SANTA BARBARA COUNTY ENERGY ACTION PLAN:

Efficient Electricity Use in County Facilities

Roy Hapeman
Kurtis Foster

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1 EXECUTIVE SUMMARY

An increase in electricity prices, compounded by the pressures of global climate change, have made the case for energy efficiency more compelling than at any time in history.

The County of Santa Barbara has chosen to exhibit leadership in environmental stewardship through its many efforts to curb electricity use and reduce greenhouse gas (GHG) emissions from County operations. The County of Santa Barbara *Energy Action Plan* (EAP) will help establish goals for electricity reduction by identifying actual electricity efficiency projects at County facilities, with a primary focus on electricity consumption. The EAP will garner cooperation, information sharing, and the development of best practices for other counties and cities throughout California.

Figure 1. Santa Barbara County Courthouse

The County of Santa Barbara provides services to those living and working throughout its incorporated and unincorporated communities. By implementing the recommendations made in the EAP, the County Board of Supervisors will promote activities geared towards preserving public facilities for the mutual benefit of staff and the general public as formalized in County Ordinance no. 4452 and generalized in the County of Santa Barbara's Facility Policy Framework: County Facilities Master Planning, as published by the Office of the County Architect in December, 2001. The EAP is drafted to serve as a catalyst for energy-related projects that will provide tangible benefits to residents and workers in the following ways: reduced electricity costs; reduced pollution and fossil fuel usage; less vulnerability to changes in electricity cost, availability, and reliability; and increased benefits to the private sector through energy-related projects. The EAP will eventually be layered into the County's larger Climate Action Strategy effort that is under way through the Department of Planning and Development (Long-Range Planning Division).

The EAP provides analysis into energy efficiency opportunities projected across the County's entire portfolio of facilities in order to establish the following metrics:

- A 25% electricity reduction goal by 2020, using a 2008 baseline that is reasonably attainable, for adoption by the Board of Supervisors
- Potential electricity efficiency projects that can apply to the County facility portfolio and contribute to the electricity reduction goal
- Cost and payback analysis to implement projects, taking into account electricity cost savings and applicable incentives/rebates
- Milestones for prioritizing projects to reach the established goal by 2020
- Implementation and funding strategies to successfully reach the adopted electricity reduction goal

Upon conducting audit walk-throughs and analyzing the characteristics of County facilities and their consumption patterns, all facilities were separated into categories distinguished by size. The EAP includes projections for electricity savings per size category (using energy modeling software), cost to implement projects, applicable incentives/rebates, and simple payback (see table 1).

Table 1. County of Santa Barbara Summary of Projected Electricity Target and Metrics

	Kilowatt Hours (kWh)	All Cost Figures Are Estimates			
2008 Baseline Consumption	24,108,242				
Existing Photovoltaic Installations					
Calle Real/San Antonio Campus annual generation (approx.)	1,700,000				
Laguna County Sanitation District annual generation (approx.)	1,786,628				
Projected Electricity Savings per Size Category (400 total facilities)		Cost Savings ($)	Cost to Implement ($)	Applicable Incentives/ Rebates ($)	Simple Payback (years)
Less than 10,000 square feet	344,715	44,813	484,269	37,867	10.0
10,001 – 20,000 square feet	593,888	77,205	972,940	45,233	12.0
20,001 – 30,000 square feet	580,244	75,432	950,736	44,322	12.0
30,001 – 60,000 square feet	314,592	40,897	344,697	22,825	7.9
60,001 – 90,000 square feet	763,389	99,241	732,182	110,361	6.3
Above 90,000 square feet	238,008	30,941	219,074	24,821	6.3
Total Projected Electricity Savings Potential by 2020 (including PV installations)	6,321,464	$368,529	$3,703,899	$285,429	9.2
Most Appropriate Electricity Savings Goal	25% off the 2008 Baseline (6,027,060 kWh)				

All efforts of the EAP will be geared towards establishing a reduction goal that is attainable by the County by 2020, using the 2008 baseline as the starting benchmark. **Looking forward at the County's potential for electricity savings, a reduction of 25% from the 2008 baseline is an appropriate and attainable goal** (particularly given the solar/photovoltaic projects already installed and generating electricity for County use). This goal will place the County of Santa Barbara in an impressive and unique community of local governments that are ambitious and successful in targeting opportunities and achieving electricity reductions. These recommended projects are designed to accompany policies aimed at providing the County with the tools needed to monitor regular electricity usage and tackle areas in need of improvement. Examples of these policies are listed in section 7.1.4 and include thermostat set point regulations and restrictions on portable space heaters. These projects can tap into additional funding sources, including low-interest financing through government agencies and the utilities, helping to minimize any additional costs to County taxpayers.

The County of Santa Barbara is poised to set forth a course of action for County staff to coordinate efforts in electrical efficiency retrofits and installations in order to help the County meet its specific goal in electricity usage reductions. By developing alternatives to electrical savings based on an electricity usage reduction goal, the EAP will provide the rationale for policy recommendations related to Countywide electricity savings. The EAP is designed as a living document that can and should be updated regularly.

A goal of the Strategic Planning Strategies Program offered through SCE is to develop best practices that can be shared with other agencies. By moving forward and adopting the EAP, the County of Santa Barbara will join only a handful of other organizations statewide that have already developed energy action plans. The County's EAP is also designed to serve as a springboard for individual municipalities within the County looking to develop similar energy action plans for their municipal facilities.

The drafting of the County of Santa Barbara EAP is a strong step forward in the County's acknowledgement that an "electricity efficient County" starts with electricity reductions in County facilities.

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2 INTRODUCTION

2.1 PURPOSE OF EAP

As an advocate of sustainable practices and energy efficiency, the County of Santa Barbara is committed to leading the local community by curbing its electricity usage and greenhouse gas emissions at County facilities and across all County operations. The County of Santa Barbara EAP will provide a framework for the County to determine the most feasible and appropriate electricity savings goal for both the near and distant future in the following ways:

- Recognize electricity efficiency as a high-priority energy resource
- Make a strong, long-term commitment to implement cost-effective electricity efficiency
- Broadly communicate the benefits of and opportunities for electricity efficiency
- Identify sufficient, timely, and stable funding opportunities to deliver electricity efficiency (where cost-effective)
- Modify existing policies to align utility incentives with the delivery of cost-effective electricity efficiency

Figure 2. Energy Action Plan Process Flow

The EAP will help to outline an approach to electricity efficiency, based on available funding and time-based electricity reduction goals. The following sections of the EAP contain a comprehensive 2008 baseline and forecast and provide recommendations for Countywide strategies and implementation measures to achieve cost savings through electricity reductions and more efficient maintenance operations. The EAP will also identify operational practices that will help the County achieve the state-recommended greenhouse gas emissions and reduction targets per California Assembly Bill 32 (AB 32). The function of the EAP is to primarily serve as a working document, one that allows the County flexibility for updates if new regulations are imposed, or if advanced technologies, additional funding, or regional partnerships become available.

The EAP identifies electricity efficiency measures and actions that can be implemented, alongside estimated electricity savings based on facility types. Specific facilities will serve as sample representations of peer facilities and will undergo audits focused on electricity. The recommendations generated through sample audits will be used to estimate electricity savings across the larger portfolio of facilities. The electricity savings projections gathered through analysis of the sample facilities will be used to predict the electricity savings potential for all County operations, based on facility types and the overall size of the portfolio. Utility data provided by Southern California Edison and Pacific Gas & Electric, and facility inventories provided by the County, will help determine the aggregate electricity usage as well as the electricity usage of individual facilities—either at an individual or campus level.

Figure 3. Lookout Park, Summerland

The *County of Santa Barbara EAP* draws from other such plans created by municipalities in California to gain insight into best practices and components that are well suited for the County of Santa Barbara. This EAP, however, is different from municipal energy action plans developed by cities or smaller municipalities due to the unique attributes of a County that encompasses over 3,789 square miles and parts of three climate zones, and includes approximately 400 facilities (facilities range from small, unoccupied buildings to larger office facilities housing hundreds of County employees). The approach taken through this EAP is unique, and serves as a model for other counties that undertake the EAP process.

The energy action plan is not a detailed implementation plan that lists every action that must take place in order for the County to reach its target reduction goal. The plan provides guidance and provides estimated projections of actions that can be taken to attain reduction targets; however, additional planning will be crucial to successfully complete electricity retrofits or any renewable/demand response strategies in the future.

Table 2. Energy Action Plan Process (Detailed)

ENERGY ACTION PLAN PROCESS
1) **Assemble EAP Team**: The EAP team consists of both County staff and a consultant team. The County is represented by personnel from the General Services Department, including the energy manager and a representative that helped accommodate all energy audits at various facilities. The Willdan Energy Solutions consultant team includes a program manager, supporting staff, and a senior engineer that conducted the audits and did the analysis for this report.
2) **Obtain and Analyze Utility Data**: The gathering of historical utility data was crucial to fully understanding the County's potential for electricity savings, as well as for understanding the County's aggregate and individual facility usage. In the case of this EAP, which focused on facilities on a Countywide scale, utility data was obtained from SCE, PG&E, and the City of Lompoc.
3) **Develop Baseline Electricity Consumption Total and Reduction Goals**: Electricity data from SCE, PG&E, and the City of Lompoc was consolidated to determine total electric energy consumption in 2008—the baseline year chosen by the County. Electric energy reduction targets were based on this 2008 baseline total. The reduction target goal was determined by a reasonable expectation for implementing projects and other energy reduction initiatives.
4) **Conduct Audits of Facilities**: The EAP team collectively decided on sample facilities that could be audited and serve as representatives for the greater portfolio of facilities. The consultant team worked alongside County staff to coordinate all audit dates and data gathering at the chosen sites. Audit walk-throughs were comprehensive in nature and considered all electric energy–consuming equipment and systems for each facility.
5) **Develop Energy Action Plan Based on Findings from Audits**: The EAP report incorporates findings from audit walk-throughs to project the electricity savings potential across the entire County facility portfolio, based on a predetermined classification. The EAP report also includes background on the County's energy efficiency activities to date; the rationale behind the EAP, including policy drivers and SCE funding source; electricity data regarding the County and specific audited facilities; and potential funding sources or opportunities.
6) **Receive Feedback from County Stakeholder Group**: The EAP was shared with a group of stakeholders comprising of County employees that offered firsthand insight on behavioral aspects of electricity efficiency and day-to-day facility operations.
7) **Present the Energy Action Plan to the County Board of Supervisors for Adoption**: The EAP (in particular, report findings and opportunities for meeting targeted electricity savings goals) are expected to be presented to the County Board of Supervisors for adoption in March 2013

What is Energy Efficiency?

Energy efficiency is the practice of increasing efficiencies in operations in an effort to consume less energy without interrupting quality of life or service (with "energy" referring to electricity or natural gas consumption). Becoming more energy-efficient implies that the cost of enhancing existing systems or installing new equipment that reduces demand for energy will be more than offset by increased savings in energy usage and costs. Energy efficiency can be realized through the following means in typical buildings or facilities:

- Behavior-based actions (e.g., turning off lights and computers)
- Installation of more efficient lighting
- Installation of efficient heating and cooling systems (HVAC)
- Enhancement of energy management practices
- Use of retro-commissioning to optimize equipment energy usage
- Utilization of demand response behavioral and technological adjustments
- Renewable energy garnered through the installation of self-generation technologies such as solar and cogeneration (where appropriate)
- Clean fossil fuels

There are several energy efficiency standards that have been developed—by federal agencies such as the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE), and by national organizations such as the U.S. Green Building Council (USGBC)—that provide quantifiable metrics and ratings to measure the level of energy efficiency for facilities. These standard-setting programs include Leadership in Energy Efficiency and Design (LEED) and ENERGY STAR. Additional programs exist through state and local government agencies, as well as through private-sector organizations that use a quantifiable method to recognize energy efficiency in facilities.

Implementing recommendations in the energy action plan positions the County of Santa Barbara to attain certifications for its facilities from the aforementioned programs and be recognized for all of its energy efficiency efforts.

2.1.1 EAP Funding

The *County of Santa Barbara EAP* is one part of a comprehensive effort funded through Southern California Edison as part of the County of Santa Barbara Strategic Plan Strategies Program. Strategic plan efforts are ratepayer funded, and work toward the energy reduction goals of the California Public Utilities Commission through the California Long-Term Energy Efficiency Strategic Plan (CEESP). Because of the funding opportunity provided through SCE and its Strategic Plan Strategies Program, the EAP primarily focused on **electricity savings**. However, the scope of the EAP was designed to be expanded to include other sources of energy in the future, including natural gas.

Strategic Plan Strategies Program Deliverables
The EAP is one of four tasks of the Strategic Plan Strategies Program, which also includes developing an energy benchmarking policy, establishing a utility manager system, and developing a commissioning/retro-commissioning policy.

Energy Benchmarking Policy
The implementation of an energy benchmarking policy provides the County with a better understanding of how facilities are performing with regard to energy and water consumption in comparison to like facilities throughout the country. The County already began establishing accounts through the ENERGY STAR Portfolio Manager system developed by the U.S. Environmental Protection Agency. Once fully set up, Portfolio Manager will assist in identifying underperforming facilities, setting investment priorities, verifying energy efficiency improvements, and identifying high-performing facilities for EPA recognition.1

Utility Manager System
A utility manager system (UMS) provides a centralized software database for all County facilities to accurately track utilities used, achieve cost savings, and set up a system to measure success in reducing utility use and greenhouse gas emissions. Once installed Countywide, the utility manager system will track utilities usage from existing utility meters, while allowing for individual sub-metering for buildings that belong to utility meters serving several buildings or a campus (as is the case for a significant number of facilities in Santa Barbara County). The County will be able to run its own reports and gather data on electricity usage and other utilities of individual facilities.

Commissioning (Cx)/Retro-commissioning (RCx)
Commissioning is the process of ensuring that systems are functioning according to operational requirements, particularly for newer buildings or newer equipment. Retro-commissioning is the process of improving building efficiency through recalibration of equipment settings, hours of operation, and maintenance hours. Once the Cx/RCx policy is adopted, the County will be able to investigate facilities that may be prime candidates for commissioning or retro-commissioning efforts, and identify areas of improvement for building operational, control, or maintenance problems.

[1] US Environmental Protection Agency, *Energy Star: Portfolio Manager Overview*, Accessible at http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager.

2.2 COUNTY BACKGROUND

The County of Santa Barbara is located along the Southern California coast, approximately 2–3 hours north of the greater Los Angeles basin and 3–4 hours south of the San Francisco Bay Area. The following description from the *County Statistical Profile* details the geographically distinct quadrants that collectively shape a diverse County:[2]

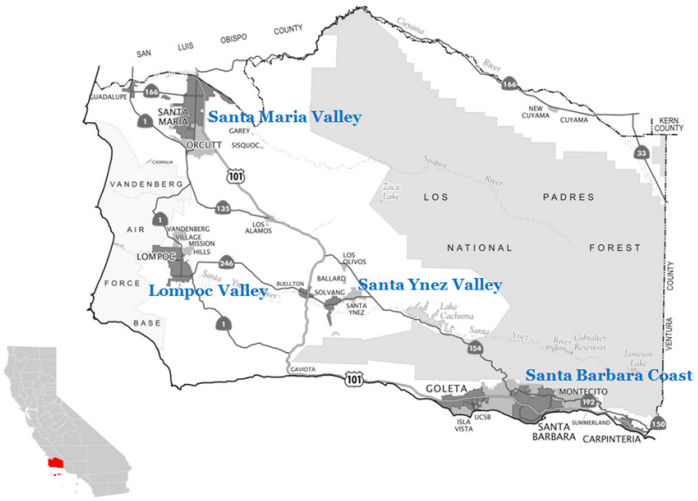
Santa Barbara Coast: Located in the southern portion of the County, this area is bordered on the south by the Pacific Ocean and on the north by the Santa Ynez mountain range, one of the few mountain systems in North America that run east-west rather than north-south. Because of the unique north and south borders, and its year-round mild "Mediterranean" climate, Santa Barbara has been described by many as the American Riviera.

Santa Ynez Valley: Located in the central portion of the County, nestled between the Santa Ynez and San Rafael mountain ranges, this area includes the communities of Buellton, Solvang, and Santa Ynez, as well as the Chumash Reservation. Cachuma Lake is also nestled between the mountain ranges, offering recreational activities and a water supply to the County. The valley's climate has recently attracted many winemakers to the area, adding vast vineyards to the rolling hills that lead to the Los Padres National Forest.

Santa Maria Valley: Located in the northern portion of the County, this area is bordered by San Luis Obispo County on the north. Much of the new development within the County has taken place here and, as a result, the area has undergone significant change in the past decade.

Lompoc Valley: Located in the western portion of the County, this area includes Vandenberg Air Force Base, which is a major contributor to the economy. Lompoc Valley is attracting many people desiring to relocate to a community that is still in its growth and development stage.

Figure 4. Santa Barbara County Sub-Regions and Location Context[3]



[2] County of Santa Barbara, *County Statistical Profile*, *2008-09*, p. B-2, Accessible at http://www.Countyofsb.org/ceo/budgetresearch/documents/budget0809/200%2008-09%20Section%20B%20County%20Statistical.pdf.

[3] Map Source: County of Santa Barbara, "Santa Barbara County Map Catalog," accessible at http://www.Countyofsb.org/gis/default.aspx?id=20752.

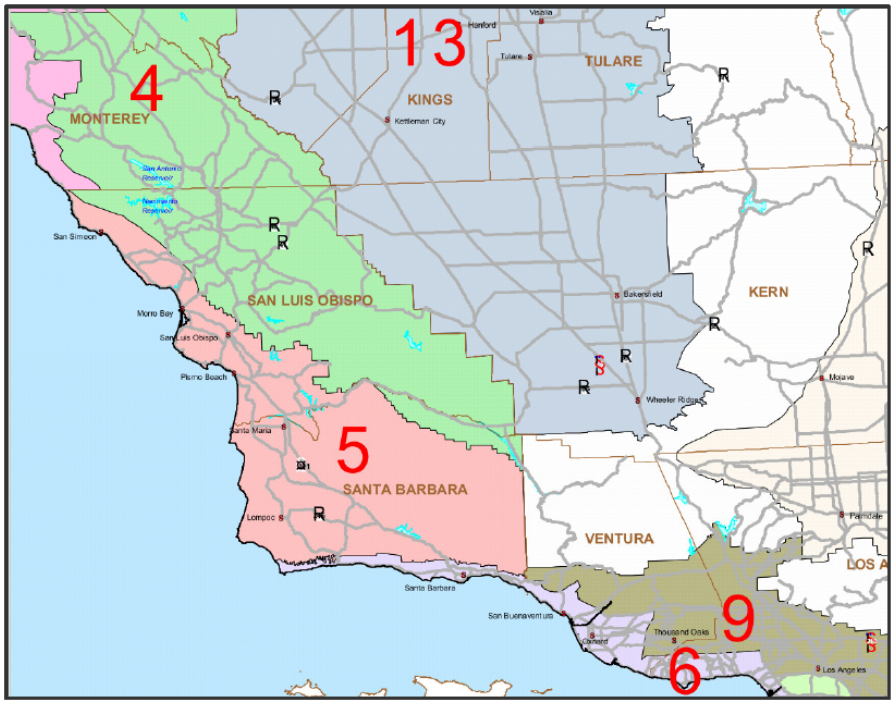
Santa Barbara County is located within three climate zones. These zones are described as follows in the *Santa Barbara County Municipal Energy Financing District Feasibility Study*:[4]

- **Zone 4** (central coastal valley) is inland of the coast with some ocean influence, which keeps temperatures from hitting more extreme highs and lows. However, summers are hot and dry and require cooing, and many days of low temperatures in the winter require heating.

- **Zone 5** (central coastal) is characterized by warmer temperatures and moist air due to the proximity to the ocean and the southern latitude. This zone comes close to comfort standards, meaning little cooling is needed and heat is only necessary for part of the day, even in the winter.

- **Zone 6** (south coastal – Los Angeles) includes beaches at the foot of the Southern California hills, where the ocean is relatively warm and keeps the climate very mild, and sunshine is plentiful—making solar equipment very advantageous. This zone requires the least energy of any region in California.

Figure 5. Santa Barbara County Climate Zone Locations[5]



As indicated in tables 3 and 4, the County consists of 8 incorporated cities and approximately 18 census-designated communities within its 3,789 square miles (2,745 square miles of land area). With a resident population of 423,895 (2010 census), the County overall exhibits a low-density landscape, with much of the population living in and around the two largest cities, Santa Maria and Santa Barbara. The County is split into five supervisorial districts (district boundaries were updated in 2011).

[4] County of Santa Barbara – Santa Barbara County AB 811 Project Team, *Santa Barbara County Municipal Energy Financing District Feasibility Study,* November 19, 2009, p. 13, accessible at http://www.Countyofsb.org/uploadedFiles/housing/CCEIP/SBCO_FeasibilityStudyFinal.pdf.
[5] Ibid.

Table 3. Incorporated Cities in Santa Barbara County and Populations (2010 Census)

INCORPORATED CITY	POPULATION
Buellton	4,828
Carpinteria	13,040
Goleta	29,888
Guadalupe	7,080
Lompoc	42,434
Santa Barbara	88,410
Santa Maria	99,553
Solvang	5,245

Table 4. Census-Designated Places in Santa Barbara County and Populations (2010 Census)[6]

COMMUNITY	POPULATION	COMMUNITY	POPULATION
Ballard	467	Montecito	8,965
Casmalia	138	New Cuyama	517
Cuyama	57	Orcutt	35,262
Garey	68	Santa Ynez	4,418
Isla Vista	23,096	Sisquoc	183
Los Alamos	1,890	Summerland	1,448
Los Olivos	1,132	Toro Canyon	1,508
Mission Canyon	2,381	Vandenberg Air Force Base	3,338
Mission Hills	3,576	Vandenberg Village	6,497

[6] An additional 44,833 persons live within the Santa Barbara County borders in areas not considered within incorporated cities and census-designated places.

2.2.1 County Operations

The County of Santa Barbara oversees operations of County-funded facilities and services, with administration headquartered at the County Administration Building, 118 E. Anapamu St., in Santa Barbara. In 2008, the County of Santa Barbara was the third largest employer within the County. As referenced in the County's 2010 Sustainability Action Plan, a profile of County government operations is illustrated in table 5.

Table 5. County of Santa Barbara Operations Profile[7]

COUNTY OPERATIONS PROFILE	
Number of County Employees	3737[8]
Number of Vehicles and Equipment*	1,378
Total Building Square Footage	2,367,822
Total Number of Structures**	717
Total Number of Electric Meters	232
Total Number of Gas Meters	88
Total County Recommended Budget, FY 2012–13	$828 million

* Includes trucks, generators, tractors, and trailers
** Includes buildings, garages, sheds, and storage containers

Most administrative government functions are headquartered in the County seat, Santa Barbara. However, due to the relatively large distance between the northern and southern parts of the County, many of these same administrative departments also have satellite offices in Santa Maria.

The County of Santa Barbara is primarily served by two electric utility providers**,** Southern California Edison (SCE) and Pacific Gas and Electric (PG&E) (the City of Lompoc serves as its own electric utility provider). Fully understanding electricity usage on a Countywide scale required a merger of utility data from all the providers.[9] While General Services collects and processes a majority of the utility bills for Countywide operations, there are several departments with billing set up directly through the utility provider.

The energy action plan provided an understanding of how the County could realize electricity savings by analyzing a representative sample of various facilities that are unique in character, and then projecting electricity savings across the larger group. Given the County's coastal climate, facilities are often not dependent on central air conditioning to maintain comfortable temperatures (the larger, more prominent facilities located in Santa Barbara or Santa Maria are more likely to have air conditioning provided through a central plant system or through individual package units serving specific locations within buildings).

[7] "UCSB Economic Forecast Project," from the *County Statistical Profile, 2008-09*, p. B-12, accessible at http://www.Countyofsb.org/ceo/budgetresearch/documents/budget0910/200%2009-10%20Section%20B%20Statistical.pdf.
[8] County employees work throughout the County and represent the County's large geographic span. However, some facilities do not house any employees on a regular basis, particularly smaller facilities.
[9] The City of Lompoc serves as its own electricity provider. Therefore, electricity data for County facilities in Lompoc was not included in the EAP.

Existing County Services

The primary function of the County is to provide taxpayers with essential services necessary for public health and safety. These services are provided to taxpayers located within incorporated cities or unincorporated, census-designated areas (depending on the service provided).[10]

The following services are provided Countywide (with providing agencies in parentheses):

- Agricultural protection and consumer assurance (Agricultural Commissioner)
- Child support services (Child Support Services)
- Criminal prosecution (District Attorney) and defense of indigents (Public Defender)
- Flood protection and control (Public Works)
- Foster care and "welfare to work" support services (Social Services)
- Health services (Alcohol, Drug and Mental Health; Public Health)
- Juvenile detention/treatment, monitoring offenders (Probation)
- Jail operations (Sheriff)
- Parks, beaches and open space maintenance (Community Services Department Department)
- Veteran affairs (Treasurer–Tax Collector–Public Administrator)

The following services are provided to residents in unincorporated areas:

- Affordable housing (Housing and Community Development)
- Building permit processing (Planning and Development)
- Fire protection (Fire)
- Planning and zoning (Planning and Development)
- Roads (Public Works)
- Sheriff patrol (Sheriff)
- Streetlights (Public Works)
- Trash and recycling collection (Public Works)

The following services are provided to incorporated cities via service contracts (with cities indicated in parentheses):

- Animal control – Field and shelter, all cities (except Santa Barbara, Carpinteria)
- Animal control – Shelter (Santa Barbara, Carpinteria)
- Building permit processing (Buellton)
- Sheriff patrol (Buellton, Solvang, Goleta, Carpinteria)

[10] County of Santa Barbara, *County Statistical Profile*, *2008-09*, p. B-4 – B-5, accessible at http://www.Countyofsb.org/ceo/budgetresearch/documents/budget0809/200%200809%20Section%20B%20County%20Statistical.pdf.

These crucial County services face many budgetary constraints and are positioned to benefit substantially from savings in utility costs that can be funneled to other taxpayer-serving programs and projects.

2.2.2 County Facilities Profile

Santa Barbara County has approximately 400 facilities scattered throughout its 3,789 square miles. The median age of these facilities is 36 years, with facility construction dates generally falling between 1920 and 2010.

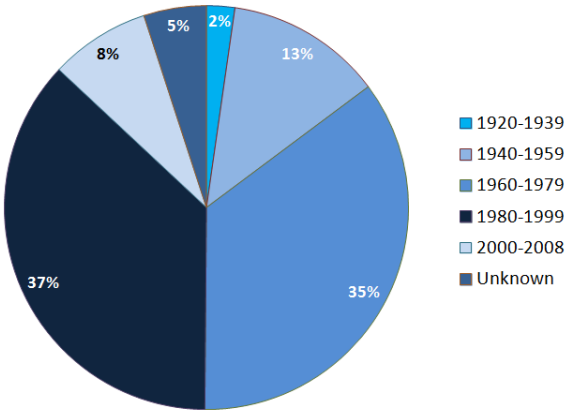


Figure 6. Distribution of County Facilities by Year Built

Considering that approximately half of all County facilities were constructed before 1978, and prior to the imposition of California Title 24 code requirements (see section 2.4), there is a significant opportunity for electricity savings not yet identified or realized.

Size Profile of County Facilities	
	Square Feet
Largest Facility	102,170
Smallest Facility	153
Median Size	1,440
Average Size	5,329

Table 6. County Facility Size Profile

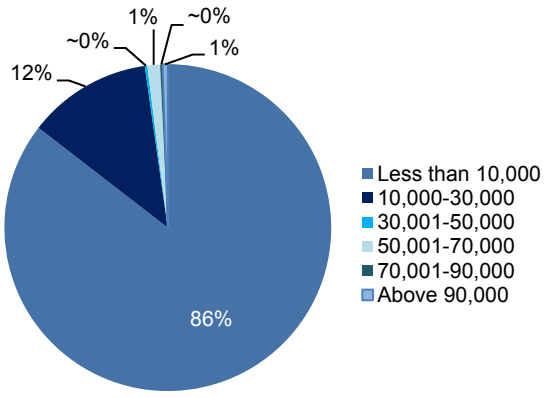


Figure 7. Square Footage Distribution of County Facilities

As indicated in figure 7, 86% of all County facilities are less than 10,000 square feet in size. While the greatest opportunities for individual facility electricity efficiency lie with the highest users (which generally correlates to square footage, aside from street lighting districts), the EAP also analyzed electricity use in smaller facilities that may be less energy intensive but represented a greater proportion of the overall facility portfolio.

Energy Element of the Santa Barbara County Comprehensive Plan
Similar to a city's general plan, the County of Santa Barbara Comprehensive Plan serves as a guiding document for the County's long-term land use practices, development, and growth.

The energy element of the Comprehensive Plan, published by the Department of Planning and Development in 1994 and republished in 2009, contains long-range strategies geared toward energy efficiency and alternative energy practices throughout the County. The energy element provides an overview of practices that the County government can take in order to achieve higher efficiencies in energy use, including the following:

- Retrofitting government facilities
- Financing energy efficiency retrofits and projects
- Incorporating energy-efficient design in new and existing facilities
- Purchase of energy-efficient equipment
- Achieving efficiencies in County transportation vehicles and management
- Pursuing efficiencies in water usage through irrigation, plumbing fixtures, and landscaping

The EAP speaks directly to the goals outlined in the energy element of the Comprehensive Plan*, and provides the County with an understanding of opportunities for reducing electricity consumption and energy demand.*

2.3 BENEFITS TO COUNTY

While an obvious direct objective, reduced electricity consumption is just one of the several benefits that the County will realize through electricity efficiency execution as detailed in the EAP. A reduction in electricity consumption can also result in reduced electricity costs; reduced pollution and fossil fuel usage; reduced vulnerability to changes in electricity costs, availability, and reliability; and new business opportunities for the local private sector.

Reduced Electricity Costs
Local governments have a fiduciary duty to taxpayers to manage public funds in the most responsible manner possible. The energy element of the *Comprehensive Plan* speaks to the benefits of energy efficiency and its impacts on constituents, as indicated in the following excerpt:

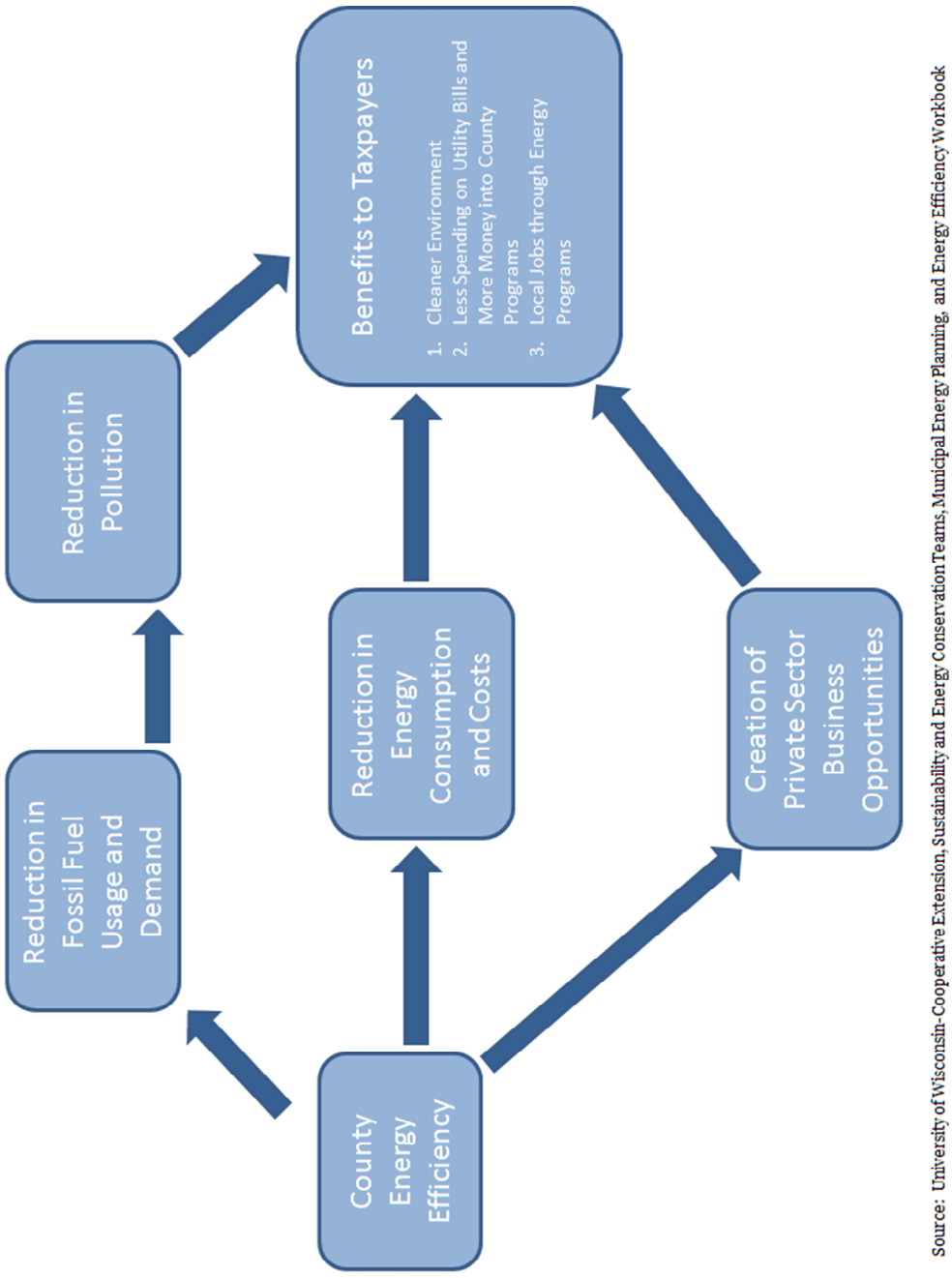
Reduced energy costs for government can mean added resources available for services or reduced revenue needs. Taxpayers' dollars that otherwise would be spend on wasted energy can be invested in local communities, infrastructural improvements, education, new products, and services.[11] Energy represents a controllable expense of operations. By increasing electricity efficiency in buildings, the County is being duly responsible with taxpayer funds that can be allocated elsewhere. Taxpayer funding not already spent can be allocated to additional programs aimed toward electricity efficiency or other needed County functions.

Reduced Pollution and Fossil Fuel Usage
Electricity efficiency improvements at a facility can provide tangible results with regard to the health of individuals and the overall community. Improved air, thermal, and acoustic environments, and enhanced occupant comfort and health, can combine to produce higher quality of life. Electricity-efficient buildings generally have higher standards of indoor air quality, low-emitting materials, air filters, outdoor air delivery, and carbon dioxide monitoring. Electricity efficiency also incorporates the effects of enhanced lighting, thermal control, and daylighting, all of which have profound health benefits for facility occupants. Electricity-efficient buildings can provide a more comfortable environment in which to work and be productive, particularly through improvements in air quality. County operations are likely to evince improved productivity and satisfaction and reduced absenteeism. The County of Santa Barbara is taking action to ensure a high-quality physical environment for its employees and constituents, one that will improve employee retention and decrease the costs associated with employee turnover.

