Steven Winter Associates, Inc.
Architects and Engineers

293 Route 18 South, Suite 330
East Brunswick, NJ 08816

Telephone: (866) 676-1972
E-mail:swinter@swinter.com
www.swinter.com

June 17, 2010

Local Government Energy Program
Energy Audit Report

For

Middletown Township
Senior Center
900 Leonardville Road
Leonardo, NJ 07737

Project Number: LGEA 41

TABLE OF CONTENTS

INTRODUCTION

On November 23, 2009, December 7, 2009 and January 9, 2010, Steven Winter Associates, Inc. (SWA) and PMK Group, Inc., a business unit of Birdsall Services Group (BSG-PMK), performed an energy audit and assessment for the Senior Center. The building is located at 900 Leonardville Road, Leonardo, NJ 07737, in Monmouth County. The current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The Senior Center building is approximately 1,963 total square feet, divided up into 3 distinct sections; the western portion or the nutrition area, the original center section built in and the newer east wing with its multipurpose room. The Senior Center houses assembly rooms, craft rooms, transportation office, (2) kitchens and other administrative offices. The building is open from 8:30 AM to 4:30 PM Monday through Friday and some evenings. The building is occupied by approximately 8 employees on a daily basis.

Energy data and building information collected in the field were analyzed to determine the baseline energy performance of each building. Using spreadsheet-based calculation methods, SWA/BSG-PMK estimated the energy and cost savings associated with the installation of each of the recommended energy conservation measures. The findings for the building are summarized in this report.

The goal of this energy audit is to provide sufficient information to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the buildings.

Launched in 2008, the LGEA Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. The Program will subsidize 75% of the cost of the audit. If the net cost of the installed measures recommended by the audit, after applying eligible NJ SmartStart Buildings incentives, exceeds the remaining cost of the audit, then the additional 25% will also be paid by the program. The Board of Public Utilities (BPU) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

EXECUTIVE SUMMARY

This document contains the energy audit report for the Senior Center, located at 900 Leonardville Road, Leonardo, New Jersey 07737.

Based on the field visits performed by SWA/BSG-PMK staff on November 23, 2009, December 7, 2009 and January 8, 2010, and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling, and electric usage.

Current conditions

In the most recent full year of data collected, October, 2008 through September, 2009, the Senior Center consumed a total of 184,600 kWh of electricity for a total cost of $31,018 and 6,752 therms of natural gas, for a total cost of $7,655.

With electricity and fossil fuel combined, the building consumed 1,305 MMBtus of energy at a total cost of $38,673.

SWA/BSG-PMK has entered energy information about the Senior Center in the US Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* energy benchmarking system. In order to compare commercial buildings equitably, the *Portfolio Manager* ratings convey the consumption of each type of energy in a single common unit. The EPA uses source energy to represent the total amount of raw fuel required to operate the building. The site energy use intensity for the Senior Center (it is important to understand that the Senior Center and Field House share a natural gas meter and that this number incorporates the Field House natural gas usage) is 635.0 kBtu/sq.ft/year. After energy efficiency improvements are made, future utility bills can be added to the Portfolio Manager and the site energy use intensity for a different time period can be compared to the year 2009 baseline to track the changes in energy consumption associated with the energy improvements.

SWA/BSG-PMK also recommends that the Township of Middletown contact third party energy suppliers in order to negotiate a lower electricity rate. Comparing the current electric rate to average utility rates of similar type buildings in New Jersey, it may be possible to save up to $ 0.018/kWh, which would have equated to $3,323 for the past 12 months.

Buildings achieving an Energy Star rating of 75 are eligible to apply for the Energy Star award and receive the Energy Star plaque to convey superior performance. These ratings also greatly help when applying for Leadership in Energy and Environmental Design (LEED) building certification through the United States Green Building Council (USGBC). SWA/BSG-PMK encourages the Township of Middletown to continue entering utility data in *Energy Star Portfolio Manager* in order to track whether normalized source energy use over time. The building performance rating could not be determined because this is a mixed-use facility, comprised by non-eligible space types categorized as "Other".

(Refer to Section 1.3 for Energy Star Rating)

Category I Recommendations: Capital Improvement Measures

The current control system is old, and should be replaced. The cost for this measure is approximately $30,000.

Category II Recommendations: Operations and Maintenance

The roof drain cages should be cleaned to prevent ponding and roof damage.

Category III Recommendations: Energy Conservation Measures - Upgrades with associated energy savings

At this time, SWA/BSG-PMK highly recommends a total of **4** Energy Conservation Measure (ECM) for the Senior Center that is summarized in the following tables. The total investment cost for these ECMs is **$179,725**. SWA/ BSG-PMK estimate a first year savings of **$12,525** with a simple payback of **14.3 years**. SWA/BSG-PMK estimate that implementing the highly recommended ECMs will reduce the carbon footprint of the building by **83,390 lbs of CO_2**, which is equivalent to removing approximately seven cars from the roads each year.

There are various incentives that the Township of Middletown could apply for that could also help lower the cost of installing the ECMs. SWA/BSG-PMK recommend that the Township apply for the NJ SmartStart program through the New Jersey Office of Clean Energy. This incentive can help provide technical assistance for the building in the implementation phase of any energy conservation project. A new NJ Clean Power program, Direct Install, could also assist to cover up to 80% of the capital investment. In order to qualify, the facility being upgraded must not have had a peak demand that exceeded 200 kW in any of the preceding 12 months; the highest peak demand for the complex in the previous year was **65.4 kW.**

The following tables summarize the proposed Energy Conservation Measures (ECMs) and their economic relevance:

ROI: Return on Investment (%)

Assumptions:

Discount rate:	3.2% per DOE FEMP guidelines	Electricity rate	$0.17 $/kWh
Energy price escalation rate:	0% per DOE FEMP guidelines	Gas rate	$1.13 $/therm

Avg. Annual Demand: 0.00335 Area of Building (SF) 16,000

Table 1 - Highly Recommended 0-5 Year Payback ECMs

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
1	Lighting Upgrades	Empirical Data	$11,654	$2,360	$9,294	19,680	5.50	0	4.20	$0	$3,346	15	$39,368	2.78	2157%	144%	36%	$30,646	26,962
	Occupancy Sensors		$920	$460	$460	2,595	0.72	0	0.55	$0	$441	10	$3,724	1.04	7097%	710%	96%	$3,303	3,555
TOTAL			$12,574	$2,820	$9,754	22,275	6.22	0	4.75	$0.00	$3,787	-	$43,092	2.58	-	-	-	$33,948	30,516

Table 2 - Recommended 5-10 Year Payback ECMs

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
2	Upgrade Bathroom Plumbing Fixures	Contractor, RSMeans CostWorks 2009	$30,000	$0	$30,000	0	0.00	0	0.00	$0	$3,205	15	$37,712	9.36	171%	11%	7%	$8,259	0
TOTAL			$30,000	$0	$30,000	0	0.00	0	0.00	$0.00	$3,205	-	$37,712	9.36	-	-	-	$8,259	0

Table 3 - Recommended Extended-Payback ECMs

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
3	Heating Upgrade	Similar projects	$274,500	$218,000	$56,500	10,184	2.84	1,391	10.86	$0	$3,303	25	$56,249	17.11	-2%	0%	3%	$1,010	30,223
4	Install Thermal-Pane Windows	Similar Projects	$83,471	$0	$83,471	1,137	0.3	1,803	11.51	$0.00	$2,231	35	$46,559	37.42	-1%	0%	0%	-$35,543	22,652
TOTAL			$357,971	$218,000	$139,971	11,320	3.2	3,194	22.37	$0.00	$5,533	-	$102,808	25.30	-	-	-	-$34,533	52,874

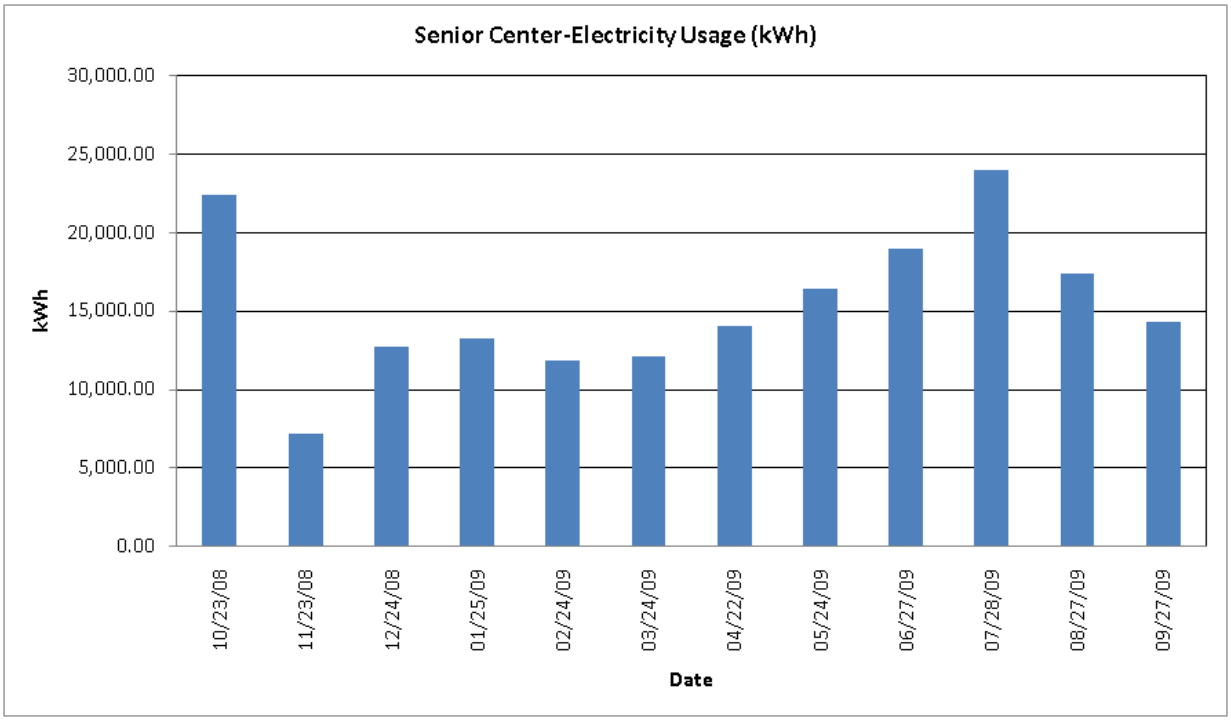
1. HISTORIC ENERGY CONSUMPTION

1.1 Energy Usage and Cost Analysis

SWA/BSG-PMK analyzed utility bills from November, 2007 through December, 2009 that were received from the utility companies supplying the Senior Center with electric and natural gas.

