Gas	Usage (therms)	?	21,987	117	14,946	87	18,580	109
Total		**373**[6]		**369**		**376**		**294**

*using 2004 emission factors, **using 2005 emission factors, ***using 2011 emission factors, ****assuming 2% growth from 2011 levels, *****using CPUC predicted 2020 emission factors[7]

3.2. Current Energy Usage in Albany

Table 3.2: Annual Municipal Energy Usage and Cost (2005, 2009 to 2011)

Commodity	Unit	2005	2009	2010	2011	2011 GHG Emissions, tonnes CO_2e
Electricity	**Usage (kWh)**	**1,135,343**	**1,350,327**	**1,347,040**	**1,181,364**	185
	Cost ($)	$138,433	$187,811	$200,047	$179,352	
	Unit Cost ($/kWh)	$0.122	$0.139	$0.148	$0.151	
Natural Gas	**Usage (therms)**	**21,987**	**9,969**	**15,242**	**14,946**	109
	Cost ($)	$9,282	$5,133	$10,184	$6,686	
	Unit Cost ($/therm)	$0.422	$0.515	$0.668	$0.447	
Total						**294**

Table 3.2 displays municipal energy usage over the most recent years: 2009, 2010, and 2011. Electric usage in 2011 was 1,181,364 kWh, a 46,021 kWh increase (3.9%) from 2005 electric usage. Natural gas usage in 2011 was 14,946 therms, a 7,041 therm decrease (32%) from usage in 2005. Due to the implementation of several energy efficiency projects (described in Section 3.3), the City has been able to decrease natural gas usage, and implement some electricity efficiency measures.

[6] Total 2004 GHG emissions were taken from the City's GHG Emissions Inventory and are not separated by specific commodity.

[7] Predicted emissions factors were forecasted for PG&E's electricity in the CPUC GHG Calculator, which is a publicly-available document that provides emission factor forecasts from 2012-2020. (Last updated October 2011).
http://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf

The most energy-intensive facility types and individual facilities are identified in Table 3.3 and Table 3.4. Buildings and Streetlights the largest energy-using facility types in the municipality and represent the greatest opportunity for energy savings. Buildings are responsible for 100% of natural gas consumption, so they will be the only source of potential reductions in natural gas use. Because of these factors, project recommendations primarily target these facility types in order to maximize energy savings.

Table 3.3: 2011 Energy Usage and Cost by Category Type

Category Type	Electric Usage (kWh)	Electric Cost ($)	Natural Gas Usage (therms)	Natural Gas ($)
Buildings	615,620	$104,626	12,709	$5,820
Streetlights	566,613	$71,506	-	-
Traffic Signals	14,877	$2,449	-	-
Mixed Lights / Sprinklers	48,852	$8,790	-	-

Table 3.4: 2011 Energy Usage by Facility / Meter Service Agreement ID Number

Highest Electric Users in 2011 (kWh)		Highest Natural Gas Users in 2011 (therms)	
1. City-Owned Streetlights	503,144	**1.** Albany Civic Center	8,258
2. Albany Civic Center	295,200	**2.** Community Center	2,923
3. Community Center	127,200	**3.** Maintenance Yard 548 Cleveland	538
4. Mixed Sprinklers and Lighting	46,383	**4.** Senior Center	495
5. Childcare Buchanan	39,440	**5.** Teen Center	495
6. Maintenance Yard 548 Cleveland	35,280		
7. Senior Center	25,080		
8. Maintenance Building	17,290		
9. Traffic Signals	14,877		
10. Teen Center	11,294		

3.3. Energy Efficiency Projects Implemented Since 2005

Information provided by the City indicates that several municipal energy projects have been completed since 2009.

Table 3.5 provides the anticipated reductions associated with each project. The values displayed and descriptions below are calculated projections using assumptions within the Municipal Energy Planning tool.[8]

[8] The project cost and energy savings and GHG emissions reductions presented in this section represent calculated estimates and are based on a number of assumptions that are detailed in the Municipal Energy Planning tool.

Table 3.5: Reductions Information for Completed Projects

Project Details			Estimated Savings					
Year	Project	Facility	Cumulative kWh	Cumulative Savings	Cumulative Tonnes CO_2e	Current Year kWh	Current Year $	Current Year CO_2e Tonnes
2008	Vending Machine Controller	Maintenance Yard-548 Cleveland	306	$4,984	4	-	-	-
2008	Vending Machine Controller	Maintenance Yard-548 Cleveland	306	$4,984	4	-	-	-
2008	Interior Lighting	Multiple Facilities	2,548	$588	1	637	$147	0.2
2010	Street Light Retrofit	City-Owned Lights	303,264	$38,116	72	151,632	$19,058	35.8
2010	Vending Machine Controller	Childcare Center	6,448	$1,110	2	3,224	$550	0.8
2011	City Hall Energy Management System	Albany Civic Center	9,444	$1,573	2	9,435	$1,571	2.2
2011	Lighting Retrofit	Community Center	31,364	$5,144	7	31,336	$5,139	7.4
2011	HVAC Retrofit	Childcare Center	7,095	$1,164	2	7,089	$1,163	1.7
2011	Plug Load Sensors	Multiple Facilities	1,391	$228	0	1,390	$228	0.4
2012	Solar PV	Childcare Center	-	-	-	34,510	$539	8.7
Total	**N/A**	**N/A**	**361,860**	**$52,907**	**91**	**239,253**	**$28,395**	**57.1**