Less Vulnerability to Changes in Electricity Costs, Availability, and Reliability
The incorporation of electricity efficiency practices into building operations not only decreases County utility consumption and costs, but also the subsequent costs passed back to residents and businesses. As utility prices continue to increase, electricity efficiency will help lessen negative financial impacts at the local level. The last decade has seen Californians experience rolling blackouts as a way of constraining electricity usage during peak times of the year. Gasoline shortages in the summer of 2008 and fall of 2012 brought about high energy prices similar to the oil shocks of the 1970s. The County's best course of action against unknown changes in electricity availability and reliability is to reduce overall electricity use and reduce peak energy demand. The EAP will provide a road map to help weather the storm (in the event of oil shocks and other disruptions over which the County has no control) by identifying potential behavioral changes and retrofits that can be made in the short and long term.

[11] County of Santa Barbara, *Santa Barbara County Comprehensive Plan: Energy Element*, Adopted 1994, Republished May 2009, accessible at http://longrange.sbCountyplanning.org/programs/genplanreformat/PDFdocs/Energy.pdf.

Figure 8. Benefits of County Energy Efficiency



Source: University of Wisconsin-Cooperative Extension, Sustainability and Energy Conservation Teams, Municipal Energy Planning, and Energy Efficiency Workbook

Business Opportunities for Private Sector

Efforts in energy efficiency have the ability to cultivate opportunities for local businesses. In particular, energy efficiency projects need engineers, planners, architects, suppliers, contractors, and other consultants to see a project through, from the planning to the measurement and verification phases.[12]

For example, the recent solar/photovoltaic project completed in April 2012 at the County's Calle Real/San Antonio campus utilized 24 local vendors. These vendors performed various functions throughout the life of the project, providing the following services:[13]

- Electrical contracting
- Environmental and solar consulting
- Landscape contracting
- Welding contracting
- Excavation contracting
- Crane operation
- Rental services
- Tools and hardware

In addition, a committed investment to electricity efficiency may spur additional activity from businesses or entrepreneurs that are looking to tap into the existing opportunities made possible through electricity efficiency projects. These investments require additional manpower to complete the tasks.

Energy projects produce the need for additional business, both from a technical and support standpoint (particularly for large projects such as the Calle Real PV installation). These projects have an immense impact on local businesses.

[12] University of Wisconsin-Cooperative Extension, Sustainability and Energy Conservation Teams, *Municipal Energy Planning: An Energy Efficiency Workbook*, Version 1.0, 2010, p. 31, accessible at http://florence.uwex.edu/files/2010/12/MunicipalEnergyPlanningWorkbook.pdf.

[13] County of Santa Barbara, General Services Department, "Santa Barbara County Goes Solar," Press Release: May 9, 2012.

2.4 STATEWIDE AND REGIONAL ENERGY AND ENVIRONMENTAL POLICY DRIVERS

There are a number of market forces and policy drivers converging to make energy efficiency an increasingly important issue in Santa Barbara County and statewide. California has taken major strides toward meeting future energy needs through clean, reliable, and low-cost means. State policy has remained the most aggressive in the nation regarding future emissions reductions, energy conservation, and investments in conservation and renewable energy.

Californians have helped save more than 40,000 gigawatt-hours (GWh) of electricity and 12,000 megawatts (MW) of peak demand through energy projects over the past three decades. These advancements have helped reduce energy supply costs through lower customer bill strengthened the statewide economy; and maintained reliable services while reducing price volatility.[14]

Approximately 105 municipalities in California have adopted their own initiatives geared toward green building and the reduction of greenhouse gas emissions, and many more have established target energy usage reduction goals.[15] Many of these initiatives are a direct result of statewide legislation that seeks to reduce greenhouse gas emissions and mandate minimum sustainable building standards. Many of these municipalities, through the support of SCE and other utilities, have developed energy action plans and climate action plans similar to this document that speaks directly to statewide legislation for energy efficiency (such as AB 32, SB 375, Title 24, CALGreen, and CEESP). While not comprehensive, this list defines the compelling statewide initiatives that drive municipal and local initiatives in energy efficiency.

AB 32

California Assembly Bill 32, the California Global Warming Solutions Act, has triggered many of the recent statewide efforts involving environmental and energy efficiency initiatives and their ensuing strategic plans. Signed into law on August 27, 2006, by Governor Arnold Schwarzenegger, AB 32 requires that the California Air Resources Board (ARB) pursue the following greenhouse gas emissions reductions through regulations and market mechanisms:

- GHG emissions reduction to 2000 levels by 2010
- GHG emissions reduction to 1990 levels by 2020 (25% total reduction)
- GHG emissions reduction to 80% below 1990 levels by 2050

As mentioned in the County's Sustainability Action Plan (SAP), the County of Santa Barbara has adopted a policy to immediately begin reducing greenhouse gas emissions to help contribute toward achieving the state's energy goals prescribed by AB 32.[16] The SAP is further detailed in Section 2.5.2: County Energy Efficiency Initiatives and Programs.

[14] California Public Utilities Commission and California Energy Commission, "Energy Efficiency: California's Highest-Priority Resource," June 2006, accessible at http://chinauseealliance.org/wp-content/uploads/2012/02/calif_cleanenergy508.pdf.
[15] US Green Building Council, *Public Policies Adopting or Referencing LEED*, 2011, accessible at http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852#CA.
[16] County of Santa Barbara, *Santa Barbara County Sustainability Action Plan*, 2010, accessible at http://longrange.sbCountyplanning.org/programs/climateactionstrategy/docs/Appendix%20A.pdf.

SB 375

California Senate Bill 375, the Sustainable Communities and Climate Protection Act of 2008 (SB 375), incorporates planning activities into GHG emissions reduction goals in order to develop sustainable communities statewide. As the metropolitan planning organization representing the County of Santa Barbara, the Santa Barbara County Association of Governments (SBCAG) must develop a "sustainable communities" strategy that integrates transportation, land-use, and housing policies as a means of achieving GHG emissions targets and energy usage reductions. The County of Santa Barbara is adapting to the new political environment in the state by creating a plan of action for energy efficiency through the EAP.

California Title 24

Title 24 of the California Code of Regulations (CCR) reflects a mandatory standard set forth by the State of California; it calls for effective monitoring of energy efficiency for buildings that have been newly constructed or altered since 1978. The regulations within Title 24 cover structural, electrical, mechanical, and plumbing systems in an effort to reduce the state's overall energy consumption. Utility rebates and incentives are often based on the amount of energy saved above Title 24 baseline consumption.

CALGreen

The California Green Building Standards Code (CALGreen) provides minimum standards in green building construction, and practices that decrease waste, reduce energy usage, and conserve resources for projects in the state. At a minimum, CALGreen requires that all new buildings reduce water consumption, divert construction waste from landfills, and utilize low-emitting materials; all new buildings over 10,000 square feet must also be adequately commissioned. CALGreen standards are mandatory for most of the new construction projects taking place in the state, and use Title 24 as a guideline for determining energy efficiency requirements. The EAP will provide County staff with a framework for how to successfully meet the 2010 energy efficiency standards made mandatory through CALGreen.

CEESP

The California Long-Term Energy Efficiency Strategic Plan (CEESP) is a joint effort between the California Public Utilities Commission (CPUC) and its regulated utilities statewide; it is an effort to fund activities that lead to long-term sustainable changes in energy efficiency. As of 2004, investor-owned utilities such as Southern California Edison and the Southern California Gas Company must use funding generated through a public goods charge imposed on ratepayers to support programs for energy efficiency, low-income services, renewable energy, and public interest research and development.[17] Programs such as the Southern California Edison Strategic Plan Strategies Program are ratepayer-funded, and provide guidelines for electricity efficiency using near-term, mid-term, and long-term strategies.

Specifically, the County of Santa Barbara Strategic Plan Strategies Program operates under the CEESP goal that "local governments lead by example with their own facilities and energy usage practices."[18] The *County of Santa Barbara Energy Action Plan* effectively speaks to the CEESP goals of promoting strategies that look at electricity efficiency over the long term.

[17] California Energy Commission, "Implementing California's Loading Order for Electricity Resources," Staff Report, July 2005, accessible at http://www.energy.ca.gov/2005publications/CEC-400-2005-043/CEC-400-2005-043.PDF.

[18] Southern California Edison, County of Santa Barbara's Strategic Plan Strategies, Statement of Work, p. 1.

2.5 COUNTY COMMITMENT TO ENERGY EFFICIENCY

2.5.1 Sustainability Action Plan and Greenhouse Gas Emissions Inventory

To help California meet its GHG emissions targets, the County must take on many roles, acting as a producer of GHG emissions; a regulator of GHG-emitting activities; and an "incentivizer" of communitywide enhancements to reduce GHG emissions.[19] In 2009, the Santa Barbara County Board of Supervisors showed strong leadership by adopting Resolution 09-059, which highlighted the County's commitment to reducing GHG emissions in order to comply with the state's GHG reduction targets. This resolution was in response to AB 32 and its mandated reduction in GHG emissions to 1990 levels by 2020 (a reduction of 15%, or 169 million metric tons), and an 80% reduction of 1990 emissions levels by 2050.

The County's *Sustainability Action Plan* (SAP), published in 2010, detailed strategic actions designed to reduce County energy usage by setting out a contextual framework for projects that can be implemented through 2020. These projects included increasing energy efficiency in vehicle fleets and buildings; demonstrating the use of clean, renewable energy sources; implementing vehicle transportation plans that reduce energy usage; encouraging waste reduction; and joining the Santa Barbara SCE and PG&E partnership programs. The SAP addressed the statewide goals and emissions targets set forth by AB 32, SB 97, and SB 375 with a template that was developed by the ICLEI-Local Governments for Sustainability initiative. The document included the following milestones for local governments to reduce GHG emissions:[20]

- **Conduct a baseline emissions inventory**: Regional governments and nations across the world can only manage what they can measure. Therefore, the first step in managing greenhouse gas emissions is to establish an inventory of those emissions.
- **Adopt an emissions reduction target**: This provides a tangible and specific goal against which progress can be measured.
- **Develop a local climate action plan**: This provides a strategy to reduce GHG emissions and includes measures already implemented.
- **Implement policies and measure results**: This is the most important part of the process, and it generally involves cooperation and coordination among multiple departments.
- **Monitor and verify results**: This milestone provides a valuable tool to measure progress toward the reduction goal. It allows for modification of the implemented measures if they aren't working, and provides a quantification of emissions to be used should an emission trading mechanism be established.

The SAP also included the County's GHG emissions inventory and baseline consumption, as detailed in table 7. County buildings and facilities accounted for the largest percentage of GHG emissions (48%). Reduction of energy usage in this category was identified as critical to meet Countywide reduction targets.

[19] Resolution to the Board of Supervisors, County of Santa Barbara, State of California, *Resolution 09-059*, Exhibit 1, accessible at http://longrange.sbCountyplanning.org/programs/climateactionstrategy/docs/Resolution%2009-059-final%20draft%20signed.pdf.
[20] County of Santa Barbara, *Santa Barbara County Sustainability Action Plan*, 2010, p. 13, accessible at http://longrange.sbCountyplanning.org/programs/climateactionstrategy/docs/Appendix%20A.pdf.

Table 7. 2008 Countywide Baseline Greenhouse Gas Emissions

2008 COUNTYWIDE BASELINE GREENHOUSE GAS EMISSIONS		
Emission Category	Metric Tons of Carbon Dioxide Equivalent (CO_2e)[21]	Percentage of Total
Buildings and Facilities	64,978	49
Streetlights and Traffic Signals	2,949	2
Wastewater Facilities	7,573	6
Vehicle Operations	9,797	7
Solid Waste Facilities	36,765	27
Other Fugitive Emissions	11,941	9
Total	**134,003**	**100%**

The EAP will leverage the efforts of the SAP by primarily focusing on electricity usage and defining specific projects and their associated cost and electricity savings that can be implemented throughout the County, particularly since electric energy is a major component of reducing greenhouse gas emissions and has a direct effect on most of the emissions categories established by the County's GHG emissions inventory. Establishing an independent baseline and reductions target specifically for electricity consumption allows the County to understand opportunities for electric energy savings that can later be translated into GHG emissions projections.

2.5.2 County Energy Efficiency Initiatives and Programs

As a steward of local energy efficiency initiatives, the County of Santa Barbara has demonstrated its commitment to sustainable practices by participating in various programs that aim to reduce energy consumption on a community-wide scale. These programs include the Innovative Building Review Program, South Coast Energy Efficiency Partnership (SCEEP), Santa Barbara County Energy Watch, and emPowerSBC. A Green Team consisting of County employees provides guidance and perspective on energy-related projects.

Innovative Building Review Program

The Innovative Building Review Program (IBRP) is a free program that advises developers on how to make their developments more energy efficient. The advice is in the form of suggestions which will benefit the construction and operation of your development in a number of ways, including energy efficiency and marketability. The IBRP is made up of local professionals including contractors, architects, engineers, energy consultants, and government officials.

South Coast Energy Efficiency Partnership (SCEEP)

In partnership with Southern California Edison (SCE) and Southern California Gas Company (SoCal Gas), the County of Santa Barbara has joined the Cities of Carpinteria, Goleta, and Santa Barbara in creating the South Coast Energy Efficiency Partnership (SCEEP). SCEEP aims to assist local governments in retrofitting their facilities, provide educational and outreach assistance to County residences and businesses in the pursuit of energy efficiency.

[21] CO_2e stands for "carbon dioxide equivalent," a standard measure of greenhouse gases.

Through SCEEP, the County installed HVAC variable-speed drives at the County courthouse in 2009; saving 130,855 kilowatt hours of electricity and approximately $15,930 per year in electricity costs (HVAC variable-speed drives change the speed of ventilation according to need and energy management.)[22]

Current programs through SCEEP include the Continuous Refrigerator and Freezer Recycling Program. In this initiative, SCE accommodates residents and businesses that are upgrading to more energy-efficient refrigerators with free weekday pickup and a nominal payment.

Santa Barbara County Energy Watch

The counterpart to the SCEEP program in the northern communities of the County of Santa Barbara is the Santa Barbara County Energy Watch (SBCEW), jointly funded by Pacific Gas & Electric Company (PG&E) and SoCal Gas. The two utilities partnered with the County and the cities of Buellton, Guadalupe, Santa Maria, and Solvang to provide training and advice on energy efficiency practices, while also assisting in the funding of direct installations of energy-efficient equipment for municipal facilities and local businesses.[23]

emPowerSBC

A participant in the Better Buildings Neighborhood program operated by the U.S. Department of Energy, the County of Santa Barbara's emPowerSBC program uses federal funding to provide homeowners with the tools to implement energy-saving home upgrades, including improved insulation, windows, and doors, and energy-efficient heating and cooling systems. Through a partnership with two local lenders, low-interest, long-term financing will be available for these specific energy efficiency upgrades. Additionally, the program's partnership with Energy Upgrade California will make available up to $4,000 in utility rebates to individuals making energy-saving upgrades.[24]

[22] South Coast Energy Efficiency Partnership, Press Release: "In 2009, SCEEP Leads Southern Santa Barbara County into an Energy Efficient Future," accessible at http://www.southcoastenergywise.org/site/news.
[23] Pacific Gas & Electric Company, "Santa Barbara County Energy Watch," accessible at http://www.sbenergywatch.com/about.shtml.
[24] U.S. Department of Energy, "Santa Barbara County Launches New Home Energy Upgrade Financing Program with Energy Department Support," except from *EERE Network News*, November 14, 2011, accessible at http://apps1.eere.energy.gov/news/news_detail.cfm/news_id=17892.

County Green Team

Green activities on an agency scale are not limited to a single department. In fact, green activities can now be attributed to many tasks, each of which involves several facilities and County departments in different ways. In order to further promote and champion energy efficiency projects Countywide, the General Services Department has reinstated the County's "Green Team" as of 2011. The Green Team is a group of County employees who work for departments directly related to projects in energy efficiency and environmental health and sustainability. At minimum, the Green Team consists of employees from the following departments: General Services, Facilities, Community Services, Water Agency, Public Works, Planning and Development, and the Sheriff's Department.

The primary focus of the Green Team is to allow County employees from different sectors and offices within the County family to provide guidance and recommendations to the Board of Supervisors on existing and future projects in energy efficiency and sustainability.

Figure 9. Manning Park

Figure 10. Energy Leader Partnership Model

Energy Leader Partnership Program

SOUTHERN CALIFORNIA EDISON® An EDISON INTERNATIONAL® Company

Achieving threshold criteria in county facilities and community-wide triggers advancement to next tier

Stepped Levels of Support	Valued Partner	Silver Level (5% kWh Savings)	Gold Level (10% kWh Savings)	Platinum Level (20% kWh Savings)
Offerings	* Valued Partner level enhanced incentives * Technical support * Strategic plan support * Co-branded marketing & outreach support	* Silver level enhanced incentives * Technical support * Strategic Plansupport * Co-branded marketing & outreach support	* Gold Level enhanced incentives * Technical Support * Strategic Plan support * Co-branded marketing & outreach support	* Platinum level enhanced incentives * Technical support * Strategic Plan support * Co-Branded marketing & outreach support * Incentives for customized county/community offering
Energy Efficiency Criteria	Basic EE Criteria * Commitment to Long Term Energy Efficiency Leadership * Commitment to Partnership goals including energy savings in municipal facilities	Basic EE Criteria Plus * Municipality initiates Energy Action Plan * Target at least 20% of county facilities to complete specified EE upgrades * Target 5% kWh reduction for county facilities * Co-sponsor marketing & outreach to the community on EE programs	Basic EE Criteria Plus * County completes Energy Action Plan * Target at least 50% of municipal facilities to complete specified EE upgrades * Target 10% kWh reduction for municipal facilities * Co-sponsor marketing & outreach to the community on EE programs	Basic EE Criteria Plus * Municipality implements Energy Action Plan (policies, ordinances, procedures) * Target 100% of county facilities to complete specified EE upgrades * Target 20% kWh reduction for county facilities * Co-sponsor marketing & outreach to the community on EE programs
Demand Response Criteria	Basic DR Criteria * Enroll in California's Statewide Flex alert and implement an internal educational campaign	Basic DR Criteria Plus * At least one (1) eligible facility to participate in one (1) SCE Demand Response program * At least one (1) eligible facility to develop a Demand Reduction Action Plan to be followed during a Flex Alert event * Distribute Energy Soltuions brochure to partner employees * Complete an Integrated Demand Side Management (IDSM) audit at all eligible facilities	Basic DR Criteria Plus * Have at least 20% of eligible facilities participate in an SCE Demand Response Program * Conduct co-branded marketing and outreach to residential customers on SCE's Demand Response programs * At least one (1) eligible facility implement a DR measure recommended from the IDSM audit	Basic DR Criteria Plus * At least one (1) eligible facility must participate in SCE's Auto Demand Response program * Have at least 50% of eligible facilities participate in an SCE Demand Response program and develop a Demand Reduction Action Plan for the participating facilities * Organize a local outreach event during the Spring/Summer season to promote Demand Response/IDSM

Energy Leader Partnership

The CPUC has established the Energy Leader Partnership (ELP) in order to support the long-term energy efficiency efforts of the CEESP, particularly by providing resources to local governments in energy efficiency efforts and increasing interest and participation in demand-side management opportunities.[25] ELP takes into account a tiered system that corresponds to the efforts and level of energy efficiency achieved by a participating agency, based on the percentage of reduction in kWh usage.

Participation in the ELP also qualifies the County for enhanced incentives based on partnership level. The applicable tiers include Valued Partner, Silver Level, Gold Level, and Platinum Level. The County of Santa Barbara is currently at the Valued Partner level through its participation in SCE's South Santa Barbara County Energy Leader Partnership.

[25] Southern California Edison, Energy Efficiency Partnership, accessible at http://www.sce.com/business/energy-solutions/energy-efficiency-partnerships.htm.

The adoption of an energy action plan positions the County of Santa Barbara to attain the Silver or Gold Level within the ELP, as long as total targeted electricity savings are at least 10% of the baseline and various other criteria are met. The County's participation in the ELP is helping the CPUC meet its objectives through its long-term CEESP, which seeks to increase energy efficiency across major groups and sectors statewide.

2.5.3 County Projects in Electricity Efficiency

Santa Barbara County has undertaken specific projects aimed at reducing electricity consumption for County facilities, as well as projects in renewable energy—including two large solar/photovoltaic projects. Table 8 illustrates some of the electricity-saving efforts undertaken for buildings and other facilities.

Table 8. Electricity-Efficiency Projects Implemented by County of Santa Barbara Since 2008

Project	Electricity Savings (kWh)	Annual Cost Savings ($)[26]	Implementation Cost ($)
Administration Building Elevator Motor Replacements and Lighting Projects	474,516	$61,687	$71,176
Santa Maria Probation Building – De-lamping Project	19,622	$2,550	$2,550
Variable-Frequency Drive (VFD) Installation – County Courthouse Cooling Tower	130,855	$15,930	Unknown
Lighting Project – Service Fleet/Corporate Yard	35,604	$4,629	$5,697
Lighting Project – Truck Maintenance Bay	24,121	$3,136	$3,859
Vending Machine Economizers	19,385	$2,520	$2,268
Lighting Project – California Strawberry Commission	7,483	$973	$1,197
Lighting Project – Santa Ynez Airport Hanger	6,008	$781	$703
Lighting Project – Lompoc Veterans Facility	4,680	$608	$548
Lighting Project – Veterans Memorial Building	29,791	$3,873	$3,486
Lighting Project – Fire Station Administration Facility	3,900	$507	$456
Outdoor Induction Lighting – Various Facilities	857,243	$111,442	Unknown
Plug Load Occupancy Project – Surge Protectors	189,189	$24,595	0
Additional Projects	13,311	$1,730	$1,226
Totals	**1,815,708**	**$234,961**	**$93,166**[27]

[26] Annual cost savings are estimated using an average virtual rate of $.13/kWh

[27] Total implementation cost includes additional projects (mostly lighting replacements and de-lamping) that did not have available quantified electricity savings or cost savings.

Additional projects were completed at the following facilities both prior to and after 2008:

Buildings

- Replacement of T12 fluorescent lighting with energy-efficient T8 lighting in all buildings
- Replacement of incandescent light bulbs with energy-efficient compact fluorescent (CFL) light bulbs in all buildings
- Replacement of exit sign lights with energy-efficient LED technology
- Full lighting retrofit at the McDonald Building, Santa Barbara
- Replacement of natural gas–powered chiller with a double-effect, gas absorption chiller in the Administration Building
- Replacement of air conditioning units in buildings A, B, and D with more efficient units with economizers and VFDs in the Betteravia government complex, Santa Maria

Community Services Department Facilities

- Replacement of fluorescent lights with energy-efficient, full-spectrum lights at the Parks Division Administration Building
- Replacement of lights with LED technology at Arroyo Burro
- Installation of a new roof at the Parks Division head office
- Replacement of swimming pool motors with more energy-efficient motors, manual control of filtration pumps, and installation of new backup generators that are more energy efficient at the Lake Cachuma recreation area
- Installation of variable-speed motors on the domestic water system and replacement of light bulbs with CFL technology at Jalama Beach park facilities
- Installation and programming of VFDs on the domestic water system and conventional pump motors at Nojoqui Falls park facilities
- Replacement of incandescent lighting with CFL technology, and installation of a VFD on the motor for the well water system at Waller Park

Solar Projects

In April, 2012, Santa Barbara County successfully installed a 1-megawatt (MW) solar photovoltaic (PV) array to feed directly into the utility meter that feeds the facilities located within the Calle Real/San Antonio campus, the largest user of electricity Countywide (see section 4.3 – Highest Users). The project will provide up to one-third of the electricity usage of the campus through renewable means.

Calle Real Photovoltaic Project:

- Size: 1 megawatt (MW) through 4,500 SolarWorld PV panels
- Electricity generation: 1.7 million kilowatt hours (kWh)
- Total cost: $5.4 million (financed over a 15-year term at a 1.2% effective rate)
- Rebate from California Solar Initiative: $1.7 million
- Cost savings from renewable energy: $12 million over life of system
- Greenhouse gas emissions savings: 1.6 million pounds of CO_2e per year

Another 1 MW photovoltaic project was installed adjacent to the Laguna County Sanitation District (LCSD) wastewater reclamation plant outside of Santa Maria, a facility that provides wastewater services to 35,000 residents in northern Santa Barbara County. Extending over 5 acres of land, this project will utilize two separate array systems using approximately 4,100 PV panels and will provide electricity to the LCSD wastewater reclamation facility located just to the south (with any additional electricity being added to the PG&E grid). The LCSD photovoltaic project generates an additional 1,786,628 kWh annually for the County.

Figure 11. Calle Real Photovoltaic Project

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3 COUNTY ELECTRIC ENERGY USAGE

Electricity data was provided by Southern California Edison (SCE) and Pacific Gas & Electric Company (PG&E). As shown in figure 12, the northern portion of the County, including Santa Maria, falls into PG&E territory (white) while the southern areas, including Santa Barbara, are served by SCE (yellow). The City of Lompoc utilizes its own municipal utility and is not served by either PG&E or SCE (data was also acquired for facilities within the City of Lompoc).

Figure 12. Santa Barbara County Electric Utility Provider Map

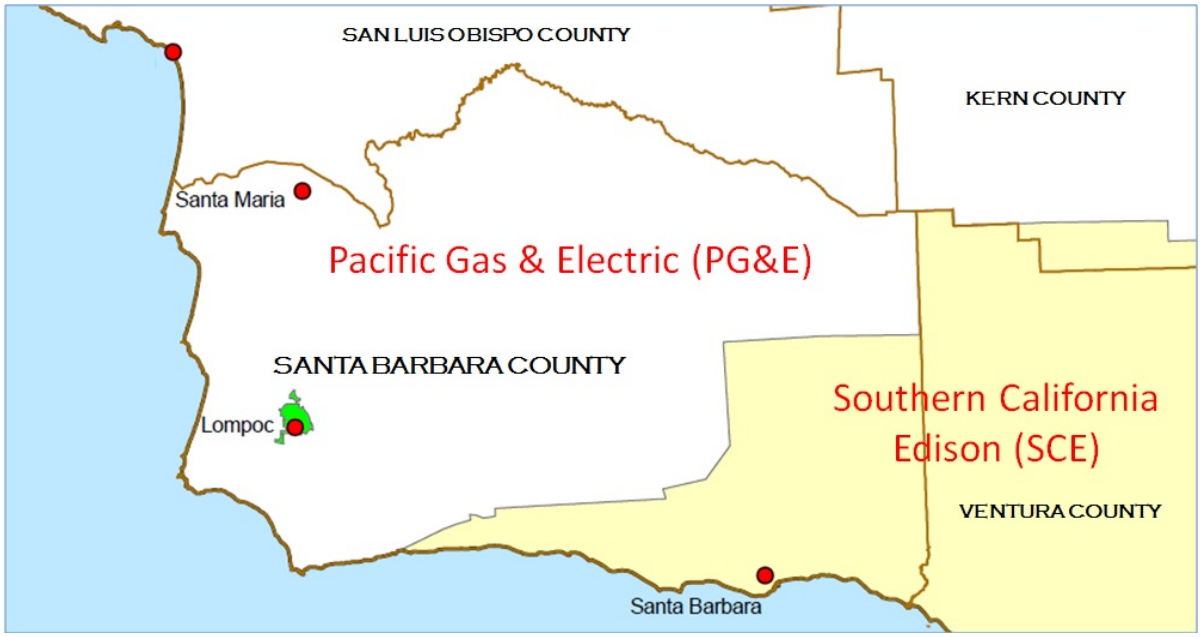


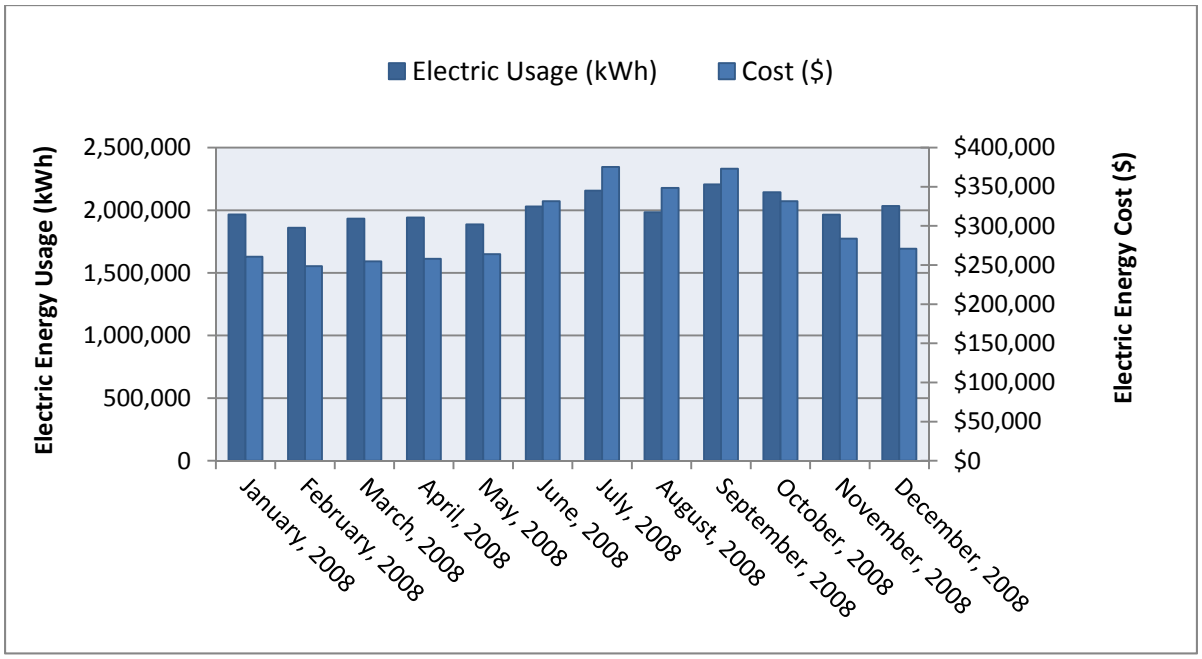
Table 9. 2008 Countywide Facility Baseline[28]

Electricity Consumption (kWh)		Greenhouse Gas (GHG) Emissions (Metric Tons of CO_2e)
Total	24,108,242	6,936
SCE Territory	16,521,574	4,728
PG&E Territory	6,696,902	1,949
City of Lompoc[29]	889,766	259

[28] GHG emissions were calculated using emissions factors as indicated by SCE and PG&E. A 2007 emissions factor was used for SCE, while a 2008 emissions factor was used for PG&E. Emissions factors were available from the following source: California Climate Action Registry, *Power Generation/Electric Utility Reporting Protocol*, Version 1.1, May 2009, accessible at http://www.climateregistry.org/resources/docs/pup/Power-Utility_Reporting_Protocol_Version_1.1.pdf.

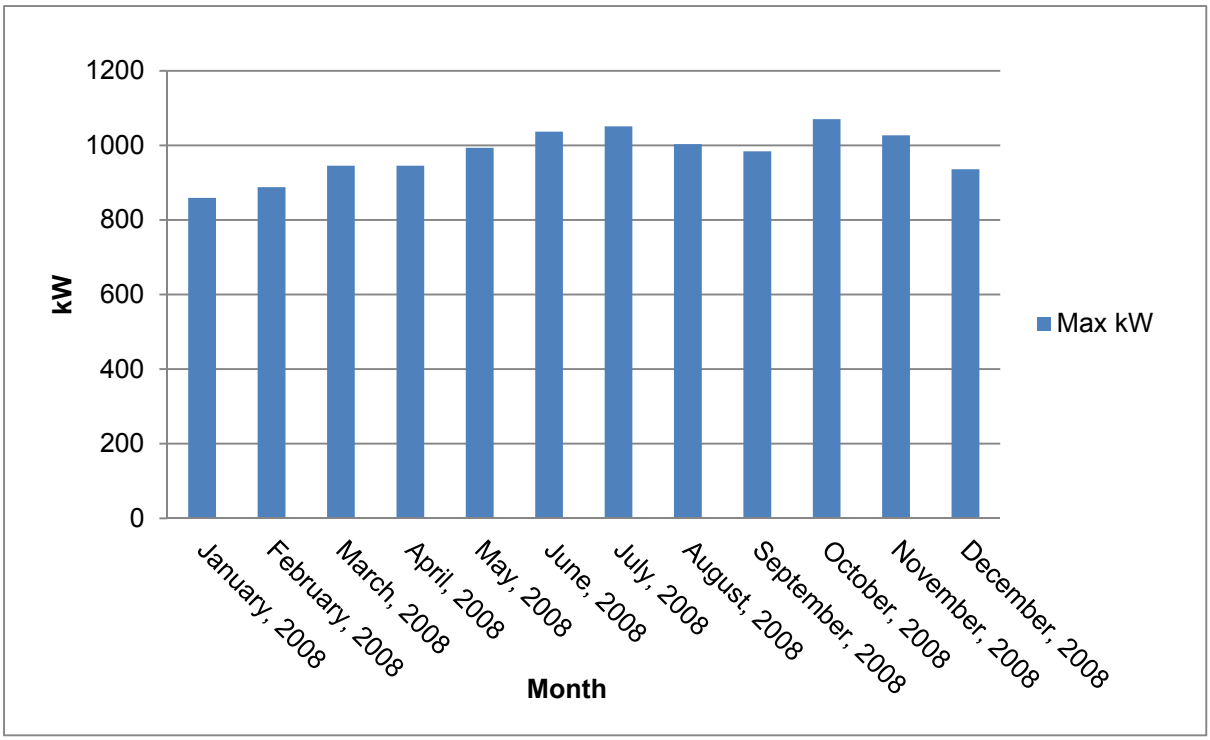
[29] City of Lompoc consumption data for 2008 was not available. As a result, consumption data for 2009 was used. The same emissions factor used for PG&E data was used for City of Lompoc data in order to calculate GHG emissions.

Figure 13. 2008 Baseline Electricity Consumption and Cost by Month



As indicated in figure 13, highest consumption took place during the summer months (June–September), which also corresponded to the highest utility costs during the year. Electricity demand also peaked during these same months (figure 14).

