In 2012 the City’s Energy Team was able to complete several projects that resulted in significant energy (and cost!) savings. The team managed to implement these energy conservation projects while continuing to focus on the completion of several long-term projects, such as the FOG receiving station (completed in FY13) and the Cogeneration Engine (slated to be complete in early FY 14.)

The 30 year-old boiler at Los Baños Del Mar pool was upgraded to a new state-of-the-art Raypak boiler which has resulted in a significant reduction in the City’s overall natural gas use (over 10%)!

The Energy Team was also able to take advantage of Southern California Edison’s fluorescent lighting switch out program (from T-12s to T-8s) at the Police Annex just before the program ended, resulting in safer lighting and energy and cost savings.

Lastly, the team continued to work on the implementation of the Enterprise Energy Management Information System (to be completed in early FY 14) which will allow us to gather critical data on energy usage and opportunities for savings.
Electricity
Electrical Supply

- In Fiscal Year 2012 (July 2011 through June 2012) the City spent $3.3 million on electricity. This amount has stayed flat from the previous year despite energy reduction measures due to a few major increases in usage within the organization and energy cost increases.

- In 2012 the new airport terminal was completed and opened. The facility’s larger size and increased amenities are a great asset to our community, but also increased the airport’s electrical usage by over a million kWh (a 4% increase in the City’s overall electrical use).

- Also, the Cater Water Treatment Plant continues to work on the implementation of the ozone project, which will both greatly improve the quality of our local drinking water but will also significantly increase the plant’s energy usage. Though not online yet, the construction and testing of this project alone has increased electrical usage by 200,000 kWh this year.

- The following chart shows the breakdown of electrical expenses for City operations by major use area.
FY 2012 Electricity Expense

Electricity cost by percentage of total FY 2012 expenditures for City departments or major use areas.

- Water 22%
- Waste Water 17%
- Parking 6%
- Street Lights 17%
- Public Works 1%
- Parks & Recreation 6%
- Library 3%
- Other 3%
- Fire 2%
- Police 2%
- Waterfront 9%
- Airport 12%
Purchased Electricity

- In calendar year 2012 the City purchased over 26 Million kWh.
- This amount was a 9% increase over CY 2011 electricity purchases.
  - The following three slides outline the purchased electricity trend and the reasons for the increased electricity usage.
Purchased Electricity

Annual Purchased Electricity Use

Million kWh

- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012

SCE
Fuel Cell
Solar PPA

City of Santa Barbara • Public Works Department
Increased Electricity Use

- Several City electricity accounts have seen significant increases this year.
- Increases are due to the ozone project at Cater, two wells which incurred additional run time while Cater was offline as part of the ozone project, the airport completion and the addition of the Fire Administrative Office Building to the Fire Station 1 meter.
- Additionally, the City assumed responsibility of the two electrical accounts at the PD annex, which were previously the responsibility of the building owner. This accounts for 72,000 kWh in additional usage.
- The following graph shows the six accounts most heavily affected.
Major Electrical Increases Since Last Year (2011)

<table>
<thead>
<tr>
<th>Location</th>
<th>kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>1,123,078</td>
</tr>
<tr>
<td>San Roque Well</td>
<td>283,530</td>
</tr>
<tr>
<td>El Estero</td>
<td>232,992</td>
</tr>
<tr>
<td>Cater</td>
<td>202,034</td>
</tr>
<tr>
<td>Alameda Well</td>
<td>159,849</td>
</tr>
<tr>
<td>Fire Station 1</td>
<td>85,028</td>
</tr>
</tbody>
</table>
Biggest Electrical Users

- The following table shows the electricity use for the six largest City service accounts. Water treatment and street lighting are both large electricity users, and their energy use is growing due to demand by the community.