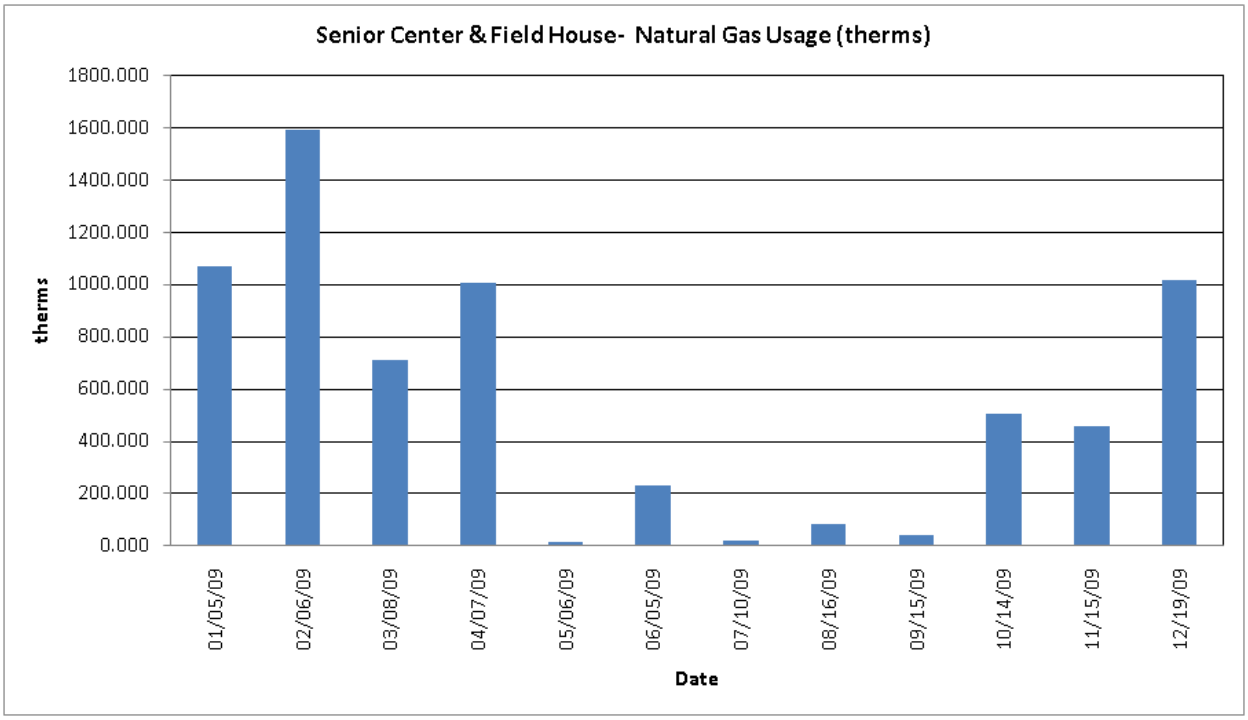
Electricity - The Senior Center is currently served by one electric meter and receives electricity from Jersey Central Power & Light at **an average rate of $0.17/kWh** based on 12 months of utility bills from October, 2008 through September, 2009. The building consumed **184,600 kWh or $31,018 worth of electricity** during that time span.

The following chart shows electricity usage for the building based on utility bills from October, 2008 through September, 2009:



Natural Gas - The Senior Center currently shares one natural gas meter with the Field House. The Senior Center and Field House receive gas from New Jersey Natural Gas at **an average rate of $1.13/therm** based on 12 months of utility bills from January, 2009 through December, 2009. The building consumed **6,752 therms or $7,655 worth of natural gas** during that time span.

The following chart shows the natural gas consumption for the building based on natural gas bills for the 12 month period of January, 2009 through December, 2009:



1.2 Utility Rate

The Senior Center currently receives electricity from Jersey Central Power & Light for electricity use (kWh) with a separate (kW) demand charge. The complex currently pays an average rate of approximately $0.17/kWh based on the 12 months of utility bills of October, 2008 through September, 2009.

The Senior Center and Field House currently receives natural gas supply and transmission from New Jersey Natural Gas at an average aggregated rate of $1.13/therm based on 12 months of utility bills from January, 2009 through December, 2009.

1.3 Energy Benchmarking

The building information and utility data were entered into the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. SWA/BSG-PMK recommends that the Township maintain the Portfolio Manager account at the link below. As the account is maintained, SWA/BSG-PMK can share with the Township and allow future data to be added and tracked using the benchmarking tool.

http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

Username: **middletowntownship**
Password: **middletown**

Buildings achieving an Energy Star rating of 75 are eligible to apply for the Energy Star award and receive the Energy Star plaque to convey superior performance. These ratings also greatly help when applying for Leadership in Energy and Environmental Design (LEED) building certification through the United States Green Building Council (USGBC). SWA/BSG-PMK encourages the Township to continue

entering utility data in Energy Star Portfolio Manager in order to track whether normalized source energy use over time.

The Site Energy Use Intensity is 635.0 kBtu/ft^{2}yr compared to the national average of 52.0 kBtu/ft^{2}yr for buildings classified similarly by the Energy Star Portfolio Manager. Implementing this report‘s recommendations will reduce use by approximately 27.1 kBtu/ft^{2}yr, which when implemented would lower the buildings energy consumption.

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Senior Center

Building ID: 2216474
For 12-month Period Ending: November 30, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: February 28, 2010

Facility	Facility Owner	Primary Contact for this Facility
Senior Center 900 Leonardville Rd Leonardo, NJ 07737	Middletown Township 1 Kings Highway Middletown, NJ 07749	Jason Greenspan 1 King's Highway Middletown, NJ 07737

Year Built: 1961
Gross Floor Area (ft^2): 1,963

Energy Performance Rating[2] (1-100) N/A

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	604,534
Natural Gas (kBtu)[4]	642,620
Total Energy (kBtu)	1,247,154

Energy Intensity[5]

Site ($kBtu/ft^2/yr$)	635
Source ($kBtu/ft^2/yr$)	1371

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	126

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	52
National Average Source EUI	102
% Difference from National Average Source EUI	1245%
Building Type	Social/Meeting

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Certifying Professional
N/A

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1 Building Characteristics

The Senior Center building is approximately 16,000 total square feet, divided up into 3 distinct sections; the western portion or the nutrition area (approx. 3200 sq ft.), the original center section built in 1961 (approx. 4,000 sq ft. per floor) and the newer (3,500 sq ft.) east wing with its multipurpose room. The Senior Center houses assembly rooms, craft rooms, transportation office, (2) kitchens and other administrative offices.

2.2 Building Occupancy Profiles

The building is open from 8:30 AM to 4:30 PM Monday through Friday and some evenings. The building is occupied by approximately 8 employees on a daily basis.

2.3 Building Envelope

2.3.1 Exterior Walls

The exterior walls are constructed from brick veneer on a masonry substrate. The walls are in good condition. The interior walls are insulated and finished with gypsum wallboard.

2.3.2 Roof

The building has all flat EPDM roofs with mechanically fastened ISO board. The original center section of the building remains asphalt shingles, which have been recently replaced. The roof is insulated. All are found to be in good condition.

Category II Repair and Maintenance: The roof drain cages should be cleaned to prevent ponding and roof damage.

Ponding in bottom-right corner

2.3.3 Base

The base of the building is poured concrete on grade. It is in good condition.

2.3.4 Windows

There are approximately 58 single pane older vinyl clad windows that should be replaced in this building.

Category III Recommendations- ECM#4: Replace original windows with more energy efficient thermal pain units.

2.3.5 Exterior doors

The exterior doors are in good condition. The main entrance is an automatic aluminum store front, and the remaining exit doors are insulated hollow metal in steel frames.

2.3.6 Building air tightness

The building, aside from older style windows and infiltration at the abandoned second floor air handler, is tight with no indications of infiltration.

2.4 HVAC Systems

2.4.1 Heating

Heating for the original building section is provided by one (1) main 807 MBH- HB Smith model 2500L natural gas, hot water boiler. The hot water is circulated throughout the building by a primary and secondary circulating loop to 37 Uni-Trane unit ventilators.

Category III Recommendation ECM #3 - Replace inefficient 1981 boiler and Barber Coleman controls with a 93.6% efficient unit.

The Nutrition wing (east section) and the Multipurpose Room (west section) are heated by a total of seven (7) York Model DCG gas fired roof top units. Space temperature is monitored by two separate Barber Coleman wall stats, one for daytime and the other for night setback.

2.4.2 Cooling

Cooling for the original building section is provided by one (1) 40-ton, 9.2 (EER) York scroll chiller.The chilled water is circulated to the existing 37 Uni-Trane unit ventilators.

The Nutrition wing (east section) and the Multipurpose Room (west section) are cooled

by the seven (7) York Model DCG Dx roof top units. Every unit was missing a nameplate. Space temperature is monitored by two separateBarber Coleman wall stats, one for daytime and the other for night setback.

Category III Recommendation – ECM #3: Replace all rooftop units with more high-efficiency units as they have reached the end of their useful lives.

2.4.3 Ventilation

There are two exhaust fans on the roof, both without nameplates, which serve the kitchen hood and the restrooms. Ventilation is also provided by the rooftop units, doors, and windows.