Figure 14. 2008 Baseline Electric Utility Demand

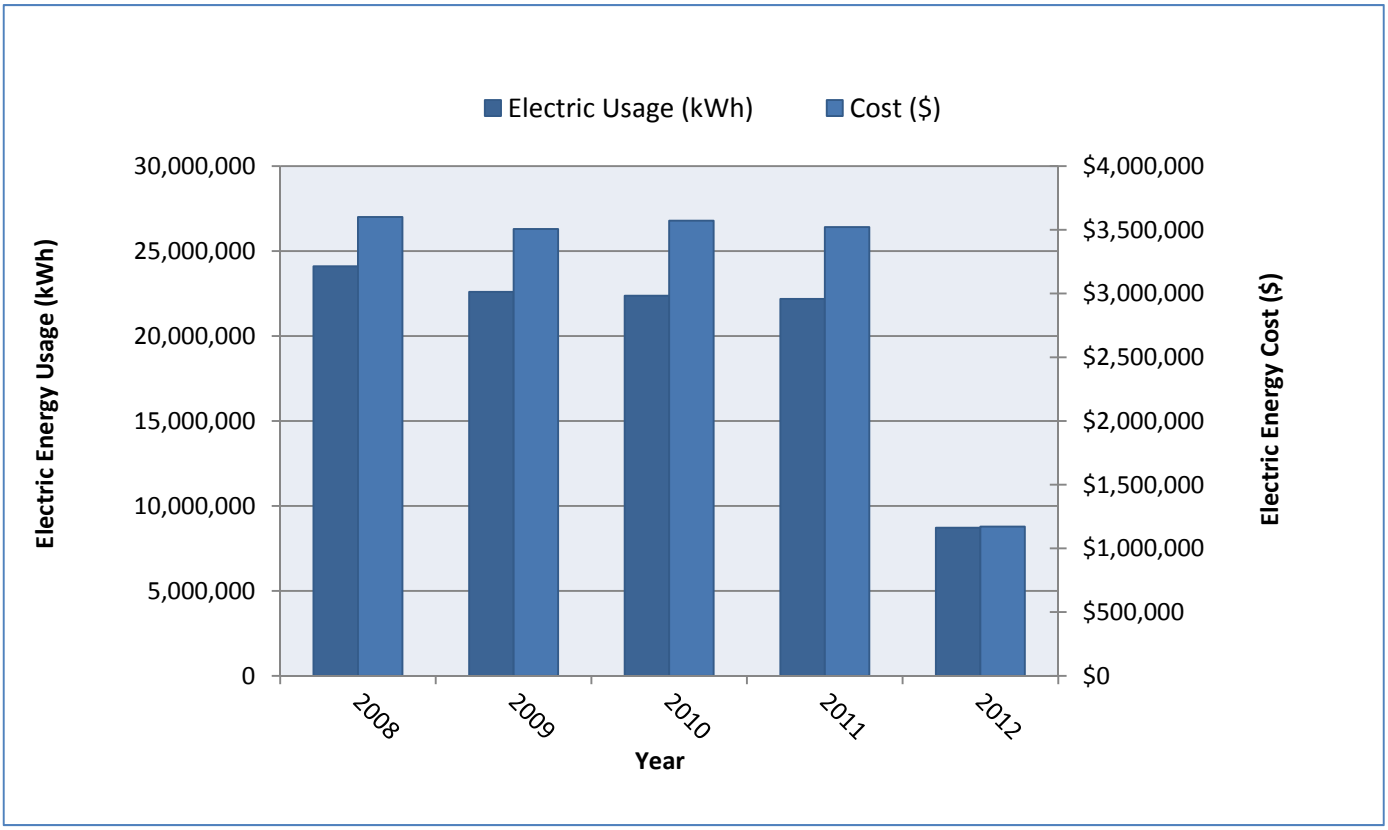


The County saw a slight dip in electric energy usage each year since 2008, even though total costs have increased (see table 10). This dip occurred as a result of electricity improvements and electricity conservation Countywide since 2008 (as described in section 2.5.3).

Table 10. Countywide Electric Utility Consumption, 2008–2012[30]

Year	Electric Energy Cost ($)	Electric Energy Usage (kWh)	Maximum Demand (kW)
2008	$3,715,978.23	24,108,242	1,114
2009	$3,621,724.57	23,490,353	1,018
2010	$3,769,756.52	23,896,131	1,118
2011	$3,677,463.96	23,375,239	1,070
2012	$1,201,656.09	8,951,743	1,118

Figure 15. Electricity Consumption and Cost, 2008–2012

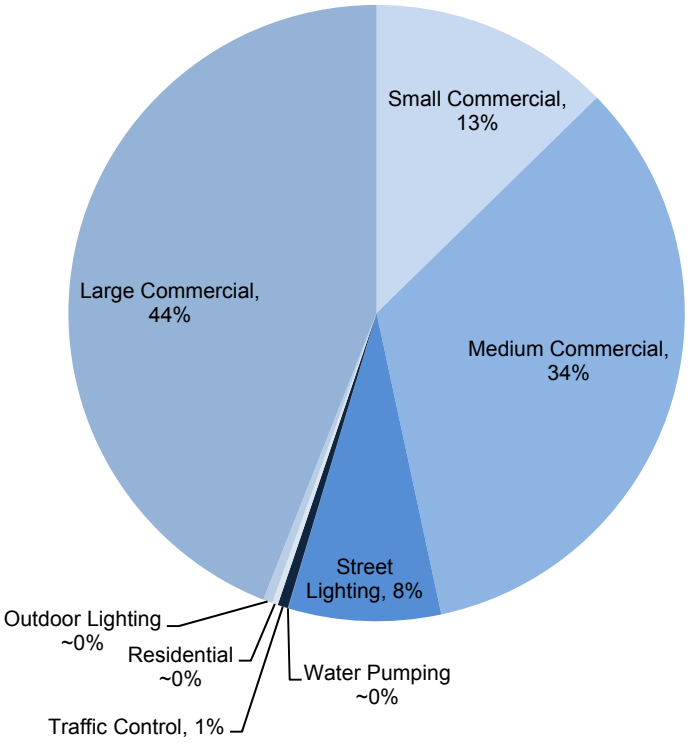


[30] Utility data for 2012 was only collected through the month of May, which is reflected in the aggregate total for consumption, cost, and demand.

Usage Category	Total Bill Amount	Total kWh	Max kW
Small Commercial	$513,392.99	3,056,012	104
Medium Commercial	$1,285,988.82	8,186,183	308
Street Lighting	$601,418.58	1,931,068	-
Outdoor Lighting	$817.73	2,691	-
Traffic Control	$19,652.02	132,750	-
Residential	$12,762.98	74,108	-
Water Pumping	$23,319.22	117,156	40
Large Commercial	$1,302,182.80	10,608,274	1,070
TOTALS	$3,759,535.14	24,108,242	

Table 11. County of Santa Barbara 2008 Electricity Consumption by Usage Category

Figure 16. County of Santa Barbara 2008 Electricity Consumption by Usage Category[31]



[31] The "large commercial" category represents the highest-consuming utility meters Countywide. This figure does not necessarily imply a particular facility size, as the largest campus meters in the County include smaller facilities that individually may be characterized as a small commercial facility. However, the County's largest facilities are represented in the large commercial category (e.g., County Courthouse and County Administration Building).

4 TARGET REDUCTION GOALS

4.1 COUNTY'S ADOPTED ELECTRICITY EFFICIENCY GOAL

The EAP provides a plan for reducing electricity consumption based on a specific reduction goal to provide an achievable target while providing a means of comparison over time. An electricity efficiency goal is based on the feasibility of projects based on existing conditions and opportunities for improvement. The goal is also based on overall projections of fiscal health and capability to implement projects that offer an attractive payback period or are otherwise necessary. Table 12 displays the potential reductions in electricity consumption using the following five percentage reduction goals: **10%**, **15%**, **20%**, **25%,** and **30%**. A goal helps support the County's goal to reduce greenhouse gas emissions per Resolution 09-059, and coincides with the state's 2020 goal of GHG emissions reductions as stipulated in AB 32. The EAP provides an understanding as to the type of projects and their corresponding expected electricity (kWh) savings that the County can undertake over time to reach this reduction goal.

2008 Baseline kWh Consumption	Reduction Target	Target kWh Savings	Total kWh Consumption after Reduction	GHG Emissions Savings (MT CO_2e)
24,108,242	10%	2,410,824	21,697,417	694
	15%	3,616,236	20,492,005	1,040
	20%	4,821,648	19,286,593	1,387
	25%	6,027,060	18,081,181	1,733
	30%	7,232,472	16,875,769	2,081

Table 12. Potential Reduction Targets by Percentage Goals[32]

Looking forward at the County's potential for electricity savings, a reduction of 25% from the 2008 baseline is an appropriate and attainable goal. A 15% reduction in electricity consumption by 2020 using a 2008 baseline results in 3,616,236 fewer kWh consumed annually. However, as indicated in section 2.5.3, the County implemented two photovoltaic projects in 2012 that generate approximately 3.48 million kWh annually in electricity off the grid; the County is already guaranteed to see a 14% reduction in electricity (kWh) savings on its utility bills based on the PV installations alone. The County is well positioned to take on a more aggressive reduction goal given its recent PV installations and the corresponding kWh savings that are generated through renewable means. As described in the following sections of the EAP, the County is poised to achieve a 25% reduction on electricity consumption off the 2008 baseline.

Table 13 shows some of the energy reduction goals set by neighboring municipalities, including those at the County level.

[32] GHG emissions were calculated using emissions factors as indicated by SCE and PG&E. A 2007 emissions factor was used for SCE, while a 2008 emissions factor was used for PG&E.

Table 13. Electricity Reduction Goals of Neighboring Municipalities

Municipality	Energy Reduction Goal	Baseline Year
County of San Luis Obispo	20%	2006
City of Ventura[33]	16%	2010
City of Goleta	10%	2007

A 25% electricity reduction goal is greater than those adopted by neighboring municipalities and serves as a testament to the efforts undertaken by the County of Santa Barbara and its Board of Supervisors in placing a heavy importance on electrical cost savings, energy efficiency and sustainability.

4.2 BUSINESS-AS-USUAL ENERGY CONSUMPTION PROJECTION THROUGH 2020

Before the total savings reduction goal had been solidified based on the 2008 baseline, it was important to understand how energy consumption would change between now and 2020 if County operations continued at a business-as-usual pace (i.e., if energy efficiency were to continue based solely on existing facility stock and energy-using systems and assumptions made about the County's growth, per the *Santa Barbara County Economic Forecast* as published by the Department of Transportation).

The variables being considered during this analysis were as follows:

- Total County Population: As population increases, the need for additional services (and County employees) will also likely increase.
- Average Temperature: The need for HVAC is directly correlated with outside temperature. As the temperature increases, facilities must use more electric energy for air conditioning.

In order to understand the type of impact these variables will have on energy consumption through 2020, the annual growth projections—as published in the County's economic forecast—were analyzed for trends or patterns.

[33] The City of Ventura adopted a goal to reduce its electricity consumption 2% each year between 2012 and 2020.

Table 14. Effect of Variables on Energy Consumption

Year	Population	Unemployment Rate	Electricity Consumption (kWh)	Gas Consumption (Therms)
2008	414,882	5.4	24,108,242	747,077
2009	419,806	8.4	23,490,353	673,376
2010	424,788	9.4	23,896,131	646,562
2011	429,324	8.9	23,375,239	647,112

While Santa Barbara County has seen unemployment remain high (above 7%) since 2008, projections show a rate reduction and eventual stabilization of around 4.4% as we approach 2020.[34] Simultaneously, population continues to grow at a compound annual growth rate (CAGR) of 1.2% between 2008 and 2020. The unemployment rate seems to have less of an effect on overall County service needs as it stabilizes over time, as a growth in population with a stabilized unemployment rate implies that County employee population will also increase.

Using the compound annual growth rate as established by the population growth levels, the estimated electric energy consumption for the business-as-usual case in 2015 and 2020 was quantified and detailed in table 15. This projection showed electricity consumption in 2020 increasing by 1,916,155 kWh over the 2008 baseline. However, if this projection took into account the recently installed PV projects, the County would still see electricity consumption savings (on bills) of approximately 1,570,473 kWh. While the PV projects provide significant savings over the baseline, a business-as-usual scenario alone—with no additional improvements—would still leave the County short of a 25% overall reduction on its electricity utility bills, using a 2008 baseline. By developing a plan to achieve additional savings and reach a more aggressive target by 2020, the County leveraged the savings generated from PV for a greater goal, rather than relying on it to reach a moderate goal.

Table 15. Estimated Electricity Consumption for Business-as-Usual Scenario[35]

Year	Population	Unemployment Rate	Projected Electricity Consumption (kWh), Business-as-Usual
2015	445,315	5.7	24,517,609
2020	462,631	4.4	26,024,397

The analysis in section 5 demonstrates the steps that the County can take to implement electricity efficiency in existing facilities and counter the increase in electricity consumption that may come with an increased County population and decreased unemployment rate.

[34] California Department of Transportation, "Santa Barbara County Economic Forecast," 2011, accessible at http://www.dot.ca.gov/hq/tpp/offices/eab/socio_economic_files/2011/SB.pdf.

[35] Utility data for full calendar years 2008–2011 were used to realize the business-as-usual projections in table 14. The effects of the photovoltaic project at the Calle Real/San Antonio campus, installed in April 2012, were not integrated into the analysis.

4.3 HIGHEST ELECTRICITY USERS

The County performed a thorough analysis of its electricity usage, using data provided by the County's electric utility companies. Table 16 shows the 10 highest electric utility users by meter. This table was drawn from the utility data provided by SCE, PG&E, and the City of Lompoc, and corresponds to all meters for which the County's General Services Department pays the utility bill (including street lighting).

In a manner similar to other organizations, several electricity meters corresponded to campuses or a grouping of geographically interconnected buildings. As an example, the two electricity meters generating the highest kilowatt-per-hour electricity usage corresponded to the buildings that collectively make up the downtown Santa Barbara and the Calle Real/San Antonio County administration campuses. These two campuses featured some of the County's largest facilities that use shared meters to measure electricity consumption (see figures 17 and 20).

As a result of the campus groupings and the inclusion of street lighting, the listing of facilities and meters on the utility bills was not directly correlated to the County's internal facility list, which primarily focuses on individual structures with measurable square footage. However, both the utility data and the County facility list were used to determine the most appropriate facilities that could adequately represent County operations and electricity-saving opportunities by undergoing energy efficiency audits.

Table 16. County of Santa Barbara Top 10 Electricity Users, 2008[36]

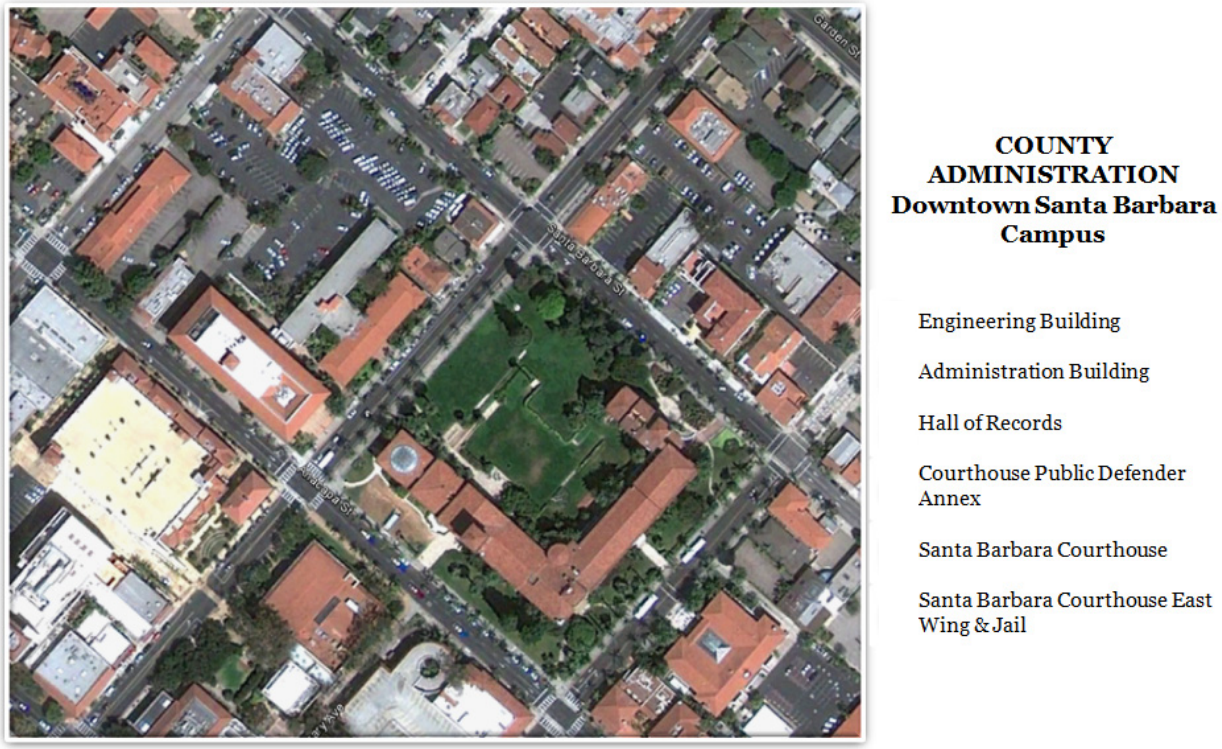
Electric Utility Provider	Meter Name	Location	Specific Buildings	Rate Type[37]	2008 Electricity Consumption (kWh)	Rank by Consumption	2008 Electricity Cost ($)
SCE	439 N. SAN ANTONIO RD.	Unincorporated SB County (Santa Barbara/Goleta)	See Calle Real/San Antonio Campus Map, p. 42	TOU-8/TOU-8-B	5,632,429	1	656,095
SCE	ANACAPA/ANAPAMU	Santa Barbara	See Downtown Santa Barbara Campus Map, p. 40	TOU-8/TOU-8-B	4,042,243	2	482,513
PG&E	BETTERAVIA-C G904	Santa Maria	Betteravia Building C	A10SX	1,065,955	3	146,635
SCE	234 CAMINO DEL REMEDIO	Unincorporated SB County (Santa Barbara/Goleta)	234 Camino del Remedio	TOU-GS3-B	864,355	4	122,123
PG&E	812B FOSTER RD (DORMITORY WEST BUILDING)	Santa Maria	Dormitory West	E19SW	795,480	5	97,565
SCE	COUNTY SERVICE AREA NO. 3 (STREETLIGHTING)	Unincorporated SB County (Santa Maria/Goleta)	N/A – Street Lighting	LS-1 ALLNITE	586,310	6	175,424
SCE	1112 SANTA BARBARA ST.	Santa Maria	District Attorney	GS-2	414,560	7	57,553
PG&E	ORCUTT AREA, SERVICE AREA #5 (STREET LIGHTING)	Unincorporated SB County (Orcutt)	N/A – Street Lighting	LS1-E	313,322	8	111,072
SCE	260 N. SAN ANTONIO RD.	Santa Barbara	Social Services	GS-2	306,400	9	41,664
PG&E	BETTERAVIA-B G903	Santa Maria	Betteravia Building B	A10S	297,440	10	42,163

[36] PG&E Meter Betteravia-C G904 did not have complete data for 2008, even though its available monthly consumption numbers registered high in comparison to the County as a whole. In order to include an accurate annual projection, 2009 data was substituted for missing months.

[37] The specific usage categories that correspond to utility rate types are explained in appendix B.

4.3.1. Profile of Downtown Santa Barbara Campus (Anacapa/Anapamu)

Figure 17. County Administration – Downtown Santa Barbara Campus Map (Overhead View)



County Administration – Downtown Santa Barbara Campus (Anacapa/Anapamu)
The downtown Santa Barbara campus provides a central location for several of the County's primary administrative functions. While other County facilities exist in the immediate vicinity, six facilities are tied to a single utility meter through SCE (several of the facilities are structurally connected through hallways or attached annexes).

As a deliverable of the SCEEP program through SCE, an audit was conducted of all six facilities in 2010. The audit identified opportunities for electricity reduction for the entire campus meter. The EAP included a follow-up audit of the engineering building to better understand how opportunities for electricity efficiency have changed since the SCEEP audit was completed.[38]

[38] Overall, the EAP will leverage the SCEEP report to determine if opportunities that were previously identified remain applicable for energy-saving purposes, and can be included in this version of the EAP for both the downtown Santa Barbara campus (Anacapa/Anapamu) and the Calle Real/San Antonio campus.

Figure 18. Downtown Santa Barbara Administration Campus Electricity Consumption (2008-2012)

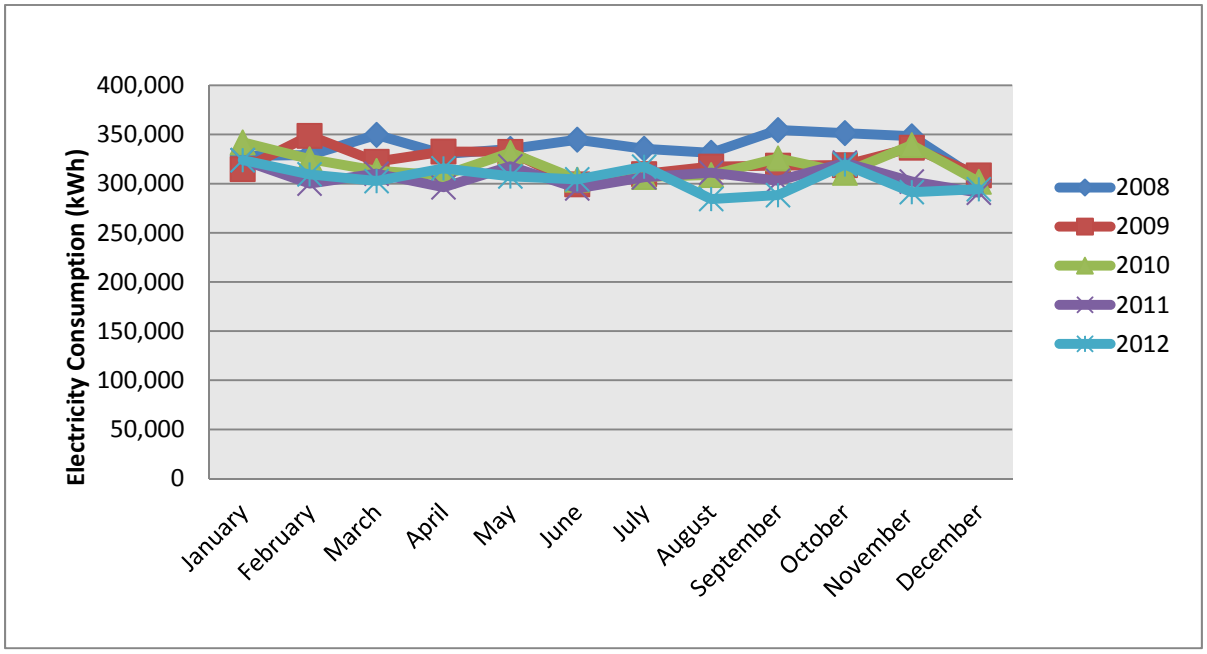
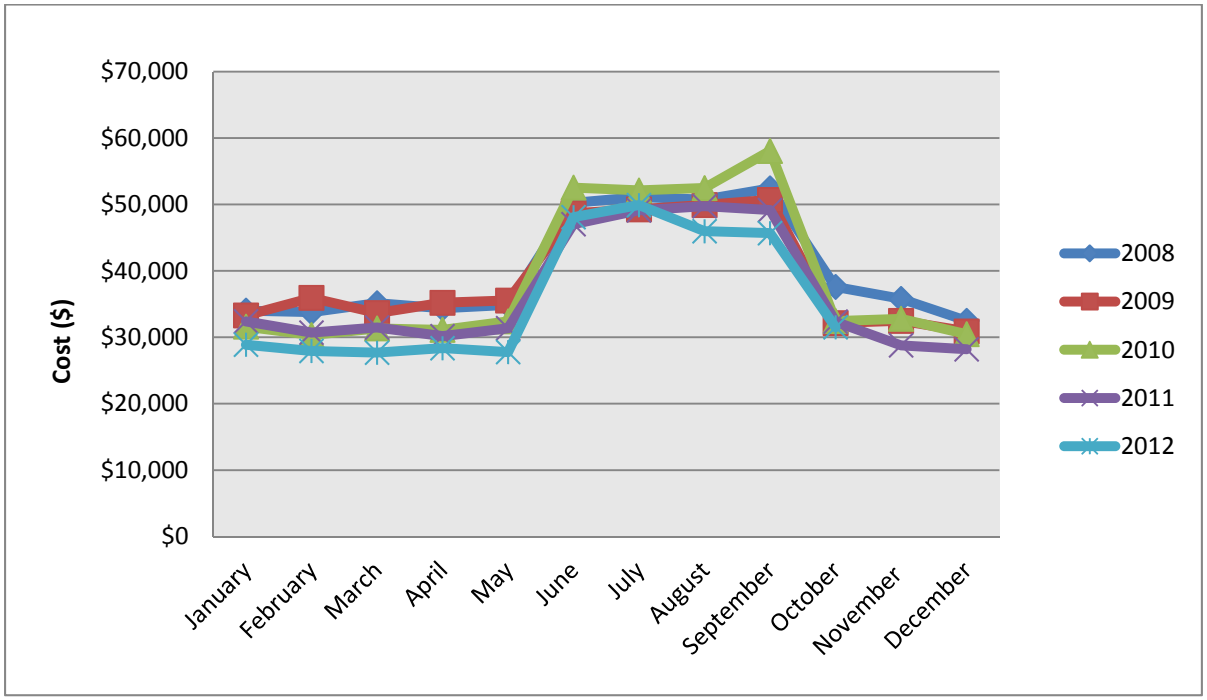


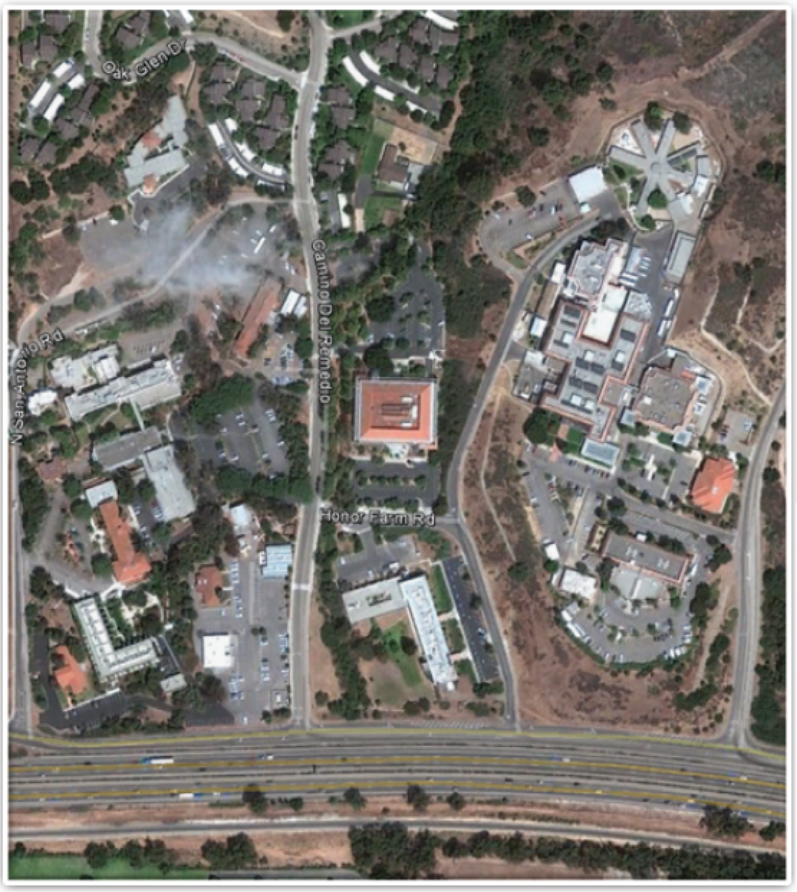
Figure 19. Downtown Santa Barbara Administration Campus Electricity Cost (2008-2012)



Electricity consumption at the downtown Santa Barbara campus was at its peak in 2008. Electricity costs, however, have followed a relatively consistent pattern over the past four years (with a spike in September 2010).

4.3.2 Profile of Calle Real/San Antonio Campus

Figure 20. County Administration – Calle Real/San Antonio Campus Map (Overhead View)



COUNTY ADMINISTRATION
Calle Real/San Antonio Campus

PHD San Antonio Building 1
Surveyors Modular Offices
PHD Health Care Center Building
PHD Psych/Health Building 2 & 3
Santa Barbara Coop Extension
Agriculture Commission/Weights & Measures
PHD Environmental Health Modular Office
PHD Administration Building 8
Annex
County Archives
Employee University
Mental Health Building
VA Clinic & Elections
Casa Nueva Annex
Sheriff Property Building
Santa Barbara County Main Jail
911 Emergency Dispatch Center
Sheriff Administration Building

County Administration – Calle Real/San Antonio Campus
The Calle Real/San Antonio campus provides a secondary, central location for several of the County's primary administrative functions in South County. This campus represents the largest concentration of County facilities, as well as the largest single electricity meter Countywide through SCE.

As part of the 2010 SCEEP audit report, an audit was conducted for the entire campus. The EAP will include a follow-up audit of the Public Health Department (PHD) Psych/Health Buildings 2 and 3 to better understand how opportunities for electricity efficiency have changed since the SCEEP audit was completed

Electricity consumption within the campus had seen various peaks over the past four years, with overall higher consumption taking place in 2008 and 2009. Overall consumption decreased in 2012; however, several electricity efficiency projects have been installed. The effects of solar photovoltaic systems installed by the County were evident through analysis of the Calle Real/San Antonio campus. The electricity consumption numbers—as reflected in the master utility bill—plummeted between April and October of 2012, largely on account of the installation of the PV system. A similar trend followed the cost figures for the months after the PV system was installed

Figure 21. Calle Real/San Antonio Campus Electricity Consumption

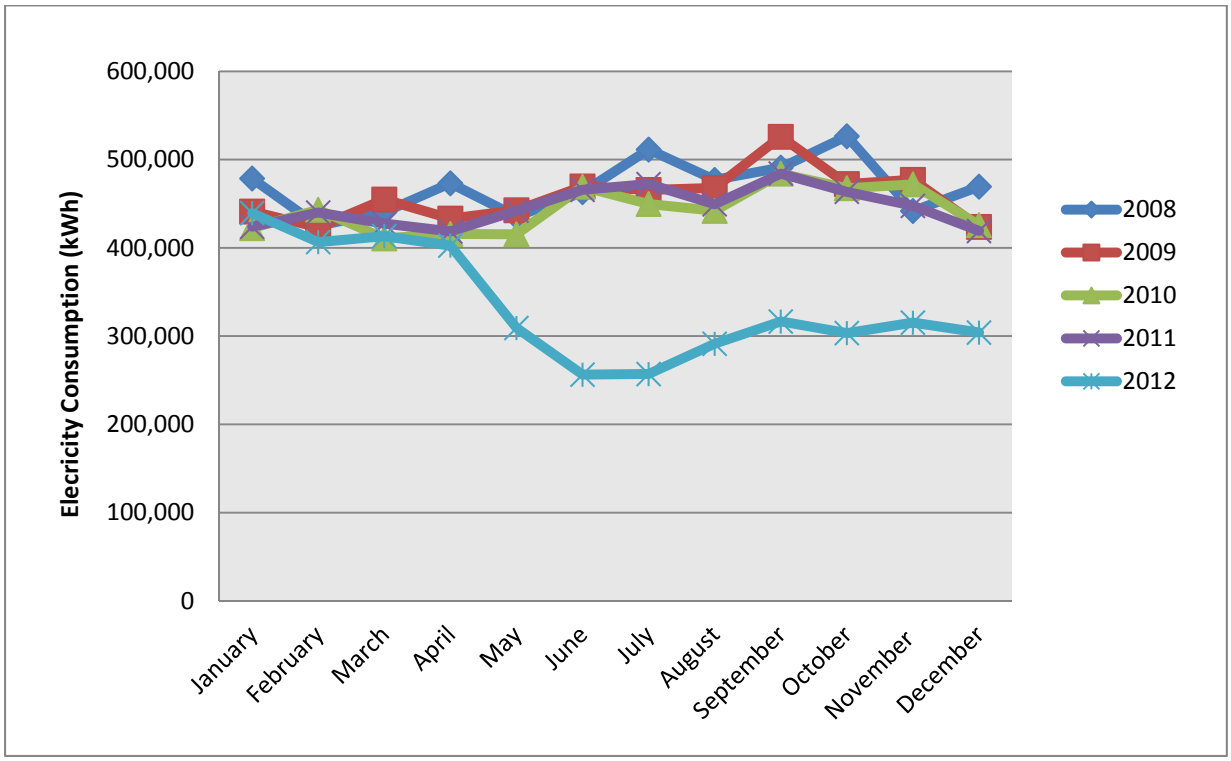
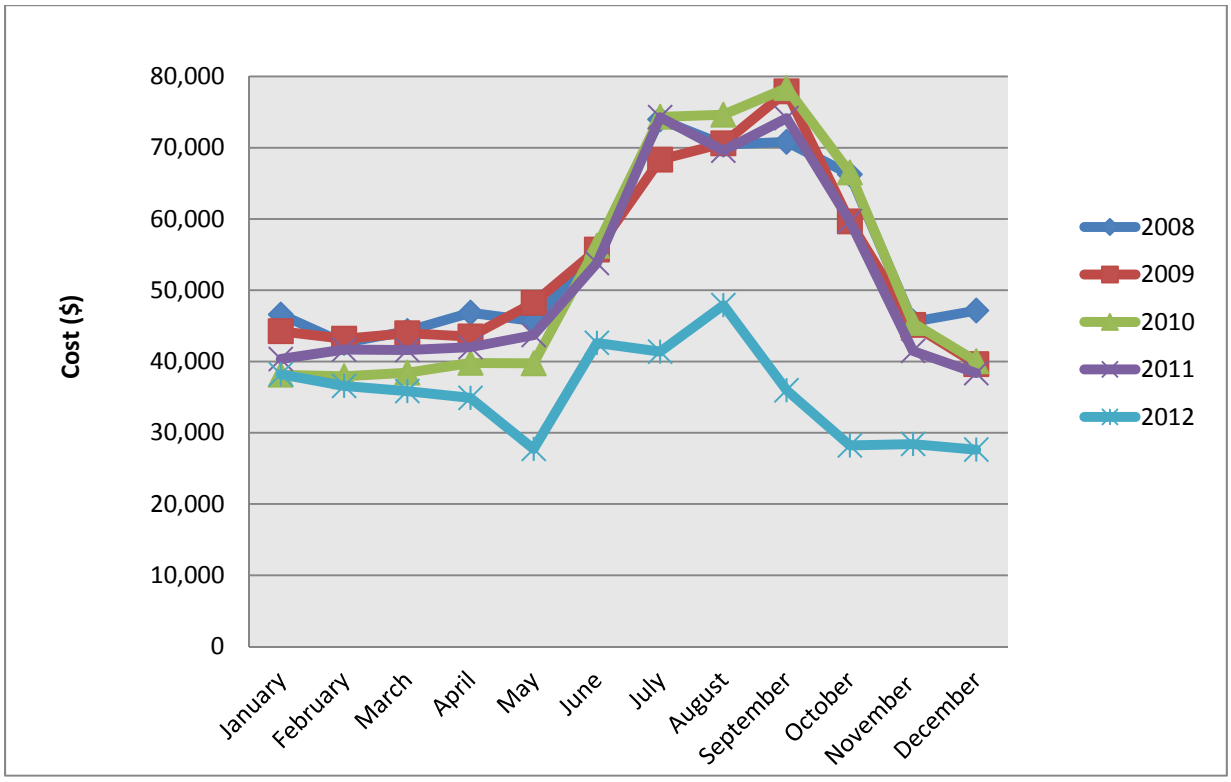


Figure 22. Calle Real/San Antonio Campus Electricity Cost



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5 ELECTRICITY EFFICIENCY METHODOLOGY

5.1 ELECTRICITY AUDITS METHODOLOGY

The electricity audit walk-throughs took place on September 5 and 6, 2012. Walk-throughs and the subsequent engineering analysis were conducted by Willdan Energy Solutions.

The most critical component of an energy action plan is the identification of electricity efficiency projects and the quantification of corresponding electricity savings. Energy audits are conducted to provide a representative sampling of the entire facility stock's electricity-saving potential. However, the County of Santa Barbara faced the following challenges when defining the engineering approach to quantifying electricity savings:

- **Large number of facilities:** As mentioned in section 2.2.2, the County has approximately 400 facilities that span a large geographic area and three climate zones. These approximately 400 facilities represent several different facility types that all use electricity at different intensities. Conducting electricity audits for all facility types would be infeasible in terms of cost and required time.
- **Matching facilities to utility data:** The County maintains a comprehensive list of its facilities. However, given the many facilities that share electricity meters and the lack of consistency between facility names and utility meter identifiers, it was difficult to quantify utility consumption for individual facilities.
- **Categorizing facilities:** While some facility types were easily identifiable and quantifiable (e.g., fire stations, park restrooms), others were much more difficult to distinguish based on similar traits. Additionally, the electricity usage (primarily through the availability of air conditioning and the conditioned percentage of facilities) was less consistent based on geography or department serving as a tenant.