Information is available for 8 projects completed in the City of Albany since 2008. The projects are estimated to have total current-year energy savings of 239,253 kWh and 0 therms, and current-year cost savings of $28,395. Current-year greenhouse gas emissions reductions associated with the 8 projects are estimated to be 57.1 metric tons carbon dioxide equivalent (CO_2e). Since the projects have been implemented, total cumulative savings are estimated to be 361,860 kWh, 0 therms, $52,907, and an estimated 91 metric tons CO_2e.

3.4. Summary of Energy Efficiency Outcomes

Completed energy projects are projected to save the City approximately $28,000 annually, with expected reductions of 239,253 kWh and 0 therms. However, several factors are believed to be contributing to realized energy consumption and costs in the City including:

Completed energy projects are projected to save the City approximately $28,000 annually, with expected reductions of 239,253 kWh.

- Normal variations in weather
- Changes in equipment & operating conditions of facilities
- Significant investment in electricity-saving projects
- Lack of efficiency projects related to natural gas reduction
- Relatively high usage of natural gas in baseline year 2005
- Estimated annual growth in energy consumption of 2%
- Addition of the Albany Civic Center to the municipal energy portfolio

These contributing factors have resulted in an increase in electricity consumption of 46,021 kWh (3.9%) and a decrease in natural gas consumption of 7,041 therms (32%) as compared to 2005.

The City should closely monitor energy consumption at sites where projects have been implemented to ensure that expected savings are being realized.

4. GOALS

The City of Albany's energy reduction targets are in line with the targets established in the City's 2010 Climate Action Plan (CAP). The CAP provides preliminary objectives and strategies the City can take to meet its energy use and GHG emissions reduction targets (See Appendix 8.2). Many of the municipal reduction strategies identified in the CAP are also relevant as broad goals to be pursued in the City's Energy Action Plan, including:

- Measure BE 1.1: Install cost-effective renewable energy systems on all city buildings, and install building performance data displays to demonstrate savings.
- Measure BE 4.2: Work with Alameda County to convert all streetlights to LED bulbs or LED-solar systems.

In keeping with the City's Climate Action goal, the City will aim to reduce GHG emissions associated with municipal energy usage by 25% from 2004 levels by 2020.

The City's current climate action goal is to "reduce greenhouse gas (GHG) emissions to 25% below 2004 levels by 2020." In keeping with this climate action goal, the City is aiming to reduce greenhouse gas emissions associated with municipal electricity usage and natural gas usage by 25% from 2004 levels by 2020. In an effort to establish a more concrete (and more ambitious) target, SEI will also define a 10% kWh and therm reduction target in addition to a GHG target.

4.1. GHG Reduction Target

In 2004, there were 373 tonnes of GHG emissions associated with municipal operations. A 25% reduction from 373 tonnes CO_2e is 280 tonnes CO_2e. With growth projections in energy use of 2%, given current energy use and predicted PG&E emission factors[9], the City should be able to achieve this 25% reduction goal by implementing energy reduction projects that reduce GHG emissions by 14 tonnes CO_2e (Table 4.1, Figure 4.1).

Table 4.1: Energy Action Plan Current Usage and Targets

Year	Commodity	Energy Usage (kWh or therms)	GHG Emissions (tonnes CO_2e)	
2004 (Baseline) [10]	Electricity (kWh)	?	?	373 tonnes
	Natural Gas (therms)	?	?	
2005	Electricity (kWh)	1,135,343	252	369 tonnes
	Natural Gas (therms)	21,987	117	
2011 (Current)	Electricity (kWh)	1,181,364	289	376 tonnes
	Natural Gas (therms)	14,946	87	
2020 Business as Usual	Electricity (kWh)	1,411,839	185	294 tonnes
	Natural Gas (therms)	18,580	109	
2020 Emissions Target	Electricity (kWh)	Various reduction combinations are possible to reduce 14 tonnes of greenhouse gas emissions		280 tonnes
	Natural Gas (therms)			
2020 Usage Target	Electricity (kWh)	1,021,809	134	250 tonnes
	Natural Gas (therms)	19,788	116	