2.4.4 Domestic Hot Water

Water is heated by three natural gas water heaters:

The main water heater that serves the Nutrition kitchen and restrooms is a gas fired State Industries 100 gallon unit. Hot water for the original building area is provided by a gas fired A.O. Smith 30 Gallon unit located in the boiler room. The multipurpose wing hot water is provided by a natural gas fired 40 gallon Rheem water heater. All were found to be in good condition, however the Nutrition area unit needs replacing with a more efficient unit.

Category I Replace the State Industries water heater with a higher efficiency unit.

2.5 Electrical systems

2.5.1 Lighting

A complete inventory of all interior, exterior, and exit sign light fixtures were examined and documented in Appendix A of this report including an estimated total lighting power consumption. Our initial findings indicate that performing a detailed lighting upgrade per the recommendations in Appendix A will result in an annual savings of $3,644.06 based on the current $0.17/kWh and the current occupancy schedule. Implementation of this ECM will cost approximately $12,574. Currently the Board of Public Utilities (BPU) would offer an estimated rebate of $2,820.00, yielding a net cost of $9,754for this project. With a yearly savings of $3,644 the payback on this ECM would about 2.7 years.

Category III Recommendation - ECM #1: Recommend upgrading all T-12 lighting fixtures with magnetic ballasts to T-8 fixtures with electronic ballasts, as well as various other lighting upgrades

outlined in Appendix A. Also recommend installing lighting sensors to certain areas where lights typically remain lit when unoccupied for long periods of time.

Refer to Appendix A for further details.

2.5.2 Appliances and process

There are three refrigerators, two stoves (one gas, one electric), a microwave, and a dishwasher.

2.5.3 Elevators

There are no elevators in the facility.

2.5.4 Other electrical systems

The facility has a 150kW Kohler Diesel Generator that supplies back-up power.

3. EQUIPMENT LIST

Building System	Description	Location	Model #	Fuel	Space Served	Estimated Remaining Useful Life %
Cooling	40-ton air-cooled scroll chiller, 9.2 EER	Outside	York M# YCAL0040EC17XC ASDT	Electric	1st floor, main building	80%
Heating	1,330/700 MBH burner	Mechanical Room	Power Flame M# C1-G-12 HBS-7	Natural Gas	Boiler	0%
	Hot water boiler, 807 MBH		H.B. Smith M# 2500L		Entire building	0%
Cooling	Air-handler	Mechanical Room	Trane M# CCDA063E0A	Electric	2nd-floor A/C, old building	0%
	Fan Motor, 1.5 hp, Eff. 0.79%		Leland Faraday #LFI 84015	Electric		20%
Cooling/ Heating	Roof top unit	Roof	York Model DCG	Electric	Nutrition area	0%
Cooling/ Heating	Roof top unit	Roof	York Model DCG	Electric	East wing	0%
Cooling/ Heating	Roof top unit	Roof	York Model DCG	Electric	Nutrition area	0%
Cooling/ Heating	Roof top unit	Roof	York Model DCG	Electric	East wing corridor area	0%
Cooling/ Heating	Roof top unit	Roof	York Model DCG	Electric	Multi-purpose room	0%
Cooling/ Heating	Roof top unit	Roof	York Model DCG	Electric	Nutrition area	0%
Cooling/ Heating	Roof top unit	Roof	York Model DCG	Electric	Multi-purpose room	0%
Heating	Circulation pump, 3/4 HP, 74% efficient	Mechanical Room	Baldor #RM3012A	Electric	Boiler	20%
Heating	Circulation Pump Motor, 1/12 HP	Mechanical Room	#E6312	Electric	Zone pump	70%

Domestic Hot Water	Domestic Hot Water Heater, 40 gal, 38,000 BTU/Hr	Slop Sink Closet	Rheem #22V40F1	Natural Gas	Slop Sink	69%
Cooling	(40 qty.) Fan coil terminal units	Interior Perimeter	Unitrane #B12A002	Electric	Original building perimeter	20%
Domestic Hot Water	Domestic Hot Water Heater, 100 gal, 199,990 BTU/Hr	Exterior Utility Closet	State Industries #SBT 100 199 NET8 F	Natural Gas	Entire building	0%
Ventilation	Exhaust Fan	Roof	No nameplate	Electric	Bathrooms	60%
Ventilation	Exhaust Fan	Roof	No nameplate	Electric	Kitchen hood	60%
Domestic Hot Water	Domestic Hot Water Heater, 28 gal, 40,000 BTU/Hr	Mechanical Room	A.O. Smith M# FCV-30-V00L010000	Natural Gas	Kitchen and east wing	50%
Appliance	Microwave	Kitchen	GE M# JBP82W0H2WW	Electric	Kitchen	80%
Appliance	Stove, 8.6 kW	Kitchen, original building	GE M# JSP40W0W3WW	Electric	Kitchen, original building	60%
Appliance	Fridge	Kitchen, original building	Frigidaire M# FRS23W3A	Electric	Kitchen, original building	60%
Appliance	Dishwasher	Kitchen, original building	Kitchen Aid M# KUDB230B0	Electric	Kitchen, original building	60%
Appliance	Stove	Kitchen, nutrition area	Vulcan M# 38L6	Natural Gas	Kitchen, nutrition area	80%
Appliance	Refrigerator	Kitchen, nutrition area	Raetone Commercial	Electric	Kitchen, nutrition area	80%
Appliance	Refrigerator	Kitchen, nutrition area	Revco	Electric	Kitchen, nutrition area	80%

Note: The remaining useful life of a system (in %) is the relationship between the system manufactured and/or installed date and the standard life expectancy of similar equipment based on ASHRAE (2003), ASHRAE Handbook: HVAC Applications, Chapter

4. ENERGY CONSERVATION MEASURES

Based on the assessment of the Senior Center, SWA/BSG-PMK has separated the investment opportunities into three recommended categories:

1. Capital Improvements - Upgrades not directly associated with energy savings
2. Operations and Maintenance - Low Cost / No Cost Measures
3. Energy Conservation Measures - Higher cost upgrades with associated energy savings

Category I Recommendations: Capital Improvement Measures

Based on the results of SWA/BSG-PMK's survey, no capital improvement measures are recommended.

Category II Recommendations: Operations and Maintenance

The roof drain cages should be cleaned to prevent ponding and roof damage.

Category III Recommendations: Energy Conservation Measures

Summary table

ECM #	Description
1	Lighting Upgrades & Occupancy Sensors
2	Upgrade Bathroom Plumbing Fixtures
3	Heating Upgrade
4	Install Thermal-Pane Windows

ECM#1: Lighting Upgrades & Occupancy Sensors

Description:

Lighting at the Senior Center consists primarily of T-12 fluorescent lamps with magnetic ballasts and incandescent lamps. It is recommended that all T-12 fixtures with magnetic ballasts be retrofit with T-8 lamps and electronic ballasts and the incandescent lamps be replaced with compact fluorescents. The exterior was lit with incandescent lamps that should be replaced with compact fluorescents. The exterior lighting also consist of H.I.D. wall mounted fixtures. Lighting replacement generally yields a very good payback, due to the fact that most lighting usage in commercial buildings is fairly high and the installation is relatively inexpensive.

Recommended lighting upgrades are detailed in Appendix A.

Installation cost:

Summary	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	$11,654.00	$920.00	$12,574.00
Rebate	$2,360.00	$460.00	$2,820.00
Net Cost	$9,294.00	$460.00	**$9,754.00**
Savings (kWh)	19,680	2,595	**21,436**
Savings ($)	$3,345.61	$441.08	**$3,644.06**
Payback	2.8	1.0	**2.7**

Variables:

$0.17	**Avg. Electric Rate ($/kWh)**
	Avg. Demand Rate ($/kW)
3744	**Operating Hours/Year**
10	**Operating Hours/Work Day**

Assumptions:

25%	**Occupancy Sensor Savings (Avg)**
40%	**Occupancy Sensor Savings(>Avg)**

Source of cost estimate: Empirical Data

Economics (without incentives):

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO2 Reduced, lbs/yr
1	Lighting Upgrades	Empirical Data	$11,654	$2,360	$9,294	19,680	5.50	0	4.20	$0	$3,346	15	$39,368	2.78	2157%	144%	36%	$30,646	26,962
	Occupancy Sensors		$920	$460	$460	2,595	0.72	0	0.55	$0	$441	10	$3,724	1.04	7097%	710%	96%	$3,303	3,555

Assumptions:

The electric cost used in this ECM was $0.168/kWh, which was the Senior Center's average rate for the 12-month period ranging from October, 2008 through September, 2009. The replacements for each lighting fixture, the costs to replace or retrofit each one, and the rebates and wattages for each fixture are located in Appendix A.

Rebates/financial incentives:

The New Jersey SmartStart offers rebates for upgrading lighting fixtures and installing lighting controls. The total rebate this ECM qualifies for is $2,820.

ECM#2: Upgrade Plumbing Fixtures

Description:

In the Senior Center restrooms, there were a total of 12 toilets, 4 urinals, and 12 sinks that should be upgraded to current water efficient units that use less water per use. The current toilets are rated at 3.5 gal/flush, the current urinals are rated at 3 gal/flush, and the current sinks are rated at 2.5 gal/min. Low-flow sinks and toilets are available at 1.5 gal/min for sinks and 1.6 gal/min for toilets, and waterless urinals are also available.

Installation cost: Low-flow (1.6 gpf) toilets: $1,700 each
Waterless urinals: $600 each
Low-flow (1.5 gpm) sinks: $600 each
Source of cost estimate: Contractor, RS Means CostWorks 2009

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
2	Upgrade Bathroom Plumbing Fixures	Contractor, RSMeans CostWorks 2009	$30,000	$0	$30,000	0	0.00	0	0.00	$0	$3,205	15	$37,712	9.36	171%	11%	7%	$8,259	0

Assumptions:

The cost per gallon of water is typically $0.01/gal. All toilets and urinals are estimated to be used twice per hour (the facility is in use 72 hours per week), and it was assumed that there is one 30-second use of a sink for each use of a toilet or urinal.