The County of Santa Barbara EAP takes into account the diversity of County operations and their corresponding facilities. During the audit walk-throughs, it was evident that the sample facilities seemed to have commonalities in electricity usage based on size. For example, the two largest facilities (the County Administration Building and the County Courthouse) are both approximately 100,000 square feet in size and are both centrally air conditioned. However, the audited buildings falling into smaller size categories were partially cooled through isolated air conditioners or not cooled at all.

The EAP takes into account facility size **(square footage)** as a critical variable when projecting potential electricity savings from chosen audited facilities onto the larger, Countywide facility portfolio. Table 17 describes the size categories that reflected the audited facilities chosen and the number of facilities that fall within each category. Electricity analysis was completed through energy modeling software taking into account electricity savings based on building size and corresponding characteristics.

5.2 OVERVIEW OF THE ANALYSIS PROCESS

The approach to conducting an electrical energy baseline analysis for building operations of Santa Barbara County was defined prior to initiating any energy audits. The methods employed were designed to provide a clear, quantifiable, and thorough analysis. Accordingly, the study proceeded through a series of steps that included data collection, organization, display, interpretation, and analysis. The process flow diagram depicting the methodical analysis approach that led to our findings is shown in figure 23. Section 5.3 provides further detail on the steps taken to complete the analysis. The detailed electricity analysis methodology used to establish the baseline and quantification of the electricity consumption and energy demand is described below.

5.2.1 Data Collection

The following steps outline the process undertaken for collecting the data necessary for conducting an electricity analysis of County facilities:

- Collected all data required to complete the analysis, which included the following: (1) SCE, PG&E, and City of Lompoc billing data, (2) County facility information, and (3) California Energy Commission statistical information. The following fields were critical data points that need to be included in the report. This information was provided in MS-Excel spreadsheet format as raw data.
    - Service account number
    - Service street address
    - Tariff/family rate type
    - Monthly kWh usage
    - Monthly maximum kW
    - Monthly billed total

Because the County has chosen to utilize an electricity consumption baseline year of 2008, utility data had to date back to include all of 2008 (i.e., January 2008 – present).

- Collected site-specific building information for the selected facilities that were analyzed at higher resolution. This information was utilized as input parameters for an energy simulation program. The types of information required included the following:
    - Building type
    - Building location
    - Building square footage/area
    - Number of floors
    - Default building envelope construction values
    - Default internal load values – People, miscellaneous equipment, and lighting
    - Building operating schedule
    - Thermostat settings for cooling and heating
    - HVAC system type

Used the California Energy Commission's *Commercial End Use Survey* for validation and analysis of the utility billing data.

5.2.2 Consolidation and Pre-Processing

The following steps helped to transform the aggregate utility data into manageable and consolidated data that could be used to establish baseline consumption figures:

- Reviewed and assessed raw data from SCE, PG&E, and the City of Lompoc.
- Compiled annual consumption figures for all facilities as aggregate for SCE,PG&E, and the City of Lompoc data (for 2008, 2009, 2010, 2011, and available data for 2012).
- Combined SCE, PG&E, and City of Lompoc data for similar years to determine the County's overall consumption and costs associated with electricity for each year.
- Determined adequate facilities that could serve as representatives for the entire County portfolio based on feedback from the County, and the completeness of utility data available for individual facilities. Segment data for facilities is to undergo audits.

5.2.3 Electricity Analysis

Once the electricity audit facilities were determined, the following steps were performed:

- Conducted electricity audits. List inventory of existing electricity-using mechanical systems and equipment present at facility, including lighting and HVAC systems. Utilize County staff to answer all pending questions about facility usage and behavior.
- Determined that the best way to project electricity savings onto the larger portfolio of 400 facilities was to distinguish categories of facilities based on size. The appropriate categories are listed in table 17. Theoretically, each facility that was audited represents a separate size category.
- Developed energy models using Trane Trace. Using specific input parameters based on the electricity audits conducted, a Trane Trace file was built for sample facilities within each facility size category. This analysis provided estimated electricity consumption and demand for the building and a breakdown of electricity consumption and demand by end-use (e.g., lighting, receptacle/plug loads, primary heating, primary cooling, and auxiliary fans and pumps). End-use characteristics for specific size categories were determined through electricity audits, and typical electricity efficiency measures were identified that would likely be found across a larger portfolio.

Figure 23. Process Flow Diagram for Electric Energy Consumption Analysis of Operations

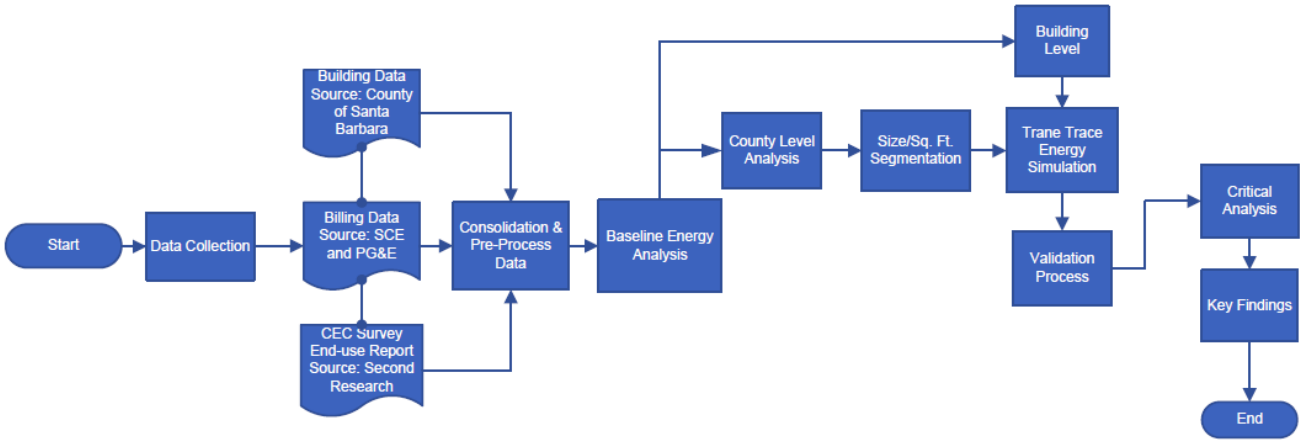
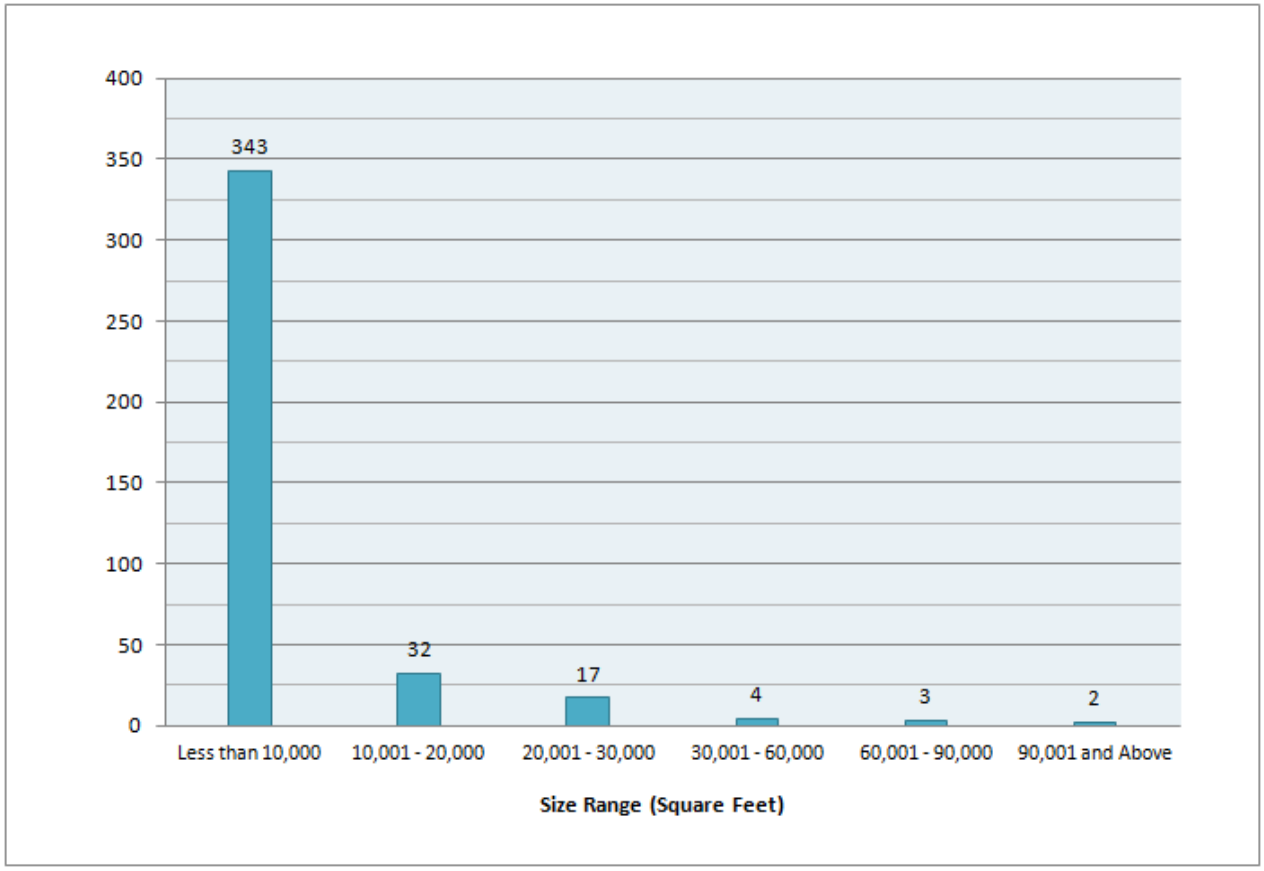


Table 17. Facility Categories by Square Footage

Size Category	Square Footage Range	Total Number of Facilities	Median Facility Area (sq. ft.)	Estimated Hours of Operation	Estimated Percent Air Conditioned[39]
1	Less than 10,000	343	1,152	7 a.m. – 7 p.m.	10%
2	10,001 – 20,000	32	13,612	7 a.m. – 7 p.m.	10%
3	20,001 – 30,000	17	25,075	7 a.m. – 7 p.m.	15%
4	30,001 – 60,000	4	51,896	7 a.m. – 7 p.m.	20%
5	60,001 – 90,000	3	64,400	7 a.m. – 7 p.m.	70%
6	Above 90,000	2	99,076	7 a.m. – 7 p.m.	100%

[39] The estimated percent air conditioned is based on the sample energy audits conducted and the percentage of overall facilities that fit within each size category. The largest facilities in the County, which are greatly outnumbered by smaller facilities, tend to have a higher percentage of air conditioned space.

Figure 24. Distribution of County Facilities in Each Size Category



- Once data was pre-processed, an analysis was performed to project electricity savings for a single facility within a size category to the entire sample. From the data, tables and charts were developed for the following perspectives:
- Total electric energy consumption (kWh) by size category
- Total electric energy consumption (kWh) per month by size category
- Peak monthly electricity demand (kW) per month by size category

- The California Energy Commission Survey Report, table 10-3, was used to validate and verify Trane Trace's basic assumptions for the building level analysis for the two largest size categories. The metric utilized was electric energy intensities (kWh/square foot–yr) by building type and end use.

- Within Trane Trace's results for each size category, results was analyzed and divided into different end-use segments, including the following:
  - Lighting
  - Receptacle/plug loads
  - Primary cooling

- A thorough interpretation of the data was performed at the County level and within size categories to understand any gaps in the analysis and better understand next steps.

Modeling with Trane Trace

To assist in understanding the energy use of the facility, a building energy model was created using Trane Trace 700. This model was derived from specific information obtained during the audits at the five selected facilities, as well as information provided from drawings and standard Trane Trace 700 program defaults.

The energy model was used to simulate energy consumption profiles based on size categories. Trane Trace 700 is a building energy use simulation program that quantifies the energy consumption and energy demand of a building. It is nationally accepted as one of the approved energy simulations tools that utility companies such as Southern California Edison use to achieve Title 24 compliance.

Trane Trace 700 calculates hour-by-hour building energy consumption over an entire year (8,760 hours), using hourly weather data for the location under consideration. Basic input parameters to the program consist of a detailed description of the building being analyzed, hourly scheduling of occupants, lighting, equipment, and thermostat settings. Where appropriate, the following measures were based on the previous measure as the baseline in order to account for interactive effects. This ensured that measures do not "double count" energy savings. Energy efficiency measures in this report were modeled using the base case (i.e., typical equipment for a building of that size category) as the starting point. The measures were analyzed in order to account for interactive effects. Measures were calculated sequentially, from highest to lowest priority, based on operational priority and/or best return on investment.

The electricity consumption (kWh) and electricity demand (kW) of each facility was simulated using Trane Trace with weather data that averages conditions for California Climate Zone 5.[40]

The following building input fields were used to model the selected facilities:

- Building type
- Building location
- Building square footage/area
- Number of floors
- Default building envelope construction values
- Default internal load values – People, miscellaneous equipment, and lighting
- Building operating schedule
- Thermostat settings for cooling and heating
- HVAC system type

For each size category, the HVAC for each sample facility was modeled to achieve a 20% efficiency improvement based on Title 24. A Trane Trace model was built for each representative facility per size category by setting site-specific simulation parameters based on actual electricity audit walk-throughs.

5.3 SIZE CATEGORY PROFILES

Profiles were input into each Trane Trace model based on typical characteristics for facilities fitting within each category, per audit walk-throughs completed at the following buildings:

Table 18. EAP Audited Facilities[41]

Facility Name
Engineering Building
Probation Building
Fire Station 11
Santa Barbara Road Yard/Public Works Permits & Construction Building
Public Health Department (PHD) Psych/Health Building

[40] While Santa Barbara County traverses Climate Zones 4, 5 and 6, only one climate zone could be used in the Trane Trace model. Climate Zone 5, which represents a balance of the various climate characteristics of the entire County, was used to quantify energy savings in the Trane Trace models.

[41] Electricity consumption for the Engineering Building and the PHD Psych/Health Building were estimated based on square footage and estimated conditioned space. The estimates were generated through a Trane Trace model for each facility, and using the inputs gathered through the audit walk-through for each facility.

Appendix A shows the exact inputs that were included in the Trane Trace simulation models. The associated electricity savings were based on the electricity usage assumptions for the median-sized facility within each size category, with electricity conservation measure inputs into each Trane Trace simulation model projected over the entire number of facilities per size category.

Table 19. Total Potential Electricity Savings with ECMs

Size Category	Square Footage Range	Electricity Savings (kWh)	Estimated Project Cost ($)	Estimated Cost Savings ($)	Estimated Incentive/ Rebate ($)	Estimated Simple Payback (years)
1	Less than 10,000	344,715	484,269	44,813	37,867	10
2	10,001 – 20,000	593,888	972,940	77,205	45,233	12
3	20,001 – 30,000	580,244	950,736	75,432	44,322	12
4	30,001 - 60,000	314,592	344,967	40,897	22,825	7.9
5	60,001 - 90,000	763,389	732,182	99,241	110,361	6.3
6	Above 90,000	238,008	219,074	30,941	24,821	6.3
Total Potential Electricity Savings as Identified through Models		**$2,834,836**	**$3,704,168**	**$368,529**	**$285,429**	**9.2 (Weighted)**
Total Electricity Savings Including Solar/PV Installations (approx.)		6,321,464				
County 20% Reduction Goal Based on 2008 Baseline		4,821,648				
County 25% Reduction Goal Based on 2008 Baseline		6,027,060				

As indicated in table 19, implementing typical electricity-conserving measures at all County facilities can potentially yield an electricity savings of 2,834,836 kWh. When added to the electricity generated annually by the County's solar/photovoltaic projects at Calle Real Campus and the Laguna County Sanitation District, the total projected electricity savings equals 6,321,464 annually. This amount by far exceeds a 20% reduction goal over the 2008 baseline by approximately 1.5 million kWh. It also exceeds the 25% reduction goal over the 2008 baseline by approximately 294,000 kWh.[42] As the projected savings total falls short of a 30% reduction over the 2008 baseline, the 25% consumption reduction goal was appropriate and achievable for the County of Santa Barbara while providing a comfortable cushion in the event that certain projects do not reach fruition by the end of 2020.

A reduction target of 25% results in an electricity consumption savings of 6,027,060 kWh, or greenhouse gas emissions savings of approximately 1,733 metric tons of carbon dioxide equivalent **(**CO_2e). The GHG emissions savings have the following real-life equivalencies, as measured by the U.S. Environmental Protection Agency (EPA):[43]

- Annual GHG emissions from **340 passenger vehicles**
- CO_2 emissions from **194,283 gallons of gasoline** consumed
- CO_2 emissions from **4,030 barrels of oil** consumed
- CO_2 emissions from the electricity use of **216 homes** for one year
- Carbon sequestered by **44,436 tree seedlings** grown for 10 years
- Carbon sequestered annually by 370 acres of pine or fir forests

Table 20 includes some typical electricity efficiency measures that can be implemented for electricity savings. The overall analysis in the EAP will take into account typical measures which apply to County buildings as indicated through audit walk-throughs; certain measures will be applied to subsets of the entire County portfolio based on size categories.

[42] The potential energy savings are a projection based on calculations presented through Trane Trace energy simulation software. As a result, a 10% margin of error (plus or minus) should be considered.

[43] The emissions savings numbers—as identified using the emissions factors provided by SCE and PG&E—were then input into the Greenhouse Gas Equivalencies Calculator (U.S. Environmental Protection Agency, Greenhouse Gas Equivalencies Calculator, updated May 2011, accessible at http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results).

Table 20. Potential Electricity-Efficiency Measure (EEM) List

Lighting Electricity Conservation Measures	
EEM-1	Replace Linear Fluorescent Lighting with High-Performance 25W T8 Fixtures
EEM-2	Replace Incandescent Lighting with CFLs
EEM-3	Install LED Exit Signs
EEM-4	Install Bi-Level Lighting and Sensors in Stairwells
EEM-5	Install Occupancy Sensors in Appropriate Spaces to Control Lighting
EEM-6	Bi-Level Lighting and Sensors in Parking Lots or Exterior of Buildings
HVAC Electricity Conservation Measures	
EEM-7	Upgrade Pneumatic Controls to DDC Controls in Terminal Air Units
EEM-8	Replace Existing Chillers and AHUs and/or Fan Coils with High-Efficiency Equipment
EEM-9	Replace HVAC Packaged Units With More Efficient Equipment
EEM-10	Replace Standard Motors with Premium-Efficiency Motors
EEM-11	Install VFDs on Domestic Hot Water Pump Motors
EEM-12	Install Controllers to Automate Economizer Operation for AHU or Packaged Rooftop Units
Central Chilled Water Plant	
EEM-13	Implement a Chilled Water Supply Temperature Reset Strategy Based on Outside Air Temperature or Return Water Temperature (Zone demand) to Reduce Chiller Energy Usage
EEM-14	Replace Old Condenser Water Pump Motors with VFD Premium-Efficiency Pump Motors
EEM-15	Replace Old Chilled Water Pump Motors with VFD Premium-Efficiency Pump Motors
EEM-16	Replace Old Heating Hot Water Pump Motors with VFD Premium-Efficiency Pump Motors
EEM-17	Install VFDs on Cooling Tower Fans and Implement Condenser Water Temperature Reset Strategy
EEM-18	Convert all Constant-Volume Pumping Systems to Variable-Volume Pumping Systems When Feasible
EEM-19	Implement Supply Air Temperature Reset Strategy Based on Outside Air Temperature or Zone Demand
EEM-20	Install Actuators on Outdoor Dampers, on Return Dampers to Automate Economizer Operation for AHU
Building Envelope Conservation Measures	
EEM-21	Replace Existing Single Clear Windows with Double-Coated Windows to Minimize Solar Gain
EEM-22	Install Solar Control Window Film to the Inside of a Window Where It Reflects and Absorbs Heat[44]

[44] Energy film is a thin, transparent window film that provides instant energy savings by reducing heat loss in winter and solar heat gain in summer.

5.3.1 Size Category Profiles

The following pages provide summaries for the Trane Trace models that were created for each of the six size categories, including the ECM assumptions. Details of the inputs for each Trane Trace model are included in appendix A. Table 21 shows the specific measures that were input for each model based on size category.

These models were created with the assumption that each facility has the ability to upgrade lighting power density efficiencies (particularly from T8-32W to T8-25W) and see efficiencies in regard to HVAC at 20% higher efficiencies than Title 24. See appendix D for specifications on how cost was estimated for the proposed equipment for each size category.

Table 21. Trane Trace Model Energy-Efficiency Measures by Size Category

Size Category	Measure Type	Specific Measure
1: Less than 10,000 sq. ft.	Lighting	Replacement of linear fluorescent lighting (T8-32W) with more efficient, high-performance T8-25W lighting
2: 10,001 – 20,000 sq. ft.	Lighting	Replacement of linear fluorescent lighting (T8-32W) with more efficient, high-performance T8-25W lighting
	HVAC	Replacement of split-system HVAC units or package HVAC units for those with higher energy efficiency ratings
3: 20,001 – 30,000 sq. ft.	Lighting	Replacement of linear fluorescent lighting (T8-32W) with more efficient, high-performance T8-25W lighting
	HVAC	Replacement of split-system HVAC units or package HVAC units for those with higher energy efficiency ratings
4: 30,001 – 60,000 sq. ft.	Lighting	Replacement of linear fluorescent lighting (T8-32W) with more efficient, high-performance T8-25W lighting
	HVAC	Replacement of split-system HVAC units or package rooftop units for those with higher energy efficiency ratings
5: 60,001 – 90,000 sq. ft.	Lighting	Replacement of linear fluorescent lighting (T8-32W) with more efficient, high-performance T8-25W lighting
	HVAC	New chiller replacement
	HVAC	Replacement or enhancement to air-cooled chillers or dual-duct, multi-zone air handler units
	HVAC (RCx)	Retro-commissioning: static pressure reset strategy
	HVAC (RCx)	Retro-commissioning: supply air temperature (SAT) reset
6: Above 90,000 sq. ft.	Lighting	Replacement of linear fluorescent lighting (T8-32W) with more efficient, high-performance T8-25W lighting

The electricity efficiency measures quantified for each size category do not represent the only possible opportunities for electricity savings for each facility. Rather, they represent the measures that would likely apply to all facilities within each size category. This conservative quantification helped the County avoid overestimating its potential electricity savings, while leaving the door open for additional possibilities for electricity reduction at an individual facility level. The electricity audits as indicated in the opportunity summary (section 5.5) served as an indication of the additional electricity efficiency potential and additional measures that County facilities can achieve by conducting audits for each individual facility. Table 20 provides the list of measures that will help the County reach its 25% reduction goal.

Some measures were originally included as part of the energy models for each size category but later removed due to exorbitantly high costs and high simple payback (including replacement of single-pane windows). Similarly, the County had already made significant improvements to the facilities within the *Above 90,000 sq. ft.* size category since 2008. This category did not include any additional HVAC improvements at this category as a result.

Size Category 1: Less than 10,000 Square Feet (343 facilities)
Potential Electricity Efficiency Measures:[45]

- Replacement of linear fluorescent lighting (T8 – 32W) with more efficient, high-performance T8 – 25W lighting

Table 22. Size Category 1: Projected Electricity Consumption and Savings

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (1 facility)	8,974
Forecasted Electricity Consumption (343 facilities)	3,078,082
Forecasted Electricity Savings with ECMs (343 facilities)	344,715

Figure 25. Size Category 1: Baseline Energy Consumption Profile by End Use

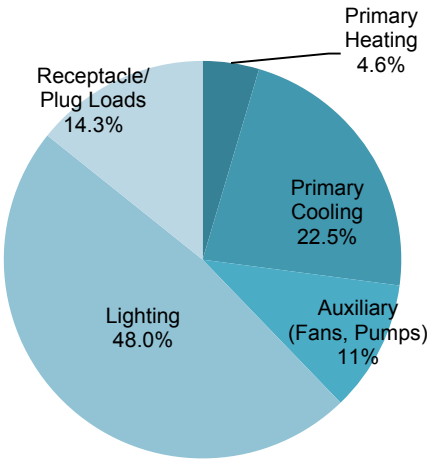


Table 23. Size Category 1: Forecasted Electricity Savings by Measure after Implementation (Per Facility)

Types of Measures and Assumptions	Estimated Electricity Savings (kWh)	Estimated Cost Savings ($)	Estimated Incentive/ Rebate ($)	Estimated Cost ($)	Estimated Simple Payback (years)
Lighting (e.g., T8-32W to T8-25W)	1,005	131	110	1,412	10.0
Totals per Facility	**1,005**	**131**	**110**	**1,412**	**10.0**
Totals for Entire Size Category (343 facilities)	**344,715**	**$44,813**	**$37,867**	**$484,269**	**10.0**

[45] This size category originally included the following measure: *Replacement of split-system HVAC units or package HVAC units for those with higher energy efficiency ratings (assuming 10% conditioned space)*. However, this measure had a simple payback that exceeded 38 years. In order to cost-effectively reach energy efficiency goals, the County would be better served by only making HVAC improvements for this size category when equipment useful life has been reached (particularly since many of the facilities in this size category likely do not have conditioned spaces).

Size Category 2: 10,001 – 20,000 Square Feet (32 facilities)

Potential Electricity Efficiency Measures:

- Replacement of linear fluorescent lighting (T8 – 32W) with more efficient, high-performance T8 – 25W lighting
- Replacement of split-system HVAC units or package HVAC units for those with higher energy efficiency ratings
-

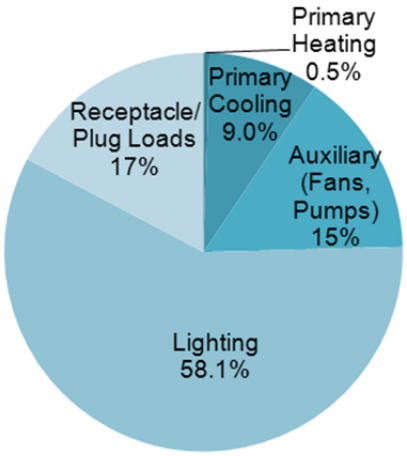
Table 24. Size Category 2: Projected Electricity Consumption and Savings

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (32 facilities)	86,747
Forecasted Electricity Consumption (32 facilities)	2,775,904
Forecasted Electricity Savings with ECMs (32 facilities)	593,888

Table 25. Size Category 2: Forecasted Electricity Savings by Measure after Implementation (Per Facility)

Types of Measures and Assumptions	Estimated Electricity Savings (kWh)	Estimated Cost Savings ($)	Estimated Incentive/ Rebate ($)	Estimated Cost ($)	Estimated Simple Payback (years)
Lighting (e.g., T8-32W to T8-25W)	12,044	1,566	1,414	16,942	9.9
HVAC (e.g., upgrading split-system air conditioning units by 20% based on Title 24)	6,515	847	0.00	13,462	15.9
Totals per Facility	**18,**559	**2,413**	**1,414**	**30,404**	**12.0**
Totals for Entire Size Category (32 facilities)	**593,888**	**$77,205**	**$45,233**	**$972,940**	**12.0**

Figure 26. Size Category 2: Baseline Energy Consumption Profile by End Use



Size Category 3: 20,001 – 30,000 Square Feet (17 facilities)

Potential Electricity Efficiency Measures:

- Replacement of linear fluorescent lighting (T8 – 32W) with more efficient, high-performance T8 – 25W lighting
- Replacement of split-system HVAC units or package HVAC units for those with higher energy efficiency ratings

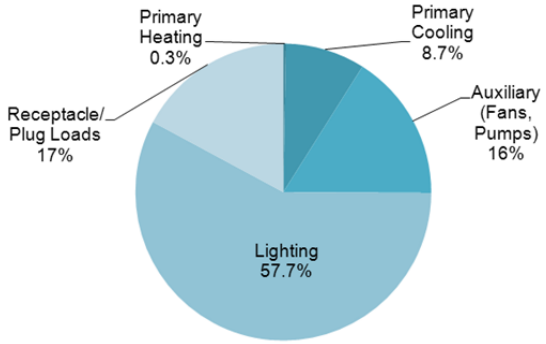


Table 26. Size Category 3: Projected Electricity Consumption and Savings

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (17 facilities)	161,103
Forecasted Electricity Consumption (17 facilities)	2,738,751
Forecasted Electricity Savings with ECMs (17 facilities)	580,244

Table 27. Size Category 3: Forecasted Electricity Savings by Measure after Implementation (Per Facility)

Types of Measures and Assumptions	Estimated Electricity Savings (kWh)	Estimated Cost Savings ($)	Estimated Incentive/ Rebate ($)	Estimated Cost ($)	Estimated Simple Payback (years)
Lighting (e.g., T8-32W to T8-25W)	22,215	2,888	2,607	31,227	9.9
HVAC (e.g., upgrading split-system air conditioning units by 20% based on Title 24)	11,917	1,549	0.00	24,699	15.9
Totals per Facility	**34,132**	**4,437**	**2,607**	**55,926**	**12.0**
Totals for Entire Size Category (17 facilities)	**580,244**	**$75,432**	**$44,322**	**$950,736**	**12.0**

Size Category 4: 30,001 – 60,000 Square Feet (4 facilities)

Potential Electricity Efficiency Measures:

- Replacement of linear fluorescent lighting (T8 – 32W) with more efficient, high-performance T8 – 25W lighting
- Replacement of split-system HVAC units or package *rooftop* HVAC units for those with higher energy efficiency ratings

Table 28. Size Category 4: Projected Electricity Consumption and Savings

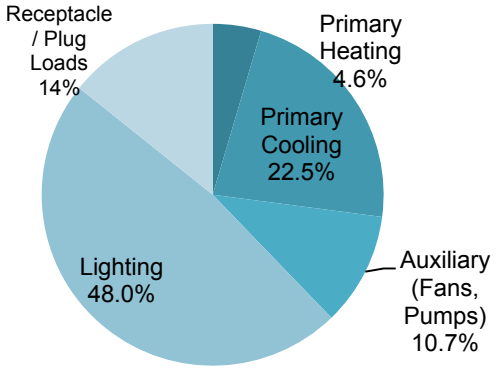


Figure 28. Size Category 4: Baseline Energy Consumption Profile by End Use

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (4 facilities)	349,294
Forecasted Electricity Consumption (4 facilities)	1,397,176
Forecasted Electricity Savings with ECMs (4 facilities)	314,592

Table 29. Size Category 4: Forecasted Electricity Savings by Measure after Implementation (Per Facility)

Types of Measures and Assumptions	Estimated Electricity Savings (kWh)	Estimated Cost Savings ($)	Estimated Incentive/ Rebate ($)	Estimated Cost ($)	Estimated Simple Payback (years)
Lighting (e.g., T8-32W to T8-25W)	49,952	6,494	5,706	62,939	8.8
HVAC (e.g., upgrading split-system air conditioning units by 20% based on Title 24)	28,696	3,730	0	23,235	6.2
Totals per Facility	**78,648**	**10,224**	**$5,706**	**86,174**	**7.9**
Totals for Entire Size Category (4 facilities)	**314,592**	**$40,897**	**$22,825**	**$344,697**	**7.9**

Size Category 5: 60,001 – 90,000 Square Feet (3 facilities)

Potential Electricity Efficiency Measures:

- Replacement of linear fluorescent lighting (T8 – 32W) with more efficient, high-performance T8 – 25W lighting
- New chiller replacement
- Replacement or enhancement to air-cooled chillers or dual-duct, multi-zone air handler units
- Retro-commissioning: static pressure reset strategy
- Retro-commissioning: supply air temperature (SAT) reset

Figure 29. Size Category 5: Baseline Energy Consumption Profile by End Use

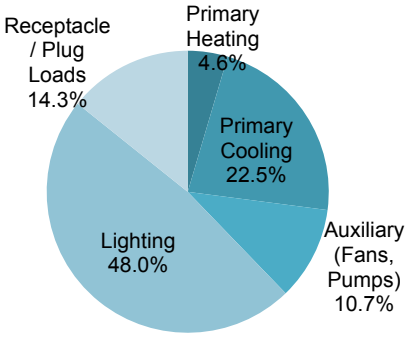


Table 30. Size Category 5: Projected Electricity Consumption and Savings

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (3 facilities)	803,022
Forecasted Electricity Consumption (3 facilities)	2,409,066
Forecasted Electricity Savings with ECMs (3 facilities)	763,389

Table 31. Size Category 5: Forecasted Electricity Savings by Measure after Implementation (Per Facility)

Types of Measures and Assumptions	Estimated Electricity Savings (kWh)	Estimated Cost Savings ($)	Estimated Incentive/ Rebate ($)	Estimated Cost ($)	Estimated Simple Payback (years)
Lighting (e.g., T8-32W to T8-25W)	42,948	5,583	5,576	54,061	8.7
New Chiller Replacement	53,604	6,969	10,902	120,000	15.7
MZ CV AHU – MZ VAV AHU[46]	136,413	17,734	17,717	60,000	2.4
Retro-Commissioning: Static Pressure Reset Strategy	13,611	1,769	1,646	5,000	1.9
Retro-commissioning: Supply Temperature Reset	7,887	1,025	946	5,000	4.0
Totals per Facility	**254,463**	**33,080**	**36,787**	**244,060**	**6.3**
Totals for Entire Size Category (3 facilities)	**763,389**	**$99,241**	**$110,361**	**$732,182**	**6.3**

[46] In reference to the following measure: "Replacement or enhancement to air-cooled chillers or dual-duct, multi-zone air handler units."

Size Category 6: Above 90,001 Square Feet (2 facilities)

Potential Electricity Efficiency Measures:

- Replacement of linear fluorescent lighting (T8 – 32W) with more efficient, high-performance T8 – 25W lighting

Table 32. Size Category 6: Projected Electricity Consumption and Savings

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (2 facilities)	1,258,368
Forecasted Electricity Consumption (2 facilities)	2,516,736
Forecasted Electricity Savings with ECMs (2 facilities)	238,008

Figure 30. Size Category 6: Baseline Energy Consumption Profile by End Use

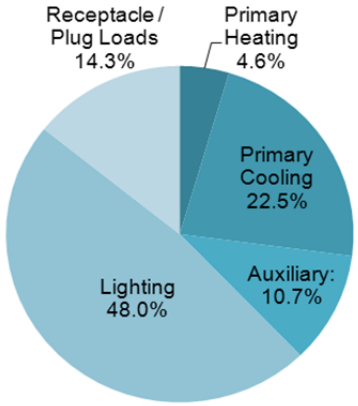


Table 33. Size Category 6: Forecasted Electricity Savings by Measure after Implementation (Per Facility)

Types of Measures and Assumptions	Estimated Electricity Savings (kWh)	Estimated Cost Savings ($)	Estimated Incentive/ Rebate ($)	Estimated Net Cost ($)	Estimated Simple Payback (years)
Lighting (e.g., T8-32W to T8-25W)	119,004	15,471	12,410	109,537	6.3
Total Potential Savings per Facility	**119,004**	**15,471**	**12,410**	**109,537**	**6.3**
Total Potential Savings for Entire Size Category (2 facilities)	**238,008**	**$30,941**	**$24,821**	**$219,074**	**6.3**

5.3.2 Milestones to Achieving Target Reduction Goal

The projections for the County indicate that performing the modeled electricity efficiency measures across all County facilities can potentially reduce electricity consumption by 2,834,836 kWh, or a reduction of approximately 12% from the 2008 baseline. Given fiscal constraints, however, it may be challenging to achieve the full projected reduction in electricity consumption by 2020.