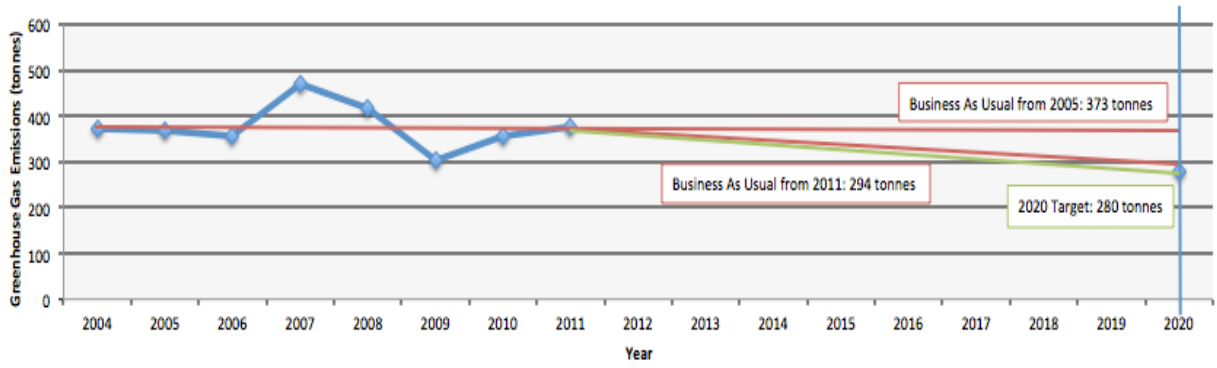

Figure 4.1: 2020 Target Based on 25% GHG Emissions Reduction Target

[9] Electricity is expected to become "cleaner" over the upcoming years. PG&E emission factors will decrease such that emissions attributed to electricity consumption will decrease in the future, even if consumption remains constant. The primary reason for the changes in utility electricity emissions is California's Renewable Portfolio Standard (RPS), established in 2002 under Senate Bill 1078, accelerated in 2006 under Senate Bill 107 and expanded in 2011 under Senate Bill 2. The RPS program requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33% of total procurement by 2020.

[10] Total 2004 GHG emissions were taken from the City's GHG Emissions Inventory and are not separated by specific commodity.

4.2. Commodity Reduction Targets

SEI has also identified a second target based on usage reductions rather than emissions reductions. To achieve the 10% usage reduction target below 2005 levels, the City will need to reduce usage by 390,031 kWh, but will not need to achieve reductions in natural gas consumption (Table 4.1, Figure 4.2).[11]

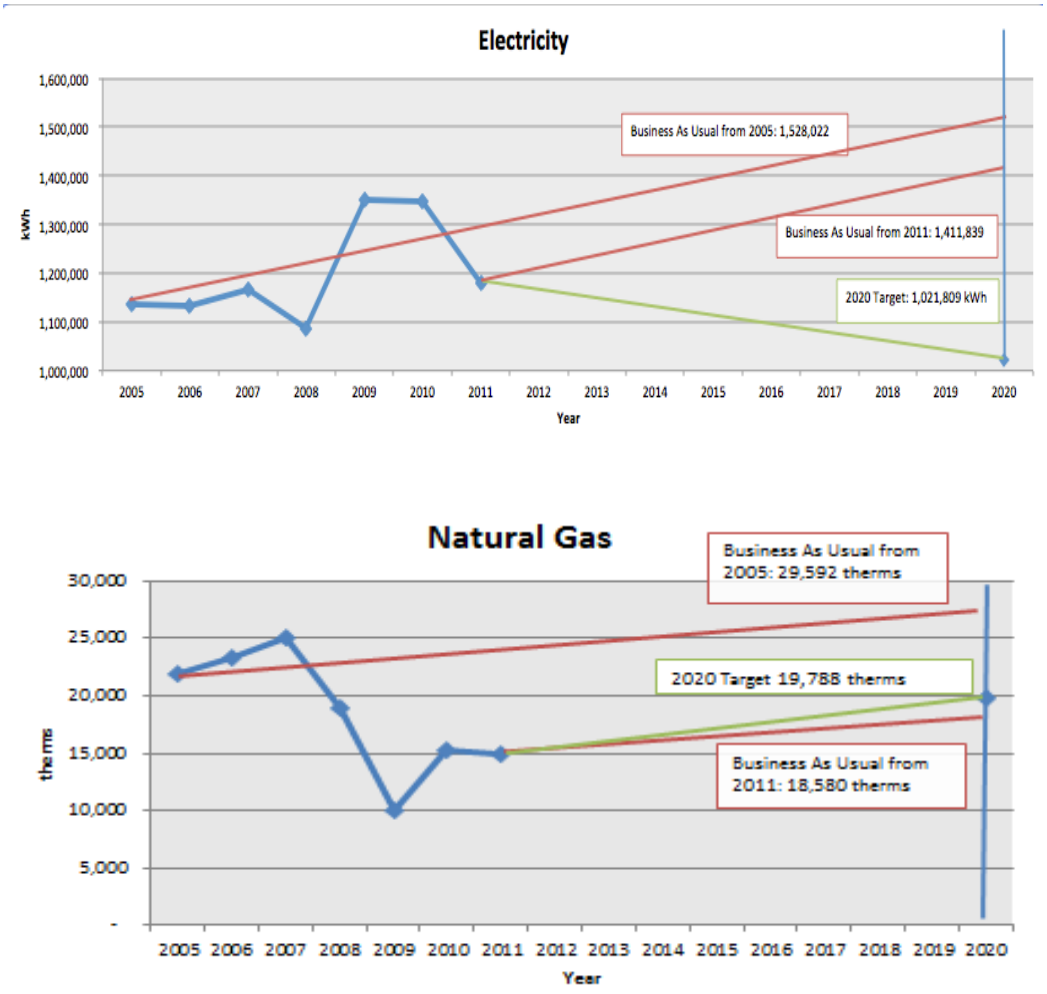

Figure 4.2: 2020 Targets Based on 10% Energy Usage Reduction Target[12]

[11] These numbers were calculated by subtracting the energy usage goals in Table 4.1 from the Business as Usual 2020 predictions listed in Table 3.1 (1,411,839 kWh – 1,021,809 kWh = 390,031 kWh and 18,580 therms – 19,788 therms = –1,208 therms).