Rebates/financial incentives:

No rebates or incentives for plumbing fixtures could be found.

ECM#3: Heating Upgrade

Description:

The Senior Center, which shares a natural gas account with the Field House, is heated by seven York Model DCG rooftop units and an HB Smith boiler. The rooftop units also provide a portion of the building's cooling. All units of these units have reached the end of their useful lives and are in poor condition. It is recommended that the rooftop units be replaced with units that have a high Seasonal Energy Efficiency Ratio (SEER) and a high heating efficiency, and the boiler, along with the 37 unit ventilators, be replaced with a high-efficiency, condensing boiler. Hot water outdoor air reset control (OAR) is also recommended for installation. These controllers reduce the maximum boiler water temperature depending on the outside air temperature; for instance, if the outside air temperature is 0°F, the boiler temperature will be 180°F, but if the outside air temperature is 40°F, the boiler temperature will only need to be 130°F. Outdoor air reset generally decreases heating costs by 8-15%.

Installation cost:

Estimated installed cost: Rooftop units: $9,000 each, $63,000 total
Boiler, pumps, burner, flue: $80,000
37 unit ventilators: $129,500 @ $3,500 each
Outdoor air reset control: $2,000
Total: $145,000

Source of cost estimate: Similar projects, RS Means CostWorks 2009

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
3	Heating Upgrade	Similar projects	$274,500	$218,000	$56,500	10,184	2.84	1,391	10.86	$0	$3,303	25	$56,249	17.11	-2%	0%	3%	$1,010	30,223

Assumptions:

The cost per therm of natural gas, taken from twelve months of the Field House and Senior Center's gas bills, was $1.134. Also taken from these bills was the annual heating consumption for all heating units in the two buildings, 6,752 therms. The cost per kWh of electricity is $0.168. Every rooftop unit was missing a nameplate and a model number, but since York Model DCG units are all between 3 and 6 tons, it is estimated that they are all 5 tons. All Model DCGs have a SEER of 10. The heating capacity of units also must to be estimated, much like the cooling capacities. All 5-ton model DCGs have heating capacities of 100 or 125 MBH; these units were estimated to be 100 MBH. There are twelve heating units in all buildings combined, so the gas consumption must be divided between these units. An accurate way to go about this is to add the heating capacities

of all twelve units, and make the percentage of the total gas consumption that each unit consumed proportional to the percentage of the cumulative heating capacities that each unit represents:

Building	Unit	MBH	% of Total	Therms
Sr. Center	Boiler	807	32.84%	2,218
	7 RTUs	700	28.49%	1,924
Field House	Furnace #1&2	250	10.18%	687
	Furnace #3&4	700	28.49%	1,924

In this same manner, the cooling consumption for each cooling unit at the Senior Center could be calculated. First, the total amount of electricity used for cooling must be separated from the electric bills. Between October, 2008 and September, 2009, the Senior Center consumed 184,600 kWh of electricity. In the months of May through September, 2009, and October, 2008, the electric consumption was higher than it was from November, 2008 through April, 2008; this can be attributed to cooling. Therefore, the difference between the electric consumptions in the six months cooling was used (113,440 kWh) and the six months where cooling was not used (71,160 kWh) would be the amount of electricity used for cooling in this 12-month period (42,280 kWh). The cooling consumed by the rooftop units and the chiller can now be calculated:

Unit	Tons	% of Total	kWh
Chiller	40	53.33%	22,549
7 RTUs	35	46.67%	19,731

All York Model DCGs, as well as the boiler, are 80% efficient; due to the poor condition of these units, the actual efficiency can be estimated to be 25% lower, or 60%. Efficiencies for new rooftop units will probably not be much higher than 80%. The proposed boiler has an efficiency of 93.6%. The saving was calculated using the following series of equations:

Current Gas Input: Boiler, 2,218 therms; 7 RTUs, 1,924 therms (combined)

Gas Input (therms)×Current Efficiency=Current/Proposed Gas Output (therms)

$$\frac{\text{Gas Output(therms)}}{\text{Proposed Efficiency}}=\text{Proposed Gas Input (therms)}$$

Current Gas Input (therms)-Proposed Gas Input (therms)=Savings (therms)

The gas savings for upgrading the boiler and rooftop units are as follows:

			Efficiency		Current Consumption		Proposed Consumption		Savings	
Unit	MBH	% of Total	Current	Proposed	Input (therms)	Output (therms)	Input (therms)	Output (therms)	Therms	$
Boiler	807	32.84%	60.0%	93.6%	2,218	1,331	1,422	1,331	796	$899.56
7 RTUs	700	28.49%	60.0%	80.0%	1,924	1,154	1,443	1,154	481	$543.41

An additional 8% savings, 114 therms, are now added to the boiler savings, for OAR.

The SEER of the current rooftop units, much like the heating efficiency, should be decreased by 25% due to the age and condition of the units, from 10 to 7.5. New rooftop units have SEERs up to 15.5. The cooling savings were calculated by the following series of equations:

Current Electric Input, all units combined: 19,731 kWh

$$\text{Current/Proposed Cooling Output (BTU)} = \text{Current Electric Input (kWh)} \times \text{SEER} \left(\frac{\text{BTU}}{\text{Wh}}\right) \times \frac{1{,}000\ \text{Wh}}{\text{kWh}}$$

$$\text{Proposed Electric Input (kWh)} = \frac{\text{Proposed Cooling Outut (BTU)}}{\text{SEER} \left(\frac{\text{BTU}}{\text{Wh}}\right) \times \frac{1{,}000\ \text{Wh}}{\text{kWh}}}$$

Savings (kWh)=Current Electric Input (kWh)-Proposed Electric Input (kWh)

The cooling savings for upgrading the rooftop units were as follows:

SEER		Current Input/Output		Proposed Input/Output		Savings	
Current	Proposed	kWh (in)	BTU (out)	kWh (in)	BTU (out)	kWh	$
7.5	15.5	19,731	147,980,000	9,547	147,980,000	10,184	$1,731.21

Rebates/financial incentives:

This ECM may be eligible for incentives through New Jersey's Direct Install Program, which can incentivize up to 80% of the total installation cost, which we estimate to be $218,000 for this measure. Please note that these incentive levels are estimates based on SWA's expected project cost and assumption of project eligibility. Actual incentive levels and project eligibility can only be determined through an Energy Assessment performed by a Direct Install Contractor.

ECM#4: Install Thermal-Pane Windows

Description:

The windows at the Senior Center have passed their useful life of 35 years. They are thin and single-paned; such windows do not provide much thermal resistance. In addition, the current units are not equipped with thermal breaks, allowing for excess heat loss. Replacing the windows with double-paned units with aluminum framing and thermal breaks will prevent heat from escaping in the winter and entering in the summer, therefore reducing the amount the heating and cooling systems need to work, saving energy and adding longevity to the lives of the systems.

Installation cost:

Estimated installed cost: $83,471 at $62 per square-foot
Source of cost estimate: Similar projects

Economics:

ECM #	ECM description	Source	Est. Installed Cost, $	Est. Incentives, $	Net Est. ECM Cost with Incentives, $	kWh, 1st Yr Savings	kW, Demand Reduction/Mo	Therms, 1st Yr Savings	kBtu/sq ft, 1st Yr Savings	Est. Operating Cost, 1st Yr Savings, $	Total 1st Yr Savings, $	Life of Measure, Yrs	Est. Lifetime Energy Cost Savings, $	Simple Payback, Yrs	Lifetime Return on Investment, %	Annual Return on Investment, %	Internal Rate of Return, %	Net Present Value, $	CO_2 Reduced, lbs/yr
4	Install Thermal-Pane Windows	Similar Projects	$83,471	$0	$83,471	1,137	0.3	1,803	11.51	$0.00	$2,231	35	$46,559	37.42	-1%	0%	0%	-$35,543	22,652

Assumptions:

The area of the windows that are recommended to be replaced is 1,346.3 square feet. The averages, over the previous 12 month period, utility rates for the Senior Center are $0.168/kWh for electricity and $1.134/therm for natural gas. The cost of installation, using several similar projects as a guideline, was determined assuming $62 per square-foot of windows. The current windows are single-pane, and have a thermal resistance (R-value) of 0.90, equivalent to an overall heat transfer coefficient (U-factor) of 1.11. The proposed windows have an R-value of 3.8 and a U-factor of 0.26. The efficiency of the proposed heating system was estimated to be 90%, as all heating units have been recommended in previous ECMs to be upgraded to gas units. The mean SEER (Seasonal Energy Efficiency Ratio) for the current air conditioning units is approximately 12, as it is recommended that all cooling units that have not been upgraded recently be upgraded to high-SEER units. The assumed indoor temperature in the cooling season is 72°F, and for the heating season, 68°F. The building is in use 72 hours per week. The calculations were performed using a heat transfer analysis, with 5°F bin temperature data for Newark, NJ. The first step in calculating the savings is to multiply the annual hourly occurrences for each 5°F bin by the difference between that temperature and the desired indoor temperature (bin temperatures above 72°F were considered to be the cooling season, and below were considered to be a heating season), and sum all of these values for heating and cooling. The unit for these two values will be hrs.×°F, and shall be represented as ($t \times \Delta T$), with t representing time and ΔT representing the temperature difference. Current and proposed heat loss was calculated using the following equations:

$U \times Area \times (t \times \Delta T)_{cool}$=Annual heat loss, cooling (in BTU)

$U \times Area \times (t \times \Delta T)_{heat}$=Annual heat loss, heating (in BTU)

The energy savings, in BTUs, were calculated using the difference between the current and proposed heat losses, for heating and cooling. Electric and natural gas savings were calculated using the following equations:

$$\frac{(\text{Cost of Electric}) \times (\text{Energy Savings})_{cool}}{\text{EER} \times 1{,}000} \times \frac{\text{Weekly Hours of Operation}}{24 \times 7} = \text{Cooling Savings}$$

$$\frac{(\text{Cost of Electric}) \times (\text{Energy Savings})_{heat}}{3{,}412 \frac{\text{BTU}}{\text{kWh}} \times (\text{Efficiency})_{\text{heating system}}} \times \frac{\text{Weekly Hours of Operation}}{24 \times 7} = \text{Heating Savings}$$

Rebates/financial incentives:

No rebates or incentives for window upgrades could be found.