The County's total electricity bill will already be significantly lower, given the approximately 3.5 million kWh savings annually coming directly from the Solar PV projects. The County can implement enough projects to reach a savings of 2,540,432 (or 90% of the kWh savings as identified through the Trane Trace simulations for each size category) to reach a 25% electricity reduction target (6,027,060 kWh off the 2008 baseline). Achieving this goal helps the County qualify for additional incentives by attaining the Silver or Gold Levels of the CPUC Energy Leader Partnership (ELP), as indicated in figure 10 (at least 50% of all County facilities must be targeted for electricity efficiency projects for the Gold Level).

The projected electricity-savings potential per the Trane Trace simulations provide a basis for reaching the Countywide electricity reduction goals, while providing an understanding of how much an average facility will need to contribute toward electricity reduction based on size and electricity intensity. However, certain types of projects were identified with shorter simple payback periods or will be easier to achieve.

The County developed tentative milestones for achieving segments of their targeted 25% reduction goal by establishing the feasible electricity efficiency measures that can be implemented using the following milestones:

- **Milestone 1**: End of 2015 Short Term Goal
- **Milestone 2**: End of 2017 Long Term Goal
- **Milestone 3**: End of 2020 Long Term Goal

Milestone 1 includes all lighting measures, particularly because the County has the ability to take advantage of both SCE and PG&E's on-bill financing programs that allow for zero-interest loans for financing incentivized measures. These programs are not infinite and have specific cycles available to partnership and government customers; the County may choose to use these programs.

Milestone 2 includes upgrades to HVAC package units. Based on audit walk-throughs of facilities within the 10,001–20,000 square foot and 30,000–60,000 square foot size categories, the useful life of the existing equipment will probably reach completion mid-decade. The year 2017 provides an opportunity for increased efficiencies, while taking advantage of the useful life of existing equipment.

Milestone 3 includes larger HVAC projects, including a chiller replacement for facilities between 60,001 and 90,000 square feet in size. This type of measure can be completed closer to the target date of 2020 because the existing chiller's useful life will be almost exhausted at that time. The incremental cost of making this type of replacement will be lower closer to 2020 since the existing chiller will need to be upgraded eventually.

Table 34. Electricity Efficiency Measures (EEMs) Achievable by Milestone 1 – End of 2015 Short Term Goal

Size Category	Type of Measure	Description	Potential Electricity Savings (kWh)	Cost ($)	Available Incentive ($)	Simple Payback (years)
1: Less than 10,000 sq. ft.	Lighting	Lighting (e.g., T8-32W to T8-25W)	344,715	484,269	37,867	10.0
2: 10,001 – 20,000 sq. ft.	Lighting	Lighting (e.g., T8-32W to T8-25W)	385,408	542,156	45,233	9.8
3: 20,001 – 30,000 sq. ft.	Lighting	Lighting (e.g., T8-32W to T8-25W)	377,655	530,861	44,322	9.9
4: 30,001 – 60,000 sq. ft.	Lighting	Lighting (e.g., T8-32W to T8-25W)	199,808	251,757	22,825	8.8
5: 60,001 – 90,000 sq. ft.	Lighting	Lighting (e.g., T8-32W to T8-25W)	128,844	162,182	16,728	8.7
6: Above 90,001 sq. ft.	Lighting	Lighting (e.g., T8-32W to T8-25W)	238,008	219,074	24,821	6.3
Total Potential Electricity Savings, by End of 2015			**1,674, 438**	**$2,190,299**	**$191,796**	**9.2**

Table 35. Electricity Efficiency Measures (EEMs) Achievable by Milestone 2 – End of 2017 Long Term Goal

Size Category	Type of Measure	Description	Potential Electricity Savings (kWh)	Cost ($)	Available Incentive ($)	Simple Payback (years)
2: 10,001 – 20,000 sq. ft.	HVAC	HVAC (e.g., upgrading split-system air conditioning units by 20% based on Title 24)	208,480	430,784	0	15.9
4: 30,001 – 60,000 sq. ft.	HVAC	HVAC (e.g., upgrading split-system air conditioning units by 20% based on Title 24)	114,784	92,940	0	6.2
Total Potential Electricity Savings, by End of 2017			**323,264**	**$523,724**	**$0**	**12.5**

Table 36. Electricity Efficiency Measures (EEMs) Achievable by Milestone 3 – End of 2020 Long Term Goal

Size Category	Type of Measure	Description	Potential Electricity Savings (kWh)	Cost ($)	Available Incentive ($)	Simple Payback (years)
3: 20,001 – 30,000 sq. ft.	HVAC	HVAC (e.g., upgrading split-system air conditioning units by 20% based on Title 24)	202,589	419,875	0	15.9
5: 60,001 – 90,000 sq. ft.	HVAC	New Chiller Replacement	160,812	360,000	32,706	15.7
5: 60,001 – 90,000 sq. ft.	HVAC	MZ CV AHU – MZ VAV AHU	409,239	180,000	53,151	2.4
5: 60,001 – 90,000 sq. ft.	HVAC (RCx)	Retro-Commissioning: Static Pressure Reset Strategy	40,833	15,000	4,938	1.9
5: 60,001 – 90,000 sq. ft.	HVAC (RCx)	Retro-commissioning: Supply Temperature Reset	23,661	15,000	2,838	4.0
Total Potential Electricity Savings, by End of 2020			**837,134**[47]	**$989,875**	**$93,633**	**8.2**

[47] For the size category 60,000–90,000 square feet, a chiller replacement must be completed first before the additional measures listed can be completed due to interactive effects. As a result, all of these measures are listed as being completed by 2020.

These milestones only address the electricity efficiency measures that were included in the Trane Trace model. As indicated in table 20, there are additional measures that can be implemented based on the needs of each specific facility. Also, the County has already completed electricity-saving projects that are already helping to reach the 25% electricity reduction goal (as mentioned in section 2.5.3). While the Trane Trace model includes electricity efficiency measures that are likely consistent across the board, the County has the ability to expand the scope of each project to capture additional electricity efficiency.

5.4 AUDITED FACILITY PROFILES

Development of the EAP (Energy Action Plan) included audits of five facilities on September 5 and 6, 2012. The audits served the following purposes:

- Represent the County's diverse portfolio
- Provide a tangible basis for inputs into Trane Trace/modeler when determining how facilities of different size categories consume and can save on electricity
- Provide examples for how the County can implement projects to meet the projected savings goals

5.4.1 Audited Facilities

Facilities selected for audits were chosen through consultation with the County Department of General Services and through an analysis of available utility data.

The EAP sought to include facilities that had readily available utility data that provided for an accurate, whole-building analysis of electricity consumption and potential savings. The ability to incorporate the two largest electric consumers was hindered by the multiple facilities that correspond to both the downtown Santa Barbara and Calle Real/San Antonio County administration campus meters. For individual facilities within these two campuses, projections of electricity usage were made based on the facility's square footage and proportion to the entire campus. The eventual incorporation of a utility manager software program will allow the County to assess electricity consumption for individual buildings much more effectively, regardless of whether or not their electricity consumption is reflected on a shared master meter. In other cases, facilities that were audited have direct utility data available to be included in the analysis.

Table 37 lists the facilities that are profiled in the EAP, with their corresponding 2008 electricity consumption to serve as a baseline. Table 39 provides an overall view of the recommended electricity efficiency measures that pertain to electricity consumption. The buildings were profiled individually to better understand how they differ in terms of operation and physical characteristics to electricity-intensive uses. Each facility has a summary table that includes each electricity efficiency measure, consumption and savings totals, and cost-benefit analysis. The operating hours for each facility were estimated at 7:00 a.m. – 7:00 p.m., Monday through Friday.

This estimate takes into account some facilities that may operate 24 hours a day, 7 days a week, but with electricity use still limited throughout the day (e.g., Fire Station 11, which operates bedrooms for firefighters).

Table 37. EAP Audited Facilities[48]

Facility Name	Location	Area (Square Feet)	2008 Electricity Consumption Baseline (kWh)	Virtual Rate
Engineering Building	Santa Barbara	53,406	270,001	$0.12
Probation Building	Santa Barbara	21,278	157,200	$0.13
Fire Station 11	Goleta	6,880	27,264	$0.16
Santa Barbara Road Yard/ Public Works Permits & Construction Building	Unincorporated County (Santa Barbara/Goleta)	15,515/ 2,700	55,668	$0.16/$0.20
Public Health Department (PHD) Psych/Health Building	Unincorporated County (Santa Barbara/Goleta)	60,496	818,101	$0.12

Each of the audited facilities is served with electric utility service by Southern California Edison.

5.4.2 Local Climate Conditions

The local climate temperatures for the cooling and heating season are as follows:

- Cooling season design condition: 80°F dry bulb/64°F wet bulb
- Heating season design condition: 36°F dry bulb

Typical for all climate zones of Santa Barbara, the greatest energy consumption is during warmer summer months. The higher outside temperatures result in HVAC systems running more frequently, incurring higher electrical utility costs.

5.4.3 Incentive Calculations

The estimated incentives/rebates shown in table 39 are based on the County of Santa Barbara's "Valued" partner level for the SCE Energy Leader Partnership (ELP) program. The ELP offers a tiered incentive structure through achievement of four separate levels of participation: "Valued Partner," "Silver," "Gold," and "Platinum." The County of Santa Barbara will realize higher incentive rates as it moves to higher tiers within the ELP structure. These incentive rates are detailed below in table 38, and add on to the existing core program incentive rates.

[48] Electricity consumption for the Engineering Building and the PHD Psych/Health Building were estimated based on square footage and estimated conditioned space. The estimates were generated through a Trane Trace model for each facility and using the inputs as gathered through the audit walk-through for each facility.

Table 38. Southern California Edison Incentive Rates for Core Programs and ELP

CORE Measure Type	$/kWh Saved	$/Demand kW Saved
Lighting	0.05	100
Lighting Controls	0.05	100
HVAC Major Equipment	0.15	100
HVAC Controls	0.09	100
Office Equipment Controls	0.09	100
Energy Leader Partnership Level Incentive Tiered Structure		
	Cost/Benefit Factor	
Valued Partner Level	3 cents per kWh addition to SCE's core program	
Silver Partner Level	6 cents per kWh addition to SCE's core program	
Gold Partner Level	9 cents per kWh addition to SCE's core program	
Platinum Partner Level	12 cents per kWh addition to SCE's core program	

5.5 OPPORTUNITY SUMMARY

Table 39 lists the identified measures, projected electricity savings, and the estimated costs and calculated simple payback periods based on these projections. The simple payback period was based on the number of years it will take for the annual cost savings to pay for the cost of implementing the measure. Payback calculations did not account for prevailing wages, inflation, equipment life, permits, crane services, or operation and maintenance costs.

A valuable metric in historical utility data analysis is the "virtual rate," which is the overall annual rate per unit of consumption that a facility pays for electricity. The virtual rate is determined by simply dividing the total electric cost for a time period by the total electric consumption for the same time period. The virtual rate used for electricity for each facility is listed in table 37 and is essential to calculate electricity cost savings as it relates to a reduction in electricity consumption (kWh).

A full lighting inventory for each of the audited facilities is located in appendix C. An explanation of efficiencies in linear fluorescent lighting, which represents the vast majority of indoor lighting Countywide, is included in appendix D.

Table 39 Opportunity Summary: Electricity Efficiency Measures and Payback Analysis for All Audited Facilities

Electricity Efficiency Measure		Cost/Benefit Factor						
		Electric Electricity Savings	Peak Electric Demand Reduction	Annual Cost Savings	Estimated Incentive/Rebate	Net Cost to Customer	Estimated Payback	Estimated Equipment Life Expectancy
EEM	**Description**	**kWh**	**kW**	**$**	**$**	**$**	**years**	**years**
	Santa Barbara Road Yard							
EEM-1	PAR 38 to LED PAR 38	3,225	0.8	$ 419	$ 320	$ 680	1.6	8.0
EEM-2	Replace Exterior 100W High-Pressure Sodium Wall Pack with LED Fixtures	1,691	0.4	$ 220	$ 135	$ 365	1.7	8.0
EEM-3	Replace Incandescents with 13W CFL	1,412	0.4	$ 184	$ 38	$ 38	0.2	6.0
	Totals	**6,328**		**$ 823**	**$ 493**	**$ 1,083**		
	Public Works Permits & Construction Building							
EEM-1	Retrofit 32W T8 TO 25W T8 Lamps	1,361	0.5	$ 177	$ 158	$ 1,606	9.1	8.0
EEM-2	PAR 38 to LED PAR 38	1,095	0.3	$ 142	$ 100	$ 355	2.5	8.0
EEM-3	Replace Incandescents with 13W CFL	1,958	0.7	$ 255	$ 60	$ 60	0.2	6.0
EEM-4	HVAC Equipment Upgrade (4 Wall-Mount Bard AC Unit, R-410A)	9,250	0	$ 1,203	$ 0	$ 7,000	5.8	15.0
	Totals	**13,664**		**$ 1,777**	**$ 318**	**$ 9,021**		
	PHD Psych Health Bldg.							
EEM-1	Retrofit 40W and 34W T12 to 25W T8 Lamps	2,849	1.0	$ 370	$ 332	$ 1,556	4.2	8.0
EEM-2	32W T8 to 25W T8 Lighting Upgrade	37,693	13.8	$ 4,900	$ 4,391	$31,165	6.4	8.0
EEM-3	Replace Incandescents with 13W CFL	4,822	1.8	$ 627	$ 308	$ 308	0.5	6.0
EEM-4	Replace Exterior 100W High-Pressure Sodium Wall Pack with LED Fixtures	18,269	4.2	$ 2,375	$ 1,462	$ 5,288	2.2	8.0
EEM-5	Static Pressure Reset	169,148	11.0	$ 21,989	$ 4,288	$ 4,288	0.2	8.0
EEM-6	Supply Temperature Reset	2,648	0	$ 344	$ 318	$ 8,257	24.0	8.0
EEM-7	Chilled Water Pump VFD	20,920	0	$ 2,720	$ 2,510	$ 490	0.2	12.0
	Totals	**256,349**		**$ 33,325**	**$ 13,609**	**$51,352**		

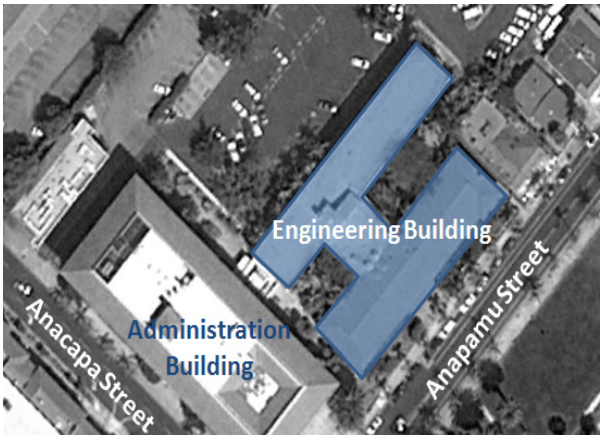
5.5.1 Audit 1: Engineering Building

Figure 31. Engineering Building Exterior Photos

Figure 32. Engineering Building Location

Engineering Building
123 E. Anapamu Street
Santa Barbara, CA 93101

Square Footage: 53,406
Year Built: 1965



The engineering building houses the departments of Public Works (transportation planning, engineering, construction administration, and maintenance of transportation infrastructure), Long Range Planning, Flood Control, and other technical County divisions. The building forms a U-shape, with three levels along one end and two for the rest. The facility has no central air conditioning; instead, three 5-ton rooftop package units and one split-system HVAC unit provide cooling to a few office spaces and departments throughout the building. The facility offers baseboard heating throughout.

As described in section 4.3 (Highest Energy Users), the downtown Santa Barbara administration campus (Anacapa/Anapamu) serves as headquarters for several County administrative operations (particularly since Santa Barbara is the County seat). Within this campus, the engineering building is directly connected to the County Administration Building and, therefore, utilizes some shared systems (including gas boilers for heating).

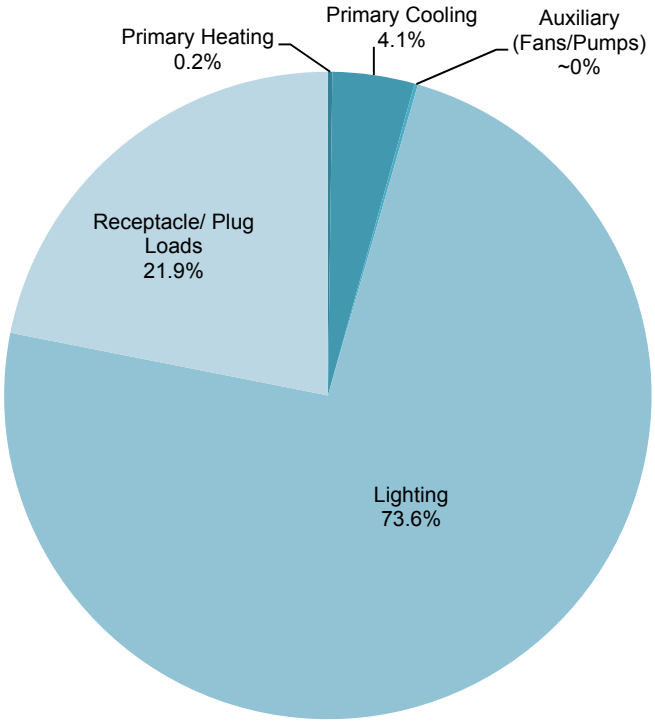
Figure 33. Baseboard Heating, Crank Windows, and Rooftop A/C Units

This facility did not have sub-metered data available to accurately provide a 2008 consumption and cost baseline. As SCE utility data for the Downtown Santa Barbara Administration campus is lumped together with the other campus facilities, the electricity use for the Engineering Building was estimated based on the known electricity-using systems at the building and its square footage. Because the Engineering Building shares various HVAC systems in common with the adjacent Administration Building, electricity usage and operations of the Administration Building were also considered during this audit and will have a presence in the audit findings.

Table 40. Engineering Building Existing HVAC Mechanical Schedule

Qty.	HVAC Equipment Inventory Description	Model	Nominal Tonnage	Refrigerant	Supply CFM	SEER
1	York Split Condensing Unit	N/A	2	R-22	1,200	12
3	Bryant Commercial Packaged Heat Pump Unit Model 602B	602BNX060000ABVS	5	R-410A	1,750	12

Figure 34. Engineering Building Electricity Consumption Breakdown[49]



[49] Consumption breakdown was calculated through a Trane Trace simulation model created for the Engineering Building, using inputs gathered from the audit walk-through.

Table 41. Engineering Building – Recommended Electricity Efficiency Measures

		ANNUAL ESTIMATES							
Meas. No.	Measure Description	Electricity Savings (kWh)	Demand Reduction (kW)	Cost Savings [1]	Estimated Initial Implementation Cost	Estimated Incentive/ Rebate [2]	Net Cost to Customer (based on estimated incentive)	Estimated Payback Period (years)	Estimated Useful Life (years)
EEM-1	32W T8 to 25W T8 Lighting Upgrade	28,927	10.4	$3,761	$39,605	$4,460	$35,145	9.3	8.0
EEM-2	40W T12 to 25W T8 Lighting Upgrade	1,463	0.5	$190	$1,311	$170	$1,141	6.0	8.0
EEM-3	Replace Incandescents with 13W CFL	1,452	0.5	$189	$165	$83	$83	0.4	6.0
EEM-4	Install Lighting Occupancy Sensors	5,059	1.8	$658	$2,255	$820	$1,435	2.2	8.0
EEM-6	HVAC Equipment Upgrade (1 Split System + 3 Bryant Commercial Packaged HP Rooftop Unit)	11,542	0	$1,500	$18,000	$1,385	$16,615	11.1	15.0
	Totals	**36,901**		**$6,298**	**$61,336**	**$6,918**	**$54,419**		

Electricity Efficiency Measures

EEM-1: 32W T8 to 28W T8 Lighting Upgrade

The building is lit primarily by 32W 48" T8 linear fluorescent fixtures. During the lighting survey it was noted that several spaces are lit over the recommended levels established by the Illuminating Engineering Society of North America (IES). According to the IES, normal office space, for example, requires approximately 45 foot-candles to be functional. Several offices in the investigated buildings demonstrated lighting outputs of over 75 foot-candles. It is recommended to permanently delamp in appropriate areas and replace standard 32W T8 lamps with high-performance 28W T8 lamps. The reduced-wattage lamps save further electricity due to interactive effects on the space-cooling equipment. The lamps produce less heat, thus lowering the demand for space cooling.

In addition to the electricity cost savings, the reduced-wattage lamps generally have a longer life—thus reducing maintenance costs. The lamps are for use with instant-start or programmed-start ballasts, which would need to replace the rapid-start ballasts currently in place. The 28W lamps with the new ballasts achieve similar illumination levels as standard T8 lamps. However, it is recommended the site test specific areas to ensure the lighting meets task requirements. The estimated costs in this analysis include both the cost of the lamps and the cost to replace the ballast.

EEM-2: 40W T12 to 28W T8 Lighting Upgrade

Although the majority of the lighting at the facility has been retrofitted to T8s, we identified some 40W 48" T12 linear fluorescent fixtures. It is recommended to replace these lamps with high-performance 28W or 25W T8 lamps. The reduced-wattage lamps save further electricity due to interactive effects on the space-cooling equipment. The lamps produce less heat, thus lowering the demand for space cooling.

EEM-3: Replace Incandescents with 13W CFL

Although many have been replaced with CFLs, there are still incandescent lamps in various locations in the facility. It is recommended to replace these incandescent fixtures with equivalent compact fluorescent lamps (CFLs). CFLs not only reduce electricity use while maintaining the same light levels, but also they generally have longer lives and produce less heat compared to incandescent lamps. The reduced-wattage lamps save further electricity due to interactive effects on the space-cooling equipment. The lamps produce less heat, thus lowering the demand for space cooling.

EEM-4: Install Lighting Occupancy Sensors

There are also opportunities for occupancy sensors in the offices, conference rooms, and other areas. Occupancy sensors reduce electricity usage by reducing the “on” time of the lights under their control. Sensors turn the lights on when they sense someone coming into a room or area, and then turn the lights off some time after sensing the room is empty. These sensors are best suited in spaces that are used infrequently or unpredictably, such as conference rooms, private offices, storage areas, and restrooms. Sensors can be mounted on the wall or they can be installed on the ceiling.

EEM-5: HVAC Equipment Upgrade (1 Split System + 3 Bryant Commercial Packaged Heat Pump Rooftop Units)

The rooftop packaged units are approximately 5 years old. They were found to be in working condition and expected to reach their estimated useful life of 10–15 years. We recommend that when the packaged rooftop units reach the end of their useful service life, they be replaced with high-efficiency models that exceed current Title 24 code. When the time comes to replace these units, an energy analysis should be run to determine the model with the best payback. If this is to be considered by the County, this measure should be further analyzed to ensure the investment is cost-effective.

This measure consists of replacing the existing HVAC equipment with higher-efficiency equipment whose refrigerants are more ecological.

Additional EEM: Replace Existing Windows with New Double, Clear-Coated ¼" Windows

As part of the overall audit, a review was completed on the potential of replacing the windows at the Engineering Building. The existing single, clear, ¼" windows at the Engineering Building could potentially be replaced with new double-coated ¼" low solar heat gain coefficient windows. The solar heat gain coefficient (SHGC) is a significant element of windows; the lower the SHGC, the greater the reduction in heat transmission through the window.

The SHGC measures the fraction of solar energy striking a window that is transmitted through the entire window assembly, including glass, frame, and other window components. Existing windows have a U-factor[50] of 0.95 and an SHGC of 0.95. The proposed windows have the following design factors (U=0.5 and SHGC=0.55).

However, window replacements at the facility—given its limited conditioned spaces—would generate far fewer electricity savings from air conditioning. As a result, the simple payback for this measure would be exorbitantly high. However, although not a part of the scope of this report, replacement of windows will also result in natural gas savings. Additional studies on the cost-effectiveness of window replacement at the Engineering Building should be conducted if this measure is to be considered.

[50] The U-factor of a window measures the rate of heat transfer and indicates how well the window insulates. The lower the U-factor, the greater a window's resistance to heat flow and the better its insulating properties.

5.5.2 Audit 2: Probation Building

Figure 35. Probation Building Exterior Photos

Probation Building
117 E. Carrillo St.
Santa Barbara, CA 93101

Square Footage: 21,728
Year Built: 1960

The partial two-story facility in Downtown Santa Barbara primarily houses offices for County probation officers. The facility primarily comprises individual office spaces and bullpen/cubicle areas.
Only selected areas within the facility receive air conditioning. One Carrier split-system A/C unit serves an executive office, while three Carrier split-system A/C units serve a file room, a conference room, and an additional office. The entire facility utilizes a baseboard heating system.

Figure 36. Probation Building Location

Figure 37. Split System Carrier A/C Units and T8-28 Watt Lighting

Table 42. Probation Building Existing HVAC Mechanical Schedule

Quantity	Existing HVAC Equipment Inventory Description	CU Model	Indoor Coil Model	Nominal Tonnage	Refrigerant	Supply CFM	SEER
1	Carrier Split Systems	38AK-007-511	Unknown	6	R-22	2,400	9.5
1	Carrier Split Systems	38YKA018300	Unknown	1.5	R-22	600	10.0
1	Carrier Split Systems	38YKA024300	Unknown	2	R-22	800	10.0
1	Carrier Split Systems	38YK036300	Unknown	3	R-22	1,200	10.0
1	Gas Boiler for Baseboard Heating	N/A	Unknown	N/A	N/A	N/A	N/A

Table 43. Probation Building Electricity Use Profile

Year	Total Annual Bill Amount	Total Annual kWh	Max Annual kW
2008	$19,978.81	157,200	39.0
2009	$17,094.63	123,840	34.2
2010	$16,259.30	108,060	32.4
2011	$15,451.64	104,460	30.0
2012	$5,196.49	43,692	31.8

Electricity consumption and cost have tapered off significantly since their peaks in 2008. The Probation Department has been exemplary in working with the General Services Department and undertaking efforts in electricity efficiency, particularly through de-lamping (or removing lamps from multi-lamp fixtures so as to require less electricity and lower light intensity and heat).

Figure 38. Probation Building Electricity Consumption

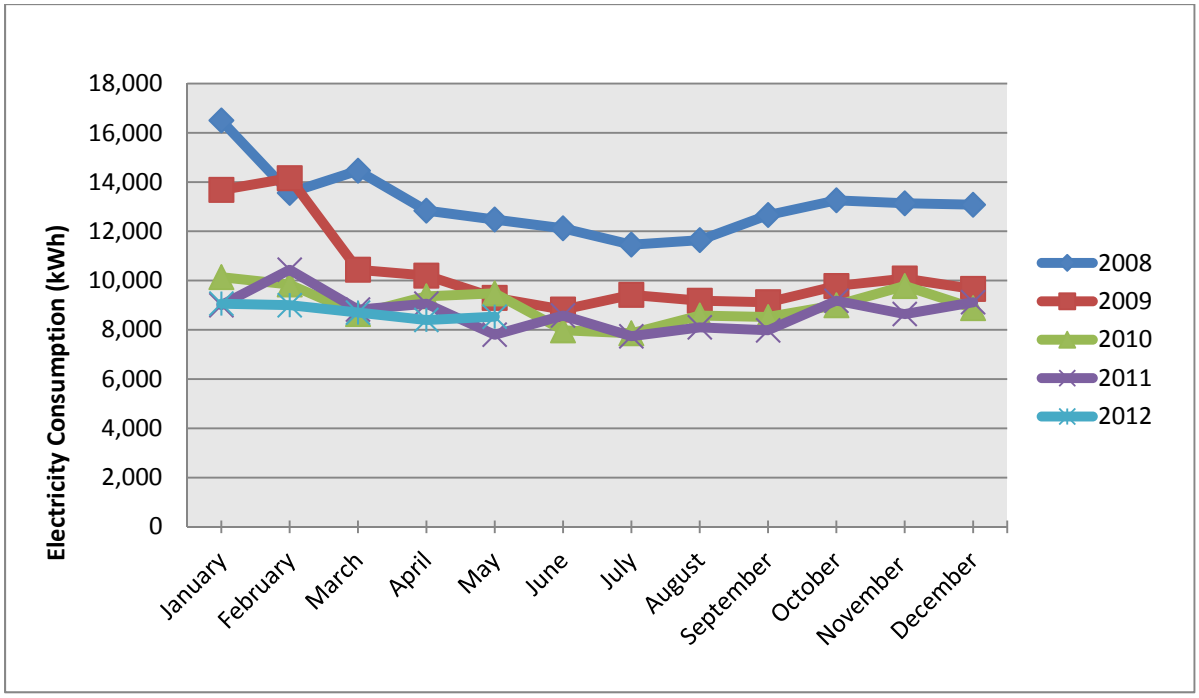


Figure 39. Probation Building Electricity Cost

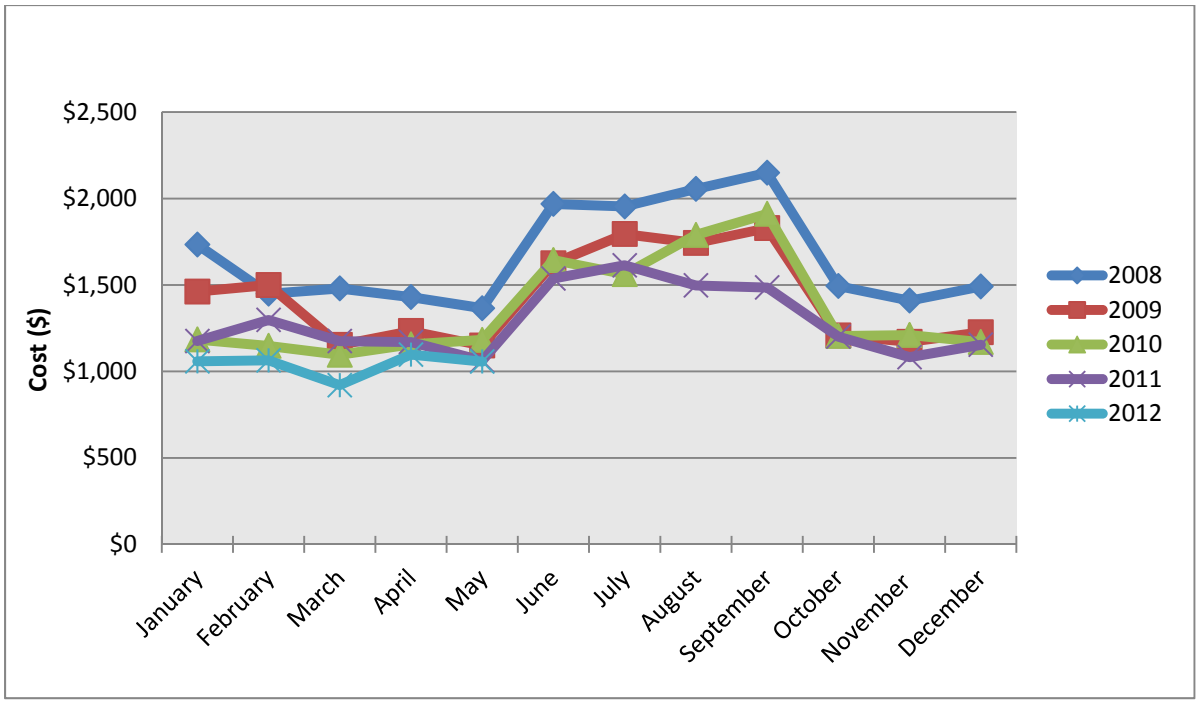


Table 44. Probation Building – Recommended Electricity Efficiency Measures

		Annual Estimates							
Meas. No.	Measure Description	Electricity Savings (kWh)	Demand Reduction (kW)	Cost Savings [1]	Estimated Initial Implementation Cost	Estimated Incentive / Rebate [2]	Net Cost to Customer (based on estimated incentive)	Estimated Payback Period (years)	Estimated Useful Life (years)
EEM-1	Retrofit 32W T8 TO 25W T8 Lamps	7,554	2.5	$982	$11,730	$856	$10,874	11.1	8.0
EEM-2	Replace Exterior MR 16 Bulbs with 3W LED MR 16	855	0.3	$111	$175	$88	$87	0.8	10.0
EEM-3	Replace Incandescents with 13W CFL	219	0.1	$28	$16	$8	$8	0.3	6.0
EEM-4	Replace Exterior 100W High-Pressure Sodium Wall Pack with LED Fixtures	1,064	0.2	$138	$750	$85	$665	4.8	8.0
EEM-5	HVAC Equipment Upgrade (4 Split System Condensing Units & Indoor Coils)	8,878	0	$1,154	$22,000	$0	$22,000	19.1	15.0
	Totals	**18,570**		**$2,413**	**$34,671**	**$1,037**	**$33,634**		

Electricity Efficiency Measures

EEM-1: Retrofit 32W T8 to 25W T8 Lamps

The Probation Building is primarily lit by 32W 48" T8 linear fluorescent fixtures. This measure recommends retrofitting these fixtures to two-lamp, reduced-wattage 25W T8 lamps with reflectors. The reflector will increase the efficiency of the troffer, allowing the space to maintain similar lighting output while consuming less electricity through the use of reduced-wattage T8s.

Savings identified in the measure include interactive-effect savings from HVAC equipment. This represents the reduction of electricity consumption by the HVAC units due to less heat being radiated by the reduced-wattage lamps; thus less heat needs to be removed from the space. However, it is recommended the site test specific areas to ensure the lighting meets task requirements. The estimated costs in this analysis include both the cost of the lamps and the cost to replace the ballast.

EEM-2: Replace Exterior MR 16 Bulbs with 3W LED MR 16

MR16 halogen light bulbs were identified in the Probation Building during the audit. This measure recommends replacing these lamps with 3W LED MR 16. These lamps offer similar light output, while reducing electricity consumption.

EEM-3: Replace Incandescents with 13W CFL

Currently the majority of interior space lighting is manually controlled. This measure recommends installing a central lighting EMS system that would allow greater control of all interior light fixtures. The system would ensure that all building lights are off during unoccupied hours. It would also allow for the ability to implement interior lighting scheduling based on occupancy patterns. More advanced systems also feature auto-commissioning functions that notify operators of lamp outages and occupancy trending.

EEM-4: Replace Exterior 100W High-Pressure Sodium Wall Pack with LED Fixtures

High-pressure sodium wall packs were identified around the facility perimeter. This measure recommends that these fixtures be replaced with LED wall packs. LED fixtures offer similar light output, while consuming less electricity. Additionally, LED fixtures have a minimum rated life of 50,000 hours, which far exceeds the typical 15,000-hour life of HID lamps, thus saving on maintenance costs.

EEM-5: HVAC Equipment Upgrade (1 Carrier Split System and 3 Carrier Split-System Units)

We are proposing to install new, higher-efficiency HVAC units whose refrigerant is also ecological (R-410A). The existing HVAC equipment is using R-22 refrigerant, which is no longer available in the market (it has been banned due to the Montreal Protocol, which cited its destructive effects on the ozone layer).

