EXHIBIT NO. 1

11
5-22-12

City of Alexandria, Virginia

MEMORANDUM

DATE: MAY 16, 2012

TO: THE HONORABLE MAYOR AND MEMBERS OF CITY COUNCIL

FROM: RASHAD M. YOUNG, CITY MANAGER

SUBJECT: ENERGY MANAGEMENT PROGRAM AND FY 2011 ANNUAL ENERGY REVIEW

ISSUE: The City's Energy Management Program and the FY 2011 Annual Energy Review.

RECOMMENDATIONS: That City Council receive an update on the City's Energy Management Program and receive the FY 2011 Annual Energy Review

DISCUSSION:

Energy Management Program Update

The City has made a substantial effort to reduce energy use and energy costs, despite growth in operations and given limited financial and staff resources. As a result, the City has reduced overall energy costs. Between FY 2006 to FY 2011, energy savings estimates range between 1% and 8% per square foot of energy usage. In FY 2011 the City achieved energy savings of approximately 8% from FY 2010, resulting in about $210,000 of cost avoidance in additional utility charges. In total, the City avoided an estimated $529,000 in additional energy costs since FY 2006.

The Energy Management Program has resulted in several successes:

- Construction of four green City buildings totaling 342,476 ft^2 (~15% of total City portfolio)
- City membership in the US EPA Green Power Partnership
- ~4.1% (CY 2010) and ~16.2% (CY 2011) of City electricity supplied by purchased renewable energy
- Implementation of an electronic electricity and natural gas payment process
- Completing energy audits on seven City facilities
- Presentation of American Recovery and Reinvestment Act (ARRA) Energy Efficiency and Conservation Block Grant (EECBG) program-funded Green Building Resource Center and Green Building Workshop series
- Creation of Energy$aver blog

In aggregate, these efforts contribute to meeting the City Council's Strategic Plan Goals 2 and 5 and the goals of the City's Environmental Action Plan 2030 (EAP) and Energy and Climate Action Plan (eCAP)

FY 2012 – FY 2014 Work Plan

Energy Management Program staff continue to implement energy reductions activities and work towards reducing overall energy costs, energy use, and greenhouse gas emissions. A selection of Energy Management Program projects and activities and estimated timing of implementation are found in the Energy Management Program Work Plan below. This work plan emphasizes projects and activities which pursue goals identified by the City Council Strategic Plan, Environmental Action Plan (EAP2030), and the Energy and Climate Action Plan (eCAP).

	FY2012				FY2013				FY2014			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
ARRA EECBG Project Implementation												
Green Energy Efficiency Program												
City Hall Green Roof												
Renewable Energy System installation												
Public Safety Center LED lighting retrofits												
Hybrid Vehicle Procurement												
City Facility Benchmarking with US EPA's EnergyStar® Portfolio Manager												
Facility Energy Audits												
Monthly Energy Reporting												
FY2014 Natural Gas Purchase												
FY2013 Renewable Energy Certificate (REC) Purchase												
CIP Project Implementation												
Facility Lighting Retrofits												
HVAC Control System upgrades												
Re- and retro-commissioning of City facilities[1]												
Facility Advanced Metering Infrastructure (fAMI)[2]												
City Energy Conservation Committee (ECC)												
Facility Temperature Setting and Scheduling Policy												
Eco-City@Work												
Energy$aver Blog												

[1] Re- and retro-commissioning is the process of verifying and calibrating facility systems as designed by the building architects and engineers.

[2] A Facility Advanced Metering Infrastructure (fAMI) is a metering system that records energy consumption in intervals of an hour or less and communicates that information to facility operators for monitoring and billing purposes

Annual Energy Review
The City's FY 2011 Annual Energy Review provides an update on the City's Energy Management Program and provides the following items:

- Energy Management Program Review
- City Energy Use
- City Energy Costs
- Estimated Energy Savings

In FY 2011, the City used approximately 42 million kilowatt-hours of electricity and 600,000 therms of natural gas for City facilities, parks, street lights and traffic lighting operations. The City's total cost from electricity and natural gas use was approximately $4.4 million; $3.7 million for electricity and $0.7 million for natural gas.

Energy Management Program staff continues to pursue cost effective energy savings opportunities to reduce City energy costs, reduce City energy usage and greenhouse gas emissions, and raise awareness to the importance of effective energy management practices in City operations.

FISCAL IMPACT: Staff continues to use currently appropriated Energy Management CIP funds to implement energy cost reduction opportunities and achieve savings to the City budget. Energy reduction projects implicitly save energy, save money, and have an attractive positive return-on-investment exceeding most alternative investment opportunities. Notwithstanding, energy reduction projects – at the very minimum – demonstrate excellent stewardship of public funds, result in positive environmental benefits, and provide continued cost savings over their lifetime.

ATTACHMENT: FY 2011 Annual Energy Review

STAFF:
Michele Evans, Deputy City Manager
Jeremy McPike, Director, Department of General Services
Bill Eger, Energy Manager

ECO-CITY ALEXANDRIA

City of Alexandria

Annual Energy Review
FY 2011

April 23, 2012

Prepared by:
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Introduction

This inaugural Annual Energy Review provides overview of the City government's use of energy resources in facilities and operations, including discussion of the following topics:

- Energy Management Program Review
- City Energy Use
- City Energy Costs
- Estimated Energy Savings

The City Council adopted the Eco-City Charter in June 2008 followed by adopting the comprehensive Environmental Action Plan 2030 (EAP 2030). The EAP 2030 was based on several core guiding principles, including a section dedicated for Energy (Chapter 6).

Concurrently, the City established an Energy Management Program in the Department of General Services – including the hiring of an Energy Manager – to review energy use and cost reductions in City operations and provide energy-related expertise to efforts of City's the Eco-City Alexandria initiative.

On May 14, 2011 the City Council adopted the City's Energy and Climate Action Plan providing further emphasis on the actions outlined in the EAP 2030. The Plan focuses on reducing energy use in City operations as well as in the community at large.

As a result, much effort has been directed at reducing the City's overall energy use, energy costs, greenhouse gas emissions, and exposure to the vulnerabilities of highly variable energy resource costs.

Energy Management Program Review

Energy Management Program Successes

Despite the limited financial and labor resources, and the growth in operations, the City of Alexandria has made a substantial effort to reduce its energy use and energy costs. The City has achieved that through increasing its energy reductions activities and reducing its overall energy costs.

Between FY 2006 and FY 2011, energy savings estimates ranged between 1% and 8% per square foot energy usage. In FY 2011 alone, the City achieved energy savings of approximately 8% over the previous fiscal year, resulting in about $210,000 of cost avoidance in additional utility charges. In total, the City avoided an estimated $529,000 in additional energy costs since FY 2006.

Generally speaking, energy reductions and energy cost avoidance are a result of several initiatives. These initiatives include:

- Better managing facility temperature settings
- Preventative and predictive facility maintenance
- Calibrating HVAC control systems
- Installation of higher efficiency equipment

The Energy Management Program identifies a selection of additional successes by the Department of General Services and through collaboration with other City departments.

- Constructing four green City buildings, totaling 342,476 ft^2 (~15% of total City portfolio).
- City membership in the US EPA Green Power Partnership
- Purchasing about 4.1% of the City electricity from renewable energy resources in 2010 and increasing that to 16.2% in 2011.
- Implementing an electronic electricity and natural gas payment process
- Completing energy audits on seven City facilities
- Presentation of American Recovery and Reinvestment Act (ARRA) Energy Efficiency and Conservation Block Grant (EECBG) program-funded Green Building Resource Center and Green Building Workshop series
- Creation of the "Energy$aver" blog

City Energy Use

Total Energy Use by City Operations

City operations require the use of energy resources – electricity and natural gas – to conduct daily business. ***Table 1*** tabulates the City's electricity and natural gas use and associated greenhouse gas emissions from FY 2006 to FY 2011. Graphical representations of these data are found in ***Figure 1*** and ***Figure 2.***

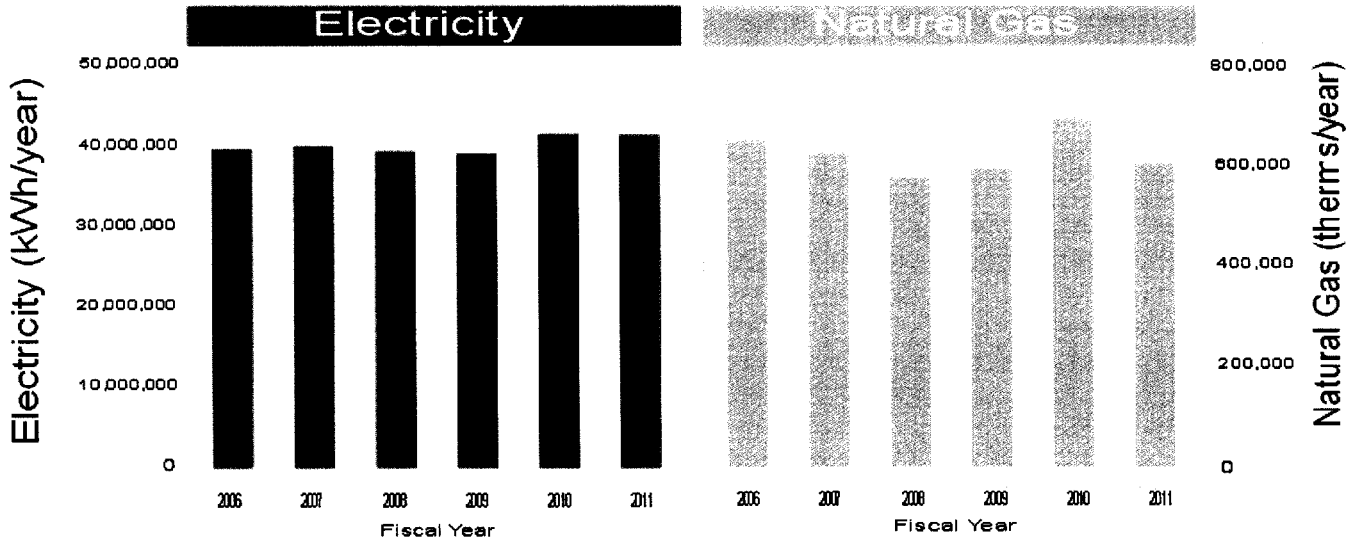
From FY 2006 through FY 2011, the City's average annual use of electricity and natural gas was about 40,000,000 kilowatt-hours (kWh) and 600,000 therms, per year, respectively. City operations contributed approximately 30,000 metric tons of CO_2 per year to the surrounding environment.

During FY 2011, the City used 41,553,818 kWh of electricity and 608,598 therms of natural gas; contributing 31,041 metric tons of CO_2 to the surrounding environment.