[12] These figures show usage under target and business as usual scenarios for the year 2020 (represented by the vertical blue line that intersects 2020). The Business As Usual scenarios were calculated with the assumption that energy usage increases approximately 2% annually due to increased usage associated with population growth

5. STRATEGY TO ACHIEVE GOALS

To achieve Energy Action Plan targets the City should have a system in place for building on the projects identified here, identifying other potential energy saving projects, tracking projects that have been implemented, and updating the overall goals and strategies of the plan when necessary.

Figure 5.1: the ENERGY STAR® Guidelines for Energy Management present a useful seven-step approach to reducing energy usage across a variety of facilities.

5.1. Identifying Projects

5.1.1. Initial Project Identification

There are a variety of ways that the City can continue to identify energy saving projects, including:

- Focusing on facilities with high-energy usage: The City has been provided with a Baseline Energy Usage Report identifying high-energy using facilities in the City's portfolio. To identify projects the City should refer to this report and figure out which facilities have high usage (also see Table 3.4) and which facilities have a high "energy usage intensity" (energy usage / ft^2).
- Energy Monitoring: The City has been provided with a Model Energy Monitoring Policies and Procedures document, highlighting best practices for monitoring energy usage and realizing maximum savings. Monitoring is critical in assessing trends and identifying anomalies, and can be done using PG&E's online tools or other energy management programs.
- Asking maintenance staff and facility-users: Talk to facilities maintenance staff to see if they have any ideas about equipment that could be upgraded for energy efficiency savings.
- Developing an equipment list: Ideally the City should put together an equipment list of lighting, HVAC systems, and other high-energy using equipment with efficiencies, expected lifetime, and potential replacement options. This way the City will be able to prioritize projects and make smart, energy efficient decisions when equipment fails.
- Performing and reviewing energy audits: Review any energy audits that have already been performed by third parties to identify potential projects. Complete energy audits on remaining facilities, especially those that use a significant amount of energy.[13]

5.1.2. Prioritizing Projects

As new energy-saving projects are identified, the next step is to quantify the savings associated with each project so that projects can be prioritized. The easiest way to quantify project costs and savings is to get a bid for each project and then enter costs, rebates, and expected energy savings into one place to compare projects based on costs and potential savings. As part of this Energy Action Plan, the City has been provided with a copy of the Municipal Energy Planning (MEP) tool. This keeps track of costs, cost savings and energy savings. These metrics

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and degradation of energy-using equipment over time. Because these graphs display site consumption, the business as usual scenarios only account for growth and are not affected by changing emission factors.

[13] http://www.pge.com/mybusiness/energysavingsrebates/analyzer/
http://www.eastbayenergywatch.com/building-energy-connection.html

are then used to calculate payback period, return on investment, and net present value of all projects entered[14]. When deciding how to order projects for implementation the City should keep these metrics in mind and try to prioritize projects according to their "cost effectiveness."[15]

Along with comfort considerations, funding availability and ease of implementation, cost effectiveness is probably the most important criteria for deciding between projects. Cost effectiveness can be measured in a number of ways, and is a way to quantify how economical a project is in terms of the goods or services received for the money spent. The City should define a metric or threshold for determining which projects to move forward on. This could be a minimum payback period or other figure. Not only will prioritizing projects according to a specific metric save the City money, it will also make it easier to identify projects that comply with grant criteria. As noted above, the City has been provided with a copy of the MEP tool, which provides several measures of cost-effectiveness from which the city can select from in order to assess which specific projects or groups of projects the City should consider implementing to meet the reduction goals.

5.2. Fund Projects

Identifying and developing funding sources is critical for the implementation of projects. Municipal budgets for energy management often fall short of the high up-front costs associated with many large projects, deterring many cities from implementing projects with high savings potential. The City should explore alternative funding opportunities such as applying for grants and rebates, utilizing Energy Performance Contracts and lease-purchase agreements, and/or issuing public bonds.

Another creative approach to financing energy projects is the development of a reinvestment mechanism which requires an initial input of seed money to fund projects, but then generates additional revenue from the savings associated with their implementation. A portion of the documented energy savings are reinvested into the fund and further energy efficiency improvements are pursued, providing a means for leveraging greater and greater energy savings.

More information on funding opportunities can be found in Section **Error! Reference source not found.** of this document, and a detailed description of the reinvestment mechanism will be issued to the City in the Municipal Reinvestment Mechanism Strategy Report, distributed by SEI as a SCCAP – IP document.