These units will consist of the following:

- One split system
- Three packaged heat pump rooftop units

Table 45. Proposed High-Efficiency HVAC Unit for Probation Building

Qty.	Proposed HVAC Equipment Description	CU Model	Indoor Coil Model	Nominal Tonnage	Refrigerant	Supply CFM	SEER/ *EER*
1	Carrier Air-Cooled Condensing Unit + Indoor Coil	38AUZ07	40RUA07	6	R-410A	2400	*11.5*
1	Carrier Air-Cooled Condensing Unit + Indoor Coil	24ABB318	FF1ENP019005	1.5	R-410A	600	14.0
1	Carrier Air-Cooled Condensing Unit + Indoor Coil	24ABB324	FF1ENP025075	2	R-410A	800	14.0
1	Carrier Air-Cooled Condensing Unit + Indoor Coil	24ABB336	FF1ENP037005	3	R-410A	1200	13.5

5.5.3 Audit 3: Fire Station 11

Figure 40. Fire Station 11 Building Exterior Photos

Fire Station 11
6901 Frey Way
Goleta, CA 93117

Square Footage: 6,880
Year Built: 1968

Fire Station 11 services portions of the City of Goleta as well as unincorporated areas located directly to the north and west of the City of Goleta. There are six firefighters on staff at this location. Also, there are two private residences that are located adjacent to the facility whose electricity usage is lumped together with the fire station.

This facility is typical of other fire stations in South County that do not have air conditioning or many energy-intensive uses. The facility is centrally heated through the use of a furnace. Other electric energy uses include lighting, washer/dryer, and radio equipment. Fire stations are unique facilities in that they also serve as bedrooms for on-call fire personnel. Lighting intensity in bedroom areas is quite low so as not to be distracting.

Approximately 86% of all County facilities are smaller than 10,000 square feet. Of these smaller facilities, approximately 29 are fire stations or serve firefighter personnel and operate 24 hours a day, 365 days a year. Pending approval, many of these fire stations are slated to be demolished and replaced by new state-of-the-art facilities, as indicated by the County of Santa Barbara *Capital Improvement Plan* (2009–2014).

Fire Station 11 is specifically slated for replacement, as it currently does not meet current staffing needs and operations or the building standard requirements for facilities under the Essential Facilities Act of 1986. The station will be slated for replacement by an 8,500–square foot facility once funding is available.

Figure 41. Fire Station 11 Location

Figure 42. Existing Ceiling Fan on 2nd Floor, and Lennox Furnace System

Table 46. Fire Station 11 Existing HVAC Mechanical Schedule

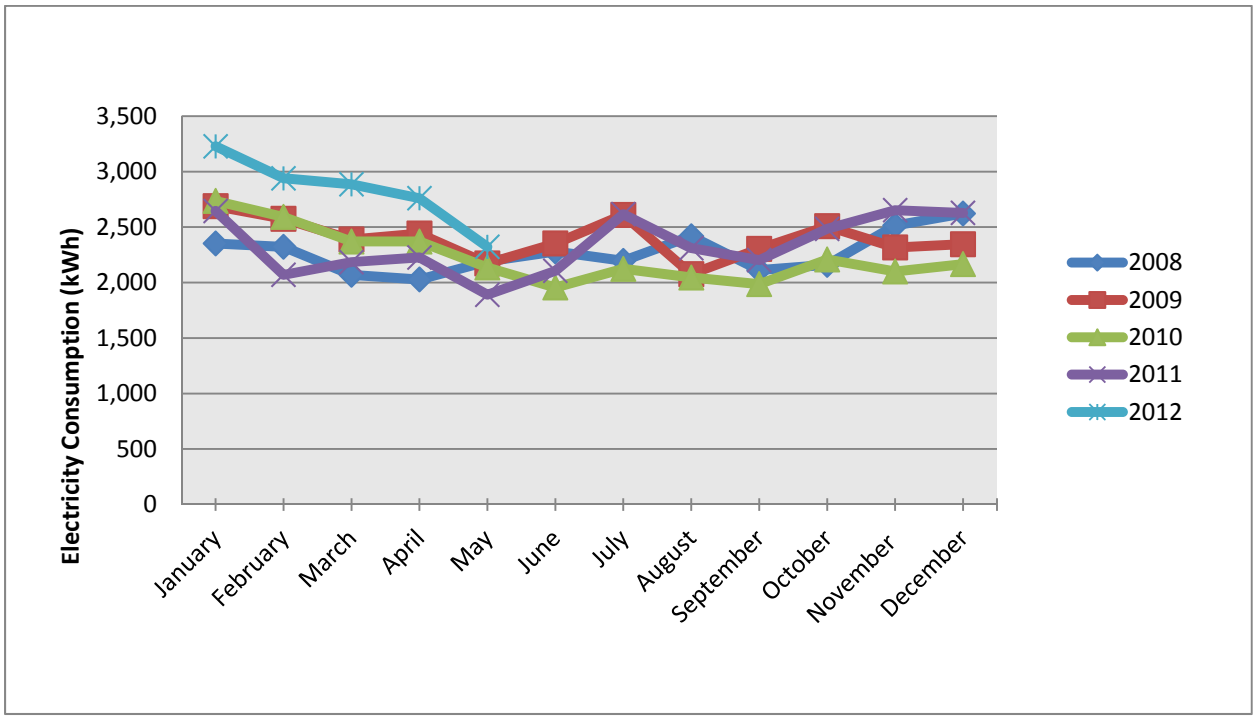
Quantity	Existing HVAC Equipment Inventory Description	Furnace Model	Gas Heating Performance (Input – Btu/h/Output – Btu/h /AFUE/CA Seasonal Efficiency)
1	Lennox Gas Furnace	G51MP-36C-090	88,000 Btu/h / 82,000 Btu/h / 92% / 85.2%

Table 47. Fire Station 11 Electricity Use Profile[51]

Year	Total Annual Bill Amount	Total Annual kWh	Max Annual kW
2008	$4,287.93	27,264	8.0
2009	$4,389.50	28,776	8.9
2010	$4,172.71	26,790	8.0
2011	$4,370.75	28,014	8.4
2012	$1,939.36	14,136	7.8

As indicated in figure 43, electricity consumption reached its peak at the beginning of 2012. However, consumption has sharply declined since then. Electricity cost reached its peak in July 2011.

Figure 43. Fire Station 11 Electricity Consumption



[51] Utility data for 2012 was only collected through the month of May, which is reflected in the aggregate total for consumption, cost, and demand.

Figure 44. Fire Station 11 Electricity Cost

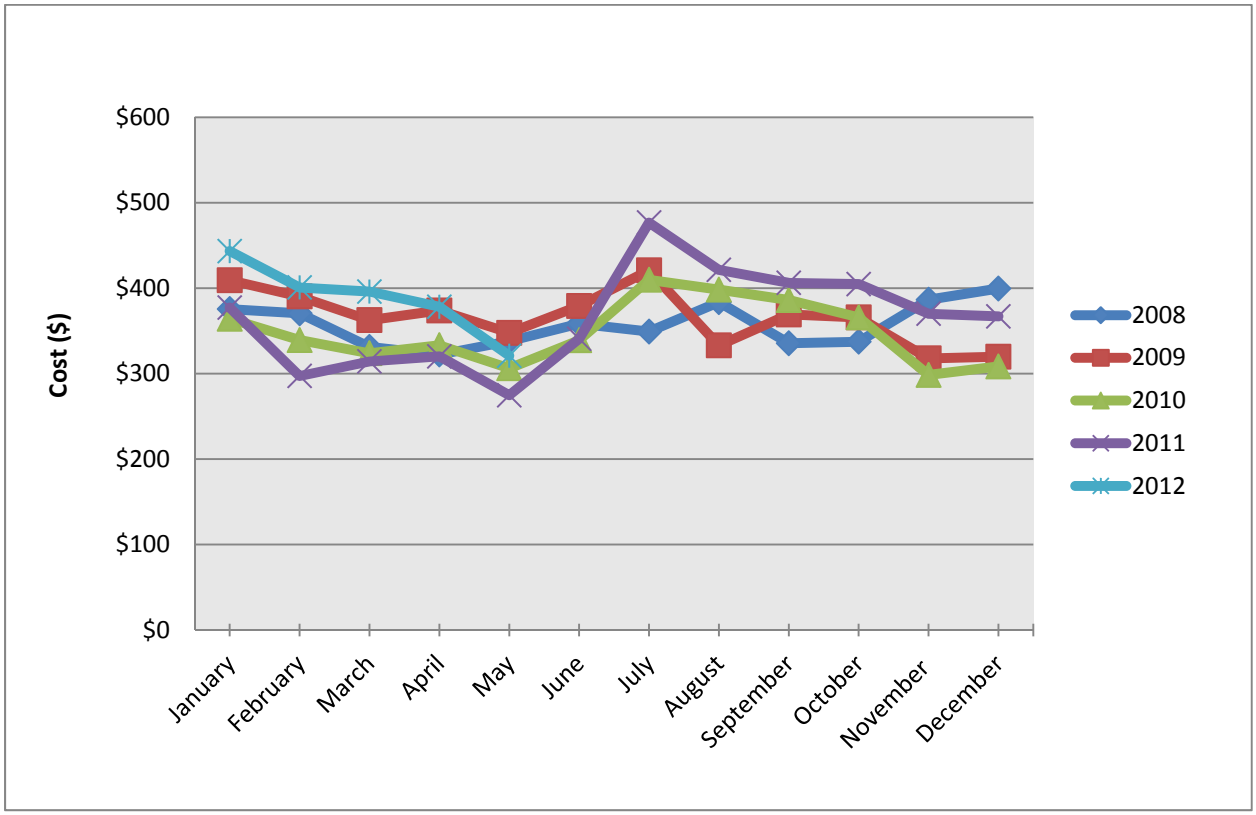


Table 48. Fire Station 11 – Recommended Electricity Efficiency Measures

		Annual Estimates							
Meas. No.	Measure Description	Electricity Savings (kWh)	Demand Reduction (kW)	Cost Savings [1]	Estimated Initial Implementation Cost	Estimated Incentive / Rebate [2]	Net Cost to Customer (based on estimated incentive)	Estimated Payback Period (years)	Estimated Useful Life (years)
EEM-1	Retrofit 32W T8 TO 25W T8 Lamps	4,757	0.6	$618	$2,532	$445	$2,087	3.4	8.0
EEM-2	Replace Exterior 100W High-Pressure Sodium Wall Pack with LED Fixtures	3,557	0.8	$462	$1,750	$285	$1,465	3.2	8.0
EEM-3	Replace Incandescents with 13W CFL	3,272	0.7	$425	$120	$60	$60	0.1	6.0
	Totals	**11,585**		**$1,505**	**$4,402**	**$790**	**$3,612**		

Electricity Efficiency Measures

EEM-1: Retrofit 32W T8 to 25W T8 Lamps

Fire Station 11 is primarily lit by 32W 48" T8 linear fluorescent fixtures. This measure recommends retrofitting these fixtures to two-lamp, reduced-wattage 25W T8 lamps with reflectors. The reflector will increase the efficiency of the troffer (the inverted trough that supports and reflects the lighting down), allowing the space to maintain similar lighting output while consuming less electricity through the use of reduced-wattage T8s.

Savings identified in the measure include interactive-effect savings from HVAC equipment. This represents the reduction of electricity consumption by the HVAC units due to less heat being radiated by the reduced-wattage lamps; thus less heat needs to be removed from the space. However, it is recommended the site test specific areas to ensure the lighting meets task requirements. The estimated costs in this analysis include both the cost of the lamps and the cost to replace the ballast.

EEM-2: Replace Exterior 100W High-Pressure Sodium Wall Pack with LED Fixtures

High-pressure sodium wall packs were identified around the facility perimeter. This measure recommends that these fixtures be replaced with LED wall packs. LED fixtures offer similar light output, while consuming less electricity. Additionally, LED fixtures have a minimum rated life of 50,000 hours, which far exceeds the typical 15,000-hour life of HID lamps, thus saving on maintenance costs.

EEM-3: Replace Incandescents with 13W CFL

Although many have been replaced with CFLs, there are still incandescent lamps in various locations in the facility. It is recommended that these incandescent fixtures be replaced with equivalent compact fluorescent lamps (CFLs). CFLs not only reduce electricity use while maintaining the same light levels, but they also generally have longer lives and produce less heat compared to incandescent lamps. The reduced-wattage lamps save further electricity due to interactive effects on the space-cooling equipment. The lamps produce less heat, thus lowering the demand for space cooling.

Additional EEM: Replace Existing Gas Furnace

This measure entails replacing the existing gas furnace—which has an AFUE (annual fuel utilization efficiency) of 82%—with a furnace whose AFUE is 95%. While outside the scope of the EAP, this measure will result in significant gas savings for Fire Station 11.

Table 49. Proposed Replacement of Furnace at Fire Station 11

Qty.	Proposed HVAC Equipment Inventory Description	Furnace Model	Gas Heating Performance (Input - Btuh/Output – Btuh/ AFUE/CA Seasonal Efficiency)
1	Lennox Gas Furnace	G71MPP-36C-090	88,000 Btuh / 82,000 Btuh / 95% / 85.2%

5.5.4 Audit 4: Santa Barbara Road Yard and Public Works Permits & Construction Building

Figure 45. Santa Barbara Road Yard and Public Works Permits & Construction Building Exterior Photos

Santa Barbara Road Yard (Four Buildings)
4415 Cathedral Oaks Rd.
Santa Barbara, CA 93110

Square Footage: 15,515
Year Built: 1960–1977

Public Works Permits & Construction Building
4417 Cathedral Oaks Rd.
Santa Barbara, CA 93110

Square Footage: 2,700
Year Built: 1992

The Santa Barbara Road Yard is one of four public road yards in the entire County that are dedicated to storage and maintenance of vehicles, signage, and equipment. The Public Works Permits & Construction Building handles County construction projects that require permitting. The most electric energy–intensive uses at these sites involve lighting.

The Road Yard office building and the three storage/maintenance garage buildings do not have air conditioning (the office is heating by two furnaces, however). The largest user of electricity within the office and garage buildings is lighting. The modular Public Works Permits & Construction Building is air conditioned through four wall-mounted A/C package units.

The Public Works Permits & Construction Building recently underwent a de-lamping process to minimize light intensity and the radiant heat that reverberated from having high amounts of lighting cover a small area. The de-lamping process has helped to increase employee comfort with more appropriate lighting levels.

Figure 46. Santa Barbara Road Yard and Public Works Permits & Construction Building Locations

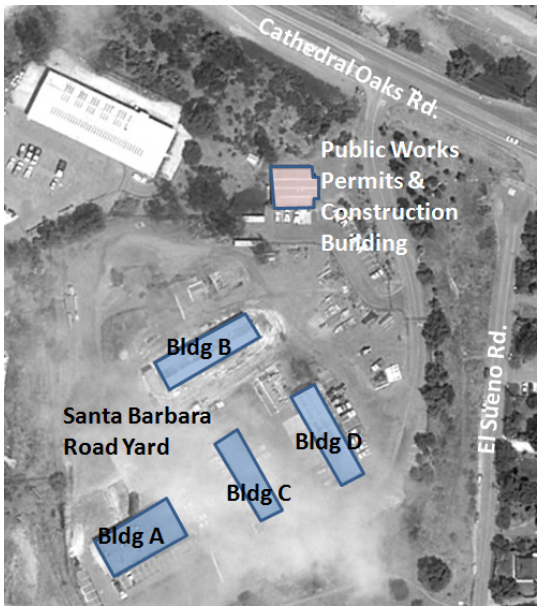


Figure 47. Existing Incandescent Lighting and Gas Furnace at Santa Barbara Road Yard

Figure 48. Existing Lighting Intensity (T8-32W) and Wall-Mount HVAC Units at Public Works Permits & Construction Building

Table 50. Santa Barbara Road Yard Existing HVAC Mechanical Schedule

Quantity	Existing HVAC Equipment Inventory Description	Unit Model	Capacity (US Gallons)	Heating Performance (Input-Btu/h)
1	Rheem Domestic Gas Water Heater	22V30F	29	N/A
2	Payne Gas Furnace	Unknown	N/A	Unknown

Table 51. Public Works Permits & Construction Building Existing HVAC Mechanical Schedule

Quantity	Existing HVAC Equipment Inventory Description	Unit Model	Refrigerant	Capacity (Ton)	SEER / EER
4	Bard Wall-Mounted A/C Unit	WL242	R-22	2	9.2

Table 52. Santa Barbara Road Yard Electricity Use Profile52

Year	Total Annual Bill Amount	Total Annual kWh	Max Annual kW
2008	$3,543.26	22,218	20.3
2009	$2,885.77	18,426	6.7
2010	$2,876.30	17,862	7.0
2011	$2,799.26	17,418	6.2
2012	$1,123.02	7,828	6.2

Table 53. Public Works Permits & Construction Building Electricity Use Profile53

Year	Total Annual Bill Amount	Total Annual kWh	Max Annual kW
2008	$6,542.45	33,450	22.2
2009	$7,090.43	32,100	40.2
2010	$7,636.04	33,150	32.4
2011	$7,273.33	27,870	31.5
2012	$2,869.02	8,400	28.5

[52] Utility data for 2012 was only collected through the month of May, which is reflected in the aggregate total for consumption, cost, and demand.
[53] Same comment as above footnote.

Figure 49. Santa Barbara Road Yard Electricity Cost

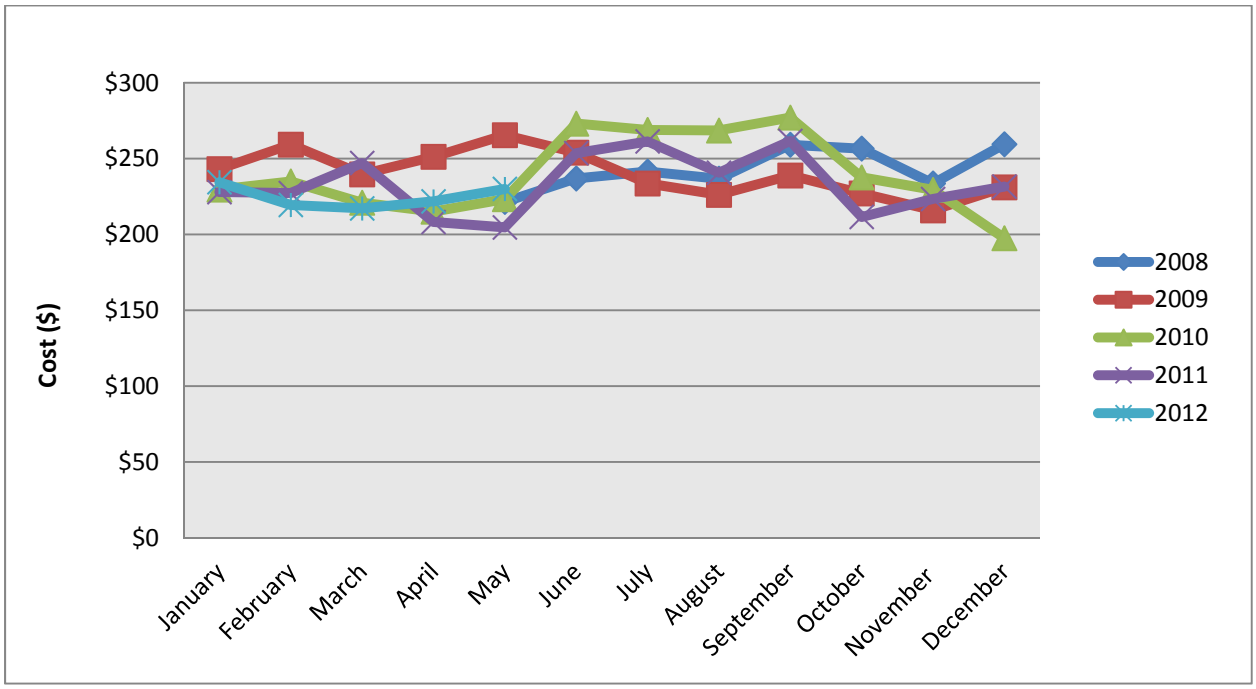


Figure 50. Santa Barbara Road Yard Electricity Consumption Cost

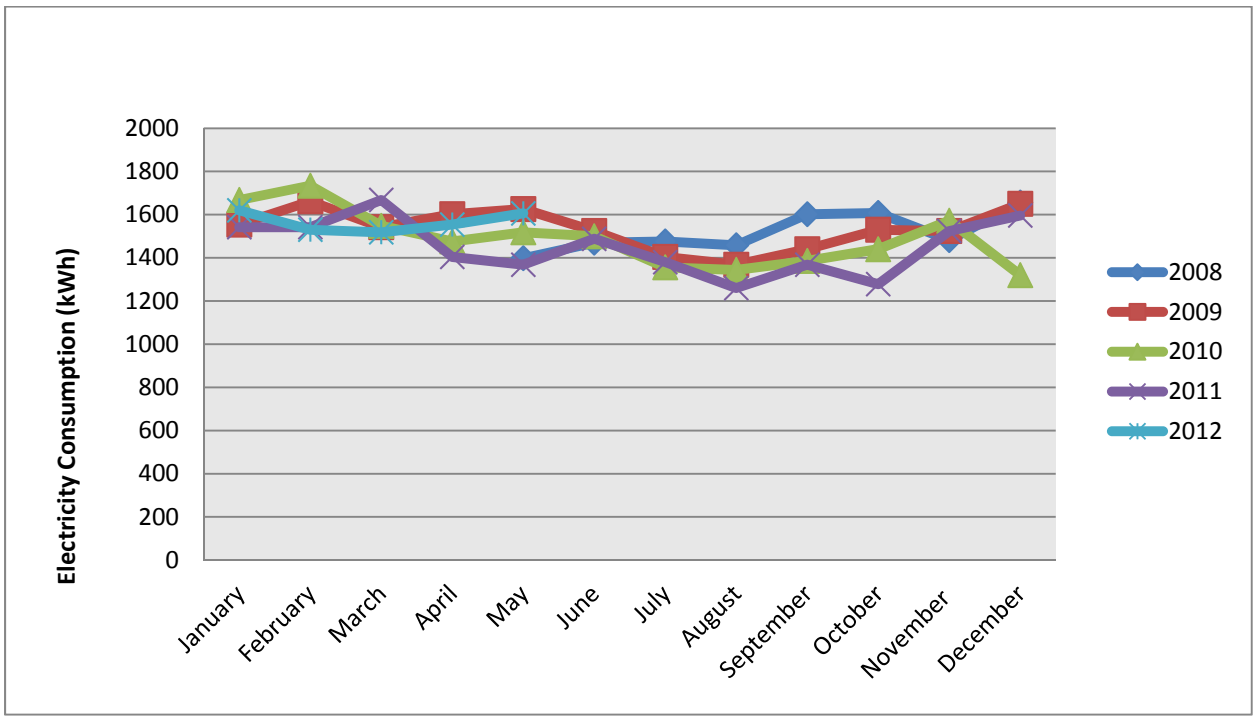


Figure 51. Public Works Permits & Construction Building Electricity Consumption

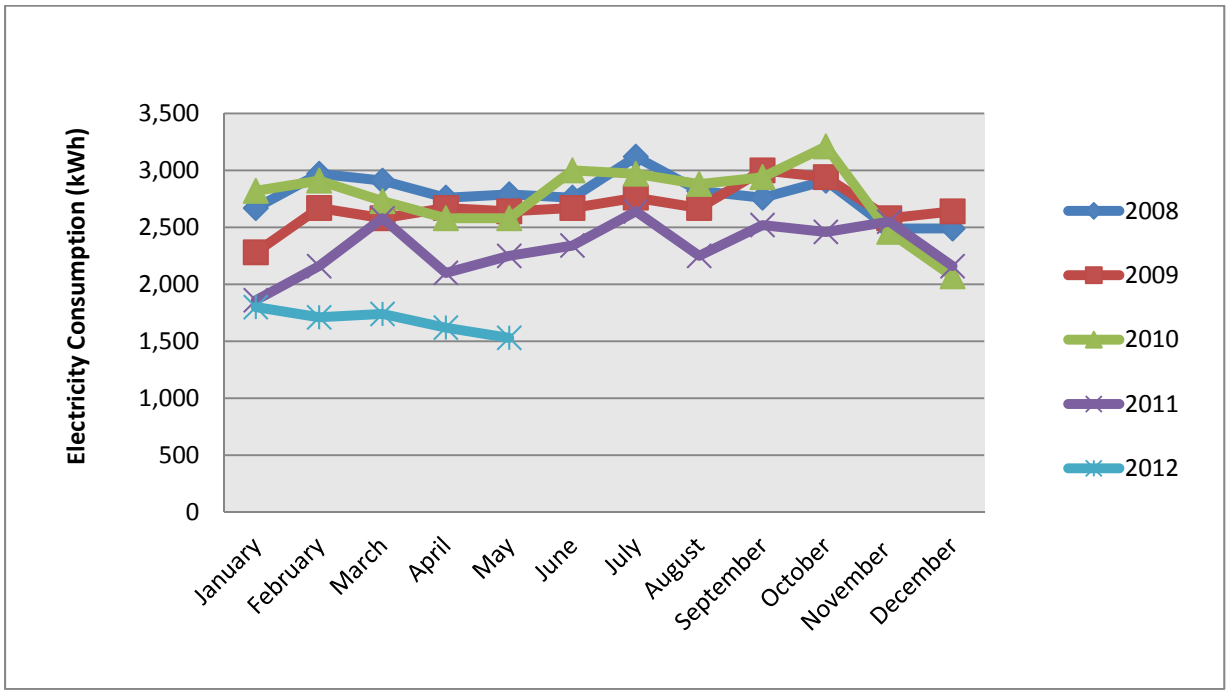
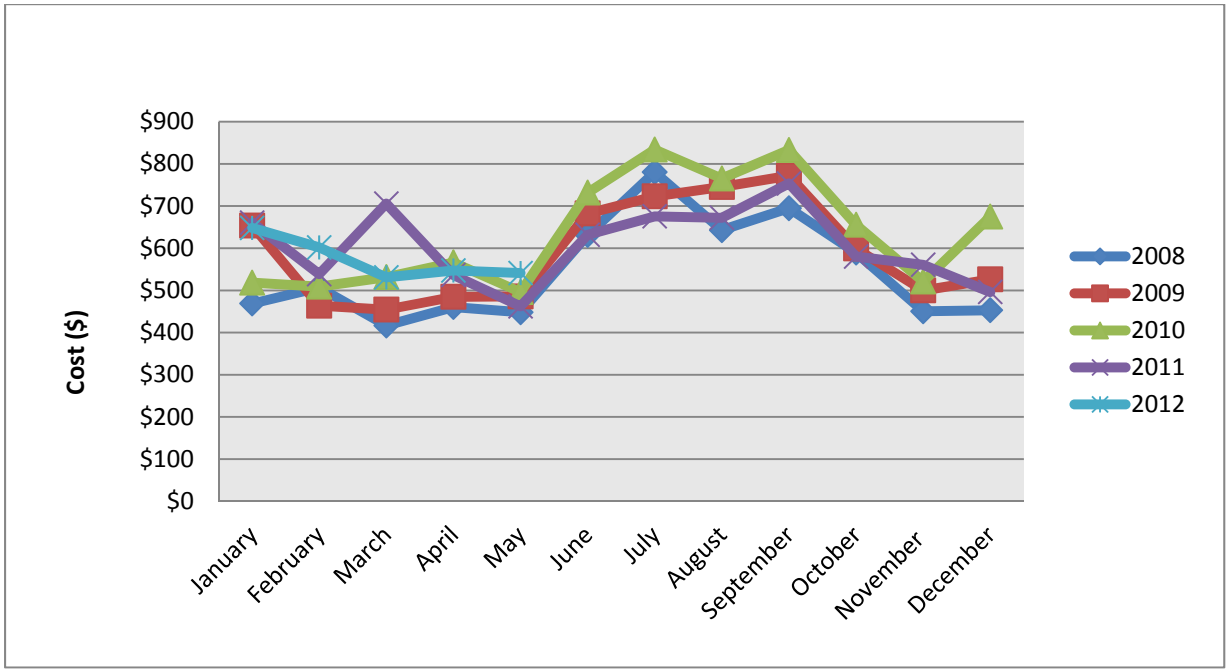


Figure 52. Public Works Permits & Construction Building Electricity Cost



		Annual Estimates							
Meas. No.	**Measure Description**	**Electricity Savings (kWh)**	**Demand Reduction (kW)**	**Cost Savings [1]**	**Estimated Initial Implementation Cost**	**Estimated Incentive/ Rebate [2]**	**Net Cost to Customer** (based on estimated incentive)	**Estimated Payback Period (years)**	**Estimated Useful Life (years)**
EEM-1	PAR 38 to LED PAR 38	3,225	0.8	$419	$1,000	$320	$680	1.6	8.0
EEM-2	Replace Exterior 100W High-Pressure Sodium Wall Pack with LED Fixtures	1,691	0.4	$220	$500	$135	$365	1.7	8.0
EEM-3	Replace Incandescents with 13W CFL	1,412	0.4	$184	$75	$38	$38	0.2	6.0
	Totals	**6,328**		**$823**	**$1,575**	**$493**	**$1,083**		

Table 54. Santa Barbara Road Yard – Recommended Electricity Efficiency Measures

		Annual Estimates							
Meas. No.	**Measure Description**	**Electricity Savings (kWh)**	**Demand Reduction (kW)**	**Cost Savings [1]**	**Estimated Initial Implementation Cost**	**Estimated Incentive/ Rebate [2]**	**Net Cost to Customer** (based on estimated incentive)	**Estimated Payback Period (years)**	**Estimated Useful Life (years)**
EEM-1	Retrofit 32W T8 TO 25W T8 Lamps	1,361	0.5	$177	$1,764	$158	$1,606	9.1	8.0
EEM-2	PAR 38 to LED PAR 38	1,095	0.3	$142	$455	$100	$355	2.5	8.0
EEM-3	Replace Incandescents with 13W CFL	1,958	0.7	$255	$120	$60	$60	0.2	6.0
EEM-4	HVAC Equipment Upgrade (4 Wall-Mounted Bard AC Units, R/410A)	9,250	0	$1,203	$7,000	$0	$7,000	5.8	15.0
	Totals	**13,664**		**$1,777**	**$9,339**	**$318**	**$9,021**		

Table 55. Public Works Permits & Construction Building – Recommended Electricity Efficiency Measures

Proposed Electricity Efficiency Measures
Santa Barbara Road Yard and Public Works Permits & Construction Building

EEM-1: PAR 38 to LED PAR 38

During the walk-through, 75W flood bulbs were identified around the facility perimeter. This measure recommends these fixtures be replaced with a 25W LED PAR 38. This LED light bulb offers similar light output, while reducing electricity consumption.

EEM-2: Replace Exterior 100W High-Pressure Sodium Wall Pack with LED Fixtures

High-pressure sodium wall packs were identified around the facility perimeter. This measure recommends that these fixtures be replaced with LED wall packs. LED fixtures offer similar light output, while consuming less electricity. Additionally, LED fixtures have a minimum rated life of 50,000 hours, which far exceeds the typical 15,000-hour life of HID lamps, thus saving on maintenance costs.

EEM-3: Replace Incandescents with 13W CFL

Although many have been replaced with CFLs, there are still incandescent lamps in various locations in the facility. It is recommended to replace these incandescent fixtures with equivalent compact fluorescent lamps (CFLs). CFLs not only reduce electricity use while maintaining the same light levels, but also they generally have longer lives and produce less heat compared to incandescent lamps. The reduced-wattage lamps save further electricity due to interactive effects on the space-cooling equipment. The lamps produce less heat, thus lowering the demand for space cooling.

Public Works Permits & Construction Building Only

EEM-6: HVAC Equipment Upgrade

We are proposing to install new, higher-efficiency HVAC units whose refrigerant is also ecological (R-410A). The existing HVAC equipment is using R22, a refrigerant that is no longer available in the market; it has been banned due to the Montreal Protocol, which cited its destructive effects on the ozone layer. Wall-mount air conditioners need to be replaced with new, higher-efficiency units. These units will consist of one split system.

Table 56. Proposed Replacement of Wall-Mounted HVAC Units at Public Works Permits & Construction Building

Quantity	Proposed HVAC Equipment Inventory Description	Unit Model	Refrigerant	Capacity (Ton)	SEER / EER
4	Bard Wall-Mounted A/C Unit	W24A1	R-410A	2	15

5.5.5 Audit 5: Public Health Department (PHD) Psych/Health Building

Figure 53. Public Health Department (PHD) Psych/Health Building Exterior Photos

Public Health Department (PHD) Psych/Health Building
315 Calle del Remedio
Santa Barbara, CA 93110

Square Footage: 60,496
Year Built: 1960

The PHD Psych/Health Building houses County medical offices and a psychiatric clinic. The building is situated on a hilltop, and therefore has three levels in one area and two in another.
Approximately 70% of the building (eastern end) is air conditioned, with the following HVAC equipment located on the roof:

- One 50-ton nominal Carrier air-cooled chiller
- Two Carrier MZ air-handler units
- One package rooftop unit
- Three gas boilers that provide heating to the entire building

This facility is one of several facilities that make up the Calle Real/San Antonio County administration campus.

Figure 54. PHD Psych/Health Building Location

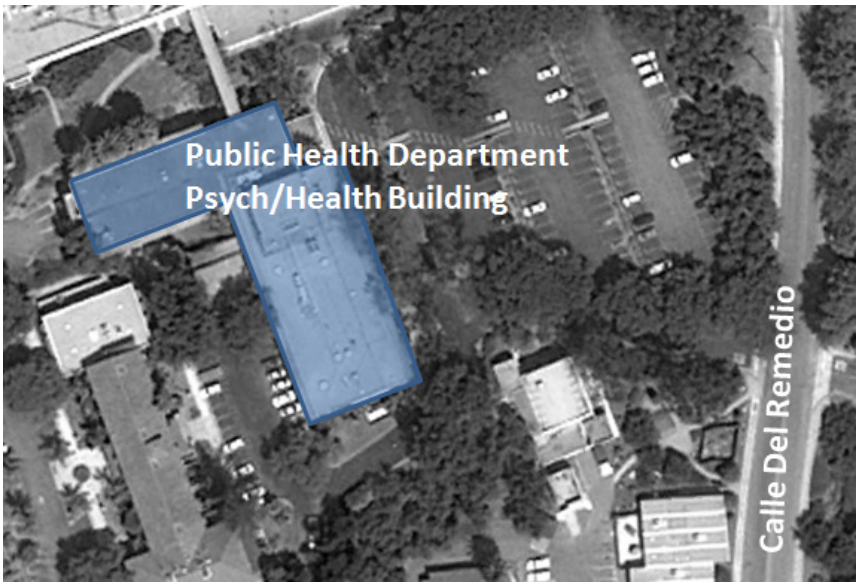


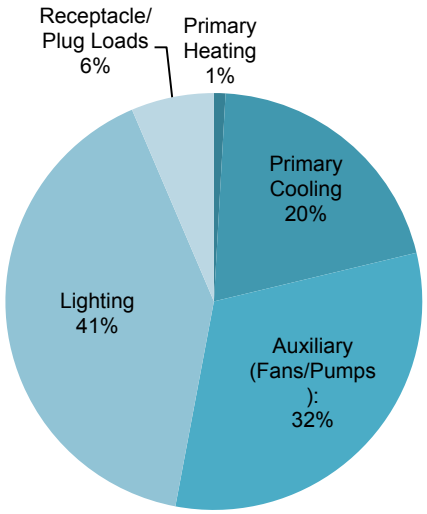
Figure 55. PHD Psych/Health Building: Existing Carrier Chiller and Raypak Boilers on Rooftop

Figure 56. PHD Psych/Health Building: Air-Handling Unit and Supply Fan Motor

Table 57. PHD Psych/Health Building Existing HVAC Mechanical Schedule

Quantity	Existing HVAC Equipment Inventory Description	Unit Model	HP	Supply CFM	Capacity (Ton)	Efficiency (kW/Ton)
2	Carrier Central Station AHU	43-100-CD	N/A	8631	21	Unknown
1	Carrier Air-Cooled Chiller	30RAN055ESC611KD	N/A	N/A	51.8	1.1
3	Raypak Gas Boiler	Unknown	N/A	N/A	Unknown	Unknown
2	Chilled Water Pumps	Unknown	10	N/A	N/A	N/A

Figure 57. PHD Psych/Health Building Electricity Consumption Breakdown54



[54] Consumption breakdown calculated through Trane Trace simulation model created for PHD Psych/Health Building, using inputs gathered from audit walk-through.