Table 1: Electricity and Natural Gas Use by Fiscal Year, Including Greenhouse Gas (GHG) Emissions

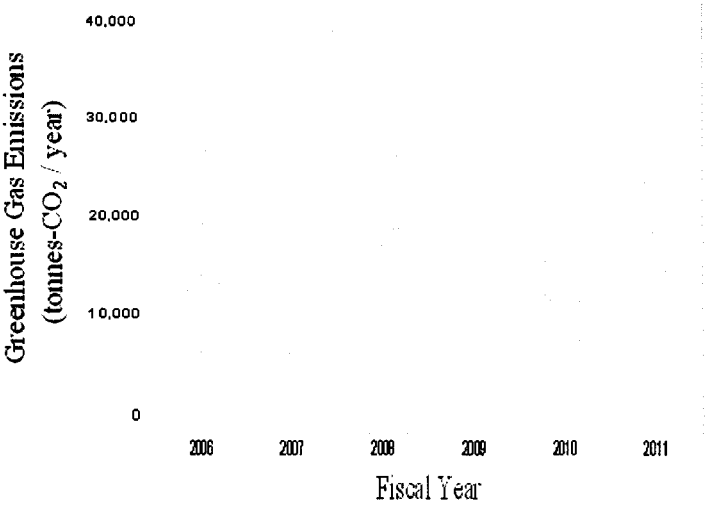
Fiscal Year	Electricity (kWh/year)	Natural Gas (therms/year)	Greenhouse Gas Emissions (metric tons)[1]
2006	39,838,359	655,209	30,162
2007	40,229,917	629,367	30,277
2008	39,538,313	580,086	29,542
2009	39,294,026	597,365	29,476
2010	41,701,477	698,834	31,645
2011	41,553,818	608,598	31,041

Figure 1: Electricity and Natural Gas Use by Fiscal Year



[1] Greenhouse gas emissions for City operations only.

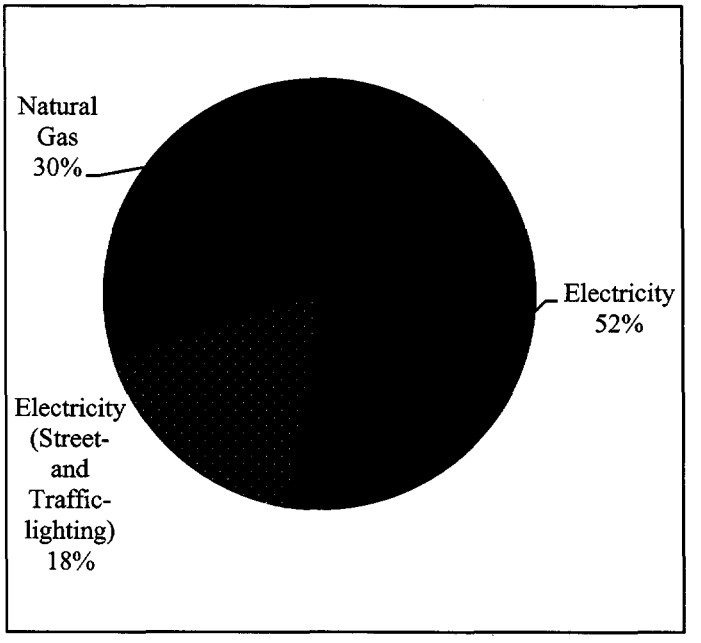
Figure 2: Greenhouse Gas Emissions by Fiscal Year



Breakdown of City Energy Consumption

In FY 2011, electricity and natural gas accounted for 70% and 30% of the City's energy use, respectively. Electricity is primarily used by the City in two fundamental ways: 1) facility/park operations and 2) street- and traffic-lighting. Natural gas is primarily used in facility/park operations. ***Figure 3*** refines the comparison by identifying electricity used for street- and traffic-lighting operations. Subsequently, natural gas, electricity for facility/park operations and electricity for street- and traffic-lighting account for 30%, 52%, and 18%, respectively.[2]

Figure 3: Energy Use Comparison by Resources (including Street-/traffic-lighting)



Energy Use by Department

Table 2 shows the use of electricity and natural gas by department during FY 2011.

Figure 4 compares the proportion of total energy used by each Department in the City. As identified in ***Figure 4***, the Department of General Services total energy use includes the City's multi-department and large facilities which are: 1) City Hall, 2) the Courthouse, 3) the Lee Center, and 4) the Public Safety Center.

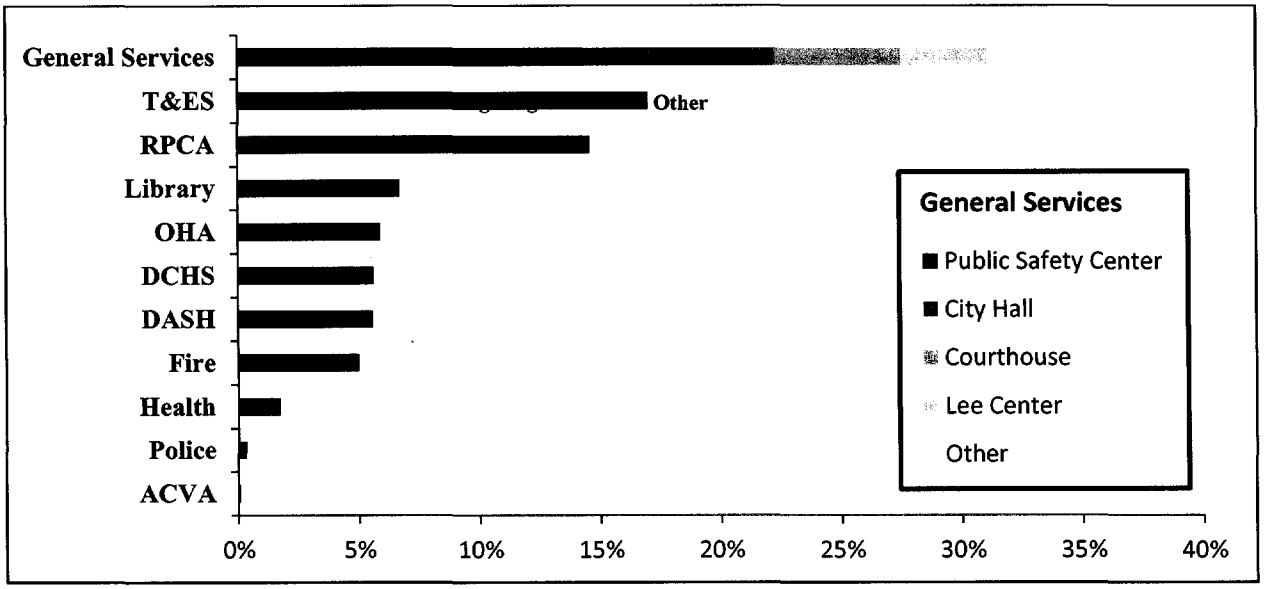
[2] Note that throughout the remaining sections of the Annual Energy Review, whenever electricity use is discussed, traffic- and street-lighting is included unless otherwise stated.

Table 2: Energy Use Comparison between Departments by Resource

Department Name	Square Footage (ft2)	Electricity	Natural Gas	Percent of Total[3]	Greenhouse Gas Emissions
		Use (kwh)	Use (therms)		Metric Tonnes CO2
General Services	838,928	13,366,871	240,303	34%	10,235
+ *GS: Public Safety Center*	*258,278*	*5,197,300*	*113,364*	*14%*	*4,091*
+ *GS: Courthouse*	*115,215*	*2,392,800*	*24,767*	*5%*	*1,730*
+ *GS: City Hall*	*87,100*	*1,569,900*	*18,502*	*4%*	*1,148*
+ *GS: Lee Center*	*84,500*	*1,342,773*	*20,061*	*3%*	*1,005*
+ *GS: Other*	*293,835*	*2,864,098*	*63,609*	*8%*	*2,261*
T&ES	67,116	11,610,082	14,828	20%	7,803
+ *TES: Street- and Traffic-lighting*	*0*	*10,389,930*	*0*	*17%*	*6,909*
+ *TES: Other*	*67,116*	*1,220,152*	*14,828*	*3%*	*894*
RPCA	263,127	5,136,138	121,021	15%	4,093
Library	114,560	2,540,980	49,401	7%	1,966
OHA	127,319	2,615,775	30,354	6%	1,909
DCHS	127,946	2,006,473	45,426	6%	1,589
DASH	160,000	2,057,491	43,073	6%	1,609
Fire	78,761	1,596,152	47,088	5%	1,325
T&ES	67,116	1,220,152	14,828	3%	894
Health	27,438	589,743	14,878	2%	476
Police	32,132	155,161	1,397	0%	111
ACVA	1,946	26,611	831	0%	22

[3] Percent total is calculated from the addition of electricity use and natural gas use in the common unit of one-thousand British Thermal Units (kBTU)