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1 Existing Systems

There are currently no existing renewable energy systems.

5.2 Solar Photovoltaic

Photovoltaic (PV) technology would not be cost beneficial to this project since there is such a high cost of installation and small area of viable space available.

5.3 Solar Thermal Collectors

Solar thermal collectors are not cost effective for this project and are not recommended due to the low amount of domestic hot water use throughout the building.

5.4 Combined Heat and Power

CHP is not applicable to this project because of the HVAC system type and limited domestic hot water usage.

5.5 Geothermal

Geothermal is not applicable to this project because it would require modifications to the existing heat distribution system, which would not be cost effective.

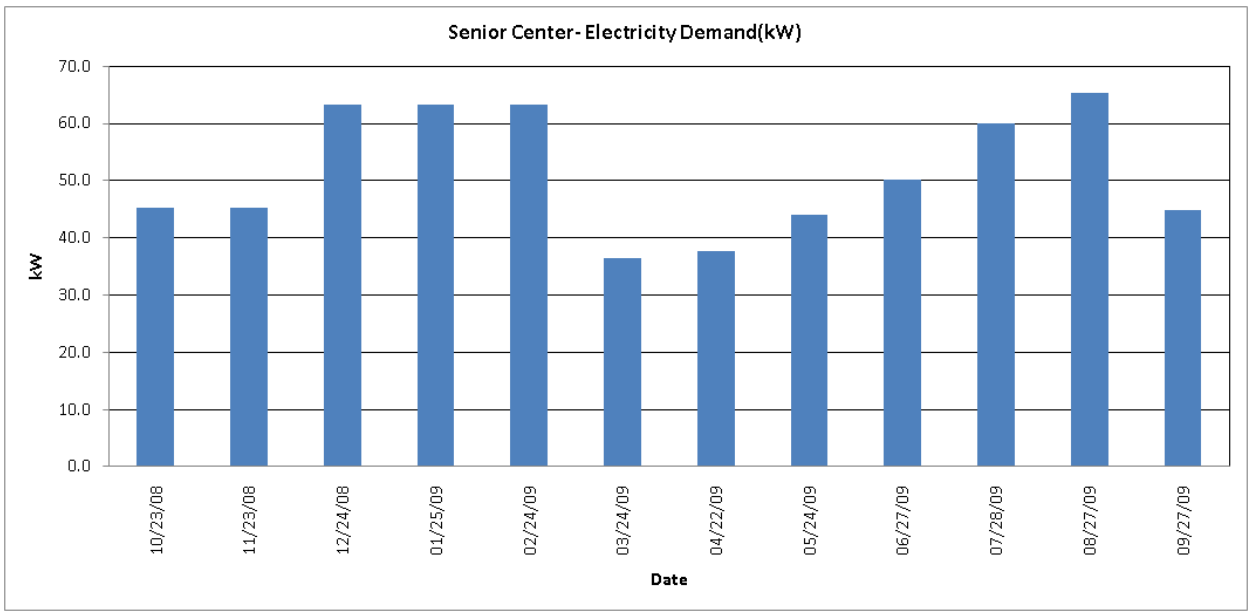
5.6 Wind

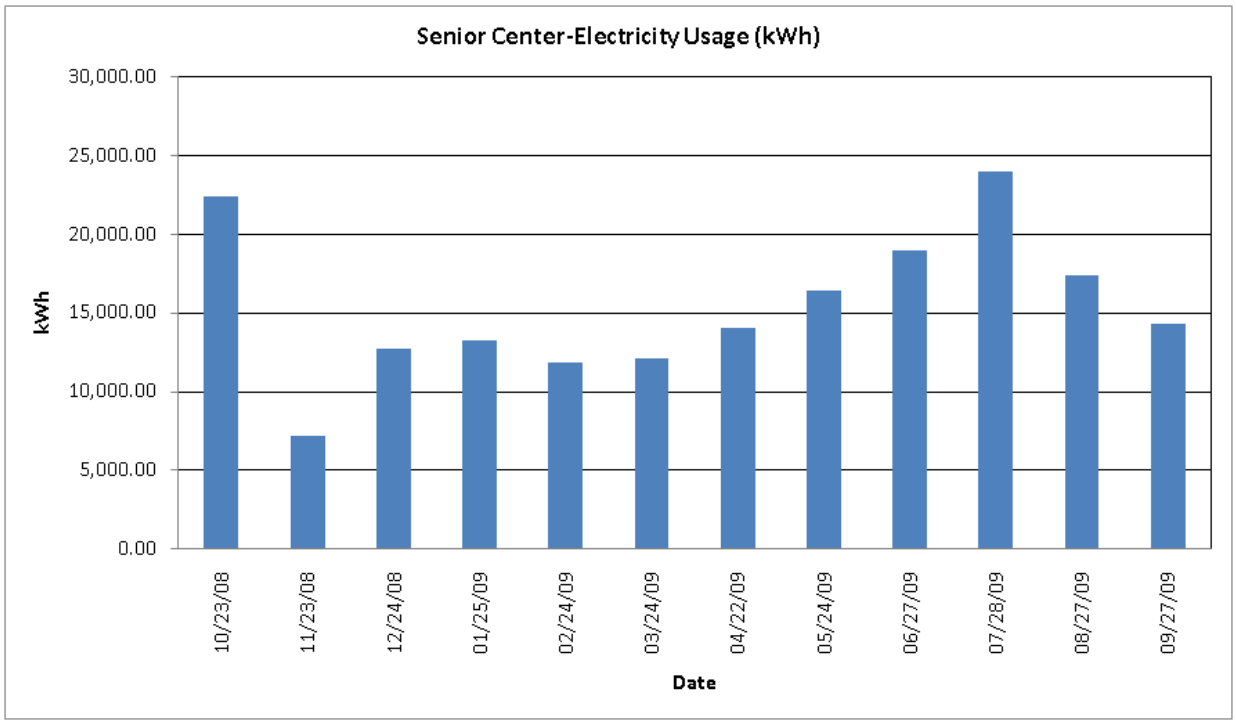
Wind power production is not appropriate for this location because required land is not available for the wind turbine. Also, the available wind energy resource is very low.

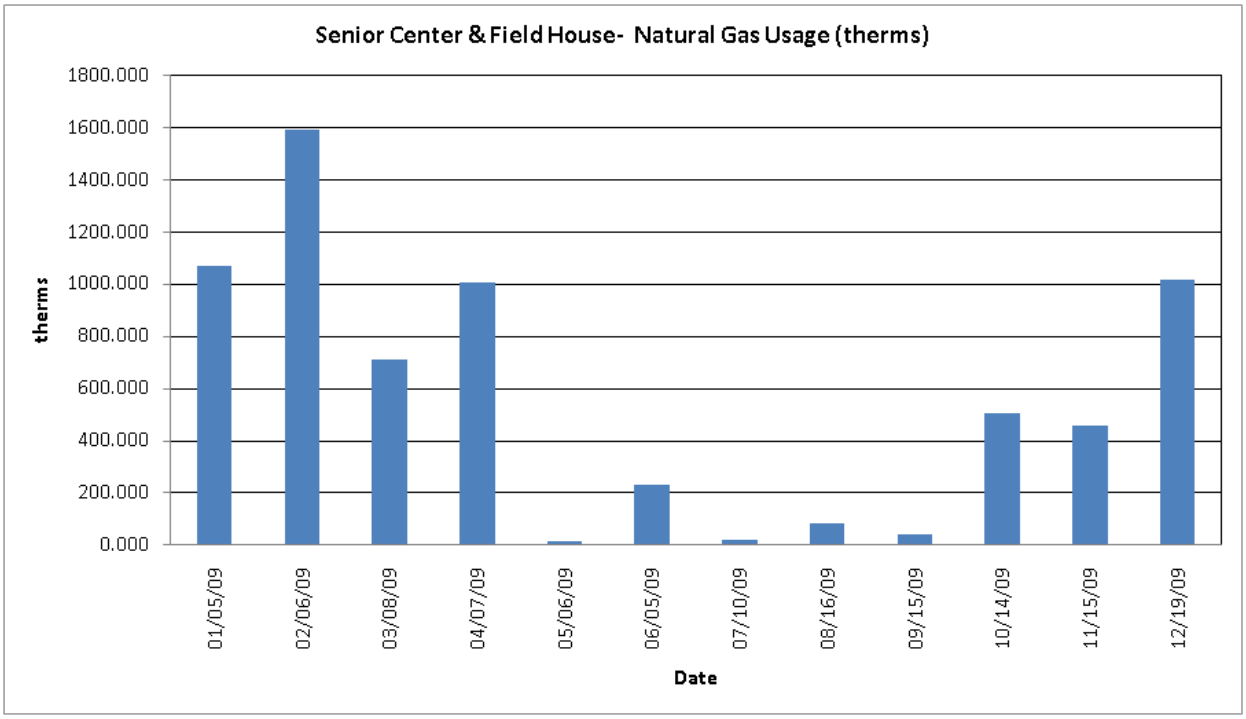
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1 Load profiles

The average electrical peak demand for the facility during previous year was 51.6 kW and the maximum peak demand was 65.4 kW. The Senior Center and Field House share natural gas service. The electric and gas load profiles for this project are presented in the following charts. The first chart shows the electric demand (in kW) for the previous 12 months and the other two charts show electric (in kWh) and gas usage (in therms), respectively.


