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May 5, 2010

Local Government Energy Program
Energy Audit Report

For

Mount Laurel Township

Church Street EMS building
1051 S. Church Street
Mount Laurel, NJ 08054

Project Number: LGEA22

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INTRODUCTION

As an approved energy consulting firm under the Local Government Energy Audit Program (LGEA), Steven Winter Associates, Inc. (SWA) was selected to perform an energy audit and assessment for the Mount Laurel Township buildings. The audit included a review of the Mount Laurel EMS building (201 Masonville Road), EMS building (1051 S. Church Street), Library, Administrative building, Paws Farm, Paws Farm (Farmhouse) and the Senior Meeting Center. The buildings are located in Mount Laurel, NJ. A separate energy audit report is issued for each of the referenced buildings.

This report addresses the Mount Laurel – Church Street EMS building located at 1051 S. Church Street, Mount Laurel, NJ. The current conditions and energy-related information were collected in order to analyze and suggest the implementation of building improvements and energy conservation measures.

The EMS building was opened in 1976, and since undergone one renovation in or around 2001. The building consists of approximately 5,420 square feet of conditioned space with occupancy of approximately 10 employees. Due to the building being used for Emergency Medical Services, the building is accessible for 24 hours per day but only occupied when necessary.

The goal of this Local Government Energy Audit (LGEA) is to provide sufficient information to Mount Laurel Township to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the building.

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 that additional 25% will also be paid by the program. The Board of Public Utilities (BPU's) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

- Section 1 and section 2 of the report cover a description and analysis of the building existing condition.
- Section 3 provides a detailed inventory of major electrical and mechanical systems in the building.
- Sections 4 through 7 provide a description of our recommendations.
- Appendices include further details and information supporting SWA's recommendations.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Mount Laurel – Church Street EMS building located at 1051 S. Church Street, Mount Laurel, NJ. The building is a single story building with a total floor area of approximately 5,420 square feet. The EMS building opened in 1976, and since then there has been one renovation in or around 2001 to the building.

Based on the field visit performed by the SWA staff on September 30th and October 1st, 2009 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.

Existing conditions

From March 2008 through March 2009, the period of analysis for this audit, the building consumed 58,582 kWh or $9,173 worth of electricity at an approximate rate of $0.156/kWh and 2,190 therms or $2,982 worth of natural gas at an approximate rate of $1.362 per therm. The joint energy consumption for the building including both electricity and fossil fuel was 420 MMBtus of energy that cost a total of $12,155.

SWA has entered energy information about the EMS building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. Currently, the building is not eligible for a performance rating since it is classified as an EMS building. SWA encourages Mount Laurel Township to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time.

The Site Energy Use Intensity is 79.0 kBtu/sq ft yr compared to the national average of 104 kBtu/sq ft yr. Implementing this report's highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 0.1 kBtu/sqft yr, with an additional 8.7 kBtu/sq ft yr from the recommended ECMs with a 5-10 year payback and an additional 1.0 kBtu/sq ft yr from the Recommended End of Life Cycle ECMs.

Recommendations

Implementing this report's recommendations will reduce use by approximately 9.8 kBtu/ft^{2}yr, which would decrease the building's energy use intensity to 69.2 kBtu/ft^{2}yr.

The EMS building is accessible 24 hours per day but is only used as emergency medical calls are received and for meetings on occasion. Due to the nature of the EMS building, the heating and cooling system must maintain a constant set point throughout the day and night. SWA recommends a package of mostly lighting measures with the addition of upgrading the unit heater located in the garage space. The three-bay garage is a large volume compared to the rest of the building and therefore has a high heating load. By upgrading the existing unit heater to a higher efficiency, the building will have overall gas savings.

Based on the assessment of the building, SWA has separated the recommendations into three categories (See Section 4 for more details). These are summarized as follows:

Category I Recommendations: Capital Improvement Measures

- Add insulation to attic space of building
- Replace windows
- Replace exterior door

- Replace Carrier thru-wall AC unit

Category II Recommendations: Operations and Maintenance

- Weather-strip overhead doors
- Trim tree located next to building
- Perform routine maintenance inspections on exterior walls
- Perform routine maintenance inspections of the roof
- Perform routine maintenance of exterior envelope
- Provide weather stripping / air sealing
- Provide water efficient fixtures and controls
- Use Energy Star labeled appliances

Category III Recommendations: Energy Conservation Measures

At this time, SWA highly recommends a total of **1** Energy Conservation Measure (ECM) for the EMS building that is summarized in the following Table 1. The total investment cost for this highly recommended ECM with incentives is **$15**. SWA estimates a first year savings of **$7** with a simple payback of **2.3 years**. SWA also recommends **2** ECM with a 5-10 year payback that is summarized in Table 2 and **1** End of Life Cycle ECM.

The implementation of all the recommended ECMs would reduce the building electric usage by 8,749 kWh annually or 15% of the building's current electric consumption and would reduce the building natural gas usage by 227 therms or 10% of the building's current natural gas consumption. SWA estimates that implementing these ECMs will reduce the carbon footprint of the EMS building by **18,168 lbs of CO_2**, which is equivalent to removing approximately 1 car from the roads each year or avoiding the need of 19 trees to absorb the annual CO_2 produced. SWA also recommends that Mount Laurel Township contacts 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 $0.006/kWh, which would have equated to $353 for the past 12 months.

There are various incentives that Mount Laurel Township could apply for that could also help lower the cost of installing the ECMs. SWA recommends that Mount Laurel Township apply for either the NJ SmartStart program or the NJ Clean Power Direct Install program. The NJ SmartStart program provides incentives for prescriptive measures in order to offset the cost of implementation, incentive levels vary by equipment type. The NJ Clean Energy Direct Install program is a new program that provides incentives that could cover up to 80% of the capital investment for prescriptive measures. More information about both programs and how to apply can be found in Appendix D or at the New Jersey Office of Clean Energy's website: http://www.njcleanenergy.com/commercial-industrial/home/home

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

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	Install 1 New CFL lamp	RSMeans	15	$0	15	29	0.0	0	0.1	2	7	5	30	2.3	98.1	19.%	33.1	15	52
	TOTALS		**15**	**0**	**15**	**29**	**0.0**	**0**	**0.1**	**2**	**7**	**-**	**30**	**2.3**	**-**	**-**	**-**	**15**	**52**

Assumptions: Discount Rate: 3.2% per DOE FEMP; Energy Price Escalation Rate: 0% per DOE FEMP Guidelines
Note: A 0.0 electrical demand reduction / month indicates that it is very low / negligible

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	Install 65 new T8 fixtures	RSMeans	13,996	1,950	12,046	7,143	1.5	0	4.5	562	1,676	15	19,725	7.2	63.7	4.2	6.5	2,253	12,790
3	Replace Garage Unit Heater	RSMeans	3,500	400	3,100	0	0.0	227	4.2	60	369	15	4,344	8.4	40.1	2.7	3.3	49	2,502
	TOTALS		**17,496**	**2,350**	**15,146**	**7,143**	**1.5**	**227**	**8.7**	**622**	**2,045**	**-**	**24,069**	**7.4**	**-**	**-**	**-**	**2,302**	**15,292**

Table 3 - Recommended End of Life Cycle 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
4	Install 18 new LED exit signs	RSMeans	1,800	360	1,440	1,577	0.3	0	1.0	31	277	15	3,260	5.2	126.4	8.4	14.1	923	2,824
	TOTALS		**1,800**	**360**	**1,440**	**1,577**	**0.3**	**0**	**1.0**	**31**	**277**	**-**	**3,260**	**5.2**	**-**	**-**	**-**	**923**	**2,824**

1. HISTORIC ENERGY CONSUMPTION

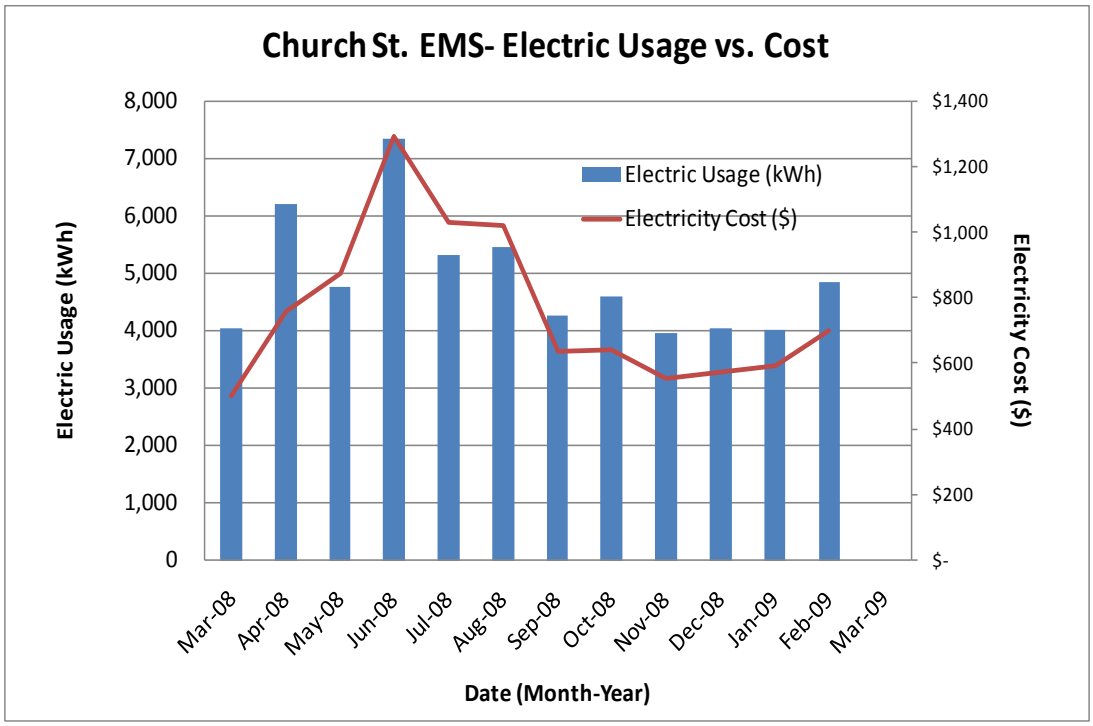
1.1. Energy usage, load profiles and cost analysis

SWA analyzed utility bills from **March 2008 through March 2009** (period of analysis) that were received from the utility companies supplying the EMS building with electric and natural gas.