Figure 4: Energy Use Comparison bewteen Departments



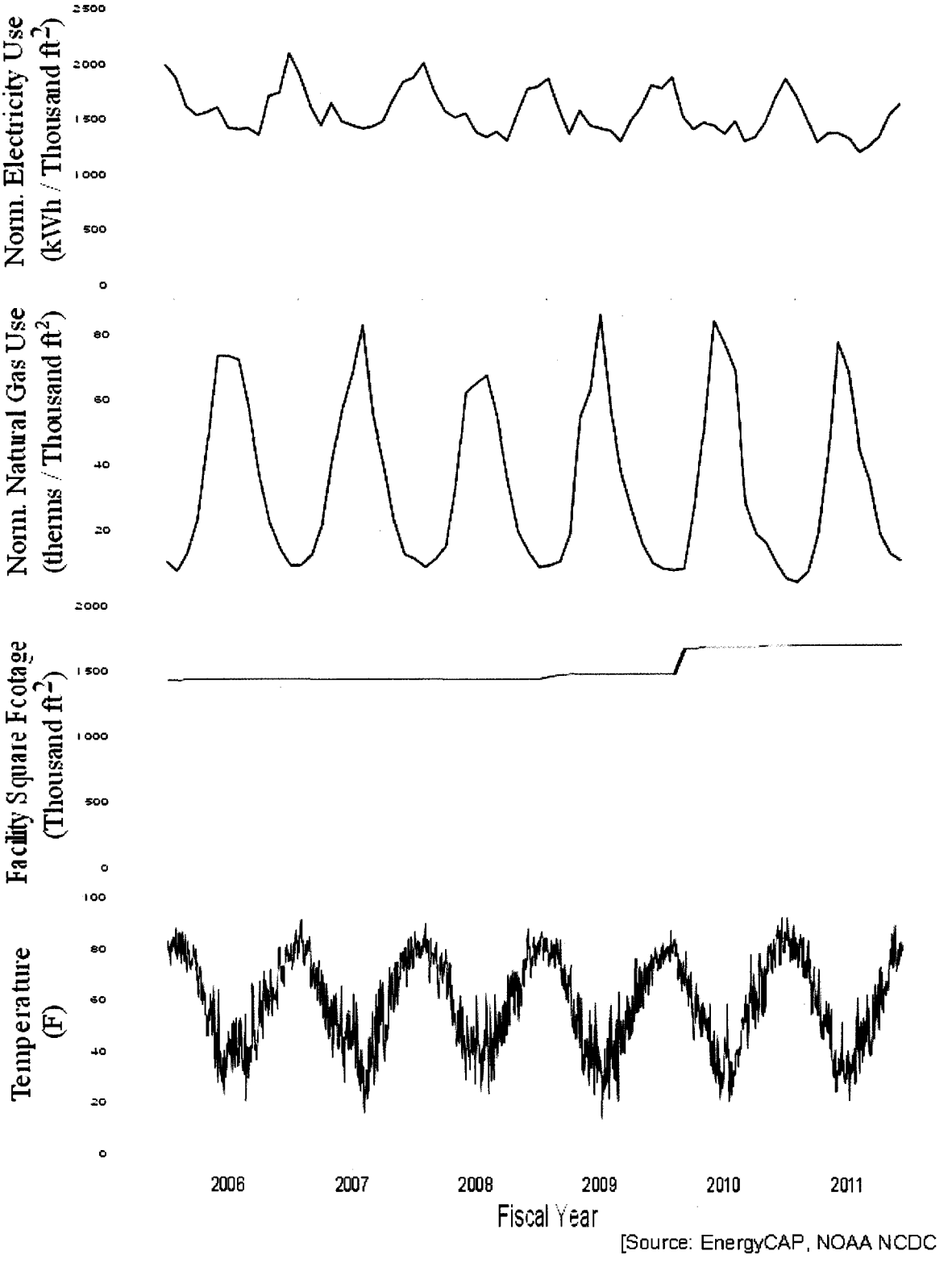
Energy Use Influences

Determining influences to the City's energy use requires controlling (i.e. normalizing) for influences outside the ability of the City to affect. ***Figure 5*** displays normalized electricity and natural gas, where electricity and natural gas are controlled for days per month and occupied building area (i.e. square foot). ***Figure 5*** also shows the City's corresponding total occupied building area and average daily outdoor air temperature to be discussed in a forthcoming section. Fiscal years are highlighted by alternating greyed sections.

The data displayed in ***Figure 5*** shows that electricity and natural gas consumption are influenced by the dynamics of local weather conditions. In fact, about 33% of electricity and natural gas use are influenced by outdoor weather conditions. The remainder, 67%, is independent of outdoor weather conditions. This weather-independent use of energy is generally attributed to employee activities and facility systems (i.e. lighting, IT and office equipment, etc.) not primarily influenced by weather. In some cases, this weather-independent energy use is the result of facility systems operated during business hours and not turned off during non-business times.

Figure 5 also highlights interesting trends in the City's energy use. In recent years, the City's occupied building area has increased – due to added new construction – which increased the quantity and variability of employee activity and the quantity of facility systems operating. During the same time, summer and winter temperatures have been marginally higher and lower, respectively, resulting in the potential for a higher influence of weather on energy use. However, electricity and natural gas use have generally decreased, which highlights the City's energy reduction activities to be discussed later in this report.

Figure 5: Normalized Monthly Electricity, Natural Gas, Occupied Building Area, and Outdoor Air Temperature from Fiscal Year 2006 - Fiscal Year 2011



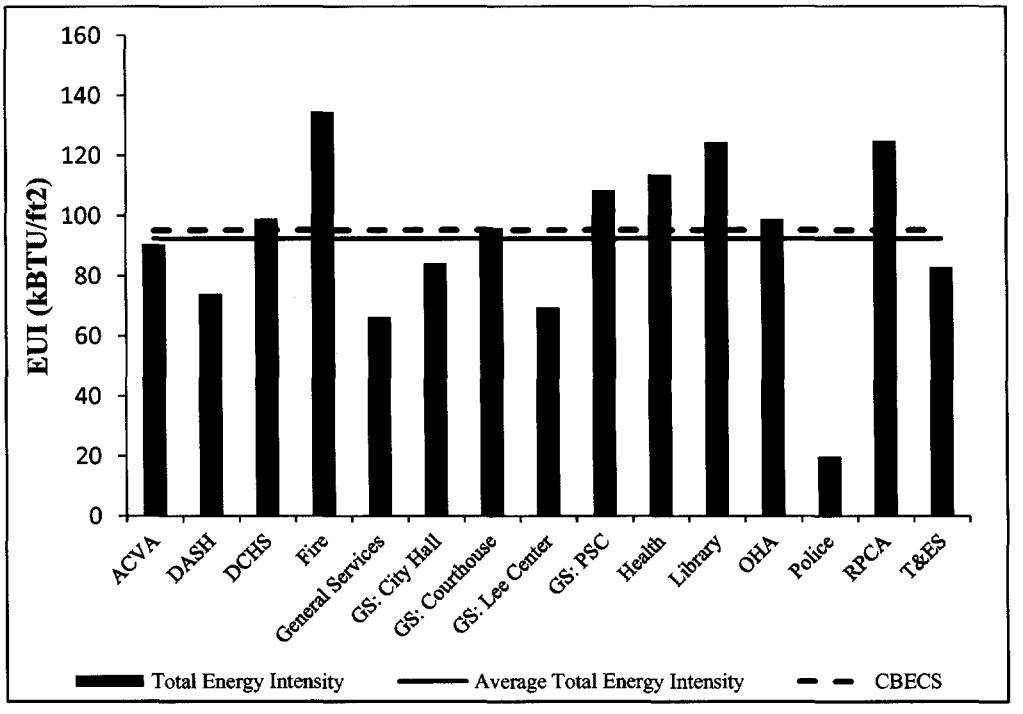
[Source: EnergyCAP, NOAA NCDC

Benchmarking Energy Use Performance

To benchmark energy performance, the Energy Usage Index (EUI) is a common metric used, which is the sum of all energy resources – electricity, natural gas, etc. – normalized for an occupied building area. The EUI does not consider weather, occupancy, hours of operation, etc. Generally, the EUI is stated in thousand British Thermal Units (kBTU) per square foot per year. The EUI is used frequently by many trade and performance-oriented organizations, including the Building Operations & Maintenance Association (BOMA), the International Facilities Management Association (IFMA), and the US Department of Energy's Energy Information Administration (EIA). While appropriate as a first-order benchmark, some caution must be taken when using EUI to make department-to-department comparison's without recognizing unique operational factors for each department.

Figure 6 shows departmental EUI for Fiscal Year 2011. The Two horizontal lines bisecting the figure are the City's average EUI and the average EUI for municipal office buildings in the mid-Atlantic climate zone, resulting from the US Department of Energy's Commercial Building's Energy Consumption Survey (CBECS)[4]. Because both the City's average EUI and the CBECS average EUI are nearly identical, this implies that energy consumption for City operations is generally consistent with similar entities in the region. Due to magnitude of energy used and their occupancy by multiple City agencies City Hall, the Courthouse, the Lee Center, and the Public Safety Center are considered comparable as "departments".

Figure 6: Fiscal Year 2011 Departmental EUI



[4] The Commercial Building Energy Consumption Survey (CBECS) The Commercial Buildings Energy Consumption Survey (CBECS) is a national sample survey that collects information on the stock of U.S. commercial buildings, their energy-related building characteristics, and their energy consumption and expenditures. More information can be found at www.eia.gov/emeu/cbecs/contents.html.

Particular note is given to the Fire Department and the Public Safety Center. It is believed several factors contribute to these departments' higher EUI values. First, hours of operation form a primary explanation as both have continuous operations to meet City public safety demands. These continuous operations increase energy use in these facilities as energy using systems and equipment are not turned off as frequently as buildings operated generally according to normal business hours. There is a secondary explanation regarding the heating and cooling of these facilities. In the case of the Fire Department, the Apparatus Bay areas of each Fire Station are continually opened and closed as Apparatus respond to fire and medical emergencies. This purges conditioned air to outside and increases energy use to keep areas comfortable. The Public Safety Center experiences a similar issue. The Public Safety Center (including the Adult Detention Center) includes a five-story residential complex which exhausts heated or cooled air once it has passed through the complex. While some tempered air is "recycled" by installed Energy Recovery Units (ERU's), there is still requirement for much energy use for heating and cooling the facility.

Considering the Library system and the Department of Parks, Recreation, and Cultural Activities the interpretation is believed to be a function of hours of operation. These operations generally operate a slightly extended schedule to accommodate community activities, events, and needs. This increases the need for additional lighting operation, heating and cooling, and operation of other facility systems.

Alternatively, Police operations are significantly below the City's average EUI. During FY 2011 and before, most energy used by Police was accounted for in leased space and not included in these figures. During FY 2012 and in future years, the operation of the new Alexandria Police Department will increase the Police departments reported EUI.

City Energy Costs

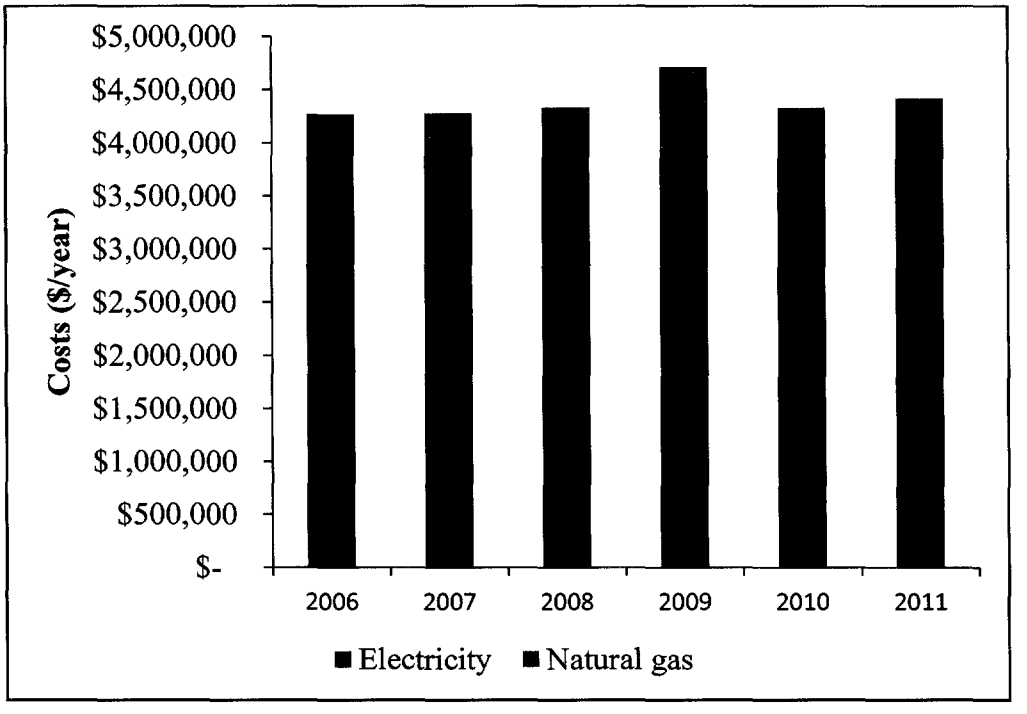
Total Energy Costs by City Operations

The City spends approximately $4.4 million annually for electricity and natural gas for City facilities, parks, and street- and traffic-lighting operations. ***Table 4*** and ***Figure 7*** tabulate and graphically display the City's electricity and natural gas costs from FY 2006 to FY 2011. During FY 2011, the City spent $3,764,724 and $652,092 for electricity and natural gas, respectively.

