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Local Government Energy Program
Energy Audit Final Report

Franklin Lakes Ambulance Corps
1 Bender Court, Franklin Lakes, NJ 07417

Project Number: LGEA46

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INTRODUCTION

On December 16, 2009 and January 13, 2010 Steven Winter Associates, Inc. (SWA) performed an energy audit and assessment for the Borough of Franklin Lakes municipal buildings. The audit included a review of the:

- Franklin Lakes Municipal Building
- Franklin Lakes Police Station
- Franklin Lakes Recreational Center
- Franklin Lakes Firehouse (Main)
- Franklin Lakes Firehouse (Southside)
- Franklin Lakes DPW
- Franklin Lakes Ambulance Corps

The buildings are located in Franklin Lakes, NJ. A separate energy audit report is issued for each of the referenced buildings.

This report addresses the Franklin Lakes Ambulance Corps located at 1 Bender Court, Franklin Lakes, NJ. 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 single-story Franklin Lakes Ambulance Corps building was built in 1972 with a complete renovation in 2007. The building houses offices, meeting rooms, and a large kitchen in addition to 3 ambulance bays. The building consists of 5,580 square feet of conditioned space. The Franklin Lakes Ambulance Corps is occupied sporadically on weekdays by approximately 3 to 6 employees for approx. 10 hours a week.

The goal of this Local Government Energy Audit (LGEA) is to provide sufficient information to the Borough of Franklin Lakes to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the Franklin Lakes Ambulance Corps.

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. For projects awarded on or prior to December 31, 2009 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 (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Franklin Lakes Ambulance Corps building located at 1 Bender Court, Franklin Lakes, NJ. The Franklin Lakes Ambulance Corps building is a single-story building with a floor area of 5,580 square feet. The original 1972 structure was completely renovated in 2007.

Based on the field visits performed by the SWA staff on December 16, 2009 and January 13, 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.

From November 2008 to October 2009 the Franklin Lakes Ambulance Corps building consumed 39,840 kWh or $8,474 worth of electricity at an approximate rate of $0.213/kWh and 4,716 therms or $5,676 worth of natural gas at an approximate rate of $1.203/therm. The joint energy consumption for the building, including both electricity and natural gas, was 608 MMBtu of energy that cost a total of $14,150.

SWA has entered energy information about the Franklin Lakes Ambulance Corps building in the U.S. Environmental Protection Agency's (EPA) Energy Star Portfolio Manager Energy benchmarking system. A benchmark score could not be calculated for the Ambulance Corps facility since it is categorized as a non-eligible (Other) space type. SWA encourages the Borough of Franklin Lakes to continue entering utility data in Energy Star Portfolio Manager in order to track weather normalized source energy use over time. EPA is continually working to expand the available space types.

The Site Energy Use Intensity is 109.0 kBtu/ft^{2}yr compared to the national average of "Other" space type of 104.0 kBtu/ft^{2}yr. Implementing this report's recommendations will reduce use by approximately 8.3 kBtu/ft^{2}yr, which when implemented would bring the building's energy consumption below the national average. There may be energy procurement opportunities for the Franklin Lakes Ambulance Corps building to reduce annual electric utility costs, which are $2,498 higher, when compared to the average estimated NJ commercial utility rates.

Based on the assessment of the Franklin Lakes Ambulance Corps, 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

- Install a garage air cleaning system controlled by CO sensors
- Install premium efficiency motors when replacements are required
- Investigate adding air makeup fan to operate in conjunction with kitchen exhaust fan

Category II Recommendations: Operations and Maintenance

- Maintain / repair garage doors so that they fully close and are sealed all around

- Maintain the integrity of the exterior wall and roof insulation by patching any damage or penetrations that may result from weather or age. Properly insulated buildings have an estimated 8% to 10% energy savings annually.
- Install a removable, insulated cover (or gravity louvers) for exhaust fans.
- Maintain roofs and verify water is draining correctly
- Maintain downspouts - repair / install missing downspouts as needed
- Provide weather stripping on all doors
- Provide air sealing, particularly between the drop ceiling and attic space
- Use Energy Star labeled appliances
- Use smart power electric strips
- Create an energy educational program

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

At this time, SWA highly recommends a total of **two** Energy Conservation Measures (ECMs) for the Franklin Lakes Ambulance Corps building that is summarized in the following Table 1. SWA estimates the total investment cost for these ECMs with incentives is **$1,702** with a first year savings of **$368** and a simple payback of **4.6 years**. SWA estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the Franklin Lakes Ambulance Corps building by **2,366 lbs of CO_2**. SWA also recommends **one** ECM with a total first year savings of **$9,593** as summarized in Table 2.

There are various incentives that the Borough of Franklin Lakes could apply for that could also help lower the cost of installing the ECMs, such as enroll in the NJ Smart Start program through the New Jersey Office of Clean Energy. This incentive program 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 of energy saving measures. These and other incentive programs are outlined in detail in Appendix D.