Electricity - The EMS building buys electricity from PSE&G at **an average rate of $0.156/kWh** based on 12 months of utility bills from March 2008 to March 2009. The EMS building purchased **approximately 58,782 kWh or $9,173 worth of electricity** in the previous year. The building is currently charged for demand (kW) which has been factored into each monthly bill. The building has an average demand of **12.7 kW** and a peak demand of **15.2 kW.**

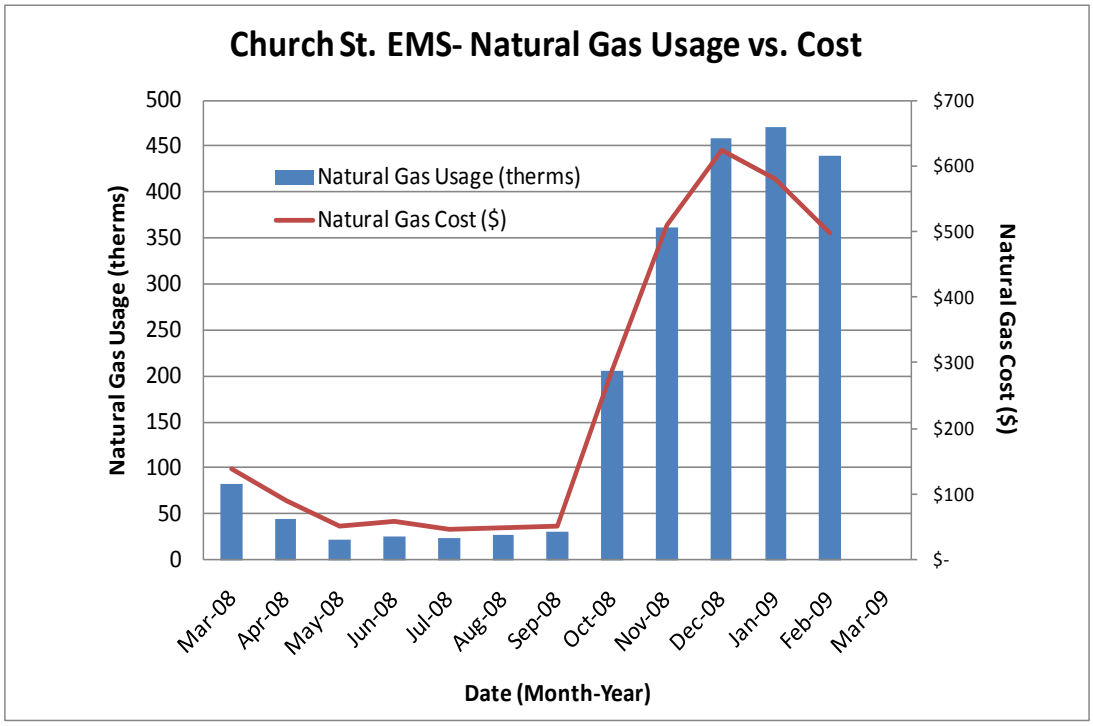
Natural gas - The EMS building is currently served by one meter for natural gas. The EMS building currently buys natural gas from PSE&G at **an average aggregated rate of $1.362/therm** based on 12 months of utility bills for March 2008 to March 2009. The EMS building purchased **approximately 2,190 therms or $2,982 worth of natural gas** in the previous year.

The following chart shows electricity use versus cost for the EMS building based on utility bills for the 12 month period of March 2008 to March 2009.



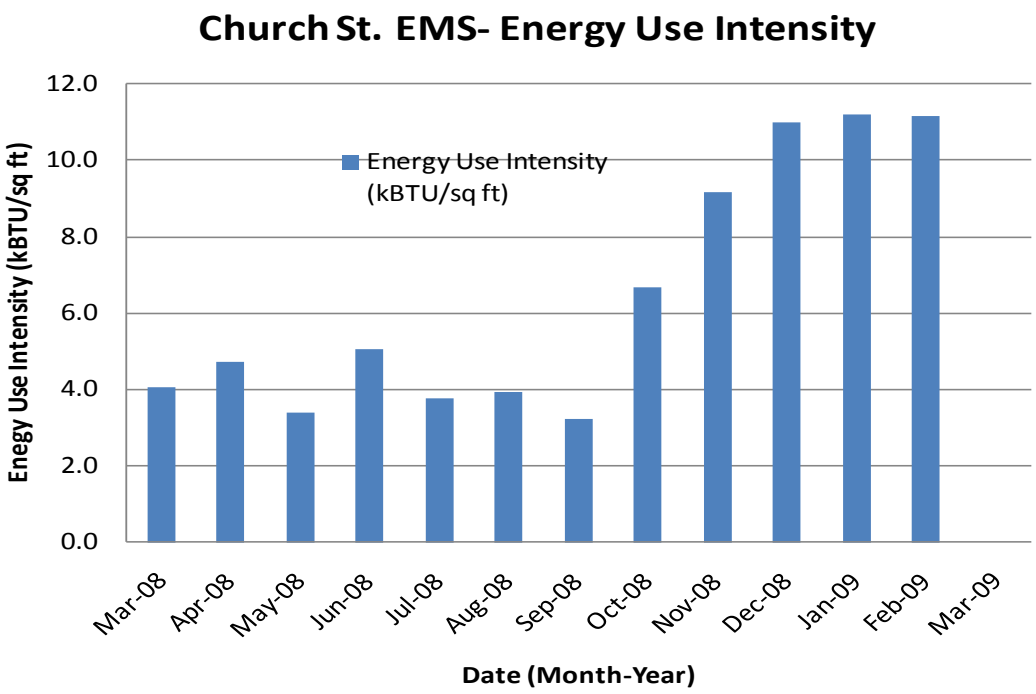
Electricity use follows the expected trend; peaking during the summer months when air conditioning units are used most and decreases during the winter. April 2008 shows a peak but most likely from an unusually cold span of weather and also billing adjustments between actual and estimated meter readings.

The following is a chart of the natural gas annual load profile for the building versus natural gas costs, peaking in the coldest months of the year.



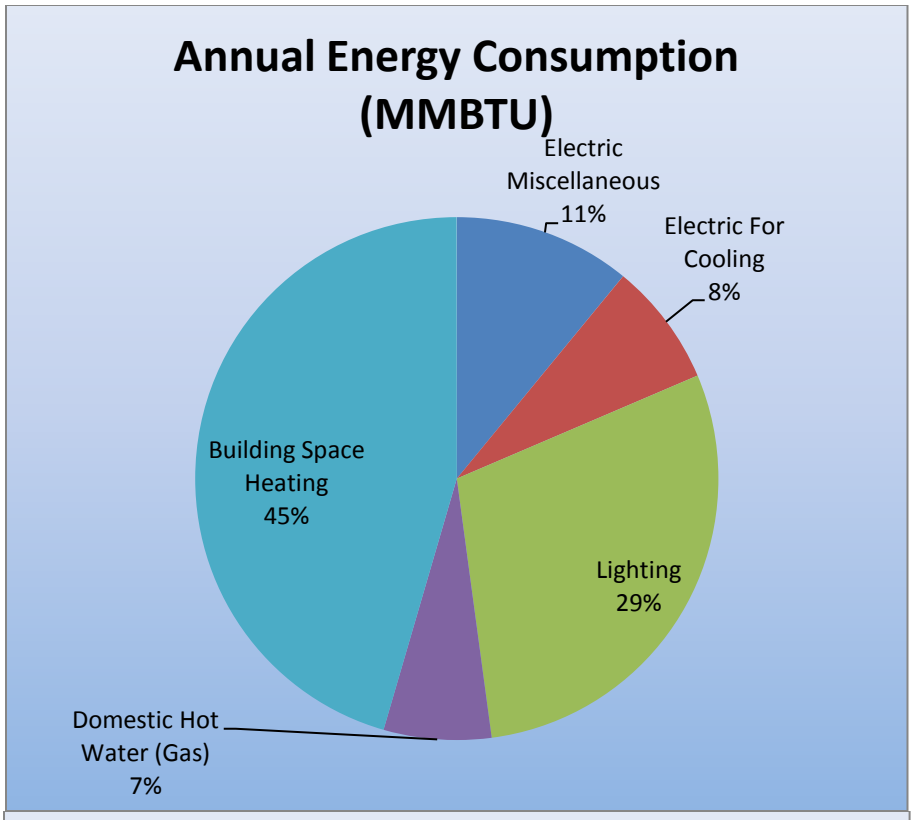
In the above chart, the natural gas use follows a heating trend as expected. During the summer it is clear that the natural gas use is very minimal which reflects that heat is not being used and the domestic hot water (DHW) load is minimal.