Table 4: Electricity, Natural Gas, and Total Costs by Fiscal Year

Fiscal Year	Electricity	Natural Gas	Total
2006	$ 3,314,078	$ 955,931	$ 4,270,009
2007	$ 3,375,674	$ 904,129	$ 4,279,804
2008	$ 3,568,568	$ 764,195	$ 4,332,762
2009	$ 3,954,580	$ 758,262	$ 4,712,842
2010	$ 3,560,590	$ 796,700	$ 4,357,290
2011	$ 3,764,724	$ 652,092	$ 4,416,816

Figure 7: Electricity and Natural Gas Costs by Fiscal Year



In FY 2011, electricity accounted for 85% and natural gas accounted for 15% of the City's energy costs, ***(Figure 8)***. Electricity costs include street- and traffic-lighting operations.

Energy Costs by Department

Figure 8: Breakdown of Energy Costs by Resource

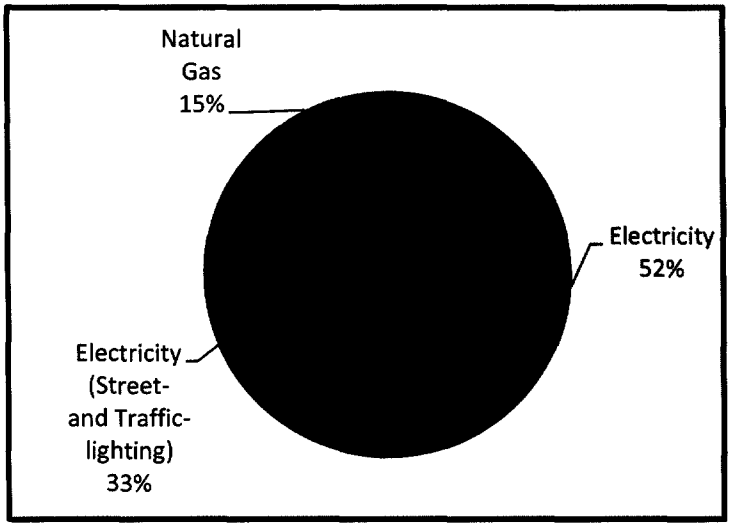
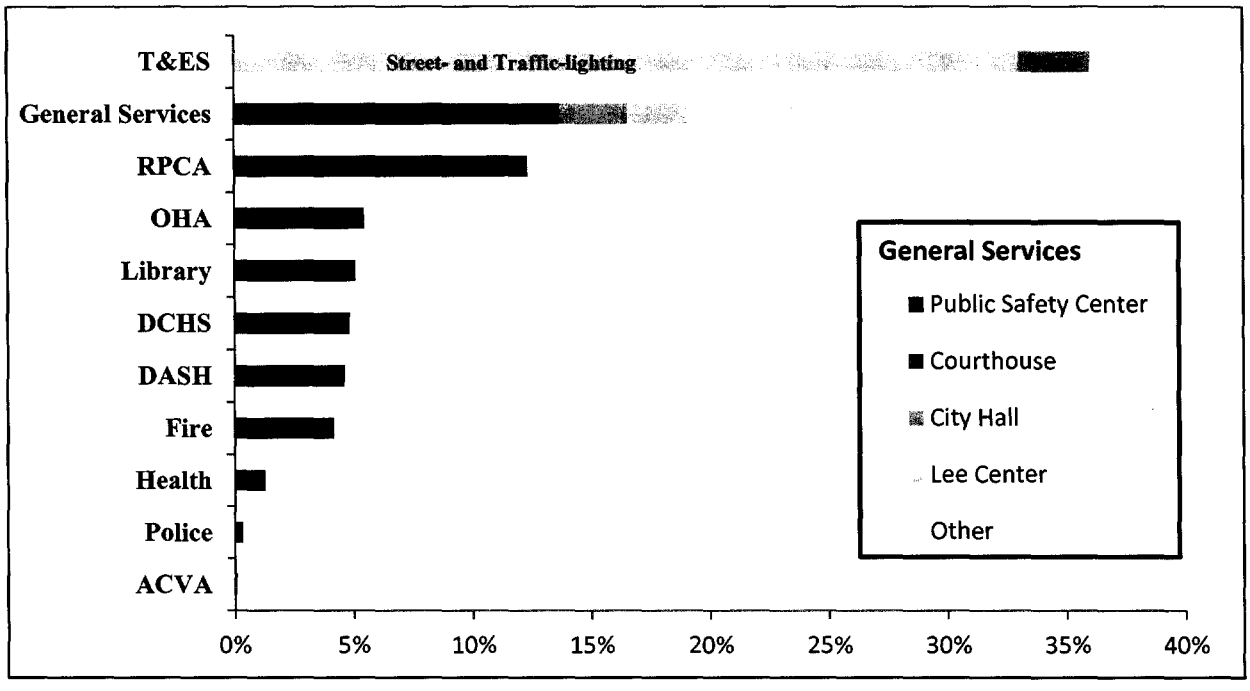


Table 5** shows the* electricity and natural gas costs for City departments during FY 2011. Alternatively, ***Figure 9 compares the proportion of total energy use by each Department. As mentioned earlier, The Department of General Services accounted for 34% of total energy use, Transportation and Environmental Services (for street- and traffic-lighting) accounted for 17%, while Recreation, Parks, and Cultural Activities accounted for 15% of total energy use. As identified in ***Figure 9***, the Department of General Services energy costs include the City's multi-department and large facilities: 1) City Hall, 2) the Courthouse, 3) the Lee Center, and 4) the Public Safety Center.

Table 5: Energy Costs by Department and Resource for Fiscal Year 2011

Department Name	Square Footage (ft2)	Electricity	Natural Gas	Total ($)	Percent of Total
		Cost ($)	Cost ($)		
T&ES	67,116	$1,592,412	$14,659	$1,607,071	36%
+ *TES: Street- and Traffic-lighting*	*0*	*$1,466,040*	*0*	*$1,466,040*	*33%*
+ *TES: Other*	*67,116*	*$126,372*	*$14,659*	*$14,1031*	*3%*
General Services	838,928	$862,596	$261,460	$1,124,056	25%
+ *GS: Public Safety Center*	*258,278*	*$278,125*	*$123,495*	*$401,620*	*9%*
+ *GS: Courthouse*	*115,215*	*$174,622*	*$27,358*	*$201,980*	*5%*
+ *GS: City Hall*	*87,100*	*$107,587*	*$20,264*	*$127,852*	*3%*
+ *GS: Lee Center*	*84,500*	*$102,838*	*$22,405*	*$125,243*	*3%*
+ *GS: Other*	*293,835*	*$199,424*	*$67,938*	*$267,361*	*6%*
RPCA	263,127	$409,804	$134,619	$544,422	12%
OHA	127,319	$206,073	$34,685	$240,758	5%
Library	114,560	$179,081	$45,562	$224,643	5%
DCHS	127,946	$160,832	$53,291	$214,124	5%
DASH	160,000	$164,800	$38,988	$203,788	5%
Fire	78,761	$132,052	$51,850	$183,902	4%
Health	27,438	$42,463	$13,682	$56,145	1%
Police	32,132	$12,151	$2,181	$14,332	0%
ACVA	1,946	$2,462	$1,115	$3,577	0%

Figure 9: Breakdown of Energy Costs by Resource



Energy Pricing

Electricity and natural gas prices are determined by a complex combination of market forces, fuel costs, state and federal regulatory action, weather conditions, operational characteristics, and other influential parameters. Leveraging the City's understanding of myriad facets of energy markets and available contract vehicles, the City has been working towards the best energy pricing.

Table 6 shows the City's average electricity and natural gas prices by Fiscal Year. Future year electricity and natural gas costs are anticipated to increase.

Table 6: Average Electricity and Natural Gas Unit Costs by Fiscal Year

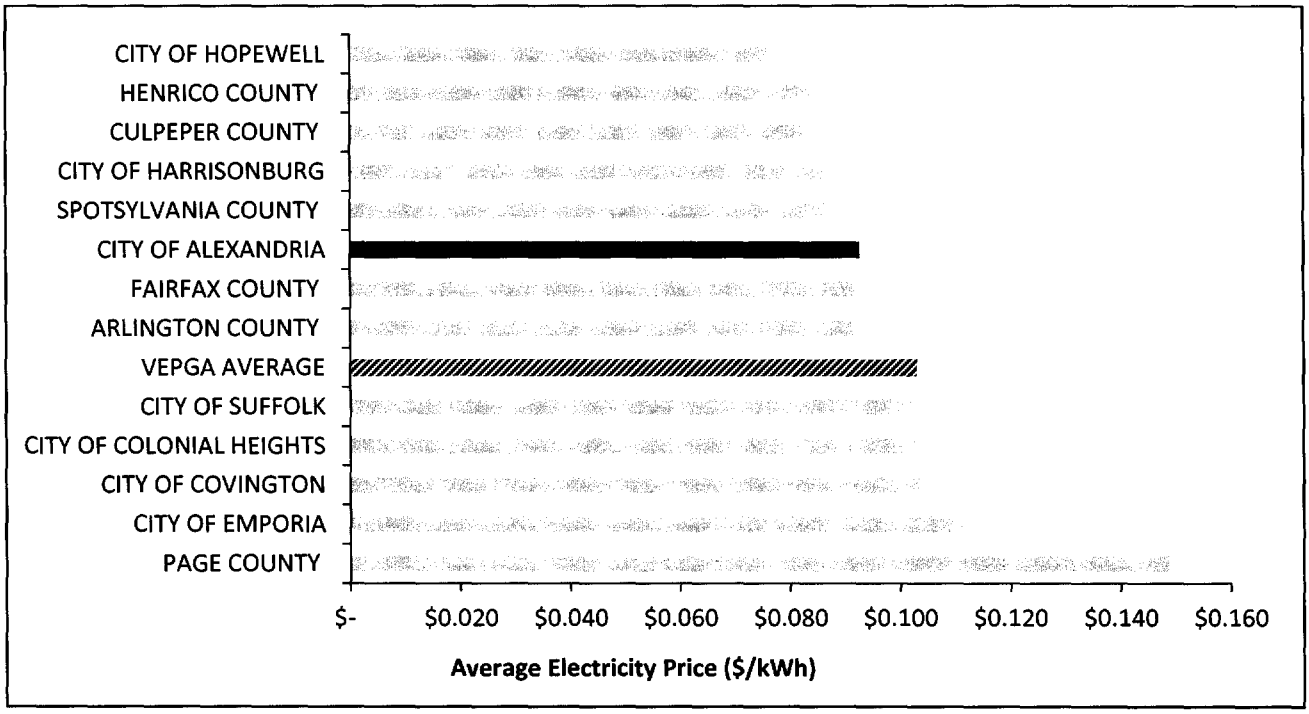
Fiscal Year	Average Electricity Cost ($/kWh)	Average Natural Gas Cost ($/therm)
2006	$ 0.083	$ 1.46
2007	$ 0.084	$ 1.44
2008	$ 0.090	$ 1.32
2009	$ 0.101	$ 1.27
2010	$ 0.085	$ 1.14
2011	$ 0.091	$ 1.07