- The new Airport Terminal has also become one of the City’s largest electrical accounts due to its larger size and increased service.
## Biggest Electricity Users

<table>
<thead>
<tr>
<th>SCE Account</th>
<th>Annual kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Estero Wastewater Treatment Plant</td>
<td>7,055,712</td>
</tr>
<tr>
<td>Cater Water Treatment Plant</td>
<td>2,449,070</td>
</tr>
<tr>
<td>Airport</td>
<td>1,779,094</td>
</tr>
<tr>
<td>Marina 1</td>
<td>934,878</td>
</tr>
<tr>
<td>Ornamental Street Lighting – Downtown</td>
<td>855,626</td>
</tr>
<tr>
<td>Police Department</td>
<td>642,143</td>
</tr>
</tbody>
</table>
Energy Savings

- There were also several accounts that saw a decrease in energy use in 2012.
- Some of these energy savings resulted from the installation of building controls for HVAC systems.
- There were also temporary energy savings due to the replacement and redecking projects at Marinas 1 & 2, which resulted in closures of significant portions of each marina and therefore, reduced electrical usage.
Major Electrical Decreases Since Last Year

- Marina 1: 36,506 kWh
- Franklin Center: 30,502 kWh
- Police Dept: 23,456 kWh
- Marina 2: 20,946 kWh
- Central Library: 15,583 kWh
Natural Gas
Natural Gas

- Natural gas usage in 2012 has decreased to the lowest level since 2002. The Energy Team is seeking out more opportunities to reduce natural gas consumption.

- Pool heating at the Los Baños del Mar pool remains the largest consumer of natural gas for the City. To reduce the substantial natural gas use at the Los Baños Del Mar pool, City staff replaced the pool boilers with high efficiency condensing boilers.

- The boiler replacement project was made possible through participation in the Southern California Gas Company’s On Bill Financing program, which loaned the City the necessary capital funds at no interest to be repaid through savings realized by the project.
FY 2012 Natural Gas Expenditures

$170,688 Total

- Parks and Recreation: 44%
- Waterfront: 8%
- Fire: 6%
- Police: 5%
- Library: 5%
- Water: 4%
- Waste Water: 4%
- Airport: 11%
- Parking: 2%
- Public Works: 8%
- Other: 3%

City of Santa Barbara • Public Works Department
Natural Gas Usage

- The following slide shows the amount of natural gas purchased by the City annually since 2002.
- 2012 saw a significant decrease in natural gas usage, largely due to the new boilers installed at Los Baños del Mar pool.
Natural Gas Use by Year

Therms

13% reduction!
## Largest Natural Gas Users

This chart shows the Southern California Gas Company accounts with the highest gas usage for City-owned facilities. Facilities Management installed a new high-efficiency boilers at the Los Baños pool in FY 2012 and reduced the gas usage for this facility by over 25%.

<table>
<thead>
<tr>
<th>Location</th>
<th>2012 Annual Therms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Los Banos Del Mar Pool</td>
<td>36,514</td>
</tr>
<tr>
<td>Airport</td>
<td>18,210</td>
</tr>
<tr>
<td>625 Laguna (Public Works)</td>
<td>14,214</td>
</tr>
<tr>
<td>El Estero Wastewater Treatment Plant</td>
<td>9,449</td>
</tr>
<tr>
<td>Police Department</td>
<td>9,047</td>
</tr>
</tbody>
</table>
Renewable Energy

- Renewable energy represents a substantial and growing part of the City’s electricity supply. Currently, renewable energy sources make up 23% of all the City’s electricity use.
- Renewable energy sources include photovoltaic generation and Southern California Edison renewable sources and will soon include renewable methane cogeneration.
- The following slide shows the components of the renewable energy used at the City.
Renewable Percentage of Electricity City Operations

Electricity Use
Showing Renewable Energy Component Percentage
Non Renewables in Black

- 30 GWh: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 25 GWh: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 20 GWh: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 15 GWh: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 10 GWh: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 5 GWh: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%

GWh
- 2005: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 2006: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 2007: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 2008: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 2009: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 2010: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 2011: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 2012: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 2013: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 2014: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
- 2015: 23.8%, 21.2%, 20.3%, 18.3%, 20.6%, 23.2%, 23.9%, 23.6%, 25.8%, 34.9%, 38.1%
Photovoltaic Generation

- The City has two large photovoltaic (PV) generation facilities. The first—a 300 kW plant, located in the Public Works Corporate Yard was installed in December 2008, and supplied 96% of the electricity used for the Public Works facility in 2012.

- The second plant is located at the Airport’s Quick Turn Around rental car maintenance facility, and this year it provided more than 91% of the facility’s electrical needs. When there is excess generation it is sold to Southern California Edison.