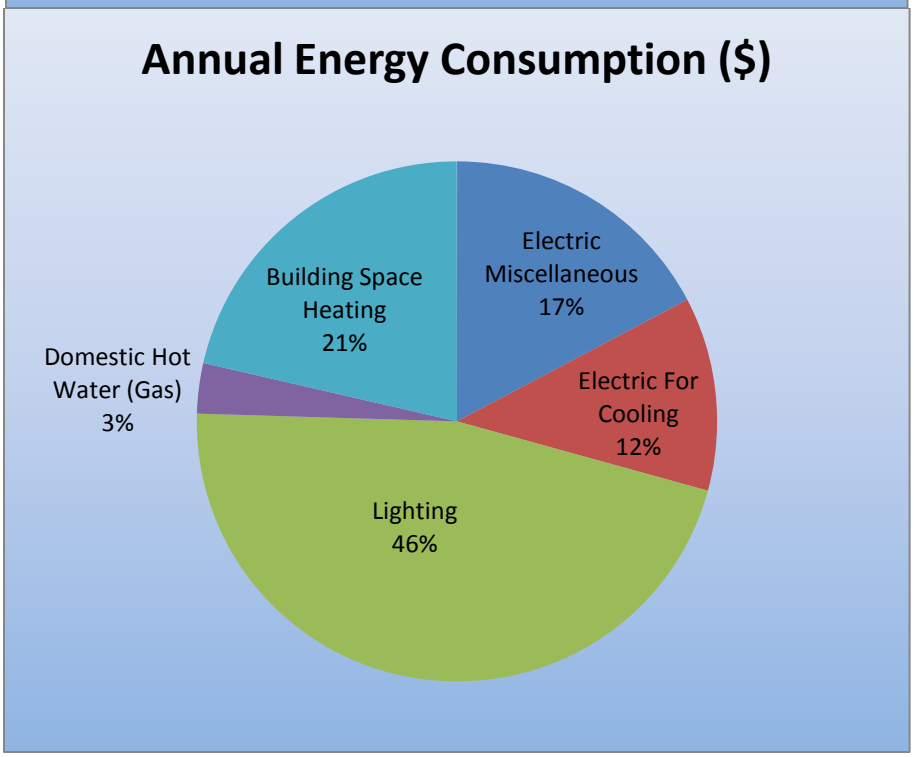
The following chart shows combined natural gas and electric consumption in kBtu/sq ft for the EMS building based on utility bills for the 12 month period of March 2008 to March 2009.



The following table and chart pies show energy use for the EMS building based on utility bills for the 12 month period of March 2008 to March 2009. Note electrical cost at $45.6/MMBtu of energy is more than 3 times as expensive to use as natural gas at $13.6/MMBtu.

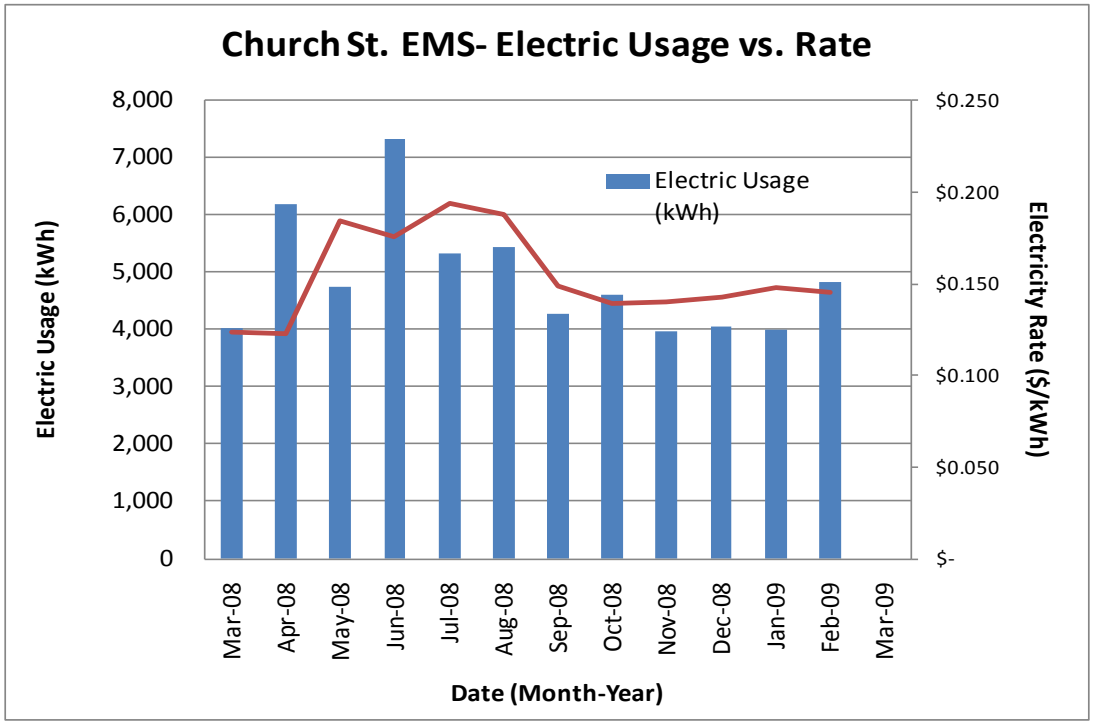
2008 Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	46	11%	$2,098	17%	45.6
Electric For Cooling	32	8%	$1,459	12%	45.6
Lighting	123	29%	$5,609	46%	45.6
Domestic Hot Water (Gas)	28	7%	$381	3%	13.6
Building Space Heating	191	45%	$2,598	21%	13.6
Totals	420	100%	$12,144	100%	
Total Electric Usage	201	48%	$9,173	75%	45.6
Total Gas Usage	219	52%	$2,982	25%	13.6
Totals	420	100%	$12,155		


Annual Energy Consumption (MMBTU)
Electric Miscellaneous 11%
Electric For Cooling 8%
Building Space Heating 45%
Lighting 29%
Domestic Hot Water (Gas) 7%


Annual Energy Consumption ($)
Electric Miscellaneous 17%
Building Space Heating 21%
Domestic Hot Water (Gas) 3%
Electric For Cooling 12%
Lighting 46%

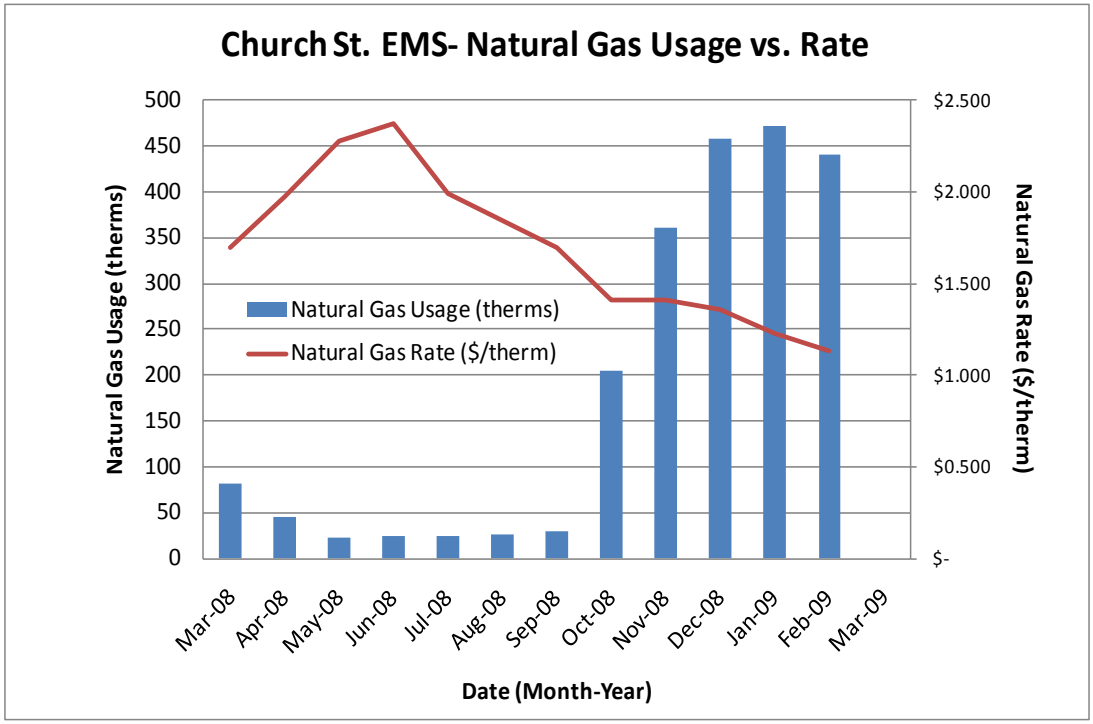
1.2. Utility rate analysis

The EMS building currently purchases electricity from PSE&G at a general service market rate for electricity use (kWh) including a separate (kW) demand charge that is factored into each monthly bill. The EMS building currently pays an average rate of approximately $0.156/kWh based on the 12 months of utility bills of March 2008 to March 2009. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. The electric rate does not show large fluctuations throughout the year except for the anticipated rate increase during the summer months, and therefore appears to be the appropriate rate for the building.