The City purchases electricity and natural gas through regionally-negotiated contracts, providing the City ability to achieve best pricing by leveraging economies of scale. The main source of electricity comes from Virginia Electricity Purchasing Government Authority (VEPGA). VEPGA includes 170 Virginia cities, counties, towns, and authorities which collectively negotiate electricity pricing with Dominion Virginia Power. In 2011, VEPGA renegotiated a 3.5 year contract which resulted in an approximately 16% price increase to all members, including Alexandria. While a substantial price increase, it is substantially lower than that which would have been experienced if Alexandria did not participate in VEPGA. If Alexandria did not participate in VEPGA, the City would have experienced an approximately 25% price increase.

Figure 10 shows a selection of the City's peers participating in VEPGA and their average electricity price. In general, the City experiences similar electricity pricing to Northern Virginia peers. Moreover, the City experiences electricity pricing which is below the average price for all VEPGA members. Natural

gas is purchased through Washington Gas as the distribution utility with the actual natural gas commodity purchased through a Metropolitan Washington Council of Governments (MWCOG) contract with Pepco Energy Services. All jurisdictions participating in the MWCOG contract experience equivalent natural gas pricing.

Figure 10: VEPGA Comparison of Costs



Benchmarking Energy Costs

Table 7 shows Energy Cost Index (ECI) information by department. Similar to the EUI discussed previously, the ECI is a common cost performance metric utilized by BOMA, IFMA, etc. The ECI sums of all energy resource costs, and divides by the total occupied building area. Consistent with the EUI, the ECI does not weight energy costs by weather, occupancy, hours of operation, etc. The ECI is reported in dollars per square foot per year. Due to lack of available published data, a comparison ECI is not provided.

In addition, ***Table 7*** shows average unit electricity and natural gas costs for each department. In general, the larger the operation the lower the average unit cost as larger operations can leverage rates which have more attractive energy pricing. However, this unfortunately doesn't hold true for all cases. One example, Department of Transportation and Environmental Services (T&ES), has a significantly higher average unit cost of electricity than other departments. This resulted in the unit cost of operating street- and traffic-lighting being greater than for facilities.

Table 7: Energy Costs per Occupied Building Area by Department

Department	Average Electricity Price ($/kWh)	Average Natural Gas Price ($/therm)	Electricity ECI ($/ft2)	Natural Gas ECI ($/ft2)	Total ECI ($/ft2)
Fire	$0.08	$1.10	$1.68	$0.66	$2.33
RPCA	$0.08	$1.11	$1.56	$0.66	$2.21
Library	$0.07	$0.92	$1.56	$0.47	$2.04
OHA	$0.08	$1.14	$1.62	$0.32	$1.94
Health	$0.07	$0.92	$1.55	$0.34	$1.89
ACVA	$0.09	$1.34	$1.26	$0.57	$1.84
DCHS	$0.08	$1.17	$1.26	$0.52	$1.78
T&ES	$0.14	$0.99	$1.31	$0.24	$1.56
+ *TES: Street- and Traffic Lighting*	*$0.14*	-	-	-	-
+ *TES: Other*	*$0.10*	*$0.99*	*$1.88*	*$0.22*	*$2.10*
DASH	$0.08	$0.91	$1.03	$0.24	$1.27
General Services	$0.07	$1.07	$0.68	$0.37	$1.05
+ *GS: City Hall*	*$0.07*	*$1.10*	*$1.24*	*$0.23*	*$1.47*
+ *GS: Courthouse*	*$0.07*	*$1.11*	*$1.52*	*$0.24*	*$1.75*
+ *GS: Lee Center*	*$0.08*	*$1.12*	*$1.22*	*$0.16*	*$1.38*
+ *GS: Public Safety Center*	*$0.05*	*$1.09*	*$1.08*	*$0.48*	*$1.55*
+ *GS: Other*	*$0.07*	*$1.07*	*$0.68*	*$0.23*	*$0.91*
Police	$0.08	$1.56	$0.38	$0.07	$0.45

Estimated Energy Savings

Energy Savings Overview

This section discusses estimates savings attributed to actions and activities undertaken by City departments to save energy resources and avoid increased energy costs. Utilizing a modified version of the International Performance Measurement and Verification Protocol (IPMVP)[5] energy saving evaluation methodology, savings estimates yield the positive results of steady energy reductions in City operations.

Table 8 estimates the savings between fiscal years in percent reduction, estimated cost savings, and the estimated cumulative cost savings. Percent savings between fiscal year reflects energy savings per square foot of occupied building area. Cost savings estimates utilize averaged current costs for electricity and natural gas resources.

Please note that much uncertainty is inherent in measuring energy savings at the organizational level. General methodologies utilize measurement and verification procedures which are directed at a specific equipment and project level. Increasing the scope of energy savings analysis to the organizational level increases estimation errors. Effort to minimize these estimations errors has been taken during savings analysis. Future work will emphasize quantifying the uncertainty of savings, sources of uncertainty and drivers of variability in quantifying energy savings. Moreover, effort will emphasize describing the nature and magnitude of energy savings activities.

According the City's 2030 Environmental Action Plan (EAP), the City aims to achieve an annual 3% reduction in energy use per square foot of occupied building area. The estimated energy savings over the most recent three years makes attempt at achieving this goal. From FY 2006 to FY 2011, the City has steadily increased its energy reduction activities to reduce overall City energy costs. Energy savings estimates range between a 1% and 8% decrease in the City's per square foot energy usage. As an example, from FY 2009 to FY 2010, the City achieved a 3% energy savings, avoiding approximately $177,000 in additional utility charges. From FY 2010 to FY 2011, the City is on-target to achieve energy savings of approximately 8%; resulting in avoiding about $210,000 in additional utility charges. In total, estimates indicate the City will have avoided approximately $529,000 in additional utility costs by instituting energy reduction measures since FY 2006.

Generally speaking, changes in energy use resulting in energy reductions and energy cost avoidance are a result of several initiatives. These initiatives include:

- Better managing facility temperature settings
- Preventative and predictive facility maintenance
- Calibrating HVAC control systems
- Installation of higher efficiency equipment

[5] International Performance Measurement and Verification Protocol (IPMVP); Concept and options for determining energy and water savings: Efficiency Valuation Organization, 2007. More information can be found at www.evo-world.org.

Please note, the ability to identify specific actions which have led to energy savings has to date been limited. Currently, the Energy Management Program is maintaining higher resolution records of savings initiatives and activities to better identify the results of energy reduction activities.

Table 8: Estimated Changes in Energy Use and Costs and Avoided Costs

	Estimated Change in Electricity Use (%)	Estimated Change in Natural Gas Use (%)	Estimated Change in Total Energy Use (%)	Estimated Annual Costs Avoided ($)	Estimated Cumulative Costs Avoided ($)
FY2006 - FY2007	2%	-7%	-1%	$ (4,000)	NA
FY2007 - FY2008	-3%	0%	-2%	$ (60,000)	$ (64,000)
FY2008 - FY2009	0%	-12%	-4%	$ (78,000)	$ (142,000)
FY2009 - FY2010	-12%	14%	-3%	$ (177,000)	$ (319,000)
FY2010 - FY2011	-6%	-12%	-8%	$ (210,000)	$ (529,000)

Energy Management Program Work Plan

The Energy Management Program continues to implement energy reductions activities and work towards reducing overall energy costs. A selection of Energy Management Program projects and activities and estimated timing of implementation are found in the Energy Management Program Work Plan ***(Figure 11)***. This work plan emphasizes projects and activities which pursue goals identified by the City Council Strategic Plan, Environmental Action Plan (EAP2030), and the Energy and Climate Action Plan (eCAP).

Figure 11: Energy Management Program Work Plan

	FY2012				FY2013				FY2014			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
ARRA EECBG Project Implementation												
Facility Energy Audits												
Green Energy Efficiency Program												
City Hall Green Roof												
Public Safety Center LED lighting retrofits												
Renewable Energy System installation												
Re- and retro-commissioning of City facilities[6]												
Hybrid Vehicle Procurement												
City Facility Benchmarking with US EPA's EnergyStar® Portfolio Manager												
Facility Energy Audits												
Monthly Energy Reporting												
FY2014 Natural Gas Purchase												
FY2013 Renewable Energy Certificate (REC) Purchase												
CIP Project Implementation												
Facility Lighting Retrofits												
HVAC Control System upgrades												
Re- and retro-commissioning of City facilities												
Facility Advanced Metering Infrastructure (fAMI)[7]												
City Energy Conservation Committee (ECC)												
Facility Temperature Setting and Scheduling Policy												
Eco-City@Work												
Energy$aver Blog												

[6] Re- and retro-commissioning is the process of verifying and calibrating facility systems as designed by the building architects and engineers.