Table 58. PHD Psych/Health Building – Recommended Electricity-Efficiency Measures

		Annual Estimates							
Meas. No.	Measure Description	Electricity Savings (kWh)	Demand Reduction (kW)	Cost Savings [1]	Estimated Initial Implementation Cost	Estimated Incentive/ Rebate [2]	Net Cost to Customer (based on estimated incentive)	Estimated Payback Period (years)	Estimated Useful Life (years)
EEM-1	Retrofit 40W and 34W T12 to 25W T8 Lamps	2,849	1.0	$370	$1,888	$332	$1,556	4.2	8.0
EEM-2	32W T8 to 25W T8 Lighting Upgrade	37,693	13.8	$4,900	$35,556	$4,391	$31,165	6.4	8.0
EEM-3	Replace Incandescents with 13W CFL	4,822	1.8	$627	$615	$308	$308	0.5	6.0
EEM-4	Replace Exterior 100W High-Pressure Sodium Wall Pack with LED Fixtures	18,269	4.2	$2,375	$6,750	$1,462	$5,288	2.2	8.0
EEM-5	Static Pressure Reset	169,148	11.0	$21,989	$8,575	$4,288	$4,288	0.2	8.0
EEM-6	Supply Temperature Reset	2,648	0	$344	$8,575	$318	$8,257	24.0	8.0
EEM-7	Chilled Water Pump VFD	20,920	0	$2,720	$3,000	$2,510	$490	0.2	12.0
	Totals	**256,349**		**$33,525**	**$64,959**	**$13,609**	**$51,352**		

PHD Psych/Health Building: Proposed Electricity Efficiency Measures

EEM-1: Retrofit 40W and 34W T12 to 25W T8 Lamps

Although the majority of the lighting at the facility has been retrofitted to T8s, we identified some 40W and 34W 48" T12 linear fluorescent fixtures. It is recommended to replace these lamps with 25W T8 lamps. The reduced-wattage lamps save further electricity due to interactive effects on the space-cooling equipment. The lamps produce less heat, thus lowering the demand for space cooling.

In addition to the electricity cost savings, the reduced-wattage lamps generally have a longer life, thus reducing maintenance costs. The lamps are for use with instant-start ballasts that would have to replace the rapid-start ballasts currently in place. The 25W lamps with instant-start ballasts achieve similar illumination levels as standard T8 lamps. However, it is recommended the site test specific areas to ensure the lighting meets task requirements.

EEM-2: 32W T8 to 25W T8 Lighting Upgrade

The building is lit primarily by 32W 48" T8 linear fluorescent fixtures. During the lighting survey it was noted that several spaces are lit over the recommended levels established by the Illuminating Engineering Society of North America (IES).

According to the IES, normal office space, for example, requires approximately 45 foot-candles to be functional. Several offices in the investigated buildings demonstrated lighting outputs of over 75 foot-candles. It is recommended to permanently de-lamp in appropriate areas and replace standard 32W T8 lamps with high-performance 25W T8 lamps. This contributes to the reduction of electricity consumption by the HVAC units due to less heat being radiated by the reduced-wattage lamps; thus less heat needs to be removed from the space. However, it is recommended the site test specific areas to ensure the lighting meets task requirements. The estimated costs in this analysis include both the cost of the lamps and the cost to replace the ballast.

EEM-3: Replace Incandescents with 13W CFL

Currently the majority of interior space lighting is manually controlled. This measure recommends installing a central lighting EMS system that would allow greater control of all interior light fixtures. The system would ensure that all building lights are off during unoccupied hours. It would also allow for the ability to implement interior lighting scheduling based on occupancy patterns. More advanced systems also feature auto-commissioning functions that notify operators of lamp outages and occupancy trending.

EEM-4: Replace Exterior 100W High-Pressure Sodium Wall Pack with LED Fixtures

High-pressure sodium wall packs were identified around the facility perimeter. This measure recommends that these fixtures be replaced with LED wall packs. LED fixtures offer similar light output, while consuming less electricity. Additionally, LED fixtures have a minimum rated life of 50,000 hours, which far exceeds the typical 15,000-hour life of HID lamps, thus saving on maintenance costs.

EEM-5: Static Pressure Reset (Fan-Power Optimization)

Fan-power optimization (also known as static pressure reset) is a control strategy that reduces the electricity use of the supply fan at part-load conditions. We recommend this measure at the PHD Psych/Health Building. In applications with variable airflow, the control system monitors the operation of each VAV terminal to identify the zone with the highest load. It then unloads the supply fan just enough to keep the VAV damper in the critical zone fully open.

Unloading the fan in this fashion decreases the static pressure in the duct, reducing the electricity consumption and noise level of the fan. The effective implementation of fan-pressure optimization requires a control system capable of monitoring the damper positions in all the VAV terminal units.

EEM-6: Supply Temperature Reset

Supply air temperature reset is a control scheme that allows an airside system to modulate the supply air temperature based on outside air temperature, worst-case room demand, or a combination of the two. When the system is enabled, the temperature of the supply air is increased. This allows for reduced compressor electricity or reheated electricity, but also increases fan electricity in a VAV system. This measure is also recommended at the PHD Psych/Health Building.

When supply air temperature reset is based on outside air temperature, the supply air temperature can be increased as the outside air temperature decreases, because of the cooler outside air being introduced to the system. Supply air temperature reset can also be based on the worst-case space load demands. If the worst-case space does not require conditioned air at the design supply air temperature, the temperature can be reset upward. The two individual strategies can also be combined so that the supply air temperature is reset based on both outside air temperature and worst-case room conditions.

EEM-7: Chilled Water Pump VFD

The chiller currently has two chilled water pumps. Only one operates at a time, with a 10 hp motor operating a constant speed regardless of the cooling load on the building. A three-way valve with a bypass line is installed at the cooling coil valves of the two air handlers that receive chilled water, which causes the pumps to circulate the same quantity of chilled water.

The current system consumes excessive electricity, and installing variable-speed drives on the chilled water pump motors (along with two-way valves at the air-handler coils) will enable the system to operate so as to match the actual cooling load of the PHD Psych/Health Building.

6 ELECTRICITY-SAVING ACTION STEPS FOR COUNTY FACILITIES

6.1 IMPLEMENTATION STRATEGY

The County is fortunate to have an energy manager and supporting staff in its General Services Department to oversee energy programs and projects, tap into additional funding sources, and work directly with utility companies and consultants to maximize potential incentives from energy savings. Furthermore, Long-Range Planning is developing a climate action plan (CAP) that will examine electricity consumption and its greater relation to greenhouse gas emissions.
The EAP examined opportunities for how the County can contribute not only to its electricity-specific goals but to its countywide GHG emissions targets being established through the CAP. Section 6 of the EAP includes the following action items:

- Implement Demand Response strategies
- Introduce a departmental revolving energy fund
- Funnel all utility bills through the General Services Department
- Develop electricity consumption Web reports
- Develop a green building ordinance

The County currently has the staff and the knowledge to implement electricity efficiency projects, as delineated in section 2.5.3. The following sections will detail how the County can utilize particular strategies with the above-mentioned strategies and existing staff to effectively transition the EAP and corresponding electricity-efficiency projects into an implementable document.

6.1.1 Implement Demand Response Strategies

Demand Response (DR) enables a facility to trigger manual or automated operational changes that cut power use at times of greatest demand and highest risk for blackouts and service disruptions (based on notifications from the electricity utility). DR strategies often require and are most appropriate when the corresponding meter registers at least 200 kW of electricity demand. Given the typical size of the County's individual facilities, most will not qualify for DR strategy programs on their own; however, some electric utility companies provide options to implement simple DR strategies keyed to air conditioning reductions that can be applied to all facilities.

Figure 58 PG&E SmartAC Program Device

Typical HVAC DR strategies for packaged single zone units include the following:

- Global temperature adjustment (GTA)
- Compressor shutdown
- Unit cycling
- Precooling and/or night ventilation (free-cooling)

Demand Response for All Facilities:

Figure 59. SCE Summer Discount Plan Device

General Services shall implement demand response devices accessible through SCE and PG&E on all facility air conditioners except in areas where other temperature settings are required by law or specialized needs of equipment or scientific experimentation deter any changes to air conditioning settings (including some server rooms). SCE and PG&E offer free devices that curtail energy use based on critical day notifications from the County for short periods of time. The utility installs a cycling device, which is a small unit that is attached to the outside of the central air conditioner (see figure 59). On peak consumption days, the utility can shut off the air conditioning unit momentarily so as to lower the overall demand on the grid and help prevent any outages. Through the SCE Summer Discount Plan, the County can receive credits on summer electric bills—regardless of how many times air conditioning is actually remotely turned off.[55] The credits vary from facility to facility based on the following criteria:

- Current rate schedule
- Characteristics of the cycling program
- Selected option
- Calculated tonnage of the air conditioner participating in the program

Through the PG&E SmartAC program, PG&E can install a similar device on North County air conditioning devices for peak days between May 1 and October 31, offering similar incentives to customers regardless of the number of critical days where air conditioning shutoff actually takes place.[56]

Additional Demand Response Opportunities for Larger Facilities:

The utilities offer additional incentivized demand response programs for facilities that register at least 200 kW of electricity demand and utilize a utility manager system. This type of DR takes corrective actions to restrict energy consumption and lower the electrical load, based on a trigger from the electric utility. Demand response is a voluntary program; participation can be either manually or automatically set up, through reliability or pricing schemes as detailed below.

- **Reliability Demand Response**: Notification is triggered on critical days to offset a potential statewide electricity emergency (participation can be voluntary, or mandatory with penalties for noncompliance).
- **Pricing Demand Response**: Electricity rates are increased on critical days for consumption during peak hours (typically between 2:00 p.m. and 6:00 p.m.).

[55] Additional information on the SCE Summer Discount Plan is accessible at http://www.sce.com/summerdiscount/summer-discount-plan.htm.
[56] Additional information on the PG&E SmartAC program is accessible at http://www.pge.com/myhome/saveenergymoney/energysavingprograms/smartac/.

For example, SCE's Summer Advantage Incentive (SAI) program is available to customers with electricity demand greater than 200 kW. SAI seeks to reduce power use during the summer peak months, up to 15 days per year. Higher prices for electricity usage on critical days are offset by lower rates at other times throughout the year.[57]

The eventual implementation of a utility manager software system Countywide will provide sub-metered demand data for each facility; that information will dictate which facilities can enter into a DR program. Each facility would need to be assessed individually, given the lack of consistency among County facilities in electricity-intensive uses (particularly since not all buildings utilize central air conditioning). Furthermore, an automatic DR strategy requires that the County's utility manager system be installed and operational in order to accept triggers from the utility companies.

DR strategies in lighting will have to be assessed separately, however. As indicated through the audit walk-throughs, lighting at County facilities is characterized primarily by T8 linear fluorescent lighting. Upgrades from T8-32W lighting to T8-28 or T8-25W lighting will result in significant electricity savings (a reduction in lighting intensity of 12.5% or 22%, respectively). However, these lower-wattage light bulbs have limited dimming capabilities that would allow for lighting intensities to be flexible in the event of a demand response trigger. The electricity savings that can be realized through lighting retrofits will deliver far greater electricity savings and cost benefits than the savings realized through inducing lighting reductions in demand response events. As a result, the County should focus its DR efforts toward HVAC reductions.

The County shall enact behavioral practices that will help reduce electricity consumption on days of peak demand. For example, the County shall mandate that decorative water fountains be shut off and lighting be manually turned off in areas with little or no occupancy on critical days (when a DR event is indicated by the utility company). The County will lower its impact on the grid while lowering its own electricity consumption and costs during peak periods throughout the year.

6.1.2 Funnel All Utility Bills through General Services Department

The General Services Department recently adopted an Internal Service Fund (ISF) system in which individual departments now pay for their own electricity consumption (previously, utility costs did not affect each departmental budget evenly, resulting in little incentive to lower electricity and other utility consumption).[58] Distribution of costs is based on department square footage occupied and amounts of electricity used. Departmental accountability for utility usage has resulted in great strides toward electricity consumption reduction and savings, as individual departments now see how electricity efficiency affects their bottom line.

There are still a couple of County departments that send payment for utility usage directly to the utility companies (rather than being funneled through General Services). While these departments are paying for the electricity that they consume, they are falling under the radar of tracking devices that monitor total County electricity consumption. The approval of an electricity benchmarking policy will provide understanding for total County electricity consumption at an individual facility level. However, without understanding how much each department pays in utility bills, General Services is not able to accurately benchmark all County facilities.

[57] Southern California Edison, "Large Business – Summer Advantage Incentive," accessible at http://www.sce.com/b-rs/large-business/sai/summer-advantage-incentive.htm.
[58] County of Santa Barbara, *Santa Barbara County Sustainability Action Plan*, 2010, accessible at http://longrange.sbCountyplanning.org/programs/climateactionstrategy/docs/Appendix%20A.pdf.

The County will also eventually implement an energy management system (EMS) that will provide a better understanding of individual facility electricity, gas, and other utility consumption (rather than being based on the existing utility meter structure). The EMS will be monitored by the General Services Department. If certain utility bills are paid directly by departments, the Board of Supervisors is at a disadvantage when it comes to tracking consumption against cost for all facilities.

All County facility utility bills shall be paid directly by the General Services Department. The General Services Department shall, in turn, charge each department for utility usage based on the existing ISF system. It only makes sense that each department pay for its utilities, using the same system that quantifies usage and cost consistently across all departments.

Street Lighting Retrofits

For governments throughout California, street lighting is a primary consumer of electricity. These municipalities are often fully built out and offer a comprehensive street grid across their entire area. The area of Santa Barbara County, in contrast, is largely uninhabited and includes Los Padres National Forest and Vandenberg Air Force Base. Street lighting is mostly limited to highways and unincorporated communities. As indicated back in figure 16, facilities account for 90.2% of the County's overall electricity consumption, with street lighting representing approximately 8.3% of the consumption total. While the County will not see the same proportion of electricity savings realized through street lighting improvements as other municipalities, street lighting improvements (particularly retrofits to LED lighting) will still help the County reach its 25% electricity reduction goal by 2020. However, as experienced by other municipalities, street lighting projects may require a high up-front capital investment, with a longer payback.

Additional studies into street lighting retrofits should be completed before moving forward with any projects. Other municipalities have performed a street lighting inventory of fixtures based on geographic information systems (GIS). GIS uses mapping technology to develop a spatial survey of streetlights based on existing satellite maps. The County may be able to commission such a study in order to have an accurate account of all street lights and fixtures that are under its jurisdiction, spread throughout the County's 3,789 square miles.

The City of Santa Rosa has instituted a successful street light reduction program over four years that results in approximately 10,000 of the city's 16,000 street lights being turned off or set on timers and sensors so as not to be continuously in operation (in addition to a LED lighting retrofit for all street lights at intersections).59 Public safety concerns were addressed when these decisions were made, and only appropriate collector and arterial streets were chosen. Santa Rosa realizes approximately $150,000 in electricity savings annually from this program.

6.1.3 Develop Energy Consumption Web Reports for County Owned Facilities

In an organization such as Santa Barbara County—which covers an expansive area with limited population concentrations—energy usage profiles for County owned facilities can differ greatly. Absent further investigation, simply identifying the top electricity-consuming meters may not give a complete understanding as to the top energy-consuming systems or equipment within individual facilities.

[59] Galbraith, Kate, "To Save Energy, Cities Darken Street Lights," *The New York Times*, September 26, 2008, accessible at http://green.blogs.nytimes.com/2008/09/26/to-save-energy-cities-darken-street-lights/.

In smaller municipalities, efforts to control overall energy consumption often target the top energy-consuming meters first. As mentioned previously, the County has several large campus meters. Within these campus meters, neighboring facilities often have different types of energy-consuming systems on-site. For example, the County Administration and Engineering buildings, although adjacent, differ greatly with regard to the availability of central air conditioning (i.e., the Administration Building offers central air conditioning throughout, while the Engineering Building provides air conditioning through isolated, package units and only to specific facility spaces). In addition, some facilities whose electricity consumption registers on larger, collective utility meters may be performing better or worse than sister facilities.

The employment of a utility management system will be critical to understanding facility-specific energy efficiency, particularly for facilities that are currently included with campus meters. The County will benefit immensely from the ability to run regular reports that reflect energy consumption and provide a basis for benchmarking across other County facilities. These reports can rank facility performance based on the following factors:

- Highest overall consumption
- Highest electricity cost per square foot
- Highest energy use intensity
- Highest energy use per facility type/utility rate type

By having detailed usage reports, the County will better understand the facilities that can be pinpointed for electricity retrofits and retro-commissioning of existing systems to achieve optimal energy consumption.

6.1.4 Develop a Green Building Standard for County Facilities

While the County of Santa Barbara has taken significant steps to pursue sustainability, a formal rating system to provide comparisons both locally and across larger geographies has not been fully established. Green building in California is guided by CALGreen and Title 24. However, participation in a green building program that adheres to specific standards in design, construction, and operation and exceeds minimum standards will provide a framework for the County to receive accreditation and corresponding positive publicity for the County's efforts in sustainability.

The County of Santa Barbara Five-Year Capital Improvement Program (CIP), effective between July 1, 2009, and June 30, 2014, is a budgeting tool that guides the implementation of various Countywide plans, including community plans, facilities plans, and the *County Comprehensive Plan*.[60] The CIP provides details as to specific projects that have been earmarked for major improvements/renovations (e.g., roads, bridges, parks, and facilities). In some cases, some County facilities are scheduled for a complete replacement (although in many cases, specific departments do not have funding set aside or allocated). For these facilities seeking full replacement, specific construction standards can be incorporated according to an already-established green building standard that exceeds minimum Title 24 requirements and CALGreen standards, including the internationally recognized, U.S. Green Building Council–developed Leadership in Energy and Environmental Design (LEED).

[60] County of Santa Barbara, Five-Year Capital Improvement Program, July 1, 2009 – June 30, 2014, accessible at http://www.Countyofsb.org/ceo/budget.aspx?id=11136.

A green building standard can help start the process of determining the most appropriate standard that the County can utilize when planning for new facilities. This standard would eventually culminate in the development of a green building implementation guide that outlines the entire process, from planning to post-construction stages. Having a vetted standard in place allows for a third-party verification of projects in sustainability and energy efficiency that can further champion the County's investments and efforts.

The use of ENERGY STAR Portfolio Manager benchmarking software will eventually provide a basis for understanding County facility electricity consumption and cost. A green building plan will build off the experience of County staff involved in other green building and sustainability programs to memorialize an action plan for all new County building and facility construction. It can fully integrate an already-established green building standard into County operations.

The establishment of a green building standard based on LEED or another industry guideline will eventually enable the County to recognize the efforts in energy efficiency and sustainability taken at a municipal level by using a benchmarking scale that is recognized internationally.

Savings By Design:

The County can take advantage of rebate and incentive programs available through SCE and PG&E. There are several that are geared specifically toward green building, particularly the Savings By Design program. Through both SCE and PG&E, Savings By Design provides incentives to building owners that implement energy efficiency measures in new buildings if they exceed 10% of California's Title 24 energy efficiency standards. This program is also available through the Southern California Gas Company, which serves parts of Santa Barbara County.

Through Savings By Design, energy savings goals can be approached in the following two ways:

- A **whole-building level,** integrating energy efficiency solutions that balance electricity and gas usage, with a maximum incentive per project of $150,000.
- A **systems level**, which considers each building system holistically (including day lighting, interior lighting, heating, ventilation, and air conditioning, and service and hot water, among others). Incentives are calculated using a flat rate, depending on project scope.

There may be additional rebate and incentive opportunities through SCE, PG&E, and SoCal Gas that compensate projects exceeding the Title 24 standard. It is important that the County of Santa Barbara use all available resources from its utility providers to lower the cost of energy efficiency and realize a more cost-effective project. The County should directly contact its utility account representatives to best understand the available rebate and incentive programs at the time of construction.

Detailed information on the program is available through the Savings By Design Participant Handbook.[61]

[61] *Savings By Design*, 2010–2012 Program Cycle Participant Handbook, June 27, 2012. http://www.savingsbydesign.com/pdfs/2010-2012-SBD-Participant-Handbook.pdf.

6.2 FUNDING OF PROJECTS

While the EAP identifies electricity efficiency opportunities, the ultimate decision as to whether implementations and initiatives will take place and reduction goals will be met will ultimately be based on available funding. Recommendations from the EAP should guide future updates to the County's Capital Improvement Plan, particularly for retrofit and replacement projects.

Table 59 details potential funding opportunities that the County may employ in order to successfully pay for the approximately $3.7 million in improvements projected through the Trane Trace simulation models for each size category. This plan does not in any way recommend any particular funding mechanism for achieving the energy efficiency described herein. Incurring debt or advocating for any type of debt is beyond the scope of this plan.

Table 59. Funding of Energy Efficiency Projects (Non–General Fund)

Funding Sources for County Energy Efficiency Projects
1) **State and Federal Grants and Low-Interest Loans**: There are several federal and state programs that offer loans to governments for energy-efficiency efforts. • As an example, the California Energy Commission (CEC) offers up to $3 million in loans to governments and public agencies for energy-efficiency projects with proven energy and/or demand cost savings that are technically and economically feasible. The loan is paid off through energy cost savings within 15 years with a 1% interest rate that is fixed for the entire loan term.[62] These funds are limited based on available state resources and are paid via reimbursements (up front funding would need to be available in order to take advantage of this type of financing). Full funding is only available for projects with a simple payback less than 13 years. • Other funding opportunities exist through the Energy Efficiency and Conservation Block Grant (EECBG) program through the U.S. Department of Energy (DOE) and the State Energy Program (SEP) through CEC.
2) **On-Bill Financing (OBF)**: This innovative program initiates loans for energy efficiency projects using a 0% (no-interest) model. For a government entity such as the County of Santa Barbara, each project must have a minimum cost of $5,000 and a maximum cost of $250,000, and can be paid off over a maximum of 10 years (simple payback for projects must be ten years or less). Additional incentivized projects, including HVAC, now also qualify for this innovative funding through SCE.

[62] California Energy Commission, "Energy Efficiency Financing", Accessible at http://www.energy.ca.gov/efficiency/financing/

3) Support from Nonprofits, Agencies or Additional Public/Private Partnerships:

- The County has already participated in projects through SCE and PG&E that use the public goods charge to ratepayers to invest in energy-efficiency projects, including the SCE Strategic Plan Strategies Program that is funding the EAP. Further participation in utility-funded programs will help position the County well when attempting to reach its electricity and greenhouse gas emissions reductions goals.
- The County receives additional incentives for energy-efficiency projects as it moves up the ladder within the CPUC *Energy Leader Partnership (ELP)*. By implementing the EAP, targeting 50% of County facilities for energy-efficiency projects, and adopting at least a 10% electricity consumption reduction goal, the County can potentially reach the gold level of the ELP and its higher incentive amounts.
- The California Statewide Community Development Authority (CSCDA) provides California's local governments with financing tools for equipment and real estate projects. This type of financing has funded over 161 projects ($125.9 million) throughout California and can provide a local agency like the County of Santa Barbara with access to institutions that competitively bid on a specific project (e.g., replacing a chiller for a facility between 60,001 – 90,000 square feet).

4) **Self-Funding and Revolving Fund Programs**: The County can study the possibility of incorporating a fee for each department on top of its utility bills (surcharge); those funds would be directed to energy efficiency projects, or have energy efficiency incentives and rebates fund further projects (the County still benefits by having lower utility costs). The County of Alameda serves as an example of a County that exercised this type of funding structure. A study would need to be developed in order to see how this type of funding would specifically affect the County of Santa Barbara. The establishment of this type of self-funding can be incorporated into the next phase of SCE Strategic Plan Strategies funding set for 2013.

5) **Agreements with Private Investors/Performance Contracting**: There may be opportunities for partnerships with private companies or energy service companies (ESCOs) that help fund up-front energy efficiency retrofit costs. These companies are often paid back through the incentives/rebates realized through the projects, or by the actual energy cost savings.

Most of these options would require legal review and review by the Debt Advisory Committee related to the particular project.

As indicated in the Trane Trace simulation models, the simple payback for measures pertaining to specific size categories range between 1.9 years to 15.9 years. In particular, lighting measures range between 6.3 years and 10.0 years depending on the size of the facility (larger facilities tend to have a shorter payback period).

Table 60. Funding of Electricity-Efficiency Projects (Non-General Fund)

Funding Mechanism	Potential Amount to be Funded
On-Bill Financing (OBF) [63]	$250,000 (maximum) per service account (for both SCE and PG&E accounts)
California Energy Commission (CEC) Loan	$3,000,000 (maximum)
Rebates/Incentives	$285,428
Additional Programs	Remainder balance using additional funding sources listed in table 59 or other sources

The Cool California website maintained by the California Air Resources Board (ARB) provides a "Funding Wizard" for local governments that serves as an online tool for available grants, rebates, tax credits, and other financial assistors to help with energy efficiency and other sustainability projects.[64] The County can tap into some of the funding potential as additional funding sources are added to this portal.

[63] Quantification of the County's potential to use OBF is challenging given the many campus utility meters that serve County facilities. Each meter can qualify for up to $250,000 in financing through OBF – as a result, each meter would need to be assessed for potential projects and ability to fit within funding guidelines.

[64] CoolCalifornia.org, "Funding Wizard", Accessible at http://www.coolcalifornia.org/funding-wizard#search//%255BAssistance+Type%253D%253DGrant%255D/false/none/false/2/6

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7 ELECTRICITY MANAGEMENT/MONITORING PLAN

7.1 COORDINATING POLICY WITH PLAN OF ACTION

Several policies must be implemented for the EAP to truly have an effect on overall County consumption and behavior. These policies fall in line with the deliverables as part of the Strategic Plan Strategies Program, and accommodate proper energy management practices going forward. These policies include the *energy benchmarking policy*, the *utility manager system*, and a *commissioning/retro-commissioning policy*. Additionally, County departments and staff can be instrumental in achieving electricity efficiency goals on a day-to-day basis by adhering to specific electricity usage guidelines aimed at optimizing electricity usage at individual facilities.

7.1.1 Energy Benchmarking Policy

A benchmarking policy will enable the County to understand the relative energy efficiency of buildings or campuses owned and operated by the County; set electricity savings goals; and regularly evaluate progress. The policy leverages the U.S. Environmental Protection Agency's (EPA) ENERGY STAR Portfolio Manager as the policy's main implementation tool. Portfolio Manager helps identify and prioritize building upgrade opportunities that will lower electricity and operating costs, and it provides a means for tracking and improving performance over time. Benchmarking provides the reference points necessary to evaluate the progress toward the County's electricity and greenhouse gas reduction goals.

The energy benchmarking policy speaks directly to AB 1103, which requires that the owner of a nonresidential property must disclose its ENERGY STAR score in advance of the sale, lease, or financing of the building. Energy benchmarking will help uncover the facilities that are underperforming in regard to total electricity use and electricity use per square foot.

7.1.2 Utility Manager System (UMS)

A utility manager system (UMS) is essential for understanding the electricity consumption of individual facilities, particularly those that are not currently individually metered and have electricity consumption feed into campus meters. The County will be better equipped to track energy use, achieve electricity cost savings, and set up a system to measure success in reducing energy use and greenhouse gas emissions as set forth through the EAP and other initiatives. The UMS will be a primary measurement and verification tool for total County consumption going forward.

The General Services Department will monitor energy usage through the selected UMS. The County will be able to review and analyze energy usage data, allowing for the analysis of the effectiveness of various electricity projects and ways to maximize all available cost- and electricity-saving opportunities. The UMS will be set up for each individual building to accurately track the energy usage on an individual basis.

The purpose of the UMS will be to provide efficient access to the actual, ongoing electricity use at all County facilities with the following objectives:

- Develop energy benchmarks for each facility and for the County at large
- Track electricity use on a continuous basis and compare the electricity usage at certain County buildings with others
- Compare electricity benchmarks to energy-industry standards
- Measure success in reducing electricity use without having to obtain data directly from the utility company
- Create cost-based or user-based reports from electricity billing data with user-defined parameters such as area of facility, number of occupants, size of equipment, season, or historical usage over defined periods
- Generate other simple reports (e.g., use and demand profiles or historical comparisons of electricity use and cost)
- Encourage Countywide participation in electricity efficiency activities by integrating electricity consciousness into the ongoing actions and activities of all County employees
- Release to the internet, the electrical consumption of County owned facilities.

The most appropriate UMS for the County of Santa Barbara will take into account the County's diverse geographic structure and facility portfolio, particularly since population centers and facilities are spread throughout the County's 3,789 square miles. As described in section 6.1.1, a utility manager software package that is tied to a facility's electricity-consuming systems is also essential in order to take advantage of any demand response (DR) opportunities presented through SCE or PG&E (particularly for those facilities that reach maximum demand peaks of over 200 kW).

7.1.3 Commissioning/Retro-Commissioning Policy

The integration of a commissioning and retro-commissioning policy into County operations will create a system for energy efficiency projects that involve a fine-tuning of equipment rather than a wholesale retrofit. Commissioning and retro-commissioning actions assess how a building's systems are operated and maintained, and identify ways to improve the building's overall performance. Commissioning and retro-commissioning policies help to ensure that County buildings function in a manner that promotes energy efficiency and optimizes equipment operation. In turn, facilities will reduce energy consumption, providing cost savings to the County and positively affecting building comfort and functionality.

A commissioning policy will go hand in hand with any potential green building policies that are implemented by the County, as the commissioning of a facility immediately post-construction will ensure that it is meeting energy efficiency standards as intended (i.e., in accordance with the manufacturer's specifications). Furthermore, buildings that are attempting to obtain a LEED certification must be commissioned. The employment of the UMS simultaneous to a commissioning/retro-commissioning policy is critical in that the ability to generate instant reports showing facility energy performance will enable regular monitoring and comparisons. These reports will help drive the projects that are ripe for the optimization of equipment operation and appropriate for retro-commissioning.

Retro-commissioning efforts can only apply to facilities greater than 10,000 square feet, which represents only 14% of the total County facility stock. However, this 14% consumes the largest amount of electricity, and certain facilities are likely candidates for an overall energy efficiency fine tuning.

7.1.4 Building-Specific or Departmental-Specific Guidelines at Individual Facilities

While General Services handles most of the County's utility bills, individual departments and County staff have a greater impact on the day-to-day energy consumption at facilities. In particular, departments can help regulate the amount of energy consumed through HVAC systems simply by regulating the set points on thermostats to those optimal for energy consumption as specified by the U.S. Department of Labor's Occupational Safety & Health Administration (OSHA), or by regulating the use of personal space heaters.

HVAC Set Points: The County may establish a standard HVAC thermostat setting for all buildings, including the County Administration Building. The standard should meet American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) standards and help to optimize HVAC controls settings at each facility. This behavioral-based approach to energy efficiency would ensure that facility temperatures fall within the acceptable comfort levels as indicated by OSHA standards.

These standards would not apply in areas where other temperature settings are required by law or by specialized needs of equipment or scientific experimentation (this is the current standard for the Social Services Department).

Also, for the County office spaces with limited or no heating and cooling, these standards would not apply.

Space Heaters: While portable space heaters may bring occupant comfort (particularly in winter months), they are huge energy consumers. The policy would restrict the use of space heaters to the following situations:

- If additional heating is required by an occupant because of a medical condition
- If the building's heater has failed
- If a heating system does not exist within a particular facility
- When building heating cannot be adjusted to achieve minimum comfort levels within the provisions established

Using OSHA standard guidelines will help to establish an environment where occupant comfort and acceptable standards in heating are established. However, the use of space heaters should be handled by individual department directors, who may grant usage on a case-by-case basis.

Domestic Hot Water Temperature: Domestic hot water temperatures should not be set above 115°F. These limits shall not apply in areas where other temperature settings are required by law or by specialized needs of equipment or scientific experimentation.

7.2 EDUCATION/TRAINING TO ASSIST IN VERIFICATION EFFORTS

As mentioned in the EAP process previously, the EAP must have input from stakeholders that have a vested interest in energy-related issues at the County. The County is fortunate to already have a Green Team; it is staffed with County personnel from various departments that have an interest in green and sustainable issues. However, there are significant opportunities to further educate the entire County staff on programs that help to make electricity-specific programs a Countywide effort rather than specific to a single department.

An interdepartmental educational program in electricity efficiency can help to promote internal efficiencies in electricity usage, while encouraging ownership and buy-in by County staff members to future electricity efficiency endeavors that will help make achieving the 15% target electricity reduction goal more probable. The County has already undertaken efforts in assisting County employees with behavioral-based electricity savings, including the additions of electricity-saving equipment to help power down computers and other electronic devices when not in use. Other behavioral-based training can cover topics such as HVAC set points, monitoring of light levels, and the habitual use of light switches. The County has an opportunity to foster further educational efforts, including training on conducting electricity audits and electricity efficiency training for key decision makers.

7.2.1 Training on Conducting Energy Audits

Since utility bills are mostly filtered through General Services, most County employees are not aware of their individual impact on electricity consumption. In addition to promoting a better understanding of behavioral changes that add to electricity efficiency, County operations can greatly benefit from equipping staff with a general understanding of facility electricity efficiency measures that may require retrofits or capital improvements (even though most County staff will not be responsible for implementing such electricity efficiency improvements).

The City of Goleta has implemented its own training through the SCE-sponsored SCEEP program, which details how building owners and facilities managers can conduct their own, on-site energy audits. The following is a description of such a training course:[65]

> *"How to Conduct an Energy Efficiency Site Survey" is designed to help building owners, maintenance professionals, business owners, and facility managers learn how to perform an on-site assessment of potential opportunities for energy efficiency and cost savings. Participants will become familiar with common energy systems like HVAC (heating, ventilating and air conditioning), lighting, and refrigeration and field equipment such as motors, fans, and pumps. Participants will also learn how to estimate the potential energy savings options through case studies. After the lecture, the class will perform an on-site survey of a facility.*

County of Santa Barbara staff would benefit from better understanding the electricity-using systems that help aid facility operations. Given the fact that the County operates approximately 400 facilities over 3,789 square miles, it is important that the staff working daily in those County facilities have meaningful knowledge of electricity-consuming systems and equipment. They can serve as additional eyes and ears for General Services and Facilities Management, which ultimately make decisions regarding electricity-related projects and retrofits.