The EMS building currently purchases natural gas supply from the PSE&G at a general service market rate for natural gas (therms). There is one gas meter that provides natural gas service to the EMS building currently. The average aggregated rate (supply and transport) for the meter is approximately $1.362/therm based on 12 months of utility bills for March 2008 to March 2009. The suppliers' general service rate for natural gas charges a market-rate price based on use and the EMS building billing does not breakdown demand costs for all periods. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the natural gas prices increase during the summer months when natural gas is used the least. Also contributing to the high gas price per therm fluctuations in the summer may be the low use caps for the non-heating months. Thus the building pays for fixed costs such as meter reading charges during the summer months.

Some of the minor unusual utility fluctuations that showed up for a couple of months on the utility bills may be due to adjustments between estimated and actual meter readings.



1.3. Energy benchmarking

From March 2008 through March 2009, the period of analysis for this audit, the building consumed 58,782 kWh or $9,173 worth of electricity at an approximate rate of $0.156/kWh and 2,190 therms or $2,982 worth of natural gas at an approximate rate of $1.362 per therm. The joint energy consumption for the building, including both electricity and fossil fuel, was 420MMBtus of energy that cost a total of $12,155.

SWA has entered energy information about the EMS building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. Currently, the building is not eligible to receive a performance rating since it is classified as an EMS building. SWA encourages the Mount Laurel Township to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time.

The Site Energy Use Intensity is 79.0 kBtu/sq ft yr compared to the national average of 104.0 kBtu/sq ft yr. The Energy Use Intensity is low because the building has limited use and is not operated on a set schedule compared to commercial buildings such as offices. Implementing this report's highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 0.1 kBtu/sqft yr, with an additional 8.7 kBtu/sq ft yr from the recommended ECMs with a 5-10 year payback and 1.0 kBtu/sqft yr from recommended End of Life Cycle ECMs.

Per the LGEA program requirements, SWA has assisted Mount Laurel Township to create an *Energy Star Portfolio Manager* account and has shared the building facility information to allow future data to be added and tracked using the benchmarking tool. SWA is sharing this Portfolio Manager Site information with TRC Energy Services. As per requirements, the account information is provided below:

[redacted]

Also, below is a statement of energy performance generated based on historical energy consumption from the Portfolio Manager Benchmarking tool.

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Mount Laurel Township - Church St. EMS

Building ID: 1923541
For 12-month Period Ending: February 28, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: January 29, 2010

Facility	**Facility Owner**	**Primary Contact for this Facility**
Mount Laurel Township - Church St. EMS 1051 S. Church Street Mount Laurel, NJ 08054	N/A	N/A

Year Built: 1976
Gross Floor Area (ft²): 5,420

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	207,678
Natural Gas (kBtu)[4]	221,641
Total Energy (kBtu)	429,319
Energy Intensity[5]	
Site (kBtu/ft²/yr)	79
Source (kBtu/ft²/yr)	171
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	43
Electric Distribution Utility	
Public Service Elec & Gas Co	
National Average Comparison	
National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	-20%
Building Type	Other

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.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, PE facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The EMS building was built in 1976 and has undergone one renovation in or around 2001. The building has an approximate total area of 5,420 square feet and houses administrative offices, a three bay garage, a lounge, kitchen and bunk rooms.

2.2. Building occupancy profiles

The building is accessible 24 hours per day due to the nature of being an EMS building. There are at least 10 staff members that occupy the building on a regular basis.

2.3. Building envelope

2.3.1.Exterior Walls

The exterior wall assemblies consist of 4" CMU block walls with ½ inch of polyisocyanurate (a rigid foil-faced insulation) located on the exterior wall sections and vinyl siding. SWA could not verify the exterior wall insulation at the time of the audit with the help of infrared technology due to warm outside temperatures. SWA recommends as part of a capital improvement to increase the insulation in the wall cavities to current building code of R-19, currently R-3 in the existing building. There were no obvious signs of water or moisture damage noted on the exterior or interior of the wall assemblies. There was a bee or wasp nesting spotted near an entrance on a light fixture. Also the tree seen in the image below should be trimmed as it may affect proper roof drainage. SWA recommends regular maintenance of gutters and downspouts to ensure proper run-off from the roof and the prevention of water damage to the walls.

Typical Exterior wall of building

Tree growing into building

Bee nest around exterior light fixture

2.3.2. Roof

The building has dark brown colored asphalt shingled roof installed approximately 10 years ago. There were no reported problems with roof leaks or maintenance issues reported at the time of SWA's audit. SWA recommends general maintenance to prevent any damage leading to roof leaks. Damaged and/or missing roof shingles should be replaced or repaired as the shingles help create a uniform vapor barrier from the environmental elements.

Asphalt shingle roof

There was no insulation detected above the garage bays or in the attic space of the building. SWA recommends installing insulation in the attic space with a minimum insulation value of R-30 in order to reduce heating and cooling loads while improving occupant comfort.

2.3.3. Base

The building's base is a 4" concrete slab on grade with a perimeter footing and concrete block walls.

2.3.4. Windows

The windows throughout the building are operable single glazed aluminum framed windows. The windows appeared to be in fine condition. SWA recommends exterior and interior inspections of all windows as part of the building's routine maintenance schedule to ensure air and water tight performance year round. It is not cost-effective to replace windows at this time however, if any major renovations are undertaken on the exterior portion of the building, SWA recommends that these windows are replaced with windows that contain a low-e glazing on double-paned glass with a frame that has a thermal break installed.

2.3.5. Exterior doors

The overhead doors located in the three bay garage were observed to be in good condition with the exception of worn weather stripping. Weather stripping around the garage doors for this building is especially important since the three-bay garage relies on a single unit heater to keep warm during the winter. SWA recommends replacing this weather stripping immediately as well as to perform biannual inspections of all exterior door weather stripping to ensure that no expensive, conditioned air is being lost.

Aside from the overhead doors, the metal exterior doors seen in the image below did not form a tight fit to the door frame. SWA recommends replacement of these doors with insulated doors, preferably with a higher R value. SWA recommends performing regular maintenance verifying all weather-stripping on exterior doors (including garage doors) form a tight seal in order to decrease the amount of conditioned air that is lost around each door. Tight seals around doors will help to conserve conditioned air.

Missing weather-stripping on exterior door

2.3.6. Building air tightness

In addition to the above mentioned recommendations SWA suggests air sealing, caulking and/ or insulating around all plumbing, electrical, HVAC and structural envelope penetrations. This should include bottom and top plates, recessed light fixtures, electrical boxes, chimney walls and window, or sleeve air conditioner units. The air tightness of buildings helps to maximize other implemented energy measures and investments and minimizes long term maintenance and repair cost.

2.4. HVAC Systems

2.4.1. Heating

The EMS building contains two separate heating systems; one for the main portion of the building and a separate system for the three bay garage. The main portion of the building is provided forced air heating via a Bryant furnace located in the mechanical room. This furnace, installed in 2006, was observed to be in good condition with no signs of poor performance or lack of maintenance. The bathroom of the building contains one small electric heater that is assumed to be original to the

building and was never replaced. This small electric heater is reaching the end of its lifetime, however it is used very little and would not be cost-effective to replace at this time.
The three-bay garage relies on a single Modine unit heater to provide warmth to the entire area. This Modine unit heater currently has a thermal efficiency of 77% which is low compared to similar unit heaters available on the market at this time.

2.4.2. Cooling

The main portion of the building is cooled while the garage area is not. The ductwork that leads from the Bryant furnace mentioned above (Section 2.4.1 Heating) also contains a cooling coil that acts as a split-type AC system. This cooling coil is connected to a condensing unit on the exterior wall of the mechanical room to provide cooling. In addition to the central cooling system, an older Carrier through-wall air conditioner is mounted in the bunk area. Based on observations and interview with building staff, this unit is used sparsely and most likely used so that occupants can feel cold air blown directly on them. It appears that the central cooling system is adequate enough to provide comfort to all areas and use of the older Carrier unit should be limited. Due to the limited use of the Carrier unit, it will not be cost-effective to replace at this time however, SWA recommends that an efficient, Energy Star unit is considered when the unit is replaced.

2.4.3. Ventilation

As mentioned above, the entire building is provided conditioned air via the ducted heating and cooling system with natural ventilation also provided by windows and doors.

2.4.4. Domestic Hot Water

The EMS building contains one Rheem domestic hot water heater with a 75 gallon capacity and 75,000 BTUH input. This DHW heater is an atmospheric, gas-fired unit. Supply temperature was observed at 125F and the unit was in good condition.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting – The EMS building contains mostly inefficient T12 fluorescent lighting with magnetic ballasts that should be replaced with more efficient T8 fluorescent lighting with electronic ballasts. Typically, replacing T12 fixtures with T8 fixtures will result in a 30% power reduction and energy savings. There was also one incandescent light bulb installed in the Janitor's closet that should be replaced with a Compact Fluorescent Lamp (CFL). See attached lighting schedule in Appendix A for a complete lighting inventory throughout the building and estimated power consumption.

Exit Lights – The EMS building contained 18 incandescent exit signs that should be replaced with more efficient LED technology. . See attached lighting schedule in Appendix A for a complete lighting inventory throughout the building and estimated power consumption.