[7] A Facility Advanced Metering Infrastructure (fAMI) is a metering system that records energy consumption in intervals of an hour or less and communicates that information to facility operators for monitoring and billing purposes

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City of Alexandria, Virginia

Annual Energy Review

FY 2011

ECO-CITY ALEXANDRIA

Energy Management Program

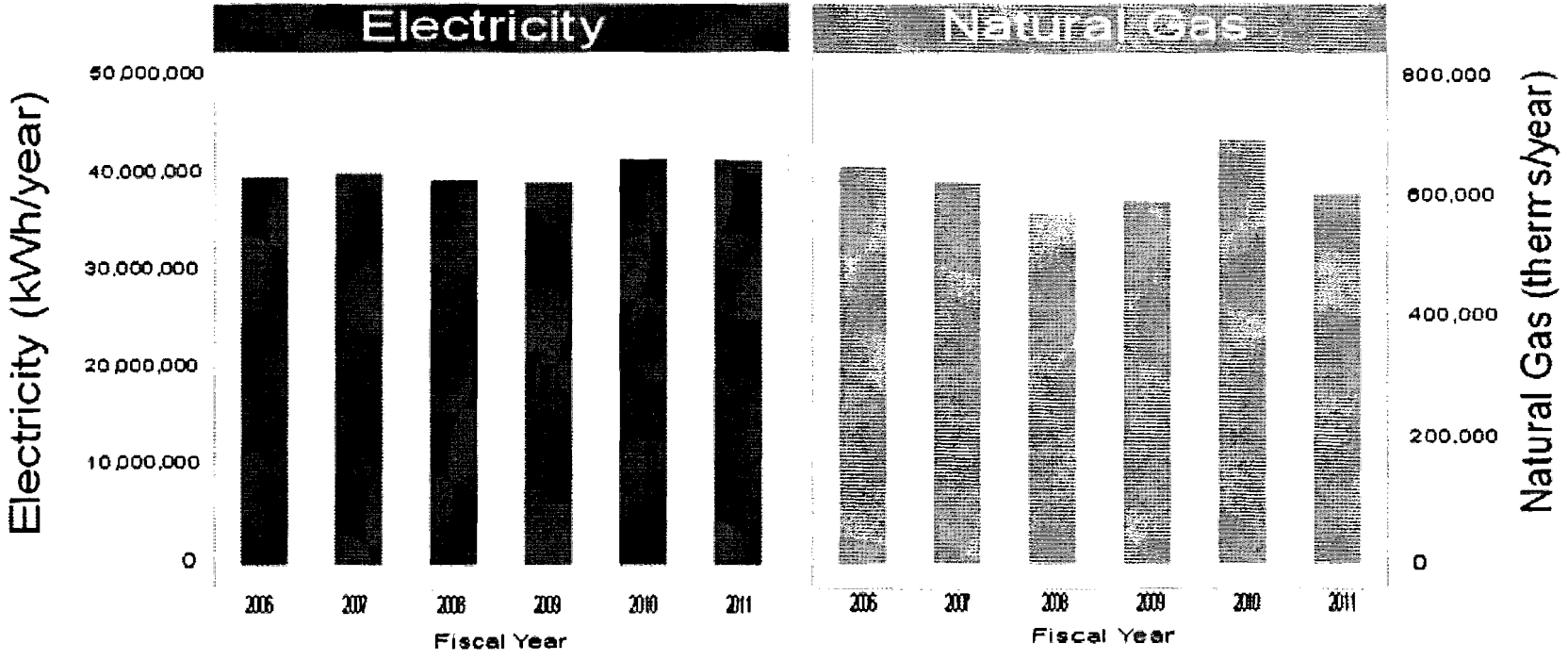
Successes[1]

- Energy savings estimates range between 1% and 8% per square foot energy usage for FY2006 – FY2011.
- Estimated $529,000 in avoided energy costs since FY2006
- Constructing four green City buildings totaling 342,476 ft^2 (~10% of total City portfolio)
- ~4.1% of City electricity supplied by purchased renewable energy
- Implementing an electronic electricity and natural gas payment process
- Completing energy audits on seven City facilities

[1] Successes helping to meet City Council Strategic Plan, EAP 2030, and eCAP goals.

Electricity and Nat. Gas Use

Total by Fiscal Year



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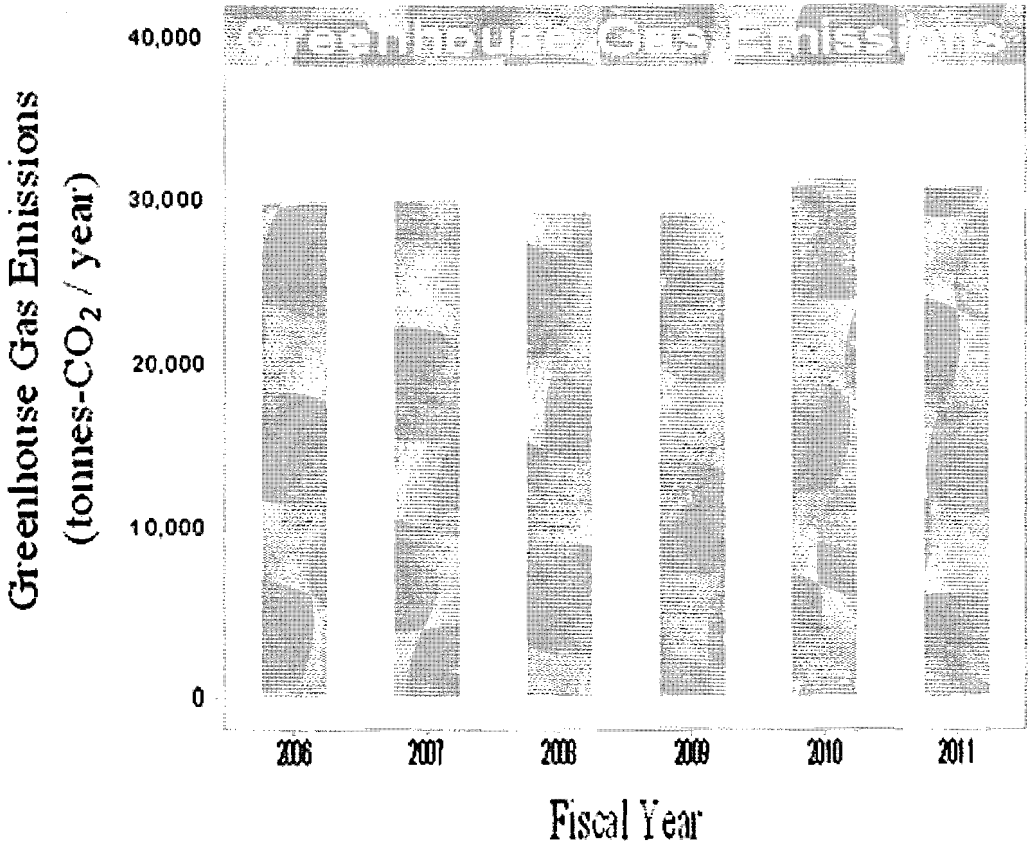
Greenhouse Gas Emissions[2]

Total by Fiscal Year



[2] Greenhouse gas emissions for City facilities only.

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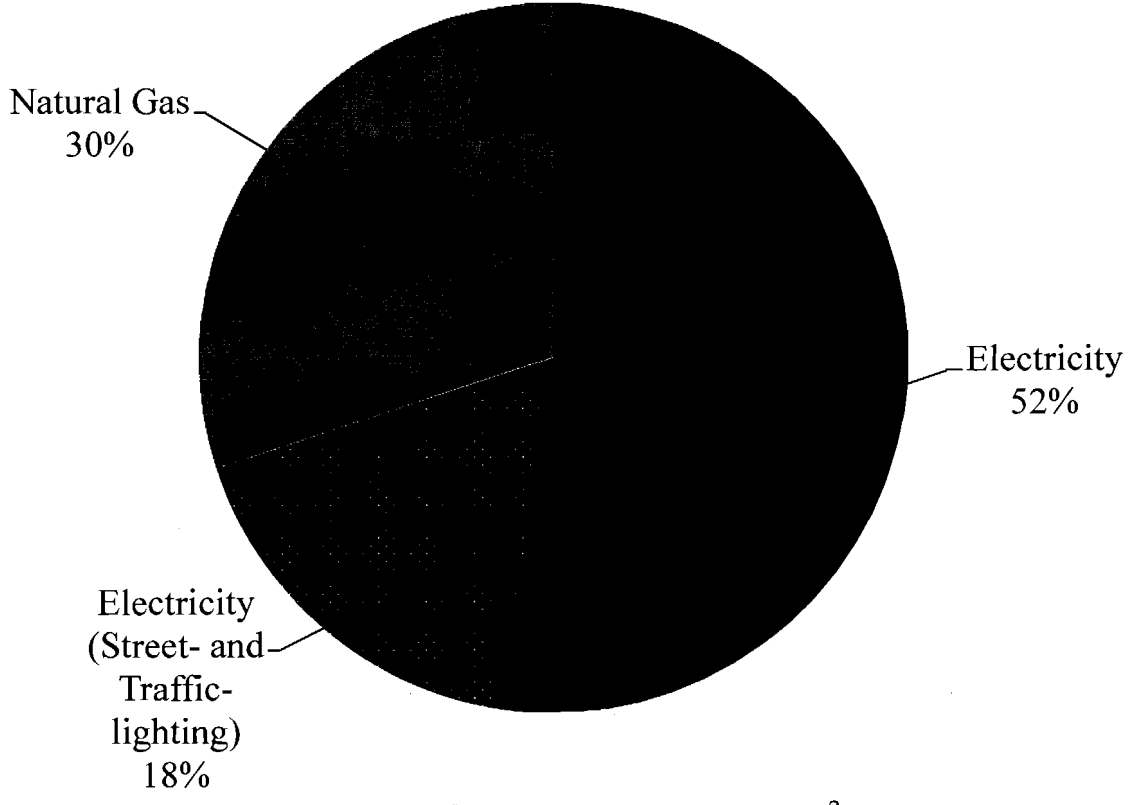
Energy Use Comparison

FY 2011 Total by Resource[3]



[3] Measured in kBTU.