5.3. Monitoring Reductions

All energy projects implemented in the City should be tracked to ensure reductions are truly being realized. Significant changes in facilities through renovation or changes in operations can have large effects on energy use. A loop of communication should be established between the staff in charge of bill monitoring and the staff in charge of capital improvements and/or major operational changes at City facilities. In a study titled "Measured Energy Savings and Cost-Effectiveness of Conservation Retrofits in Commercial Buildings" cited in Appendix (Section 8.3), researchers discovered that retrofit projects do not always achieve their maximum potential savings due to improper installation and calibration, lack of maintenance, and inappropriate usage. The researchers concluded that energy management should incorporate long-term tracking of energy performance. If departments and capital improvement project implementers alert Bill Monitoring Staff to facilities that have recently undergone a retrofit, the Bill Monitoring Staff can then help the departments' track energy and cost savings. With this process in place, relevant department staff will also be quickly alerted to specific indicators of operating problems.

[14] For more information on the MEP tool and its performance metrics see the MEP instruction guide.
[15] EPA guide to cost-effectiveness

In order to ensure that a project is on course to meet reduction targets and to diagnose operating problems there are several performance measures that can be tracked:

- Performance scores: Compare performance scores in Portfolio Manager to baseline performance scores
- Comparison to CA averages: Compare achieved energy performance with peers to establish a relative understanding of where a local government's performance ranks. This type of comparison can be done through Portfolio Manager, or by comparing Energy Use Intensity of a facility with California averages.[16]
- Estimated versus actual savings: Compare achieved energy use performance against established goals for environmental performance or financial savings.

The third performance measure (comparing estimated savings to actual savings) can be done using the Municipal Energy Planning (MEP) tool and another energy management tool such as Portfolio Manager or EnergyCAP Express. Estimated savings values in the MEP are calculated using estimates and assumptions; the tool does not track or monitor billing data to compare savings to those projected in MEP. Other energy management tools (My Energy, Business Tools, Portfolio Manager, EnergyCAP Express) can be used to see billing data and track actual usage/savings at facilities where a project has been implemented. Once realized savings are quantified, adjustments can be made to MEP.

It is important to remember that energy consumption in a facility is affected by much more than a single project. If new, energy-consuming equipment is brought into a facility that has undergone an energy efficiency retrofit, it will add to the total usage and detract from the savings produced by the retrofit. Energy consumption patterns and behaviors must be analyzed thoroughly before comparing realized savings to those estimated in the MEP Tool. Also, cities should not be discouraged when energy savings are not accruing as expected. Energy management is a long-term ongoing process that depends on long-term tracking, occupant education, commissioning and operations optimization.

5.4. Updating the Energy Action Plan

A designated City staff member should assemble a supplementary report once a quarter or once a year to check the City's most recent energy use and cost records against any relevant short and long-term GHG emissions savings and any energy savings goals and/or targets that may exist in the City's EAP or CAP. This report should document any gaps and check for discrepancies and anomalies. The report should be passed on to the Environmental Services, Recreation or Public Works staff in charge of implementing the EAP or CAP, who should subsequently come up with a plan and timeline for reconciling the City's energy use with the City's energy goals.

[16] http://www.energy.ca.gov/ceus/

6. MUNICIPAL FACILITY RETROFIT OPPORTUNITIES

SEI, in coordination with City staff, has identified several potential energy-saving projects to achieve the reductions goals laid out in Section 4. These projects are presented in Table 6.1 with associated energy cost savings, implementation cost estimates, relevant incentive programs and post implementation energy usage and GHG reduction estimates. To assist with forecasting costs and savings, projects are currently bundled into 2-year groups so that project costs remain relatively consistent over the next ten years.

As indicated in Table 6.1 below, the projects quantified in the Municipal Energy Planning (MEP) tool alone fall well short of the City's 2020 commodity reduction goal of 390,031 kwh (below the business as usual scenario). It is therefore imperative that the City identify future potential projects to close the deficit in energy reductions, or amend its goal to a more achievable target given the amount of investment available for energy management and retrofits. Furthermore, the City will need to prioritize projects with large savings in order to make significant progress.

Although different energy efficiency projects have been identified through the development of this EAP, it is imperative that the City identify additional potential projects to achieve its energy reduction goals, or amend its goals to a more achievable target in the future.

The total estimated costs of the proposed projects listed are $44,090, but through grants, rebates, and other financing options, the tool estimates that the City would be responsible for approximately $40,752. Establishing funding opportunities is especially important for projects with large costs and can reduce the burden on City budgets.

To provide a benchmark for project costing, an energy project budget for Table 6.1 was set at $10,000 annually. While the suggested annual budget exceeds the total amount necessary to complete the projects below by 2020, extra funding is required for additional projects which are necessary for the City to reach its goals.