2.5.2. Appliances

SWA performed a basic survey of appliances installed at the EMS building. Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. For example, Energy Star refrigerators use as little as 315 kWh / yr. When

compared to the average electrical consumption of older equipment, Energy Star equipment results in a large savings. Building management should select Energy Star label appliances and equipment when replacing: refrigerators, printers, computers, copy machines, etc. More information can be found in the "Products" section of the Energy Star website at: http://www.energystar.gov.

Computers left on in the building consume a lot of energy. A typical desk top computer uses 65 to 250 watts and uses the same amount of energy when the screen saver is left on. Televisions use approximately 3-5 watts of electricity when turned off. SWA recommends all computers and all appliances (i.e. refrigerators, coffee makers, televisions, etc) be plugged in to power strips and turned off each evening just as the lights are turned off.

2.5.3. Elevators

The EMS building is one story and therefore contains no elevators.

2.5.4. Process and others electrical systems

There are not currently any other electrical or process systems located in the building.

3. EQUIPMENT LIST

Building System	Description	Physical Location	Make/ Model	Fuel	Space served	Date Installed	Estimated Remaining useful life %
Heating	Bryant furnace, natural gas	Mechanical Room	Bryant, Plus80, Model #395CAV036111, Serial #NA	Natural Gas	All non-garage areas	2006	73%
Heating	Bryant evaporator coil attached to gas furnace, part of a split AC system	Mechanical Room	Bryant, Model #V3514221, Serial #0406872303	Electric	All non-garage areas	2006	73%
Cooling	Bryant Condensor that is attached to evaporator coil/furnace in Mechanical room	Outside of building next to Exterior wall	Bryant, Model #113ANA042-A, Serial #0206E17192	Electric	All non-garage areas	2006	73%
Heating	Modine gas-fired unit heater, 105,000 BTUH input, 80,850 BTUH output, 77% thermal efficiency, 115V, 180W, 2.7 amps, 1 PH, 60 Hz	Garage	Modine, Model #PA105AF, Serial #05012020987	Natural Gas	Garage	2001	50%
Cooling	Carrier through wall AC unit, no nameplate	Bunk Area	Carrier, Model #NA, Serial #NA	Electric	Bunk Area	2001	30%
Heating	Small electric heater located in bathroom, no nameplate	Bathroom	No nameplate, Model #NA, Serial #NA	Electric	Bathroom	1976	10%
Domestic Hot Water	Rheem domestic hot water heater, natural gas, atmospheric, 75 gallon capacity, 75,000 BTUH input	Mechanical Room	Rheem, Rheemglas Fury, Model #21VR75, Serial #RHNG0101G00341	Natural Gas	All areas	2001	20%
Lighting	See Appendix A	-	-	-	-	-	-

Note: The remaining useful life of a system (in %) is an estimate based on the system date of built and existing conditions derived from visual inspection.

4. ENERGY CONSERVATION MEASURES

Based on the assessment of the Library building, SWA 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 Improvements

- Add insulation to attic space of the building – As part of a broad capital improvement plan, Mount Laurel Township should consider adding insulation to the attic space of this building. Adding insulation will reduce operating costs by thermally protecting the building from the outside environment. Adding insulation can help separate the building from these fluctuations and thereby reducing the operating costs of the heating and cooling system by reducing building HVAC loads.

- Replace windows – The existing windows are in good condition, however they contain single pane glass with no low-e coating. At this time it is not cost-effective to replace, however if major exterior renovations are undertaken for the building, replacing these windows with more efficient options should be considered.

- Replace exterior door – SWA noticed one steel door that did not appear to be insulated and was not able to properly close. This door can allow valuable conditioned air out of the building and increase heating and cooling loads on the HVAC system by allowing a penetration in the shell of the building. SWA recommends that this door is replaced with an insulated door with proper weather-stripping.

- Replace Carrier thru-wall AC unit – There is currently an older Carrier unit located in the bunk area of the EMS building. This unit is old and no longer performing as designed. Due to the limited use, it will not be cost-effective to replace at this time. SWA recommends considering upgrading to an efficient Energy Star unit when this unit is replaced.

Category II Recommendations: Operations and Maintenance

- Weather-strip overhead doors – The overhead doors located in the three-bay garage were observed to have deteriorated weather-stripping. This weather-stripping should be repaired or replaced to prevent expensive, conditioned air from escaping the garage area. The garage bays have a large volume that is heated by a single unit heater, therefore maintaining the weather-stripping will ensure that heating loads are kept at a minimum.

- Trim tree located next to building – Currently there is a tree located next to the EMS building with branches that have overgrown a portion of the building. This tree should be maintained and trimmed to prevent debris from clogging the roof gutters and potentially causing water damage.

- Perform routine maintenance inspections of the roof – SWA recommends that biannual inspections of the roof are conducted as part of a preventative maintenance schedule. At this time, there are no major concerns with the roofing material that should be addressed. Properly maintaining the roof will ensure that the vapor barrier as well as insulation levels are not compromised.

- Perform routine maintenance inspections of exterior envelope - SWA recommends that biannual inspections of each window, door and exterior wall are conducted as part of a preventative maintenance schedule.

- Provide weather stripping / air sealing – SWA observed that all windows and doors were in age-appropriate condition, with some exterior doors showing signs of compromised weather-stripping and air sealing. As a best practice, SWA recommends that each window and door is inspected twice per year for deficiencies. Any time that a seal has been compromised, building maintenance staff should repair and replace the seal immediately to ensure that thermal barriers are not breached.

- Provide water efficient fixtures and controls - Adding controlled on / off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and / or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures / appliances will save both energy and money through reduced energy consumption for water heating, while also decreasing water / sewer bills.

- Use Energy Star labeled appliances - such as Energy Star refrigerators that should replace older energy inefficient equipment.

Category III Recommendations: Energy Conservation Measures

Summary table

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Install 1 new CFL lamp
	Description of Recommended 5-10 Year Payback ECMs
2	Install 65 new T8 fixtures
3	Replace Garage Unit Heater
	Description of Recommended End of Life ECMs
4	Install 18 new LED exit signs

ECM#1: *Install 1 new CFL lamp*

Description:
Currently, the EMS building contains one 60W incandescent bulb in the Janitor's closet that should be upgraded to a Compact Fluorescent Lamp (CFL). For a detailed lighting schedule, please see Appendix A.

Installation cost:
Estimated installed cost: $15
Source of cost estimate: RS *Means; Published and established costs*

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
1	Install 1 New CFL lamp	RSMeans	15	0	15	29	0.0	0	0.1	2	7	5	30	2.3	98.1	19.6	33.1	15	52

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes operation cost savings based on avoided bulb replacement when upgrading to lighting that consists of longer rated burn hours.

Rebates / financial incentives:
There are no incentives for this measure at this time.

Options for funding ECM:
This project may benefit from enrolling in the NJ Direct Install or the NJ SmartStart program to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/home/home

ECM#2: *Install 65 new T8 fixtures*

Description:
Currently, the EMS building uses mostly inefficient T12 fluorescent fixtures with magnetic ballasts for general lighting purposes. SWA recommends that each T12 fluorescent fixture is replaced with an efficient T8 fluorescent fixture with electronic ballast. Typically, a T8 fluorescent fixture will save 30% on power and energy consumption. For a detailed lighting schedule, please see Appendix A.

Installation cost:
Estimated installed cost: $12,046
Source of cost estimate: RS *Means; Published and established costs*

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	Install 65 new T8 fixtures	RSMeans	13,996	1,950	12,046	7,143	1.5	0	23.7	562	1,676	15	19,725	7.2	63.7	4.2	6.5	2,253	12,790

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes operation cost savings based on avoided bulb replacement when upgrading to lighting that consists of longer rated burn hours.

Rebates / financial incentives:
NJ Clean Energy – Prescriptive Lighting, T-8 Lamps with electronic ballast in existing facilities ($30 per fixture)
Maximum incentive is $1,950.

Options for funding ECM:
This project may benefit from enrolling in the NJ Direct Install or the NJ SmartStart program to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/home/home

ECM#3: *Replace Garage Unit Heater*

Description:
The three-bay garage area located within the EMS building is a large portion of the total floor area. This area is heated using a single Modine unit heater with an efficiency of 77%. SWA recommends that this unit heater is replaced with a newer, more efficient unit heater similar to the Modine Effinity93 which has an efficiency of 93%. Since the three bay garage has a high ceiling, creating a larger volume and thus a large heating load, increasing the efficiency of the unit heater will ultimately save money.

Installation cost:
Estimated installed cost: $3,100
Source of cost estimate: RSMeans

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	Replace Garage Unit Heater	RSMeans	3,500	400	3,100	0	0.0	227	22.0	60	369	15	4,344	8.4	40.1	2.7	3.3	49	2,502

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumes a operation and maintenance savings of $60 per year based on 2 hours worth of work at an average rate of $30 per hour.

Rebates / financial incentives:
NJ Clean Energy – Gas heating, Gas furnaces ($300-$400 per unit)
Maximum incentive amount is $400.

Options for funding ECM:
This project may benefit from enrolling in the NJ Direct Install or the NJ SmartStart program to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/home/home

ECM#4: *Install 18 new LED exit signs*

Description:
Currently, the EMS building uses inefficient incandescent exit signs. These exit signs present an opportunity for energy savings since they are operated 24 hours per day. SWA recommends that all 18 incandescent exit signs are upgraded to newer, more efficient LED exit signs. For a detailed lighting schedule, please see Appendix A.