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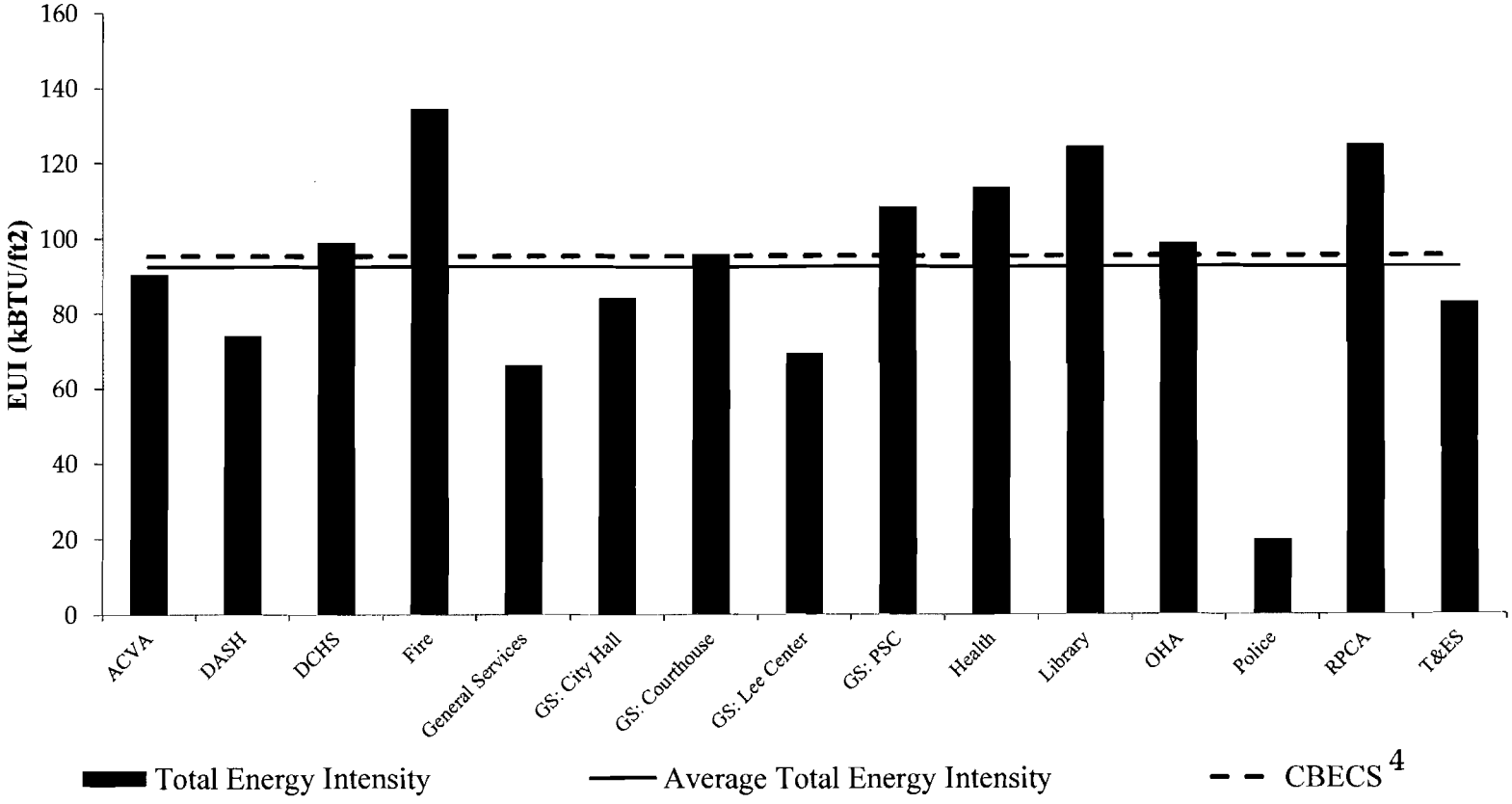
Energy Use Index

by Department



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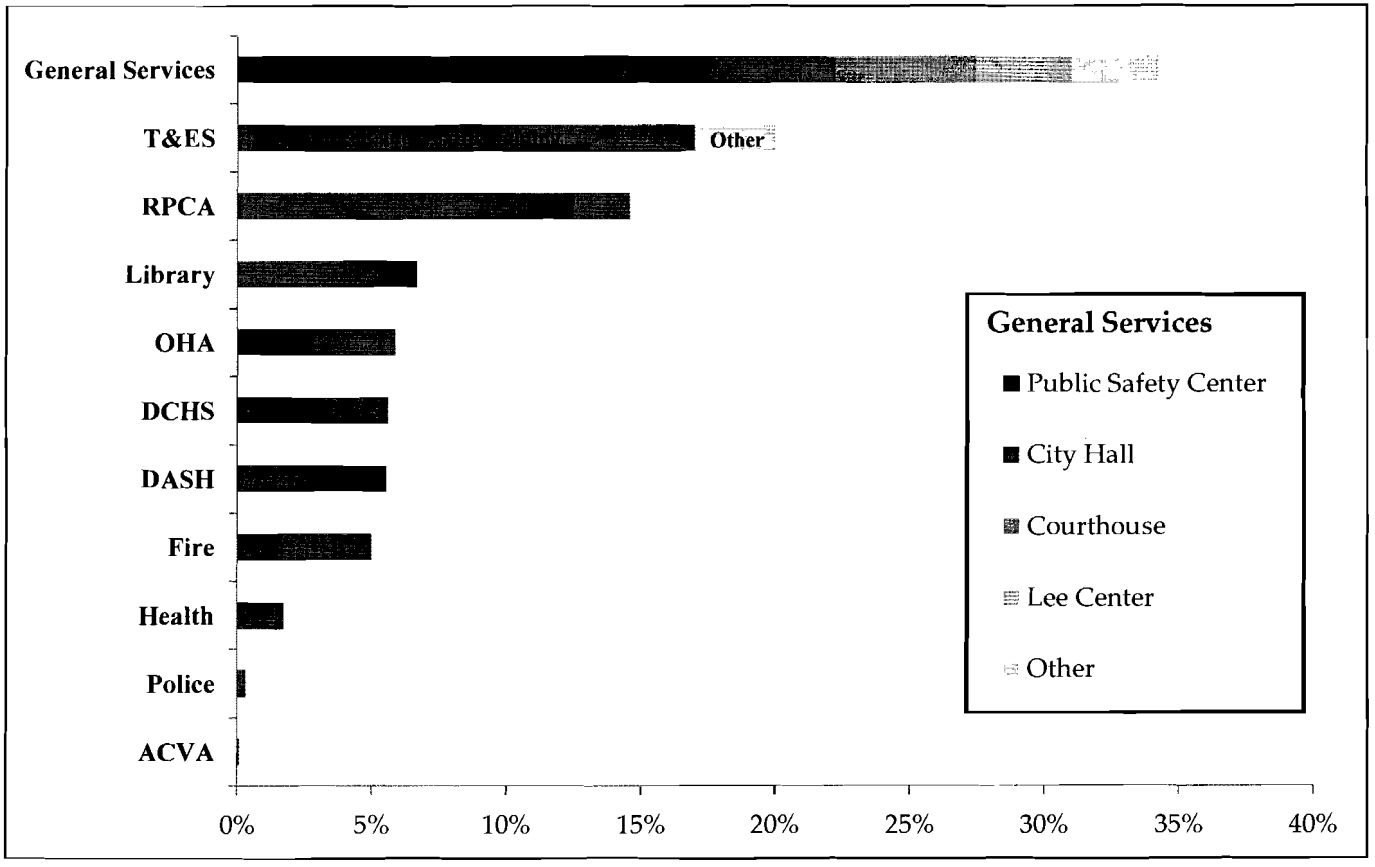
[4] Commercial Building Energy Consumption Survey (CBECS) [DOE, 2011]

Energy Use

Percent of Total by Department



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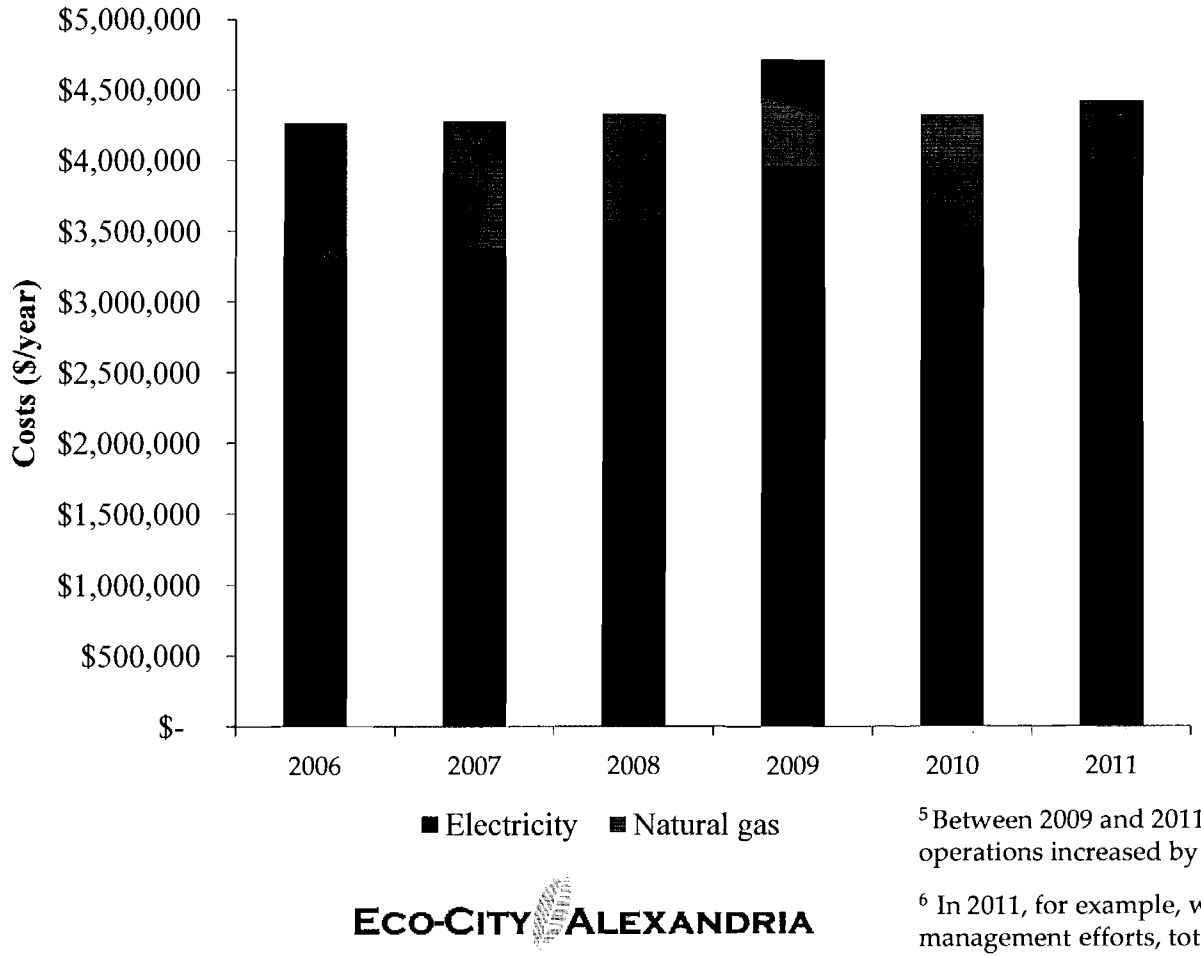
Electricity and Nat. Gas Costs

by Fiscal Year[5,6]