- A third, large PV installation is being considered for the Airport’s new long term parking lot.
Solar Photovoltaic Projects

This table shows the annual solar generation and system size for all City solar photovoltaic generation projects. These systems provide a total annual generation of 847,000 kWh. This is enough energy to power 150 local area homes.

<table>
<thead>
<tr>
<th>Project</th>
<th>Year Installed</th>
<th>kW (size)</th>
<th>Annual kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW Corporate Yard PV</td>
<td>2008</td>
<td>302</td>
<td>565,584</td>
</tr>
<tr>
<td>Airport QTA PV</td>
<td>2010</td>
<td>190</td>
<td>229,494</td>
</tr>
<tr>
<td>Fire Station 2 PV</td>
<td>2007</td>
<td>15</td>
<td>28,000</td>
</tr>
<tr>
<td>Fire Station 1 PV</td>
<td>2009</td>
<td>10.2</td>
<td>24,000</td>
</tr>
</tbody>
</table>
Solar Power Production

- The following two slides show a monthly breakdown of electricity generation at each facility for 2012.
- The QTA facility slide also shows the monthly electrical demand at that facility.
The Corporate Yard PV system is exceeding expectations for total
generation. The system provided 96% of the electrical needs for the Garden
Street and Laguna Street Complexes.
Airport QTA PV System

2012 Total Production – 229,494 kWh

2012 Total Usage – 265,248 kWh

Net Utility Supplied Electricity 2012 – 35,754 kWh
FOG Station

- The City’s Fats, Oils and Grease (FOG) receiving station and our engine cogeneration facility at the El Estero Wastewater Treatment Plant continued to be developed in 2012.

- The FOG project will allow El Estero to receive brown grease from local restaurant grease interceptors and inject that material into the waste treatment process, generating more methane to be used by the cogeneration facility to generate electricity and heat for plant operations.
2012 Renewable Electricity Totals

- Southern California Edison delivers about 20% renewable energy in their power mix.
- The combination of SCE and City renewable generation sources provide the City:
  - 23% Renewable Electricity
Energy Conservation

- The energy team is applying new technologies, such as a comprehensive Enterprise Energy Management Information System and building automation systems to find new opportunities for reducing energy use.

- When the Energy Team designs energy conservation projects, we try to maximize:
  - Energy Savings
  - Operational Savings
  - Maintenance Savings
  - Deferred Maintenance Reduction –targeting building systems that need to be replaced due to age
Success Story: PD Annex

- The PD Annex had outdated T-12 fluorescent lights that the energy team replaced with much more efficient T-8 lighting technology.
- This upgrade will save the City an estimated 53,909 kWh per year, resulting in $7,547 in annual cost savings.
- The City also received $4,047 in incentive funds to help pay for the project.

* please see the slide on page 8 regarding this electricity account
Success Story: Los Baños

- In 2012 the Energy Team replaced the 30-year old boilers at the Los Baños Del Mar pool. Due to their old age, these boilers were far less efficient than technology available today.

- Raypak X-therm boilers were selected based on mechanical calculations and high rates of success at other municipal pools.

- The new boilers 7,200 therms per year and over $7,000 annually in natural gas savings.

- In 2012 the pool used 25% less natural gas – largely due to the replacement of the boilers!
Success Story

Los Baños del Mar Pool

Annual Therms

<table>
<thead>
<tr>
<th>Year</th>
<th>Therms</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>50,000</td>
</tr>
<tr>
<td>2008</td>
<td>45,000</td>
</tr>
<tr>
<td>2009</td>
<td>40,000</td>
</tr>
<tr>
<td>2010</td>
<td>45,000</td>
</tr>
<tr>
<td>2011</td>
<td>50,000</td>
</tr>
<tr>
<td>2012</td>
<td>40,000</td>
</tr>
</tbody>
</table>

Down 25%!
Energy Team Savings

- The efforts of the Energy Team have resulted in significant cost savings for the City. Since the Team became active in 2008, we have achieved an ongoing annual savings of $428,000 from energy conservation and tariff changes.