Table 6.1: Projects Identified for Implementation Between 2011 and 2020

Project	*Project Cost Assumptions*					*Estimated Annual Savings in 2020*			
	Estimate Total Costs	**Estimated Rebate**	**City Cost Share**	**2-Year Budget**	**Simple Payback**	**Cost-Savings**	**kWh**	**Therms**	**CO_2 (tonnes)**
Projects To-Date						**$46,008**	**226,717**	-	**54**
2013-2014									
Library Lighting Retrofit	$30,440	$2,438	$28,002		5.5	$5,737	26,102	-	6.6
Adjust HVAC Schedule	$550	-	$550		2.7	$231	1,050	-	0.3
2013-2014 Total	**$30,990**	**$2,438**	**$28,552**	**$20,000**	**5.5**	**$5,968**	**27,152**	**0**	**7**
Cumulative annual savings						**$51,976**	**253,869**	**0**	**61**
2015-2016									
LED Traffic Signals	$9,350	-	$9,350		2.7	$3,746	15028	-	3.8
2015-2016 Total	**$9,350**	**$0**	**$9,350**	**$20,000**	**2.7**	**$3,746**	**15,028**	**0**	**4**
Cumulative annual savings						**$55,722**	**268,897**	**0**	**65**
2017-2018									
Replace HVAC Upon Failure	$3,500	$900	$2,600		3.5	$801	1,780	376	2.4
2017-2018 Total	**$3,500**	**$900**	**$2,600**	**$20,000**	**3.5**	**$801**	**1,780**	**376**	**2**
Cumulative annual savings						**$56,523**	**271,775**	**0**	**67**
2019-2020									
Irrigation Controls	$250	-	$250		0.4	$574	2,878	-	0.7
2019-2020 Total	**$250**	**$0**	**$250**	**$20,000**	**0.4**	**$574**	**2,878**	**0**	**1**
Cumulative annual savings						**$57,097**	**274,653**	**0**	**68**
2011-2020									
All 2011-2020 Projects	**$44,090**	**$3,338**	**$40,752**	**$80,000**	**4.7**	**$11,089**	**46,838**	**376**	**14**
Goal							390,031	-	14
Difference							**343,193**	-	**0**

The project costs, energy savings, and GHG emissions reductions presented in Table 6.1 were generated using the Municipal Energy Planning tool. They represent calculated estimates and are predicated on a number of performance assumptions, which are included in Appendix (Section 8.4). The estimated rebates in the table above are based on current rebate amounts and are subject to change. In many cases, the City obtained bids for projects to estimate costs and energy savings for each project. In other cases, the estimates were based off of information in the PG&E rebate database, ENERGY STAR® database, and other relevant sources. Simple Payback is provided as a measure of cost-effectiveness for each project and for each project grouping. For groups of projects, the Simple Payback is a weighted average based on the costs of the project to the city relative to the total group costs (e.g. a project with high project costs affects the grouping more than a project with low project costs, given equal payback periods). Further details about each project can be found in the Appendix 8.5.

It is also important to note that some of the fields included in Table 6.1 have been populated with estimated or assumed savings or costing data. For every project, the costs and savings should be carefully reviewed in MEP to ensure accuracy. In order to facilitate this process, the City should fill in information about next steps (Table 6.2).

Table 6.2: Project Information to Facilitate Implementation

Project	Facility	Next Steps	Implementation Difficulties	Payback Rating[17]
Library Lighting Retrofit	Library	Find Vendor	Financing	Weak
Adjust HVAC Schedule	Library	Discuss w/ Bldg. Maintenance	N/A	Strong
LED Traffic Signal Retrofit	Traffic Signals	Find Vendor	Financing	Strong
Replace HVAC Upon Failure	Community Center	Find Efficient Units	N/A	Moderate
Efficient Irrigation Controls	Irrigation Controls	Find Vendor	Installation	Strong

[17] A Strong Simple Payback period is less than 3 years; Moderate is 3 to 5 years; Weak is more than 5 years.

7. FUNDING - RELEVANT INCENTIVE PROGRAMS AND STRATEGIES

To fund the aforementioned projects and other future projects the City should pursue available subsidies, rebates and grants. Some relevant funding opportunities are listed in Table 7.1 below.