Senior Center- Electricity Demand(kW)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
kW
10/23/08
11/23/08
12/24/08
01/25/09
02/24/09
03/24/09
04/22/09
05/24/09
06/27/09
07/28/09
08/27/09
09/27/09
Date


Senior Center-Electricity Usage (kWh)
30,000.00
25,000.00
20,000.00
15,000.00
10,000.00
5,000.00
0.00
kWh
10/23/08
11/23/08
12/24/08
01/25/09
02/24/09
03/24/09
04/22/09
05/24/09
06/27/09
07/28/09
08/27/09
09/27/09
Date

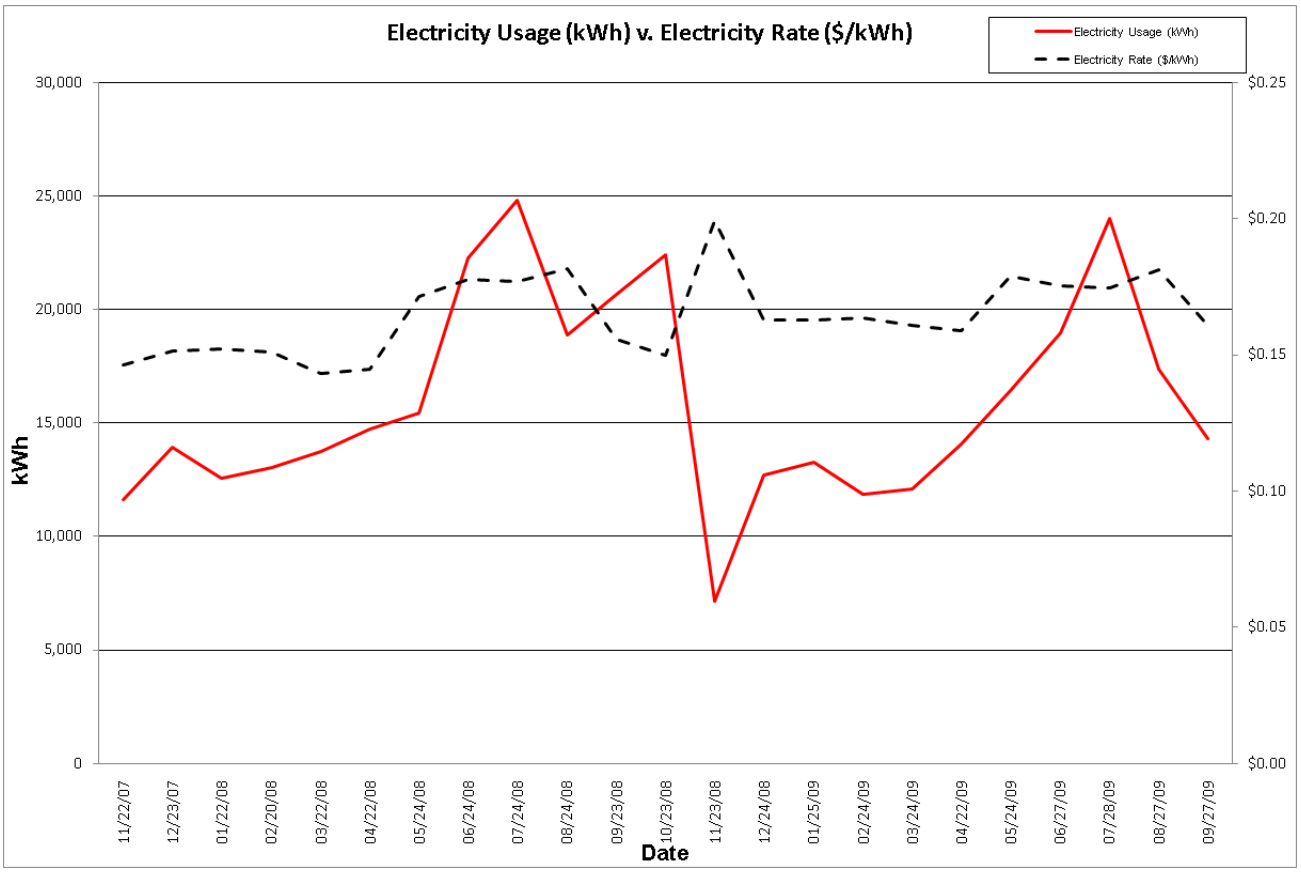


6.2 Energy Procurement strategies

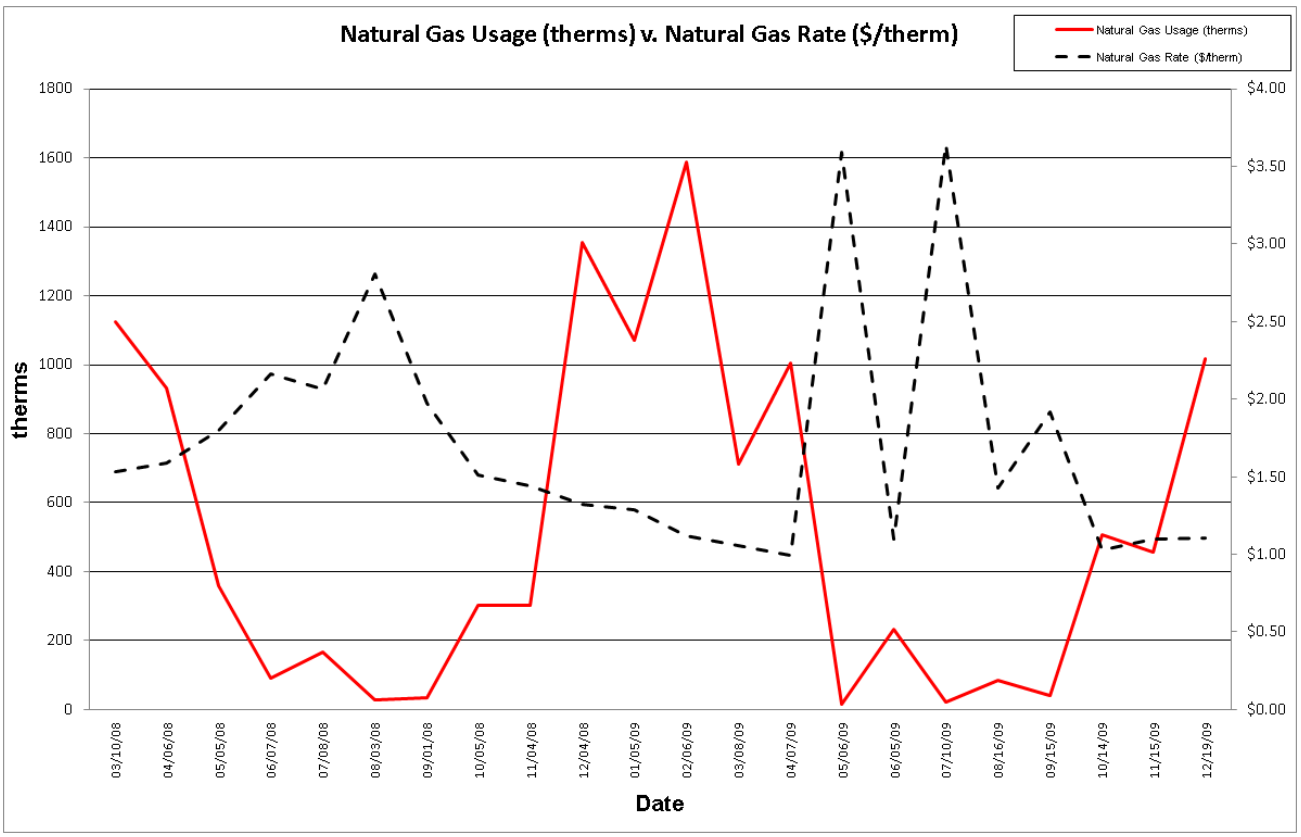
Billing analysis shows price fluctuations of over 20% over the course of the year for the building's electrical and natural gas accounts. This may be reflective of the utility tariffs under which the building owner secures its' energy supply. These tariffs often include seasonally adjusted demand charges, or seasonally adjusted usage charges which reflect the markets for the underlying energy commodity.
Buildings which have a large variation in monthly billing rates can often reduce the costs associated with energy procurement by selecting a third party energy supplier who can provide them with fixed pricing over the course of a contract term as well as attain purchasing economies which may not be available on a utilities default tariff (basic generation service in the case of electric and basic gas service in the case of natural gas).

SWA/BSG-PMK also recommends that the Township of Middletown contact third party energy suppliers in order to negotiate a lower electricity rate. Comparing the current electric rate to average utility rates of similar type buildings in New Jersey, it may be possible to save up to $ 0.018/kWh, which would have equated to $3,323 for the past 12 months.

Contact the NJ Energy Choice Program for further information on companies that can act as third party (non-utility) energy suppliers. Purchasing energy from a third party supplier can reduce price fluctuations and can ultimately reduce the annual cost of energy for the facility. Appendix B contains a complete list of third party energy suppliers.



Electricity prices reflect electricity usage



Natural gas prices and usage levels fluctuate over the course of the year

7. METHOD OF ANALYSIS

7.1 Assumptions and tools

Energy modeling tool:	established / standard industry assumptions, E-Quest
Cost estimates:	RS Means 2009 (Facilities Maintenance & Repair Cost Data) RS Means 2009 (Building Construction Cost Data) RS Means 2009 (Mechanical Cost Data) Published and established specialized equipment material and labor costs. Cost estimates also based on utility bill analysis and prior experience with similar projects

7.2 Disclaimer

This engineering audit was prepared using the most current and accurate fuel consumption data available for the site. The estimates that it projects are intended to help guide the owner toward best energy choices. The costs and savings are subject to fluctuations in weather, variations in quality of maintenance, changes in prices of fuel, materials, and labor, and other factors. Although we cannot guarantee savings or costs, we suggest that you use this report for economic analysis of the building and as a means to estimate future cash flow.