[65] City of Goleta, City Calendar, "How to Conduct an Energy Efficiency Site Survey," accessible at http://www.cityofgoleta.org/index.aspx?page=82&recordid=1573.

8 FURTHER OPPORTUNITIES

8.1 ABILITY TO FURTHER SCOPE OF PROJECT

The EAP can expand its scope to address additional utilities that contribute to GHG emissions or overall sustainability, including natural gas and water. These additional utilities can be layered into the overall totals already identified through this report or through subsequent audits. GHG emissions are not isolated to a single utility, and the ability to identify additional emissions reduction potential is critical to reaching targeted electricity efficiency reductions by 2020.

As previously described, the EAP provides a guiding framework for specific projects that can be implemented Countywide, while providing an understanding of the overall County facility profile. Given the broad scope of the County of Santa Barbara EAP, both in regard to the electricity projections and the large geographic area of the County, individual facility audits should occur whenever a retrofit or renovation project is considered in order to truly understand the electricity-saving potential.

8.2 CREATE PRECEDENT FOR OTHER COUNTIES

The EAP will provide an outlet for the County of Santa Barbara to fulfill "Goal 3" of the CEESP: "Local governments lead by example with their own facilities and energy use practices."

Specifically, there have been few EAP documents created at a Countywide scale. Providing a viable precedent for an EAP that covers a vast geographic area and a substantial facility portfolio will prove extremely valuable to other peer counties looking to take on this challenging endeavor. A County represents a more complex level of government. The County of Santa Barbara EAP will speak directly to the unique challenges of County operations and levels of approval (including the Board of Supervisors), and will likely spur additional EAP efforts within other counties.

The City of Goleta, through SCEEP and in conjunction with the development of its EAP, hosts training sessions and symposiums directed toward educating other municipalities on strategies for developing and implementing supporting programs within other jurisdictions. Similarly, the County of Santa Barbara, in its development of an EAP, can provide a unique perspective on projects and initiatives that would be beneficial to neighboring counties and incorporated cities throughout Santa Barbara County (e.g., installing a photovoltaic project, strategies in benchmarking campuses, or projecting electricity savings on a Countywide scale).

Similarly, other agencies—including the Orange County Cities Energy Partnership through SCE—host workshops geared toward sharing best practices on electricity projects unique to their participating municipalities. The County of Santa Barbara can maintain its reputation as a forerunner in electricity efficiency initiatives and action by hosting similar workshops that reflect on its participation in SCE- and PG&E-funded energy programs, and the challenges that face a County jurisdiction and its unique elements.

8.2.1 Develop Santa Barbara County Green Portal Website

The County of Santa Barbara has undertaken several significant projects in energy efficiency, and is positioned to serve as an example to other counties and local governments with innovative programs for energy efficiency, sustainability, and climate change. The ability to display sustainability-related programs and projects in an easily accessible portal will help publicize the work already completed by the County. The County has already begun developing a green portal that can serve as a one-stop shop for energy- or sustainability-related initiatives already under way, including the EAP. The *Go Green* website will be an external website that provides a space for different County departments to upload project documents and information regarding all things related to sustainability, including electricity efficiency.
The County of Santa Barbara *Go Green* website can serve a similar role as the *Green LA County* website. *Green LA County* was developed by the Los Angeles County Office of Sustainability and serves as a one-stop portal for all activities related to regional, environmental, and sustainability programs Countywide. *Green LA County* is targeted toward residents, businesses, and government employees as a resource in the following topics:

- Energy Upgrade California
- Energy efficiency
- Transportation
- Green building
- Environmental programs
- Rebates and financial assistance

Figure 60. Los Angeles County Green.LA County Portal

The County of Santa Barbara EAP—if published on a County-operated green activity website—would serve as a precedent for other municipalities, particularly those that are demographically comparable to Santa Barbara County. Other municipalities would be able to learn from the challenges and strategies the County encountered throughout the EAP's development process.

9 CONCLUSION

The County of Santa Barbara has accepted and answered its own ambitious challenge to reduce both its electricity consumption and its effects on climate change—the global challenges of climate change and electricity consumption issues with global implications. By passing Santa Barbara County Resolution #09-059, the Board of Supervisors has proven that it is committed to seriously addressing the threats of climate change and high energy prices, while also supporting the requirements set forth by the state. The County's ability to collectively accomplish both electricity and GHG emission-reduction goals is contingent on the level of cooperation encountered at every level of the governance structure. Through its existing energy initiatives, its comprehensive project list (both past and present), and now the drafting of an energy action plan, the County is poised to meet its own targets—while providing leadership amongst other counties statewide.

As a living document that represents a vast geography and diverse set of facilities, the *Energy Action Plan* will itself need to be revisited over time. As indicated by its engineering analysis, the EAP uses assumptions to provide a basis for electricity savings quantifications. These assumptions will have to change over time as projects are implemented or as further information and more detailed electricity consumption information is made available (particularly once a Countywide energy management system is implemented).

The EAP will likely also change over time as more efficient technologies enter the market, and as the overall facility makeup changes. For example, innovation and technology for lighting alone have wrought tremendous transformations over the past decade. With advancements in LED technology for lighting, the most cost-efficient and electricity-efficient lights over the next decade may still be unknown to us today. Additionally, changes to California's Title 24 standards may further increase the minimum baseline standards for energy efficiency. An update to the EAP document every two to three years is crucial to preventing document obsolescence, while reflecting new projects that are implemented and their corresponding changes in electricity consumption, savings, and cost totals. During these updates, the County will have clarity on the County's performance to date regarding the achievement of electricity reduction goals against the 2008 baseline. A three-year update cycle will allow for at least three updates between now and 2020, when the County's GHG and electricity consumption goals *must* be achieved.

The County of Santa Barbara *Energy Action Plan* provided the County with an opportunity for innovative planning to reduce electricity consumption, improve facility functionality and efficiency, and provide a healthy environment for residents and workers.

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APPENDIX A

Electricity Consumption and Savings Projections for Each Facility Size Category

Table A-1. Facility Categories by Square Footage

Size Category	Square Footage Range	Total Number of Facilities	Median Facility Area (sq. ft.)	Estimated Hours of Operation	Estimated Percent Air Conditioned[66]
1	Less than 10,000	343	1,152	7 a.m. – 7 p.m.	10%
2	10,001 - 20,000	32	13,612	7 a.m. – 7 p.m.	10%
3	20,001 - 30,000	17	25,075	7 a.m. – 7 p.m.	15%
4	30,001 - 60,000	4	51,896	7 a.m. – 7 p.m.	20%
5	60,001 - 90,000	3	64,400	7 a.m. – 7 p.m.	70%
6	Above 90,001	2	99,076	7 a.m. – 7 p.m.	100%

[66] The estimated percent air conditioned is based on the sample energy audits conducted and the percentage of overall facilities that fit within each size category. The trend shows that the largest facilities in the County, which are greatly outnumbered by smaller facilities, tend to have a higher percentage of air conditioned space.

Appendix A.1 Size Category 1: 10,000 Square Feet or Less

Table A-2. Size Category 1: Projected Electricity Consumption and Savings

Total Size Category Projection	Electricity Consumption (kWh)
Baseline Consumption (1 facility)	**8,974**
Projected Electricity Consumption (343 facilities)	**3,078,082**
Projected Electricity Savings with ECMs (343 facilities)	**344,715**

Table A-3. Size Category 1: Trane Trace Model Inputs

Electricity Modeling Simulations (Trane Trace) for Size Category	
Building Categorization Square Footage:	10,000 sq. ft. or less
Number of Floors:	1
Building Median Size:	1,152 sq. ft.
Quantity of Building under This Category:	343
Climate Zone:	CTZ05
Design Cooling Summer Temperatures (DBT°F/WBT°F):	79.8°F/63.6°F
Design Winter Heating Temperature (DBT°F/WBT°F):	36°F
Building % Glass Area - Double Clear (1/4"):	30%
HVAC Equipment Type:	
Cooling Equipment:	Split Systems (Condensing Units + Fan Coils)
Heating Equipment:	Radiant – Gas Boiler
Conditioned Space % Area for Cooling:	10%
Conditioned Space % Area for Heating:	90%
Facility Operating Days and Hours:	Monday - Friday, 7:00 a.m. to 7:00 p.m.
Standard Occupied Thermostat Set Points – Cooling & Heating:	75°F/72°F
Unoccupied Thermostat Set Points – Cooling & Heating:	90°F/60°F

Size Category 1: 10,000 Square Feet or Less

EEM	Measure Description	Baseline Usage		Installed Usage		Electricity Savings		Incentive Rate		Incentive	Electricity Cost	Electricity Cost
		(kWh/yr)		(kWh/yr)		(kWh/yr)		($/kWh)		Savings ($)	per kWh	Savings ($)/Year
		A	-	B	=	C	x	D	=	E1		
1	**Lighting Power Density Reduction - T8 32W - T8 25W**	8,974	-	7,969	=	1,005	x	$0.08	=	$80.40	$0.13	$130.65

Table A-4.
Size Category 1: Calculated Electricity Savings, Incentive Savings, Electricity Cost Savings, and Demand Incentive

EEM	Measure Description	Baseline On-Peak Demand		Installed On-Peak Demand		On-Peak Demand Reduction		Incentive Rate		On-Peak Demand Reduction Incentive
		(kW)		(kW)		(kW)		($/kW)		($)
		A	-	B	=	C	x	D	=	E2
1	Lighting Power Density Reduction – T8 32W - T8 25W	1.7	-	1.4	=	0.3	x	$100.00	=	$30.00

Table A-5. Size Category 1: Calculated Project Cost and Simple Payback

EEM	Measure Description	Estimated Project Cost	Electricity Cost Savings	Net Project Cost	Actual Incentive	Simple Payback Period With Incentive (years)
		($)	($)	($)	($)	
1	Lighting Power Density Reduction – T8 32W - T8 25W	1,411.86	130.65	1,301.46	110.40	10.0
	TOTAL FOR ONE FACILITY	1,411.86	130.65	1,301.46	110.40	10.0
	TOTAL FOR ALL FACILITIES (343)	$484,267.98	$44,943.60	$449,003.70	$38,198.40	10.0

Appendix A.2 Size Category 2: 10,001 to 20,000 Square Feet

Table A-6. Size Category 2: Projected Electricity Consumption and Savings

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (1 facility)	**86,747**
Projected Electricity Consumption (32 facilities)	**2,775,904**
Projected Electricity Savings with ECMs (32 facilities)	**593,888**

Table A-7. Size Category 2: Trane Trace Model Inputs

Electricity Modeling Simulations (Trane Trace) for Size Category	
Building Categorization Square Footage:	10,001 to 20,000 sq. ft.
Number of Floors:	1
Building Median Size:	13,612 sq. ft.
Quantity of Buildings under This Category:	32
Climate Zone:	CTZ05
Design Cooling Summer Temperatures (DBT°F/WBT°F):	79.8°F/63.6°F
Design Winter Heating Temperature (DBT°F/WBT°F):	36°F
Building % Glass Area – Double Clear (1/4"):	30%
HVAC Equipment Type:	
Cooling Equipment:	Split Systems (Condensing Units + Fan Coils)
Heating Equipment:	Radiant – Gas Boiler
Conditioned Space % Area for Cooling:	10%
Conditioned Space % Area for Heating:	90%
Facility Operating Days and Hours:	Monday - Friday, 7:00 a.m. to 7:00 p.m.
Standard Occupied Thermostat Set Points – Cooling & Heating:	75°F/72°F
Unoccupied Thermostat Set Points – Cooling & Heating:	90°F/60°F

Size Category 2: 10,001 to 20,000 Square Feet

Table A-8.
Size Category 2: Calculated Electricity Savings, Incentive Savings, Electricity Cost Savings, and Demand Incentive

EEM	Measure Description	Baseline Usage		Installed Usage		Electricity Savings		Incentive Rate		Incentive	Electricity Cost	Electricity Cost
		(kWh/yr)		(kWh/yr)		(kWh/yr)		($/kWh)		Savings ($)	per kWh	Savings ($)/Year
		A	-	B	=	C	x	D	=	E1		
1	**Lighting Power Density Reduction – T8 32W - T8 25W**	**86,747**	**-**	**74,703**	**=**	**12,044**	**x**	**$0.08**	**=**	**963.52**	**$0.13**	**$1,565.72**
2	**HVAC Equipment Efficiency Upgrade – 20% Efficiency Improvement from T24**	**74,703**	**-**	**68,188**	**=**	**6,515**	**x**	**$0.00**	**=**	**0.00**	**$0.13**	**$846.95**
				TOTAL		**18,559**		**TOTAL**		**$963.52**	**$0.13**	**$2,412.67**

Table A-9. Size Category 2: Calculated Project Cost and Simple Payback

EEM	Measure Description	Baseline On-Peak Demand		Installed On-Peak Demand		On-Peak Demand Reduction		Incentive Rate		On-Peak Demand Reduction Incentive
		(kW)		(kW)		(kW)		($/kW)		($)
		A	-	B	=	C	x	D	=	E2
1	Lighting Power Density Reduction – T8 32W - T8 25W	20.4	-	15.9	=	4.5	x	100.00	=	450.00
2	HVAC Equipment Efficiency Upgrade – 20% Efficiency Improvement from T24	10.1	-	6.2	=	3.9	x	0.00	=	0.00
				TOTAL		8.4		TOTAL		$450.00

Appendix A.3 Size Category 3: 20,001 to 30,000 Square Feet

EEM	Measure Description	Estimated Project Cost	Electricity Cost Savings	Net Project Cost	Actual Incentive	Simple Payback Period With Incentive (years)
		($)	($)	($)	($)	
1	Lighting Power Density Reduction – T8 32W - T8 25W	16,942.37	1,565.72	15,528.85	1,413.52	9.9
2	HVAC Equipment Efficiency Upgrade – 20% Efficiency Improvement from T24	13,462.00	846.95	13,462.00	0.00	15.9
	TOTAL FOR ONE FACILITY	30,404.37	2,412.67	28,990.85	1,413.52	
	TOTAL FOR ALL FACILITIES (32)	$972,939.84	$77,205.44	$927,707.20	$45,232.64	

Table A-10. Size Category 3: Projected Electricity Consumption and Savings

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (1 facility)	**161,103**
Projected Electricity Consumption (17 facilities)	**2,738,751**
Projected Electricity Savings with ECMs (17 facilities)	**580,244**

Table A-11. Size Category 3: Trane Trace Model Inputs

Electricity Modeling Simulations (Trane Trace) for Size Category	
Building Categorization Square Footage:	20,001 to 30,000 sq. ft.
Number of Floors:	2
Building Median Size:	25,075 sq. ft.
Quantity of Buildings under This Category:	17
Climate Zone:	CTZ05
Design Cooling Summer Temperatures (DBT°F/WBT°F):	79.8°F/63.6°F
Design Winter Heating Temperature (DBT°F/WBT°F):	36°F
Building % Glass Area – Double Clear (1/4"):	30%
HVAC Equipment Type:	
Cooling Equipment:	Split Systems (Condensing Units + Fan Coils)
Heating Equipment:	Radiant
Conditioned Space % Area for Cooling:	10%
Conditioned Space % Area for Heating:	90%
Facility Operating Days and Hours:	Monday - Friday, 7:00 a.m. to 7:00 p.m.
Standard Occupied Thermostat Set Points – Cooling & Heating:	75°F/72°F
Unoccupied Thermostat Set Points – Cooling & Heating:	90°F/60°F

EEM	Measure Description	Baseline Usage		Installed Usage		Electricity Savings		Incentive Rate		Incentive	Electricity Cost	Electricity Cost
		(kWh/yr)		(kWh/yr)		(kWh/yr)		($/kWh)		Savings ($)	per kWh	Savings ($)/Year
		A	-	B	=	C	x	D	=	E1		
1	**Lighting Power Density Reduction –** T8 32W - T8 25W	161,103	-	138,888	=	22,215	x	0.08	=	1,777.20	$0.13	2,887.95
2	**HVAC Equipment Efficiency Upgrade – 20% Efficiency Improvement from T24**	138,888	-	126,971	=	11,917	x	0.00	=	0.00	$0.13	1,549.21
				TOTAL		34,132		TOTAL		$1,777.20	$0.13	$4,437.16

Size Category 3: 20,001 to 30,000 Square Feet

Table A-12.
Size Category 3: Calculated Electricity Savings, Incentive Savings, Electricity Cost Savings, and Demand Incentive

EEM	Measure Description	Baseline On-Peak Demand		Installed On-Peak Demand		On-Peak Demand Reduction		Incentive Rate		On-Peak Demand Reduction Incentive
		(kW)		(kW)		(kW)		($/kW)		($)
		A	-	B	=	C	x	D	=	E2
1	Lighting Power Density Reduction – T8 32W - T8 25W	37.6	-	29.3	=	8.3	x	100.00	=	830.00
2	HVAC Equipment Efficiency Upgrade – 20% Efficiency Improvement from T24	17.2	-	11.2	=	6	x	0.00	=	0.00
				TOTAL		14.3		TOTAL		$830.00

Table A-13. Size Category 3: Calculated Project Cost and Simple Payback

EEM	Measure Description	Estimated Project Cost	Electricity Cost Savings	Net Project Cost	Actual Incentive	Simple Payback Period With Incentive (years)
		($)	($)	($)	($)	
1	Lighting Power Density Reduction – T8 32W - T8 25W	31,227.12	2,887.95	28,619.92	2,607.20	9.9
2	HVAC Equipment Efficiency Upgrade – 20% Efficiency Improvement from T24	24,698.51	1,549.21	24,698.51	0.00	15.9
	TOTAL FOR ONE FACILITY	55,925.63	4,437.16	53,318.43	2,607.20	12.0
	TOTAL FOR ALL FACILITIES (17)	$950,735.71	$75,431.72	$906,413.31	$44,322.40	12.0

Appendix A-4. Size Category 4: 30,001 to 60,000 Square Feet

Table A-14. Size Category 4: Projected Electricity Consumption and Savings

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (1 facility)	**349,294**
Projected Electricity Consumption (3 facilities)	**1,397,176**
Projected Electricity Savings with ECMs (3 facilities)	**314,592**

Table Appendix A-15. Size Category 4: Trane Trace Model Inputs

Electricity Modeling Simulations (Trane Trace) for Size Category	
Building Categorization Square Footage:	30,001 to 60,000 sq. ft.
Number of Floors:	2
Building Median Size:	51,896 sq. ft.
Quantity of Building under This Category:	4
Climate Zone:	CTZ05
Design Cooling Summer Temperatures (DBT°F/WBT°F):	79.8°F/63.6°F
Design Winter Heating Temperature (DBT°F/WBT°F):	36°F
Building % Glass Area – Double Clear (1/4"):	30%
HVAC Equipment Type:	
Cooling Equipment:	Split Systems (Condensing Units + Fan Coils)
Heating Equipment:	Radiant
Conditioned Space % Area for Cooling:	10%
Conditioned Space % Area for Heating:	90%
Facility Operating Days and Hours:	Monday - Friday, 7:00 a.m. to 7:00 p.m.
Standard Occupied Thermostat Set Points – Cooling & Heating:	75°F/72°F
Unoccupied Thermostat Set Points – Cooling & Heating:	90°F/60°F

Size Category 4: 30,001 to 60,000 Square Feet

EEM	Measure Description	Baseline Usage		Installed Usage		Electricity Savings		Incentive Rate		Incentive	Electricity Cost	Electricity Cost
		(kWh/yr)		(kWh/yr)		(kWh/yr)		($/kWh)		Savings ($)	per kWh	Savings ($)/Year
		A	-	B	=	C	x	D	=	E1		
1	Lighting Power Density Reduction – T8 32W - T8 25W	349,294	-	299,342	=	49,952	x	$0.08	=	$3,996.16	$0.13	$6,493.76
2	HVAC Equipment Efficiency Upgrade – 20% Efficiency Improvement from T24	299,342	-	270,646	=	28,696	x	$0.00	=	$0	$0.13	$3,730.48
				TOTAL		78,648		TOTAL		$3,996.16	$0.13	$10,224.24

Table A-16.
Size Category 4: Calculated Electricity Savings, Incentive Savings, Electricity Cost Savings, and Demand Incentive

EEM	Measure Description	Baseline On-Peak Demand		Installed On-Peak Demand		On-Peak Demand Reduction		Incentive Rate		On-Peak Demand Reduction Incentive
		(kW)		(kW)		(kW)		($/kW)		($)
		A	-	B	=	C	x	D	=	E2
1	Lighting Power Density Reduction – T8 32W - T8 25W	77.8	-	60.7	=	17.1	x	$100.00	=	$1,710.00
2	HVAC Equipment Efficiency Upgrade – 20% Efficiency Improvement from T24	46.7	-	30.5	=	16.2	x	$0.00	=	$0.00
				TOTAL		33.3		TOTAL		$1,710

Table A-17.
Size Category 4: Calculated Project Cost and Simple Payback

EEM	Measure Description	Estimated Project Cost	Electricity Cost Savings	Net Project Cost	Actual Incentive	Simple Payback Period with Incentive (years)
		($)	($)	($)	($)	
1	Lighting Power Density Reduction – T8 32W - T8 25W	62,939.33	6,493.76	57,233.17	5,706.17	8.8
2	HVAC Equipment Efficiency Upgrade – 20% Efficiency Improvement from T24	23,235.00	3,730.48	16,453.72	0.00	6.2
	TOTAL FOR ONE FACILITY	86,174.33	10,224.24	80,468.17	5,706.16	7.9
	TOTAL FOR ALL FACILITIES (4)	$344,697.32	$40,896.96	$294,747.56	$22,824.68	7.9

Appendix A.5 Size Category 5: 60,001 to 90,000 Square Feet

Table A-18. Size Category 5: Projected Electricity Consumption and Savings

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (1 facility)	**803,022**
Projected Electricity Consumption (3 facilities)	**2,409,066**
Projected Electricity Savings with ECMs (3 facilities)	**698,895**

Table A-19. Size Category 5: Trane Trace Model Inputs

Electricity Modeling Simulations (Trane Trace) for Size Category	
Building Categorization Square Footage:	60,001 to 90,000 sq. ft.
Number of Floors:	3
Building Median Size:	64,400 sq. ft.
Number of Buildings under This Category:	3
Climate Zone:	CTZ05
Design Cooling Summer Temperatures (DBT°F/WBT°F):	79.8°F/63.6°F
Design Winter Heating Temperature (DBT°F/WBT°F):	36°F
Building % Glass Area – Double Clear (1/4"):	30%
HVAC Equipment Type:	
Cooling Equipment:	Split Systems (Condensing Units + Fan Coils)
Heating Equipment:	Radiant
Conditioned Space % Area for Cooling:	10%
Conditioned Space % Area for Heating:	90%
Facility Operating Days and Hours:	Monday – Friday, 7:00 a.m. to 7:00 p.m.
Standard Occupied Thermostat Set Points – Cooling & Heating:	75°F/72°F
Unoccupied Thermostat Set Points – Cooling & Heating:	90°F/60°F

Size Category 5: 60,001 to 90,000 Square Feet

EEM	Measure Description	Baseline Usage		Installed Usage		Electricity Savings		Incentive Rate		Incentive	Electricity Cost	Electricity Cost
		(kWh/yr)		(kWh/yr)		(kWh/yr)		($/kWh)		Savings ($)	per kWh	Savings ($/Year)
		A	-	B	=	C	x	D	=	E1		
1	Lighting Power Density Reduction – T8 32W - T8 25W	803,022	-	760,074	=	42,948	x	0.08	=	3,435.84	$0.13	5,583.24
2	New Chiller Replacement	760,074	-	706,470	=	53,604	x	0.18	=	9,648.72	$0.13	6,968.52
3	MZ CV AHU – MZ VAVA AHU	706,470	-	570,057	=	136,413	x	0.12	=	16,359.56	$0.13	17,733.69
4	Static Pressure Reset Strategy	570,057	-	556,446	=	13,611	x	0.12	=	1,633.32	$0.13	1,769.43
5	Supply Air Temperature Reset Strategy	556,446	-	548,559	=	7,887	x	0.12	=	946.44	$0.13	1,025.31
				TOTAL		254,463		TOTAL		$32,023.88	$0.13	$30,080.19

Table A-20
Size Category 5: Calculated Electricity Savings, Incentive Savings, Electricity Cost Savings, and Demand Incentive

EEM	Measure Description	Baseline On-Peak Demand		Installed On-Peak Demand		On-Peak Demand Reduction		Incentive Rate		On-Peak Demand Reduction Incentive
		(kW)		(kW)		(kW)		($/kW)		($)
		A	-	B	=	C	x	D	=	E2
1	Lighting Power Density Reduction – T8 32W - T8 25W	97.2		75.8		21.4	x	100.00	=	2,140.00
2	New Chiller Replacement	195.96		183.43		12.53	x	100.00	=	1,253.00
3	MZ CV AHU – MZ VAVA AHU	183.43		169.96		13.47	x	100.00	=	1,347.00
4	Static Pressure Reset Strategy	169.96		169.83		0.13	x	100.00	=	13.00
5	Supply Air Temperature Reset Strategy	169.83		170.38		0	x	100.00	=	-
				TOTAL				TOTAL		$4,753.00

Table A-21. Size Category 5: Calculated Project Cost and Simple Payback

EEM	Measure Description	Estimated Project Cost	Electricity Cost Savings	Net Project Cost	Actual Incentive	Simple Payback Period With Incentive (years)
		($)	($)	($)	($)	
1	Lighting Power Density Reduction	54,060.67	5,583.24	48,484.83	5,575.84	8.7
2	New Chiller Replacement	120,000.00	6,968.52	109,098.28	10,901.72	15.7
3	MZ CV AHU – MZ VAVA AHU	60,000.00	17,733.69	42,283.44	17,716.56	2.4
4	Static Pressure Reset Strategy	5,000.00	1,769.43	3,353.68	1,646.32	1.9
5	Supply Air Temperature Reset Strategy	5,000.00	1,025.31	4,053.56	946.44	4.0
	TOTAL FOR ONE FACILITY	244,060.67	33,080.19	207,273.79	36,786.88	6.3
	TOTAL FOR ALL FACILITIES (3)	$732,182.01	$99,240.57	$621,821.37	$110,360.64	6.3

Appendix A.6 Size Category 6: 90,000 Square Feet and Larger

Table A-22. Size Category 6: Projected Electricity Consumption and Savings

Total Category Projection	Electricity Consumption (kWh)
Baseline Consumption (1 facility)	**1,258,368**
Projected Electricity Consumption (2 facilities)	**2,516,736**
Projected Electricity Savings with ECMs (2 facilities)	**238,008**

Table Appendix A-23. Size Category 6: Trane Trace Model Inputs

Electricity Modeling Simulations (Trane Trace) for Size Category	
Building Categorization Square Footage:	Above 90,001 sq. ft.
Number of Floors:	4
Building Median Size:	99,076 sq. ft.
Number of Buildings under This Category:	2
Climate Zone:	CTZ05
Design Cooling Summer Temperatures (DBT°F/WBT°F):	79.8°F/63.6°F
Design Winter Heating Temperature (DBT°F/WBT°F):	36°F
Building % Glass Area – Double Clear (1/4"):	30%
HVAC Equipment Type:	
Cooling Equipment:	Split Systems (Condensing Units + Fan Coils)
Heating Equipment:	Radiant
Conditioned Space % Area for Cooling:	10%
Conditioned Space % Area for Heating:	90%
Facility Operating Days and Hours:	Monday – Friday, 7:00 a.m. to 7:00 p.m.
Occupied Thermostat Set Points – Cooling & Heating:	75°F/72°F
Unoccupied Thermostat Set Points – Cooling & Heating:	90°F/60°F

Size Category 6: 90,000 Square Feet and Large

EEM	Measure Description	Baseline Usage		Installed Usage		Electricity Savings		Incentive Rate		Incentive	Electricity Cost	Electricity Cost
		(kWh/yr)		(kWh/yr)		(kWh/yr)		($/kWh)		Savings ($)	per kWh	Savings ($/Year)
		A	-	B	=	C	x	D	=	E1		
1	Lighting Power Density Reduction – T8 32W - T8 25W	1,258,368	-	1,139,364	=	119,004	x	$0.08	=	$9,520.32	$0.13	$15,470.52

Table A-24.
Size Category 6: Calculated Electricity Savings, Incentive Savings, Electricity Cost Savings, and Demand Incentive

EEM	Measure Description	Baseline On-Peak Demand		Installed On-Peak Demand		On-Peak Demand Reduction		Incentive Rate		On-Peak Demand Reduction Incentive
		(kW)		(kW)		(kW)		($/kW)		($)
		A	-	B	=	C	x	D	=	E2
1	Lighting Power Density Reduction – T8 32W - T8 25W	135.4	-	106.5	=	28.9	x	$100.00	=	$2,890.00
				TOTAL				TOTAL		$2,890.00

Table A-25. Size Category 6: Calculated Project Cost and Simple Payback

EEM	Measure Description	Estimated Project Cost	Electricity Cost Savings	Net Project Cost	Actual Incentive	Simple Payback Period With Incentive (years)
		($)	($)	($)	($)	
1	Lighting Power Density Reduction	109,537.08	15,470.52	97,126.76	12,410.32	6.3
	TOTAL FOR ONE FACILITY	109,537.08	15,470.52	97,126.76	12,410.32	6.3
	TOTAL FOR ALL FACILITIES (2)	$219,074.16	$30,941.04	$194,253.52	$24,820.64	6.3

APPENDIX B

Electricity Consumption Breakdown by Utility Rate Type

Southern California Edison

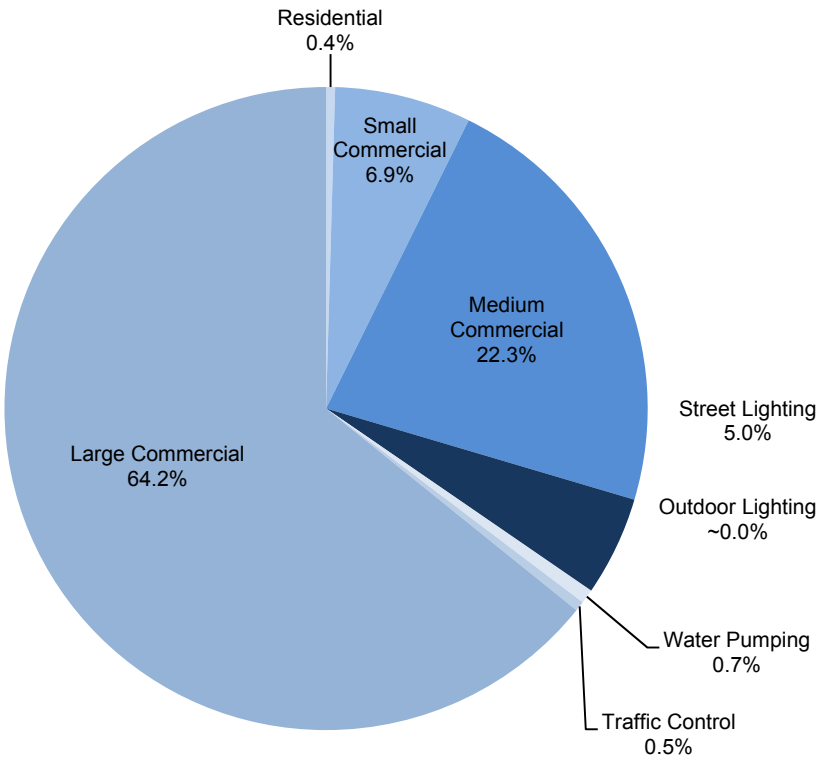
Table B-1. County of Santa Barbara 2008 Electricity Consumption by Rate Type (SCE)

Usage Category	SCE Rate Type	Total Bill Amount	Total kWh	Max kW
Residential	DOMESTIC	$ 12,762.98	74,108	-
Small Commercial	GS-1	$ 196,073.41	1,133,771	25
Medium Commercial	GS-2	$ 657,638.90	3,572,638	210
	GS-2/GS-1	$ 15,689.61	105,726	40
Street Lighting	LS-1 ALL NITE	$ 223,276.30	744,645	-
	LS-2	$ 6,061.18	59,904	-
	LS-3	$ 2,005.94	21,343	-
Outdoor Lighting	OL-1	$ 698.19	2,340	-
Water Pumping	PA-1	$ 23,319.22	117,156	40
Traffic Control	TC-1	$ 11,959.73	81,669	-
Large Commercial	TOU-8	$ 41,450.54	69,247	588
	TOU-8-B	$ 1,138,608.83	9,674,672	1,070
	TOU-GS3-B	$ 122,123.43	864,355	206
	TOTALS	**$ 2,451,668.26**	**16,521,574**	

Table B-2. County of Santa Barbara 2008 Electricity Consumption by Usage Category (SCE)

Usage Category	Total Bill Amount	Total kWh	Max kW
Residential	$ 12,762.98	74,108	-
Small Commercial	$ 196,073.41	1,133,771	25
Medium Commercial	$ 673,328.51	3,678,364	210
Street Lighting	$ 231,343.42	825,892	-
Outdoor Lighting	$ 698.19	2,340	-
Water Pumping	$ 23,319.22	117,156	40
Traffic Control	$ 11,959.73	81,669	-
Large Commercial	$ 1,302,182.80	10,608,274	1,070
TOTALS	**$ 2,451,668.26**	**16,521,574**	

Figure B-1. County of Santa Barbara 2008 Electricity Consumption by Usage Category (SCE)



Pacific Gas & Electric

Table B-3. County of Santa Barbara 2008 Electricity Consumption by Rate Type (PG&E)

Usage Category	PG&E Rate Type	Total Bill Amount	Total kWh	Max kW
Small Commercial	A1	$ 81,696.45	493,239	-
	A1F	$ 108.98	12	-
	A1P	$ 224,698.03	1,355,205	104
	A6	$ 917.44	3,383	-
	A6X	$ 3,127.67	18,840	-
	HA1	$ 219.79	1,168	9
Medium Commercial	A10S	$ 248,819.49	1,772,384	133
	A10SX	$ 94,719.44	642,681	308
	E19SW	$ 97,565.69	795,480	209
	E19SX	$ 62,437.33	457,902	61
Street Lighting	LS1-A	$ 82,478.02	266,500	-
	LS1-C	$ 396.99	1,408	-
	LS1-D	$ 45,967.54	118,651	-
	LS1-E	$ 144,861.50	418,202	-
	LS1-F	$ 1,130.97	3,444	-
	LS1-F1	$ 90,566.37	257,728	-
	LS2-A	$ 3,561.86	30,808	-
	LS3	$ 1,111.91	8,435	-
Outdoor Lighting	OL1	$ 119.54	351	-
Traffic Control	TC1	$ 7,180.66	47,781	-
	TC1F	$ 511.63	3,300	-
	TOTALS	**$ 1,192,197.30**	**6,696,902**	

Table B-4. County of Santa Barbara 2008 Electricity Consumption by Usage Category (PG&E)

Usage Category	Total Bill Amount	Total kWh	Max kW
Small Commercial	$ 310,768.36	1,871,847	104
Medium Commercial	$ 503,541.95	3,668,447	308
Street Lighting	$ 370,075.16	1,105,176	-
Outdoor Lighting	$ 119.54	351	-
Traffic Control	$ 7,692.29	51,081	-
TOTALS	**$ 1,192,197.30**	**6,696,902**	

Figure B-2 County of Santa Barbara 2008 Electricity Consumption by Usage Category (PG&E)