- The Team also applies for and receives grants and rebates. The following page shows the one-time grant and rebate funding and cumulative annual savings for the City’s energy program.
Energy Team Savings

One Time Savings 2012

- Rebates – $10,652
- Grants - $25,000

Ongoing Annual Savings*

- Annual Conservation Savings – $308,154
- Annual Electrical Rate Savings – $120,700

Total- $428,854

* From actions taken 2008 through 2012
In an effort to create a robust national Electric Vehicle Charging Infrastructure, the Department of Energy funded the installation of charging stations in strategic locations.

The City of Santa Barbara received eight of these stations, which we located in easily accessed locations around the City.
Project Spotlight: Electric Vehicle Charging Stations

- The stations were given to the City free of charge as part of the Dept. of Energy’s grant program, in partnership with Coulomb Technologies.

- The installation costs were also covered by Coulomb through a grant from the California Energy Commission and the Santa Barbara County Air Pollution Control District.
Project Spotlight: Electric Vehicle Charging Stations

- There are a total of 8 stations installed, two at each of the following locations:
  - Granada Garage
  - Central Library Parking Structure
  - Helena Ave Parking Lot
  - Harbor Waterfront Lot
- Currently, the City charges $1/hr for vehicle charging.
- In 2012 the stations generated $662 in revenue and the electrical costs were approximately $300
Future Energy Projects

- El Estero Influent Pumps Upgrade
- Micro Hydro
- Dwight Murphy Sports Lighting
- Cabrillo Ballfield Sports Lighting
- The Energy Team has also received a grant of $52,000 from Southern California Edison to study the feasibility of an energy efficiency fund that will reinvest energy savings and incentives into future energy projects.
GHG Emissions
The City’s greenhouse gas emissions for operations from all sources, including transportation, energy use and other sources; are decreasing due to conservation and efficiency. Calendar year 2012’s emissions in Carbon Dioxide Equivalents (CO2e) is 10,833 metric tons, well below our Kyoto target of 12,224 metric tons.

The following chart shows actual and projected CO2e since 2006.
CO\textsubscript{2}e Emissions from City Operations

CO\textsubscript{2}e Emissions by Type
as reported to the CCAR and CAR (2013, 2014, 2015 Estimated)

<table>
<thead>
<tr>
<th>Year</th>
<th>Estimated</th>
<th>Electricity</th>
<th>Vehicle Fuel</th>
<th>Natural Gas</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>6,051</td>
<td>2,377</td>
<td>811</td>
<td>1,471</td>
<td>9,512</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>6,469</td>
<td>2,377</td>
<td>833</td>
<td>1,722</td>
<td>9,951</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>7,425</td>
<td>2,377</td>
<td>833</td>
<td>1,722</td>
<td>10,907</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>7,514</td>
<td>2,377</td>
<td>822</td>
<td>1,722</td>
<td>10,986</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>7,125</td>
<td>2,324</td>
<td>949</td>
<td>1,372</td>
<td>10,670</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>7,160</td>
<td>2,454</td>
<td>961</td>
<td>1,372</td>
<td>10,847</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>8,021</td>
<td>2,433</td>
<td>966</td>
<td>1,372</td>
<td>11,691</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>7,447</td>
<td>2,497</td>
<td>1,016</td>
<td>1,372</td>
<td>11,232</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>9,271</td>
<td>2,455</td>
<td>1,02</td>
<td>1,372</td>
<td>12,827</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>8,522</td>
<td>2,319</td>
<td>943</td>
<td></td>
<td>11,784</td>
<td></td>
</tr>
</tbody>
</table>

Kyoto Goal 12,224

15% increase in emission factor

City of Santa Barbara  •  Public Works Department
Acknowledgements

- The Energy Team’s success this year is the result of the hard work of City staff, and the support of the City Council and the Community. Our aim is to serve as an example by implementing projects that save energy and money, using strategies that others can duplicate.

- During these difficult economic conditions, energy conservation is a great opportunity to save money and preserve natural resources.

- Thanks to you for supporting our efforts to conserve energy and save money.
City of Santa Barbara
Energy Team

- Alelia Parenteau
- Jeff McKee
- Victor Garza
- Dion Tait
- Karl Treiberg
- Lori Pedersen
- Amanda Flesse

- David Lewis
- Todd Heldoorn
- Nina Johnson
- Jim Dewey