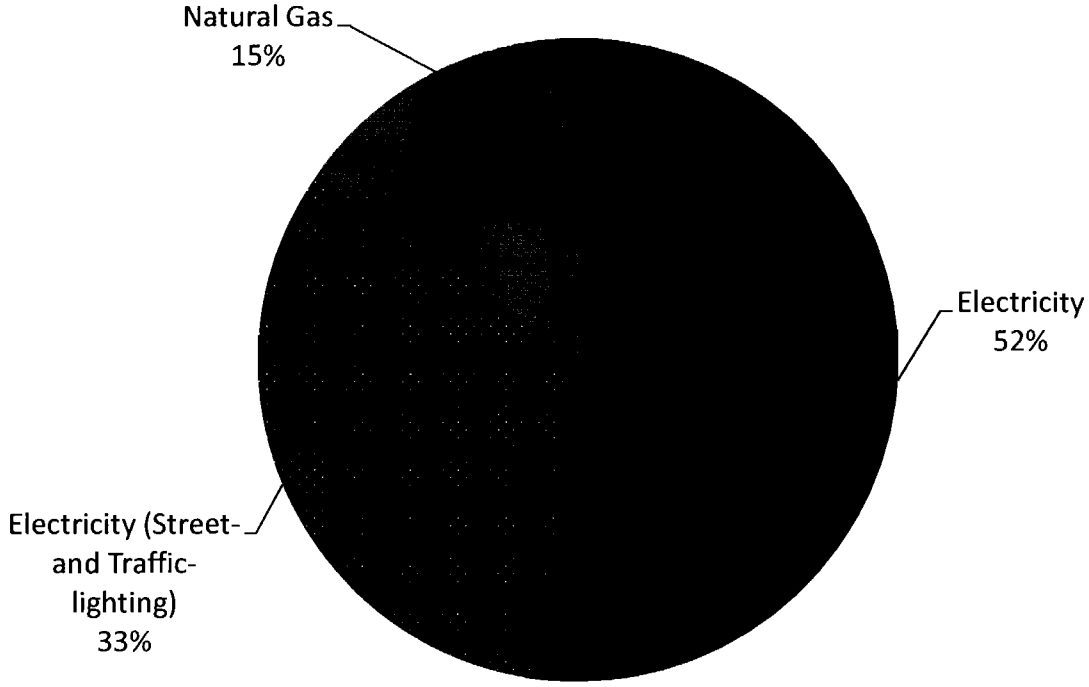
ECO-CITY ALEXANDRIA

[5] Between 2009 and 2011, City operations increased by 230,000 ft^2.

[6] In 2011, for example, without energy management efforts, total electricity and natural gas cost would have been about $4.6 million.

Energy Cost Comparison

FY 2011 Total by Resource



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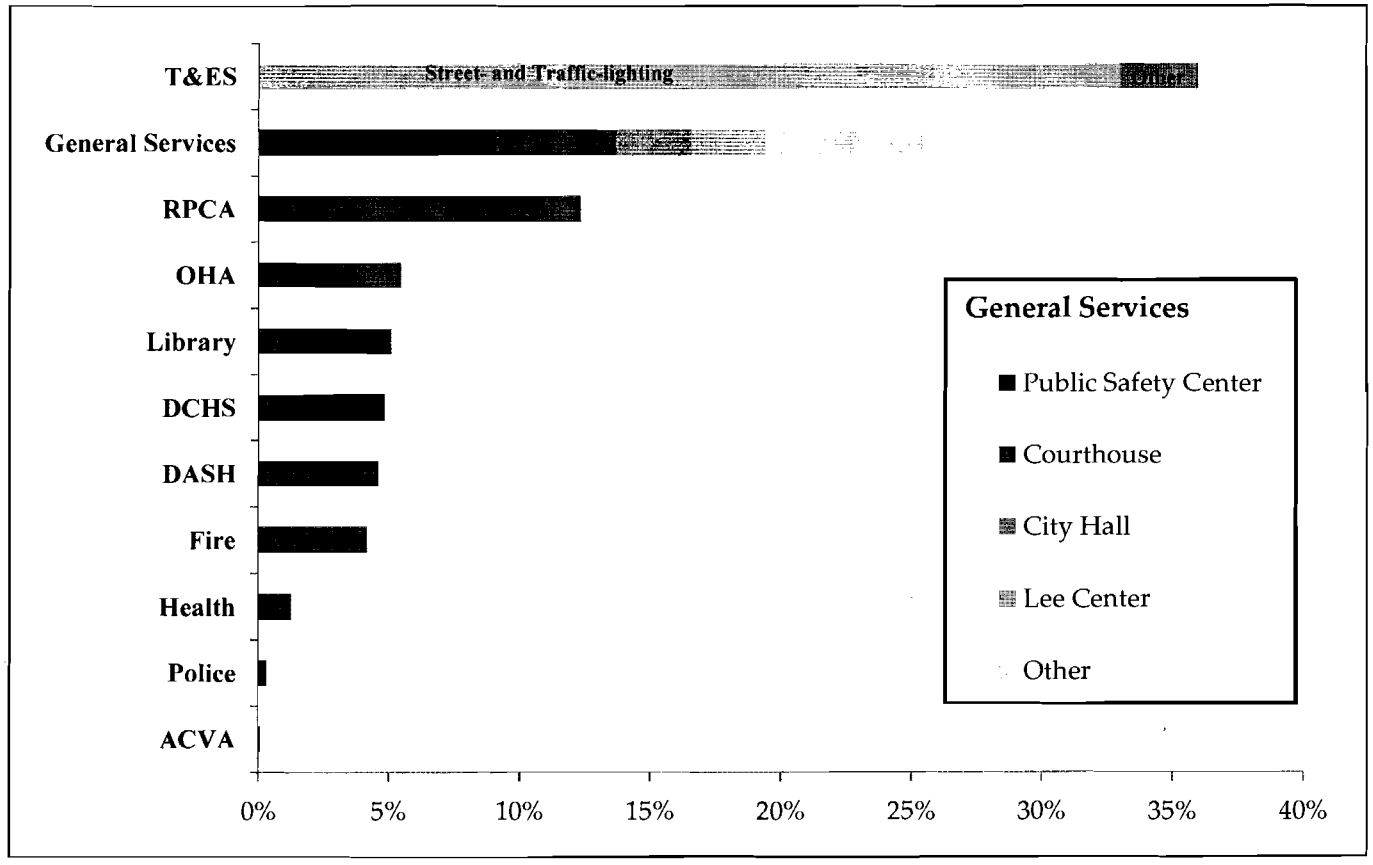
Energy Costs

Percent of Total by Department



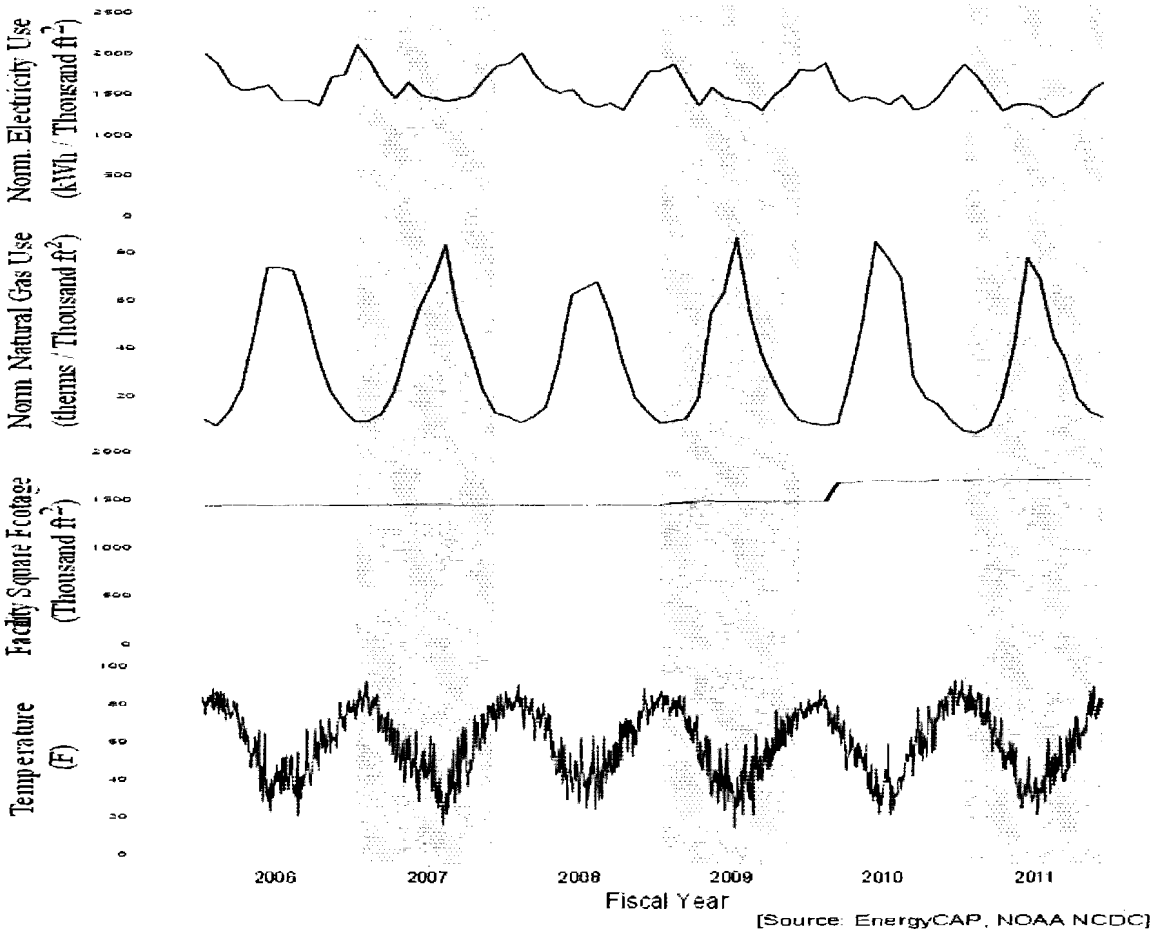
Energy Pricing Comparison

by Fiscal Year

Fiscal Year	Average Electricity Cost ($/kWh)	Average Natural Gas Cost ($/therm)
2006	$ 0.083	$ 1.46
2007	$ 0.084	$ 1.44
2008	$ 0.090	$ 1.32
2009	$ 0.101	$ 1.27
2010	$ 0.085	$ 1.14
2011	$ 0.091	$ 1.07

Energy Use Influences

Normalized by Month by Fiscal Year



[Source: EnergyCAP, NOAA NCDC]

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Energy Use Influences

Normalized by Month by Fiscal Year

- Adjusting for occupied building area, electricity and natural gas use decreasing since FY 2009.
- Occupied Building Area increasing since FY2006.
- Recent summer temperatures slightly higher than historical record.
- Recent winter temperatures representative of historical record.

Estimated Avoided Costs

by Fiscal Year

	Estimated Change in Electricity Use (%)	Estimated Change in Natural Gas Use (%)	Estimated Change in Total Energy Use (%)	Estimated Annual Costs Avoided ($)	Estimated Cumulative Costs Avoided ($)
FY2006 - FY2007	2%	-7%	-1%	$ (4,000)	NA
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FY2010 - FY2011	-6%	-12%	-8%	$ (210,000)	$ (529,000)

- Adjusting for both occupied building area and outdoor air temperature identifies avoided energy use and costs since FY2006

FY2012 – FY2014 Focus