THE RECOMMENDATIONS PRESENTED IN THIS REPORT ARE BASED ON THE RESULTS OF ANALYSIS, INSPECTION, AND PERFORMANCE TESTING OF A SAMPLE OF COMPONENTS OF THE BUILDING SITE. ALTHOUGH CODE-RELATED ISSUES MAY BE NOTED, BSG-PMK AND SWA STAFF HAVE NOT COMPLETED A COMPREHENSIVE EVALUATION FOR CODE-COMPLIANCE OR HEALTH AND SAFETY ISSUES. THE OWNER(S) AND MANAGER(S) OF THE BUILDING(S) CONTAINED IN THIS REPORT ARE REMINDED THAT ANY IMPROVEMENTS SUGGESTED IN THIS SCOPE OF WORK MUST BE PERFORMED IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS THAT APPLY TO SAID WORK. PARTICULAR ATTENTION MUST BE PAID TO ANY WORK WHICH INVOLVES HEATING AND AIR MOVEMENT SYSTEMS, AND ANY WORK WHICH WILL INVOLVE THE DISTURBANCE OF PRODUCTS CONTAINING MOLD, ASBESTOS, OR LEAD.

LIGHTING ANALYSIS

Middletown Township
Senior Center
900 Leonardville Road

BIRDSALL SERVICES GROUP
ENGINEERS & CONSULTANTS

Upgrade Code	Upgrade Description	Existing		Proposed		Lighting		
		Fixture	Watts	Fixture	Watts	Total # of Upgrades	Cost per Upgrade ($)	SmartStart Rebate per Upgrade
1	(3) 4' 34W T12 Lamps, Magnetic Ballasts / Retrofit with T8 Lamps, Electronic Ballast	3L4' EE/STD	130	3L4' T8/ELEC	89	88	$80.00	$15.00
2	LED Exit Sign / No Upgrade	LED	2	No Upgrade	2	8	$0.00	$0.00
3	(4) 4' 34W T12 Lamps, Magnetic Ballasts / Retrofit with T8 Lamps, Electronic Ballast	4L4' EE/STD	160	4L4' T8/ELEC	110	11	$90.00	$15.00
4	60W Incandescent Lamp / Replace with 13W Compact Fluorescent	60W INCANDESCENT	60	13W CF/SI	15	14	$6.00	$0.00
5	(2) 4' 34W T12 Lamps, Magnetic Ballasts / Retrofit with T8 Lamps, Electronic Ballast	2L4' EE/STD	80	2L4' T8/ELEC	61	53	$60.00	$15.00
6	13W Compact Fluorescent / No Upgrade	13W CF/SI	15	No Upgrade	15	9	$0.00	$0.00
7	100W Metal Halide HID Fixture / No Upgrade	100W MV/BALLAST	120	No Upgrade	120	19	$0.00	$0.00
8	150W Metal Halide HID Fixture	175W MV/BALLAST	205	No Upgrade	205	12	$0.00	$0.00
9	Halogen Spot Lights	75W HALOGEN	75	26W CF/SI	28	4	$10.00	$0.00
10	Incandescent Exit Sign / Upgrade to LED	15W EXIT	15	LED	2	8	$40.00	$10.00
11						0	$0.00	$0.00
12						0	$0.00	$0.00

Summary

	Lighting (Only)	Sensors (Only)	Complete Lighting Upgrade
Cost	$11,654.00	$920.00	$12,574.00
Rebate	$2,360.00	$460.00	$2,820.00
Net Cost	$9,294.00	$460.00	**$9,754.00**
Savings (kWh)	19,680	2,595	**21,436**
Savings ($)	$3,345.61	$441.08	**$3,644.06**
Payback	2.8	1.0	**2.7**

Variables:

$0.17	Avg. Electric Rate ($/kWh)
	Avg. Demand Rate ($/kW)
3744	Operating Hours/Year
10	Operating Hours/Work Day

Assumptions:

25%	Occupancy Sensor Savings (Avg)
40%	Occupancy Sensor Savings(>Avg)

Notes:

Seq. #	Upgrade Code	Room/Area	Hrs/ Work Day	Hrs/ Year	Existing				Proposed			kW Reduction	Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	Controls		Energy Savings, kWh	Cost ($)	Savings ($)	Payback (yrs)	SmartStart Rebate		Energy Savings, kWh	Post-Rebate Cost ($)	Savings ($)	Payback (yrs)
					Fixture	Qty.	Watts	Foot Candles	Fixture	Qty.	Watts						Type	Qty.					Lighting	Sensors				
		Totals:					23591				17504	6.087	19680	$11,654.00	$3,345.61	3.5			2595	$920.00	$441.08	2.1	$2,360.00	$460.00	21436	$9,754.00	$3,644.06	2.7
1	1	Lobby	10	3744	3L4' EE/STD	2	260		3L4' T8/ELEC	2	178	0.082	307	$160.00	$52.19	3.1			0	$0.00	$0.00		$30.00	$0.00	307	$130.00	$52.19	2.5
2	2	Lobby	10	3744	LED	2	4		No Upgrade	2	4	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
3	1	Assembly Room	8	2995.2	3L4' EE/STD	18	2340		3L4' T8/ELEC	18	1602	0.738	2210	$1,440.00	$375.78	3.8	OSW	2	1752	$400.00	$297.87	1.3	$270.00	$40.00	3410	$1,530.00	$579.71	2.6
4	2	Assembly Room	8	2995.2	LED	2	4		No Upgrade	2	4	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
5	1	Kitchen	8	2995.2	3L4' EE/STD	4	520		3L4' T8/ELEC	4	356	0.164	491	$320.00	$83.51	3.8			0	$0.00	$0.00		$60.00	$0.00	491	$260.00	$83.51	3.1
6	1	Men's Room	10	3744	3L4' EE/STD	1	130		3L4' T8/ELEC	1	89	0.041	154	$80.00	$26.10	3.1			0	$0.00	$0.00		$15.00	$0.00	154	$65.00	$26.10	2.5
7	5	Men's Room	10	3744	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	142	$120.00	$24.19	5.0			0	$0.00	$0.00		$30.00	$0.00	142	$90.00	$24.19	3.7
8	1	Corridor	10	3744	3L4' EE/STD	4	520		3L4' T8/ELEC	4	356	0.164	614	$320.00	$104.38	3.1			0	$0.00	$0.00		$60.00	$0.00	614	$260.00	$104.38	2.5
9	1	Transportation	8	2995.2	3L4' EE/STD	2	260		3L4' T8/ELEC	2	178	0.082	246	$160.00	$41.75	3.8			0	$0.00	$0.00		$30.00	$0.00	246	$130.00	$41.75	3.1
10	1	Women's Room	10	3744	3L4' EE/STD	1	130		3L4' T8/ELEC	1	89	0.041	154	$80.00	$26.10	3.1			0	$0.00	$0.00		$15.00	$0.00	154	$65.00	$26.10	2.5
11	5	Women's Room	10	3744	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	142	$120.00	$24.19	5.0			0	$0.00	$0.00		$30.00	$0.00	142	$90.00	$24.19	3.7
12	1	Room(off of entrance)	8	2995.2	3L4' EE/STD	2	260		3L4' T8/ELEC	2	178	0.082	246	$160.00	$41.75	3.8			0	$0.00	$0.00		$30.00	$0.00	246	$130.00	$41.75	3.1
13	2	Corridor	10	3744	LED	1	2		No Upgrade	1	2	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
14	3	Room 1	8	2995.2	4L4' EE/STD	1	160		4L4' T8/ELEC	1	110	0.05	150	$90.00	$25.46	3.5			0	$0.00	$0.00		$15.00	$0.00	150	$75.00	$25.46	2.9
15	3	Room 2	8	2995.2	4L4' EE/STD	1	160		4L4' T8/ELEC	1	110	0.05	150	$90.00	$25.46	3.5			0	$0.00	$0.00		$15.00	$0.00	150	$75.00	$25.46	2.9
16	3	Room 3	8	2995.2	4L4' EE/STD	1	160		4L4' T8/ELEC	1	110	0.05	150	$90.00	$25.46	3.5			0	$0.00	$0.00		$15.00	$0.00	150	$75.00	$25.46	2.9
17	3	Room 4	8	2995.2	4L4' EE/STD	1	160		4L4' T8/ELEC	1	110	0.05	150	$90.00	$25.46	3.5			0	$0.00	$0.00		$15.00	$0.00	150	$75.00	$25.46	2.9
18	4	Entrance to Stairwell	10	3744	60W INCANDESC	1	60		13W CF/SI	1	15	0.045	168	$6.00	$28.64	0.2			0	$0.00	$0.00		$0.00	$0.00	168	$6.00	$28.64	0.2
19	4	Stairwell	10	3744	60W INCANDESC	2	120		13W CF/SI	2	30	0.09	337	$12.00	$57.28	0.2			0	$0.00	$0.00		$0.00	$0.00	337	$12.00	$57.28	0.2
20	6	Stairwell	10	3744	13W CF/SI	1	15		No Upgrade	1	15	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
21	3	Stairwell	10	3744	4L4' EE/STD	1	160		4L4' T8/ELEC	1	110	0.05	187	$90.00	$31.82	2.8			0	$0.00	$0.00		$15.00	$0.00	187	$75.00	$31.82	2.4
22	3	Room 6	8	2995.2	4L4' EE/STD	1	160		4L4' T8/ELEC	1	110	0.05	150	$90.00	$25.46	3.5			0	$0.00	$0.00		$15.00	$0.00	150	$75.00	$25.46	2.9
23	3	Room 7	8	2995.2	4L4' EE/STD	1	160		4L4' T8/ELEC	1	110	0.05	150	$90.00	$25.46	3.5			0	$0.00	$0.00		$15.00	$0.00	150	$75.00	$25.46	2.9
24	3	Room 8	8	2995.2	4L4' EE/STD	4	640		4L4' T8/ELEC	4	440	0.2	599	$360.00	$101.84	3.5			0	$0.00	$0.00		$60.00	$0.00	599	$300.00	$101.84	2.9
25	4	Custodial Supply	1	374.4	60W INCANDESC	1	60		13W CF/SI	1	15	0.045	17	$6.00	$2.86	2.1			0	$0.00	$0.00		$0.00	$0.00	17	$6.00	$2.86	2.1
26	5	Nutrition Room	8	2995.2	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	114	$120.00	$19.35	6.2			0	$0.00	$0.00		$30.00	$0.00	114	$90.00	$19.35	4.7
27	4	Closet	0.5	187.2	60W INCANDESC	1	60		13W CF/SI	1	15	0.045	8	$6.00	$1.43	4.2			0	$0.00	$0.00		$0.00	$0.00	8	$6.00	$1.43	4.2
28	5	Room 1	8	2995.2	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	114	$120.00	$19.35	6.2			0	$0.00	$0.00		$30.00	$0.00	114	$90.00	$19.35	4.7
29	5	Room 2	8	2995.2	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	114	$120.00	$19.35	6.2			0	$0.00	$0.00		$30.00	$0.00	114	$90.00	$19.35	4.7
30	5	Room 3	8	2995.2	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	114	$120.00	$19.35	6.2			0	$0.00	$0.00		$30.00	$0.00	114	$90.00	$19.35	4.7
31	5	Room 4	8	2995.2	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	114	$120.00	$19.35	6.2			0	$0.00	$0.00		$30.00	$0.00	114	$90.00	$19.35	4.7
32	5	Room 5	8	2995.2	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	114	$120.00	$19.35	6.2			0	$0.00	$0.00		$30.00	$0.00	114	$90.00	$19.35	4.7
33	4	Bathroom	10	3744	60W INCANDESC	2	120		13W CF/SI	2	30	0.09	337	$12.00	$57.28	0.2			0	$0.00	$0.00		$0.00	$0.00	337	$12.00	$57.28	0.2
34	4	Bathroom	10	3744	60W INCANDESC	3	180		13W CF/SI	3	45	0.135	505	$18.00	$85.92	0.2	OSR	1	168	$260.00	$28.64	9.1	$0.00	$105.00	548	$173.00	$93.09	1.9
35	5	Room 6	8	2995.2	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	114	$120.00	$19.35	6.2			0	$0.00	$0.00		$30.00	$0.00	114	$90.00	$19.35	4.7
36	5	Room 6	8	2995.2	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	114	$120.00	$19.35	6.2			0	$0.00	$0.00		$30.00	$0.00	114	$90.00	$19.35	4.7
37	2	Corridor	10	3744	LED	2	4		No Upgrade	2	4	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
38	1	Kitchen	8	2995.2	3L4' EE/STD	2	260		3L4' T8/ELEC	2	178	0.082	246	$160.00	$41.75	3.8			0	$0.00	$0.00		$30.00	$0.00	246	$130.00	$41.75	3.1
39	1	All Purpose Room	8	2995.2	3L4' EE/STD	32	4160		3L4' T8/ELEC	32	2848	1.312	3930	$2,560.00	$668.05	3.8			0	$0.00	$0.00		$480.00	$0.00	3930	$2,080.00	$668.05	3.1
40	10	Exit	24	8760	15W EXIT	8	120		LED	8	16	0.104	911	$320.00	$154.88	2.1			0	$0.00	$0.00		$80.00	$0.00	911	$240.00	$154.88	1.5
41	4	Closet	0.5	187.2	60W INCANDESC	1	60		13W CF/SI	1	15	0.045	8	$6.00	$1.43	4.2			0	$0.00	$0.00		$0.00	$0.00	8	$6.00	$1.43	4.2
42	1	Pool Table Room	8	2995.2	3L4' EE/STD	4	520		3L4' T8/ELEC	4	356	0.164	491	$320.00	$83.51	3.8			0	$0.00	$0.00		$60.00	$0.00	491	$260.00	$83.51	3.1
43	1	Hallway	14	5241.6	3L4' EE/STD	10	1300		3L4' T8/ELEC	10	890	0.41	2149	$800.00	$365.34	2.2			0	$0.00	$0.00		$150.00	$0.00	2149	$650.00	$365.34	1.8
44	1	Closet	0.5	187.2	3L4' EE/STD	2	260		3L4' T8/ELEC	2	178	0.082	15	$160.00	$2.61	61.3			0	$0.00	$0.00		$30.00	$0.00	15	$130.00	$2.61	49.8
45	1	Foyer	8	2995.2	3L4' EE/STD	2	260		3L4' T8/ELEC	2	178	0.082	246	$160.00	$41.75	3.8			0	$0.00	$0.00		$30.00	$0.00	246	$130.00	$41.75	3.1
46	1	Mens Room	10	3744	3L4' EE/STD	1	130		3L4' T8/ELEC	1	89	0.041	154	$80.00	$26.10	3.1			0	$0.00	$0.00		$15.00	$0.00	154	$65.00	$26.10	2.5
47	1	Womens Room	10	3744	3L4' EE/STD	1	130		3L4' T8/ELEC	1	89	0.041	154	$80.00	$26.10	3.1			0	$0.00	$0.00		$15.00	$0.00	154	$65.00	$26.10	2.5
48	5	Womens Room	10	3744	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	142	$120.00	$24.19	5.0			0	$0.00	$0.00		$30.00	$0.00	142	$90.00	$24.19	3.7
49	4	Janitors Closet	1	374.4	60W INCANDESC	1	60		13W CF/SI	1	15	0.045	17	$6.00	$2.86	2.1			0	$0.00	$0.00		$0.00	$0.00	17	$6.00	$2.86	2.1
50	5	Mens Room	10	3744	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	142	$120.00	$24.19	5.0			0	$0.00	$0.00		$30.00	$0.00	142	$90.00	$24.19	3.7
51	2	Exit	24	8760	LED	1	2		No Upgrade	1	2	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
52	5	Pool Table Room	8	2995.2	2L4' EE/STD	4	320		2L4' T8/ELEC	4	244	0.076	228	$240.00	$38.70	6.2			0	$0.00	$0.00		$60.00	$0.00	228	$180.00	$38.70	4.7
53	5	Hallway	10	3744	2L4' EE/STD	7	560		2L4' T8/ELEC	7	427	0.133	498	$420.00	$84.65	5.0			0	$0.00	$0.00		$105.00	$0.00	498	$315.00	$84.65	3.7
54	4	Closet	0.5	187.2	60W INCANDESC	1	60		13W CF/SI	1	15	0.045	8	$6.00	$1.43	4.2			0	$0.00	$0.00		$0.00	$0.00	8	$6.00	$1.43	4.2
55	4	Closet	0.5	187.2	60W INCANDESC	1	60		13W CF/SI	1	15	0.045	8	$6.00	$1.43	4.2			0	$0.00	$0.00		$0.00	$0.00	8	$6.00	$1.43	4.2
56	5	Restroom	10	3744	2L4' EE/STD	2	160		2L4' T8/ELEC	2	122	0.038	142	$120.00	$24.19	5.0			0	$0.00	$0.00		$30.00	$0.00	142	$90.00	$24.19	3.7
57	6	Restroom	10	3744	13W CF/SI	4	60		No Upgrade	4	60	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
58	5	Card Room	8	2995.2	2L4' EE/STD	6	480		2L4' T8/ELEC	6	366	0.114	341	$360.00	$58.05	6.2			0	$0.00	$0.00		$90.00	$0.00	341	$270.00	$58.05	4.7
59	5	Meeting Room	10	3744	2L4' EE/STD	9	720		2L4' T8/ELEC	9	549	0.171	640	$540.00	$108.84	5.0	OSR	1	674	$260.00	$114.57	2.3	$135.00	$315.00	1154	$350.00	$196.19	1.8
60	5	Kitchen	6	2246.4	2L4' EE/STD	1	80		2L4' T8/ELEC	1	61	0.019	43	$60.00	$7.26	8.3			0	$0.00	$0.00		$15.00	$0.00	43	$45.00	$7.26	6.2
61	7	Outside	7	2620.8	100W MV/BALLA	19	2280		No Upgrade	19	2280	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
62	6	Outside	7	2620.8	13W CF/SI	4	60		No Upgrade	4	60	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
63	8	Outside	7	2620.8	175W MV/BALLA	12	2460		No Upgrade	12	2460	0	0	$0.00	$0.00				0	$0.00	$0.00		$0.00	$0.00	0	$0.00	$0.00	
64	9	Outside	7	2620.8	75W HALOGEN	4	300		26W CF/SI	4	112	0.188	493	$40.00	$83.76	0.5			0	$0.00	$0.00		$0.00	$0.00	493	$40.00	$83.76	0.5

Appendix B: Third Party Energy Suppliers (ESCOs)

Supplier	Telephone & Web Site
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009 Attn: Brian Vayda	877-977-2636 bvayda@americanpowernet.com www.americanpowernet.com
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com
ConEdison Solutions Cherry Tree Corporate Center 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	212-538-3124 www.creditsuisse.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07962	(800) 977-0500 Supply chain website www.firstenergycorp.com/supplierregistration www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	1-877-569-2841 www.glacialenergy.com
Hess Corporation 1 Hess Plaza Woodbridge, NJ 070956	(800) 437-7872 Tom Miller www.hess.com
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	1-877-763-9977 Dole Janssen: 920-617-6029 Charles Kuntz: 614-844-4324 www.integrysenergy.com

Supplier	Telephone & Web Site
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866)769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Palmco Power NJ, LLC One Greentree Centre 10000 Lincoln Drive East, Suite 201 Marlton, NJ 08053	(877) 726-5862 www.PalmcoEnergy.com
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	(800) ENERGY-9 (363-7499) www.pepco-services.com
PPL Energy Plan, LLC 811 Church Road Cherry Hill, NJ 08002	800-281-2000 www.pplenergyplus.com
Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 732-596-6400-Tony Buck www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 Gary Bean gbean@sjindustries.com www.southjerseyenergy.com

M:\Cranford\Jobs\Steven Winter Associates\602492093896 - Middletown\Reports\Pub Library-Bayshore\093896-8E-EE-Draft-BayshoreLib.docx