Table 7.1: Funding Types and Resources

Funding Type	Description	Additional Resources
Energy Performance Contracts (ESCOs)	An energy performance contract is an arrangement with an ESCO that allows a local government to finance energy-saving capital improvements—usually over a 7–15 year term—with no initial capital investment by using money saved through reduced utility expenditures.	How to Hire an ESCO
Lease-purchase agreements (also known as a municipal lease)	A tax-exempt lease-purchase agreement allows public entities to finance purchases and installation over long-term periods using operating budget dollars rather than capital budget dollars.	U.S. EPA's Innovative Financing Solutions Doc
Public Bonds	Bonds are well suited for energy efficiency projects. Bonds allow amortization of capital costs over a multi-year repayment term, so they recover their costs through energy savings over the life of the project.	http://energycenter.org/index.php/public-affairs/federal-legislation/1283-qualified-energy-conservation-bonds-qecbs
State Government Loans, Rebates, and Other Assistance	The California Energy Commission's (CEC) Energy Partnership Program offers technical assistance to cities, counties, hospitals, and colleges and universities. The program helps these local groups identify energy efficiency improvements in existing buildings and energy-efficient options in new construction. The CEC also helps these groups identify state loans and other financing sources for project installation.	http://www.energy.ca.gov/efficiency/partnership/index.html
	The CEC's Energy Efficiency Financing Program provides low-interest loans for public schools, public hospitals, and local governments to fund energy audits and install energy efficiency measures.	http://www.energy.ca.gov/efficiency/financing/index.html http://www.lgc.org/freepub/energy/funding.html http://www.epa.gov/greenbuilding/tools/funding.htm
Utility Rebates	A number of local governments use rebates or other financial assistance from utilities to offset the cost of improving energy efficiency in their facilities.	http://www.dsireusa.org/ http://www.pge.com/mybusiness/energysavingsrebates/incentivesbyindustry/
On-Bill Financing	The Energy Efficiency Retrofit Loan Program, or On-Bill Financing (OBF), lets PG&E customers make facilities improvements without large outlays of cash. PG&E will finance the project, and the customer will pay the loan – interest-free – through monthly utility bills.	http://www.pge.com/obf
Capital budgets and	Using capital or operating budgets funds has many	

operating budgets	advantages: funding is already on hand, there is no need to negotiate financing arrangements, and there are no interest payments. Using life-cycle cost accounting to quantify the lower net capital and future operating costs can help local governments improve the chances of incorporating energy efficiency into their limited capital budgets.	
Federal tax incentives	The Internal Revenue Service Code includes a number of tax incentives for energy efficiency investments. For example, the Energy Policy Act (EPAct) of 2005 authorizes several financial incentives to support local government energy efficiency activities, including tax deductions for energy efficiency upgrades in commercial (including public) facilities at the local level. For buildings that achieve annual energy cost reductions of 50 percent or greater, EPAct provides for tax deductions of up to $1.80 per square foot off the cost of installing energy-efficient HVAC systems, building envelope components, and lighting systems.	http://energy.gov/savings
Private foundations (grants).	Foundations are nonprofit corporations or charitable trusts that can help fund local government energy efficiency activities. The most common types of funding include grants and program-related investments.	http://sustainca.org/grants_and_funding_programs
Reinvestment Mechanism	A reinvestment mechanism is a City-created fund that starts with an initial seed of money. Each year a portion of documented energy savings are reinvested into the fund and further energy efficiency improvements are pursued, providing a means for leveraging greater and greater energy savings.	More information on starting and maintaining a Reinvestment Mechanism will be provided in a future SCCAP-IP document

City staff should also consider other incentive programs, such as peak pricing opportunities and demand response programs, to reduce the overall cost of electricity.[18]

In many cases, small cities can benefit by forming and joining regional partnerships in order to leverage resources. The City of Albany should continue to look for opportunities with the East Bay Energy Watch program, the Small Cities Climate Action Partnership, and the Association of Bay Area Governments.

[18] http://www.pge.com/mybusiness/energysavingsrebates/demandresponse/index.shtml

8. APPENDIX

8.1. Completed Energy Saving Projects Details

Table 8.1: Financial Information for Completed Projects

Project Details			Financial Information				
Fiscal Year	Project	Facility	Project Costs Total	Project Costs City	Year 1 Savings Costs	Simple Payback	Other Funding
2008	Vending Machine Controller	Maintenance Yard	Unknown	Unknown	$306	-	PG&E
2008	Interior Lighting retrofit	Multiple Facilities	Unknown	Unknown	Unknown	-	PG&E
2010	Street Light Retrofit	City-Owned Street Lights	$88,846	$0	$17,286	0	EECBG
2010	Vending machine controller	Childcare Center	Unknown	Unknown	$504	-	PG&E
2011	Energy Mgmt. System	Civic Center	$10,958	$0	$1,543	0	EPA
2011	Lighting Retrofit	Community Center	$30,440	$28,002	$5,046	5.5	PG&E
2011	HVAC Retrofit	Childcare Center	$22,566	$0	$1,142	0	EPA
2011	Plug Load Sensors	Multiple Facilities	$0	$0	$224	0	PG&E
2012	Solar PV	Childcare Center	$150,000	$150,000	$5,390	27.8	Financing
Total	**N/A**	**N/A**	**$302,810**	**$178,002**	**$31,440**	**N/A**	**N/A**