Installation cost:
Estimated installed cost: $3,300
Source of cost estimate: RS *Means; Published and established costs*

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 18 new LED exit signs	RSMeans	3,660	360	3,300	1,577	0.3	0	5.2	31	277	15	3,260	11.9	-1.2	-0.1	-3.1	(937)	2,824

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes operation cost savings based on avoided bulb replacement when upgrading to lighting that consists of longer rated burn hours.

Rebates / financial incentives:
NJ Clean Energy – Prescriptive Lighting, LED Exit signs ($10/$20 per fixture)
Maximum incentive is $360.

Options for funding ECM:
This project may benefit from enrolling in the NJ Direct Install or the NJ SmartStart program to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/home/home

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

Existing systems

There are not currently any existing renewable energy systems.

Wind

A Wind system is not applicable for this building because the area does not have winds of sufficient velocity to justify installing a wind turbine system.

Solar Photovoltaic

Solar Photovoltaic panels are not recommended to this building due to the low amount of available South/South-West exposure and limited electric baseload.

Solar Thermal Collectors

Solar thermal collectors are not cost effective for this building and would not be recommended due to the insufficient and not constant use of domestic hot water throughout the building to justify the expenditure.

Combined Heat and Power

CHP is not applicable for this building because of the existing HVAC system and insufficient domestic hot water use.

Geothermal

Geothermal is not applicable for this building because of the current HVAC configuration and would not be cost-effective.

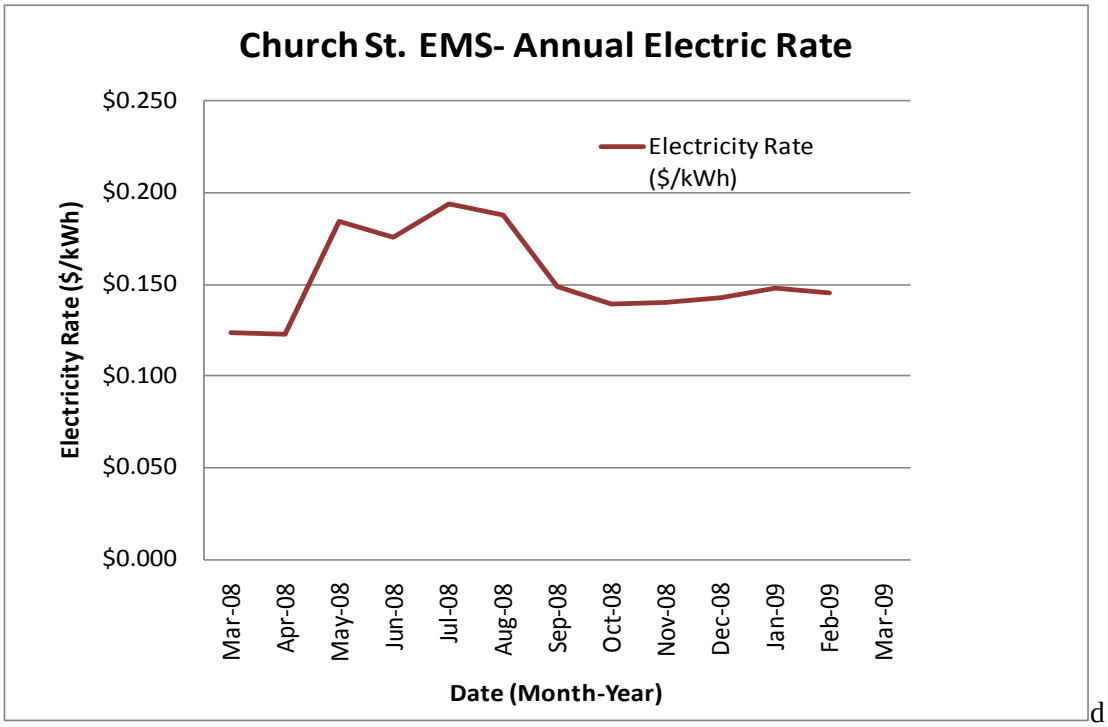
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Energy Purchasing

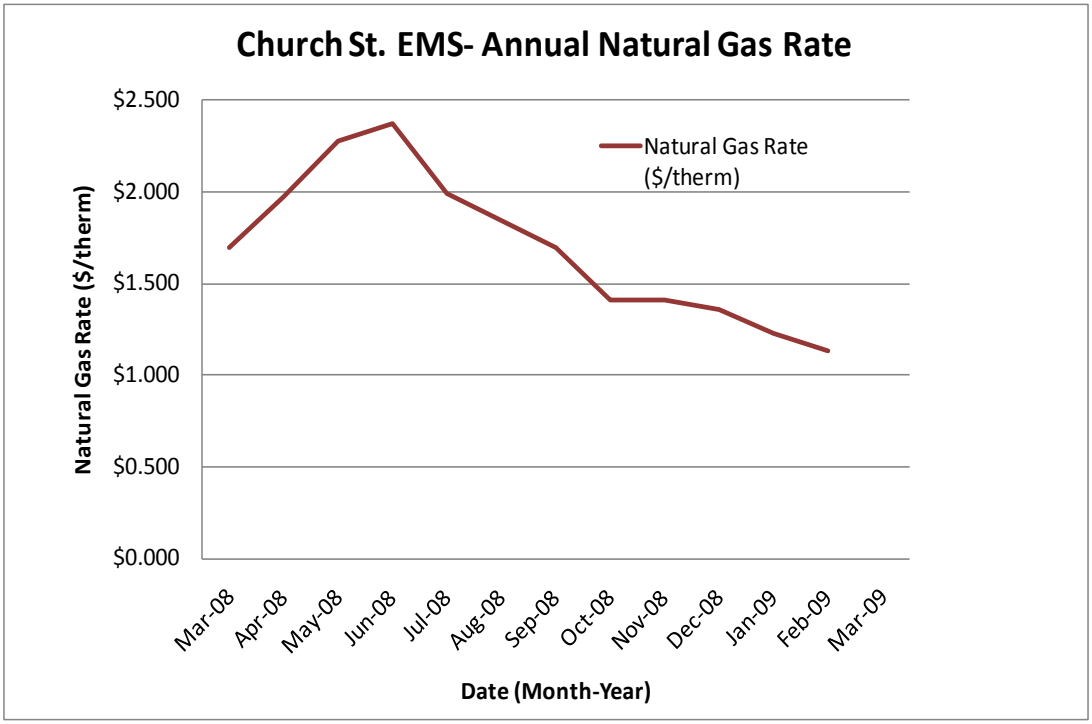
The EMS building receives natural gas via one incoming meter. PSE&G supplies gas to the building. There is not an ESCO engaged in the process. An Energy Services Company (ESCO) is a consultancy group that engages in a performance based contract with a client firm to implement measures which reduce energy consumption and costs in a technically and financially viable manner. Electricity is also purchased via one incoming meter directly for the building from PSE&G without an ESCO. SWA analyzed the utility rate for natural gas and electricity supply over an extended period. Electric bill analysis shows fluctuations of up to 37% over the 12 month period. Natural gas bill analysis shows fluctuations up to 52% over the 12 month period. Some of these fluctuations may be due to unusual high and escalating energy costs in 2008.

Currently, New Jersey commercial buildings of similar type pay $0.150/kWh for electricity and $1.55/therm for natural gas. Currently, the electricity rate for the EMS building is $.156/kWh, which means there is a potential cost savings of $353 per year. The current natural gas rate for the EMS building is $1.362/therm which is better than the average natural gas cost. A cost savings potential for electricity exists, however this involves contacting third party suppliers and negotiating utility rates.

SWA recommends that Mount Laurel Township further explore opportunities of purchasing electricity from third party energy suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the EMS building. Appendix B contains a complete list of third party energy suppliers for the Mount Laurel Township service area. Mount Laurel Township may want to consider partnering with other school districts, municipalities, townships and communities to aggregate a substantial electric and natural gas use for better leveraging in negotiations with ESCOs and of improving the pricing structures. This sort of activity is happening in many parts of the country an



d in New Jersey.



6.2. Energy Procurement strategies

Also, the EMS building would not be eligible for enrollment in a Demand Response Program, because there isn't the capability at this time to shed a minimum of 150 kW electric demand when requested by the utility during peak demand periods, which is the typical threshold for considering this option.

7. METHOD OF ANALYSIS

7.1. Assumptions and tools

Energy modeling tool:	Established / standard industry assumptions, DOE 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, 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.

Appendix A: Lighting Study

Location			Existing Fixture Information												Retrofit Information												Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
1	1	Garage	Parabolic	M	4'T12	28	2	40	S	14	365	15	2,255	13,593	T8	Parabolic	4'T8	E	S	28	2	32	14	365	6	1,798	10,016	3,577	0	3,577
2	1	Garage storage	Parabolic	M	4'T12	4	2	40	S	2	365	15	335	277	T8	Parabolic	4'T8	E	S	4	2	32	2	365	6	262	204	73	0	73
3	1	Breezeway	Parabolic	M	4'T12	1	2	40	S	2	365	15	95	69	T8	Parabolic	4'T8	E	S	1	2	32	2	365	6	70	51	18	0	18
4	1	Mechanical Rm	Parabolic	M	4'T12	4	2	40	S	2	365	15	335	277	T8	Parabolic	4'T8	E	S	4	2	32	2	365	6	262	204	73	0	73
5	1	Oxygen rm	Parabolic	M	4'T12	1	2	40	S	2	365	15	95	69	T8	Parabolic	4'T8	E	S	1	2	32	2	365	6	70	51	18	0	18
6	1	Hallway	4' U-Shape	M	4'T12	8	2	40	S	14	365	15	655	3,884	T8	4' U-Shape	4'T8	E	S	8	2	32	14	365	6	518	2,862	1,022	0	1,022
7	1	Hallway	Exit Sign	N	Inc	18	1	16	N	24	365	0	288	2,523	LEDex	Exit Sign	LED	N	N	18	1	5	24	365	1	91	946	1,577	0	1,577
8	1	Lounge	Parabolic	M	4'T8	7	2	32	S	14	365	13	461	2,754	N/A	Circiline	4'T8	N	S	7	2	32	14	365	13	461	2,754	0	0	0
9	1	Office	Parabolic	M	4'T12	4	2	40	S	14	365	15	335	1,942	T8	Parabolic	4'T8	E	S	4	2	32	14	365	6	262	1,431	511	0	511
10	1	Janitor's Closet	Screw-in	N	Inc	1	1	60	N	2	365	0	60	44	CFL	Screw-in	CFL	N	N	1	1	20	2	365	0	20	15	29	0	29
11	1	Living rm / pool table	Parabolic	M	4'T12	6	4	40	S	14	365	24	984	5,641	T8	Parabolic	4'T8	E	S	6	4	32	14	365	13	781	4,323	1,318	0	1,318
12	1	Bunk rm	Parabolic	M	4'T12	1	4	40	S	6	365	24	184	403	T8	Parabolic	4'T8	E	S	1	4	32	6	365	13	141	309	94	0	94
13	1	Bunk rm	Parabolic	M	4'T8	1	4	32	S	6	365	13	141	309	N/A	Circiline	4'T8	N	S	1	4	32	6	365	13	141	309	0	0	0
14	1	Bathroom Women	Parabolic	M	4'T12	4	2	40	S	6	365	15	335	832	T8	Parabolic	4'T8	E	S	4	2	32	6	365	6	262	613	219	0	219
15	1	Bathroom Men	Parabolic	M	4'T12	4	2	40	S	6	365	15	335	832	T8	Parabolic	4'T8	E	S	4	2	32	6	365	6	262	613	219	0	219
Totals:						92	34	580				209	6,893	33,450						92	34	441				5,401	24,701	8,749	0	8,749

Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space

Appendix B: Third Party Energy Suppliers (ESCOs)

http://www.state.nj.us/bpu/commercial/shopping.html

Third Party Electric Suppliers for PSEG Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.com
BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.boc.com
Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728	(800) 556-8457 www.commerceenergy.com
ConEdison Solutions 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 07926	(800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 www.metroenergy.com
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com
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	(800) 363-7499 www.libertypowercorp.com
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) 363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002	(800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.com
Suez Energy Resources NA, Inc. 333 Thornall Street, 6th Floor Edison, NJ 08837	(888) 644-1014 www.suezenergyresources.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
Cooperative Industries	(800) 628-9427
412-420 Washington Avenue	www.cooperativenet.com
Belleville, NJ 07109	
Direct Energy Services, LLC	(866) 547-2722
120 Wood Avenue, Suite 611	www.directenergy.com
Iselin, NJ 08830	
Dominion Retail, Inc.	(866) 275-4240
395 Highway 170, Suite 125	www.retail.dom.com
Lakewood, NJ 08701	
Gateway Energy Services Corp.	(800) 805-8586
44 Whispering Pines Lane	www.gesc.com
Lakewood, NJ 08701	
UGI Energy Services, Inc.	(856) 273-9995
704 East Main Street, Suite 1	www.ugienergyservices.com
Moorestown, NJ 08057	
Great Eastern Energy	(888) 651-4121
116 Village Riva, Suite 200	www.greateastern.com
Princeton, NJ 08540	
Hess Corporation	(800) 437-7872
1 Hess Plaza	www.hess.com
Woodbridge, NJ 07095	
Hudson Energy Services, LLC	(877) 483-7669
545 Route 17 South	www.hudsonenergyservices.com
Ridgewood, NJ 07450	
Intelligent Energy	(800) 724-1880
2050 Center Avenue, Suite 500	www.intelligentenergy.org
Fort Lee, NJ 07024	
Keil & Sons	(877) 797-8786
1 Bergen Blvd.	www.systrumenergy.com
Fairview, NJ 07002	
Metro Energy Group, LLC	(888) 536-3876
14 Washington Place	www.metroenergy.com
Hackensack, NJ 07601	
MxEnergy, Inc.	(800) 375-1277
510 Thornall Street, Suite 270	www.mxenergy.com
Edison, NJ 08837	
NATGASCO (Mitchell Supreme)	(800) 840-4427
532 Freeman Street	www.natgasco.com
Orange, NJ 07050	
Pepco Energy Services, Inc.	(800) 363-7499
112 Main Street	www.pepco-services.com
Lebanon, NJ 08833	
PPL EnergyPlus, LLC	(800) 281-2000
811 Church Road	www.pplenergyplus.com
Cherry Hill, NJ 08002	
Sempra Energy Solutions	(877) 273-6772
581 Main Street, 8th Floor	www.semprasolutions.com
Woodbridge, NJ 07095	
South Jersey Energy Company	(800) 756-3749
One South Jersey Plaza, Route 54	www.southjerseyenergy.com
Folsom, NJ 08037	
Sprague Energy Corp.	(800) 225-1560
12 Ridge Road	www.spragueenergy.com
Chatham Township, NJ 07928	
Stuyvesant Energy LLC	(800) 646-6457
10 West Ivy Lane, Suite 4	www.stuyfuel.com
Englewood, NJ 07631	
Woodruff Energy	(800) 557-1121
73 Water Street	www.woodruffenergy.com
Bridgeton, NJ 08302	

Appendix C: Glossary and Method of Calculations

Glossary of ECM Terms

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Net ECM Cost: The net ECM cost is the cost experienced by the customer, which is typically the total cost (materials + labor) of installing the measure minus any available incentives. Both the total cost and the incentive amounts are expressed in the summary for each ECM.

Annual Energy Cost Savings (AECS): This value is determined by the audit firm based on the calculated energy savings (kWh or Therm) of each ECM and the calculated energy costs of the building.

Lifetime Energy Cost Savings (LECS): This measure estimates the energy cost savings over the lifetime of the ECM. It can be a simple estimation based on fixed energy costs. If desired, this value can factor in an annual increase in energy costs as long as the source is provided.

Simple Payback: This is a simple measure that displays how long the ECM will take to break-even based on the annual energy and maintenance savings of the measure.

ECM Lifetime: This is included with each ECM so that the owner can see how long the ECM will be in place and whether or not it will exceed the simple payback period. Additional guidance for calculating ECM lifetimes can be found below. This value can come from manufacturer's rated lifetime or warranty, the ASHRAE rated lifetime, or any other valid source.

Operating Cost Savings (OCS): This calculation is an annual operating savings for the ECM. It is the difference in the operating, maintenance, and / or equipment replacement costs of the existing case versus the ECM. In the case where an ECM lifetime will be longer than the existing measure (such as LED lighting versus fluorescent) the operating savings will factor in the cost of replacing the units to match the lifetime of the ECM. In this case or in one where one-time repairs are made, the total replacement / repair sum is averaged over the lifetime of the ECM.

Return on Investment (ROI): The ROI is expresses the percentage return of the investment based on the lifetime cost savings of the ECM. This value can be included as an annual or lifetime value, or both.

Net Present Value (NPV): The NPV calculates the present value of an investment's future cash flows based on the time value of money, which is accounted for by a discount rate (assumes bond rate of 3.2%).

Internal Rate of Return (IRR): The IRR expresses an annual rate that results in a break-even point for the investment. If the owner is currently experiencing a lower return on their capital than the IRR, the project is financially advantageous. This measure also allows the owner to compare ECMs against each other to determine the most appealing choices.