8.2. Climate Action Plan Strategies

Table 8.2: Climate Action Plan Measures Related to Municipal Energy Use

Objective BE-1: Lead by Example with Zero-Emission City Buildings by 2015		
Measure BE 1.1: Install cost□effective renewable energy systems on all city buildings, and install building performance data displays to demonstrate savings.		
Actions	**Timetables**	**Responsibility**
Conduct energy audits of all municipal buildings.	Before 12/31/10	Building
Evaluate the potential to locate cost□effective renewable energy systems on City properties	Before 7/31/12	Environmental Resources Building
Purchase remaining energy from renewable sources or from PG&E's Climate Smart Program.	Before 1/1/15	Building
Install electronic building performance displays in all publicly accessible buildings.	Before 12/31/14	Building
Progress Indicators	**Target**	
Percentage of energy efficiency improvement in City buildings	20% by 2015	

through retrofits and conservation measures (baseline year 2005).	40% by 2020	
Percentage of City's building electricity from renewable sources.	100% by 2015	
Objective BE-3: Require Energy Performance In New Construction		
Measure BE 3.1: Require new construction to comply with Tier 2 energy efficiency standards contained within section 503.1.2 of the California Green Building Code.		
Actions	**Timetables**	**Responsibility**
Amend the Albany Green Building Ordinance to incorporate the Tier 2 energy efficiency standards contained in Section 503.1.2 of the 2008 California Green Building Code as the required standards for energy efficiency for new construction.	Before 12/31/10	City Council Building
Objective BE-4: Community Energy Management		
Measure BE 4.1: Partner with other neighboring cities and PG&E to fast□track smart grid technology in Albany		
Actions	**Timetables**	**Responsibility**
Partner with PG&E and develop a community smart grid integration plan.	Before 12/31/11	Environmental Resources Public Works
Develop outreach program that informs property owners and businesses about benefits of smart grid and smart appliances.	Before 7/31/12	Environmental Resources
Progress Indicators	**Target**	
Percent of buildings with Smart Meters.	100% by 2015	
Percent of communitywide energy savings from Smart Grid Integration.	4% by 2020	
Measure BE 4.2: Work with Alameda County to convert all streetlights to LED bulbs or LED□solar systems.		
Actions	**Timetables**	**Responsibility**
Partner with Alameda County and convert all existing streetlights to LED bulbs.	Before 12/31/14	Public Works
Progress Indicators	**Target**	
Percentage of streetlights converted to LED.	100% by 2014	

8.3. California Energy Commission Energy Aware Planning Guide

The California Energy Commission (CEC) Energy Aware Planning Guide cites a 1990 study of more than 1,700 buildings in the United States, Canada, and Europe, titled "Measured Energy Savings and Cost-Effectiveness of Conservation Retrofits in Commercial Buildings." The study also found that retrofit projects do not always achieve their maximum potential savings due to improper installation and calibration, lack of maintenance, and inappropriate usage. The researchers concluded that energy management must be viewed not as an event but rather a process, one that incorporates both an understanding of proper building operation on the part of the facility manager and the long-term tracking of energy performance and specific indicators of operating problems.[19]

8.4. Municipal Energy Planning Tool Calculations & Assumptions

The Municipal Energy Planning Tool (MEP) provides several measures of cost-effectiveness from which the city

[19] www.energy.ca.gov/2009publications/CEC-600-2009-013/CEC-600-2009-013.PDF

can pick to assess specific projects or groups of projects to implement. It keeps track of costs, cost savings and energy savings. These metrics are then used to calculate payback period, return on investment, and net present value of all projects entered. For groups of projects, the calculated metrics are a weighted average based on the costs of the project relative to the total group costs (e.g. a project with a high ROI, but low overall project costs affects the grouping less than a project with low ROI but high project costs). For more information on the MEP tool and its performance metrics and calculations, see the MEP instruction guide.

The estimated rebates are based on current rebate amounts and are subject to change. In many cases the City obtained bids for projects to estimate costs and energy savings for each project. In other cases the estimates were based off of information in the PG&E rebate database, ENERGY STAR® database, and other relevant sources.

The project costs, energy savings, and GHG emissions reductions represent calculated estimates and are predicated on a number of performance assumptions. The assumptions are listed in Table 8.3 below.

Table 8.3: Performance Assumptions

Planning Tool Assumptions	
Annual Performance Loss (kWh)	3%
Annual Performance Loss (kWh) Solar Projects	0.5%
Annual Performance Loss (Therms)	3%
Annual Escalation of Energy Rates	5%
Escalation of Operation and Maintenance Cost	3%
Discount Rate of Money	3%
Historic GHG Coefficient - Electricity (lbs./kWh)	0.559
Historic GHG Coefficient - Natural Gas (lbs./Therm)	11.7
Electric Rates (per kWh)	
A1	$0.1898
A10S	$0.1562
A6	$0.1862
E19SV	$0.1586
LS-1	$0.1140
LS-2	$0.1140
Gas Rates (per Therm)	
GNR1	$1.10
EPA - Small Commercial	$0.89

8.5. Project Details

Table 8.4: Project Details

Project	Facility	Description	Implementation Difficulty
Library Lighting Retrofit	Library	Retrofit all lighting on the library side to county specified standard fixtures. (430 fixtures)	Medium
Adjust HVAC Schedule	Library	HVAC systems should only run during hours of operation, with options to temporarily enable AC units for nighttime events.	Low

LED Traffic Signal Retrofit	Traffic Signals	Retrofit traffic signals with LED lamps.	High
Replace HVAC Upon Failure	Community Center	Replace HVAC with high efficiency units when old ones fail.	Low
Efficient Irrigation Controls	Irrigation Controls	Replace irrigation controls with high efficiency units.	Medium