Calculation References

ECM = Energy Conservation Measure
AOCS = Annual Operating Cost Savings
AECS = Annual Energy Cost Savings
LOCS = Lifetime Operating Cost Savings
LECS = Lifetime Energy Cost Savings
NPV = Net Present Value
IRR = Internal Rate of Return
DR = Discount Rate

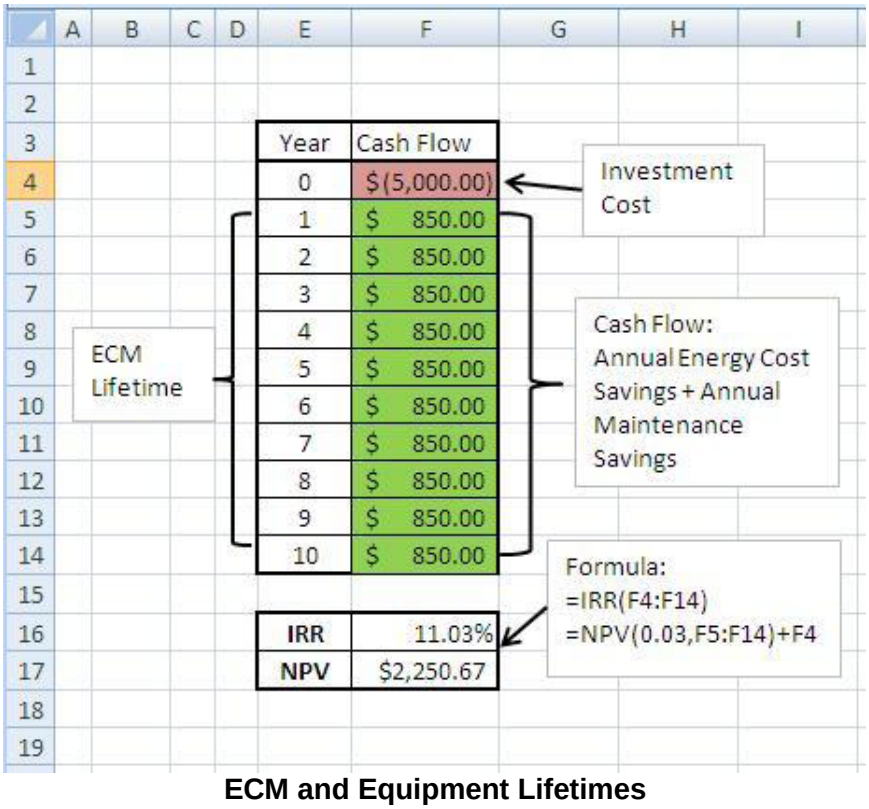
Net ECM Cost = Total ECM Cost – Incentive
LECS = AECS X ECM Lifetime
AOCS = LOCS / ECM Lifetime

Note: The lifetime operating cost savings are all avoided operating, maintenance, and / or component replacement costs over the lifetime of the ECM. This can be the sum of any annual operating savings, recurring or bulk (i.e. one-time repairs) maintenance savings, or the savings that comes from avoiding equipment replacement needed for the existing measure to meet the lifetime of the ECM (e.g. lighting change outs).

Simple Payback = Net ECM Cost / (AECS + AOCS)
Lifetime ROI = (LECS + LOCS – Net ECM Cost) / Net ECM Cost
Annual ROI = (Lifetime ROI / Lifetime) = (AECS + OCS) / Net ECM Cost – 1 / Lifetime
It is easiest to calculate the NPV and IRR using a spreadsheet program like Excel.

Excel NPV and IRR Calculation

In Excel, function =IRR(values) and =NPV(rate, values) are used to quickly calculate the IRR and NPV of a series of annual cash flows. The investment cost will typically be a negative cash flow at year 0 (total cost - incentive) with years 1 through the lifetime receiving a positive cash flow from the annual energy cost savings and annual maintenance savings. The calculations in the example below are for an ECM that saves $850 annually in energy and maintenance costs (over a 10 year lifetime) and takes $5,000 to purchase and install after incentives:



ECM and Equipment Lifetimes

Determining a lifetime for equipment and ECM's can sometimes be difficult. The following table contains a list of lifetimes that the NJCEP uses in its commercial and industrial programs. Other valid sources are also used to determine lifetimes, such as the DOE, ASHRAE, or the manufacturer's warranty.
Lighting is typically the most difficult lifetime to calculate because the fixture, ballast, and bulb can all have different lifetimes. Essentially the ECM analysis will have different operating cost savings (avoided equipment replacement) depending on which lifetime is used.

When the bulb lifetime is used (rated burn hours / annual burn hours), the operating cost savings is just reflecting the theoretical cost of replacing the existing case bulb and ballast over the life of the recommended bulb. Dividing by the bulb lifetime will give an annual operating cost savings.

When a fixture lifetime is used (e.g. 15 years) the operating cost savings reflects the avoided bulb and ballast replacement cost of the existing case over 15 years minus the projected bulb and ballast replacement cost of the proposed case over 15 years. This will give the difference of the equipment replacement costs between the proposed and existing cases and when divided by 15 years will give the annual operating cost savings.

NJCEP C & I Lifetimes

Measure	Measure Life
Commercial Lighting — New	15
Commercial Lighting — Remodel/Replacement	15
Commercial Custom — New	18
Commercial Chiller Optimization	18
Commercial Unitary HVAC — New - Tier 1	15
Commercial Unitary HVAC — Replacement - Tier 1	15
Commercial Unitary HVAC — New - Tier 2	15
Commercial Unitary HVAC — Replacement Tier 2	15
Commercial Chillers — New	25
Commercial Chillers — Replacement	25
Commercial Small Motors (1-10 HP) — New or Replacement	20
Commercial Medium Motors (11-75 HP) — New or Replacement	20
Commercial Large Motors (76-200 HP) — New or Replacement	20
Commercial VSDs — New	15
Commercial VSDs — Retrofit	15
Commercial Comprehensive New Construction Design	18
Commercial Custom — Replacement	18
Industrial Lighting — New	15
Industrial Lighting — Remodel/Replacement	15
Industrial Unitary HVAC — New - Tier 1	15
Industrial Unitary HVAC — Replacement - Tier 1	15
Industrial Unitary HVAC — New - Tier 2	15
Industrial Unitary HVAC — Replacement Tier 2	15
Industrial Chillers — New	25
Industrial Chillers — Replacement	25
Industrial Small Motors (1-10 HP) — New or Replacement	20
Industrial Medium Motors (11-75 HP) — New or Replacement	20
Industrial Large Motors (76-200 HP) — New or Replacement	20
Industrial VSDs — New	15
Industrial VSDs — Retrofit	15
Industrial Custom — Non-Process	18
Industrial Custom — Process	10
Small Commercial Gas Furnace — New or Replacement	20
Small Commercial Gas Boiler — New or Replacement	20
Small Commercial Gas DHW — New or Replacement	10
C&I Gas Absorption Chiller — New or Replacement	25
C&I Gas Custom — New or Replacement (Engine Driven Chiller)	25
C&I Gas Custom — New or Replacement (Gas Efficiency Measures)	18
O&M savings	3
Compressed Air (GWh participant)	8

APPENDIX D: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

The NJ Clean Energy Pay for Performance (P4P) Program relies on a network of Partners who provide technical services to clients. LGEA participating clients who are not receiving Direct Energy Efficiency and Conservation Block Grants are eligible for P4P. SWA is an eligible Partner and can develop an Energy Reduction Plan for each project with a whole-building traditional energy audit, a financial plan for funding the energy measures and an installation construction schedule.

The Energy Reduction Plan must define a comprehensive package of measures capable of reducing a building's energy consumption by 15+%. P4P incentives are awarded upon the satisfactory completion of three program milestones: submittal of an Energy Reduction Plan prepared by an approved Program Partner, installation of the recommended measures and completion of a Post-Construction Benchmarking Report. Theincentives for electricity and natural gas savings will be paid based on actual savings, provided that the minimum 15%performance threshold savings has been achieved.

For further information, please see: http://www.njcleanenergy.com/commercial-industrial/programs/pay-performance/existing-buildings .

Direct Install 2010 Program

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC and other equipment with energy efficient alternatives. The program pays **up to 80%** of the retrofit costs, including equipment cost and installation costs.

Eligibility:

- Existing small and mid-sized commercial and industrial facilities with peak electrical demand **below 200 kW** within 12 months of applying
- Must be located in New Jersey
- Must be served by one of the state's public, regulated or natural gas companies
    - Electric: Atlantic City Electric, Jersey Central Power & Light, Orange Rockland Electric, PSE&G
    - Natural Gas: Elizabethtown Gas, New Jersey Natural Gas, PSE&G, South Jersey Gas

For the most up to date information on contractors in New Jersey who participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/direct-install

Smart Start

New Jersey's SmartStart Building Program is administered by New Jersey's Office of Clean Energy. The program also offers design support for larger projects and technical assistance for smaller projects. If your project specifications do not fit into anything defined by the program, there are even incentives available for custom projects.

There are a number of improvement options for commercial, industrial, institutional, government, and agricultural projects throughout New Jersey. Alternatives are designed to enhance quality while building in energy efficiency to save money. Project categories included in this program are New Construction and Additions, Renovations, Remodeling and Equipment Replacement.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings.

Renewable Energy Incentive Program

The Renewable Energy Incentive Program (REIP) provides incentives that reduce the upfront cost of installing renewable energy systems, including solar, wind, and sustainable biomass. Incentives vary depending upon technology, system size, and building type. Current incentive levels, participation information, and application forms can be found at the website listed below.

Solar Renewable Energy Credits (SRECs) represent all the clean energy benefits of electricity generated from a solar energy system. SRECs can be sold or traded separately from the power, providing owners a source of revenue to help offset the cost of installation. All solar project owners in New Jersey with electric distribution grid-connected systems are eligible to generate SRECs. Each time a system generates 1,000 kWh of electricity an SREC is earned and placed in the customer's account on the web-based SREC tracking system.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/renewable-energy/home/home.

Utility Sponsored Programs

Check with your local utility companies for further opportunities that may be available.

Energy Efficiency and Conservation Block Grant Rebate Program

The Energy Efficiency and Conservation Block Grant (EECBG) Rebate Program provides supplemental funding up to $20,000 for eligible New Jersey local government entities to lower the cost of installing energy conservation measures. Funding for the EECBG Rebate Program is provided through the American Recovery and Reinvestment Act (ARRA).

For the most up to date information on how to participate in this program, go to: http://njcleanenergy.com/EECBG

Other Federal and State Sponsored Programs

Other federal and state sponsored funding opportunities may be available, including BLOCK and R&D grant funding. For more information, please check http://www.dsireusa.org/.