Renewable ECMs require application approval and negotiations with the utility and proof of performance. There is also a utility-sponsored program that would allow the building to pay for the installation of the PV system through a loan issued by Orange Rockland Electric.

The following two tables summarize the proposed Energy conservation Measures (ECMs) and their economic relevance. In order to clearly present the overall energy opportunities for the building and ease the decision and choice of which ECM to implement, SWA calculated each ECM independently and did not incorporate potential overlaps between some of the summarized ECMs (i.e. lighting change influence on heating/cooling).

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, $	est. energy & operating 1st year cost savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO2 reduced, lbs/yr
1a	10 New CFL fixtures to be installed with incentives	RS Means, lit search	502	none at this time	502	599	0.1	0	0.4	0	127	12	1,530	3.9	205	17	23	752	820
1b	6 New occupancy sensors to be installed with incentives	RS Means, lit search	1,320	120	1,200	1,128	0.2	0	0.7	0	240	12	2,884	5.0	140	12	17	1,164	1,546
	TOTALS		**1,822**		**1,702**	**1,727**	**0.3**	**0**	**1.1**	**0.0**	**368**	**24**	**4,414**	**4.6**	**-**	**-**	**-**	**-**	**2,366**

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, $	est. 1st year cost savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO2 reduced, lbs/yr
2	Install 10 kW Solar Photovoltaic system	Similar Projects	70,000	10,000	60,000	11,800	10.0	0	7.2	0	9,593	25	169,035	6.3	181.7	7.3	14.2	186,117	21,128

1. HISTORIC ENERGY CONSUMPTION

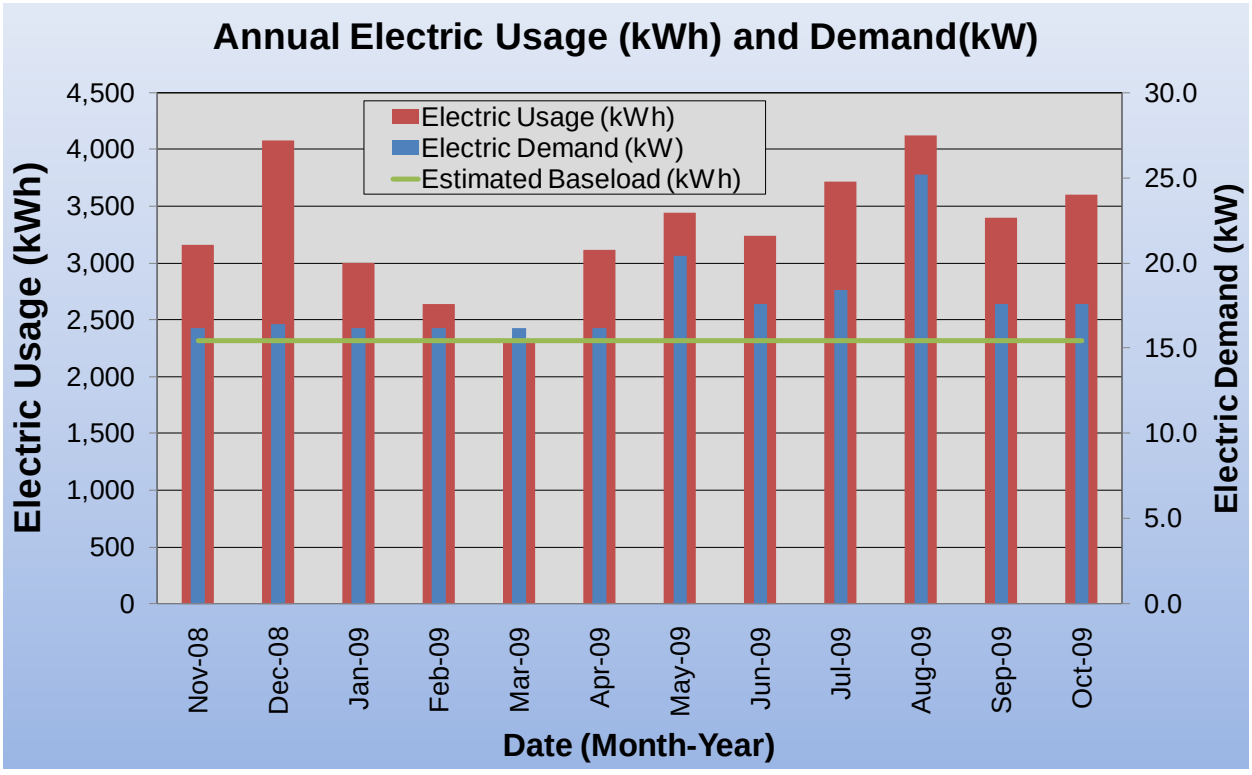
1.1 Energy usage and cost analysis

SWA analyzed utility bills from November 2008 through October 2009 that were received from the utility companies supplying the Franklin Lakes Ambulance Corps with electric and natural gas.

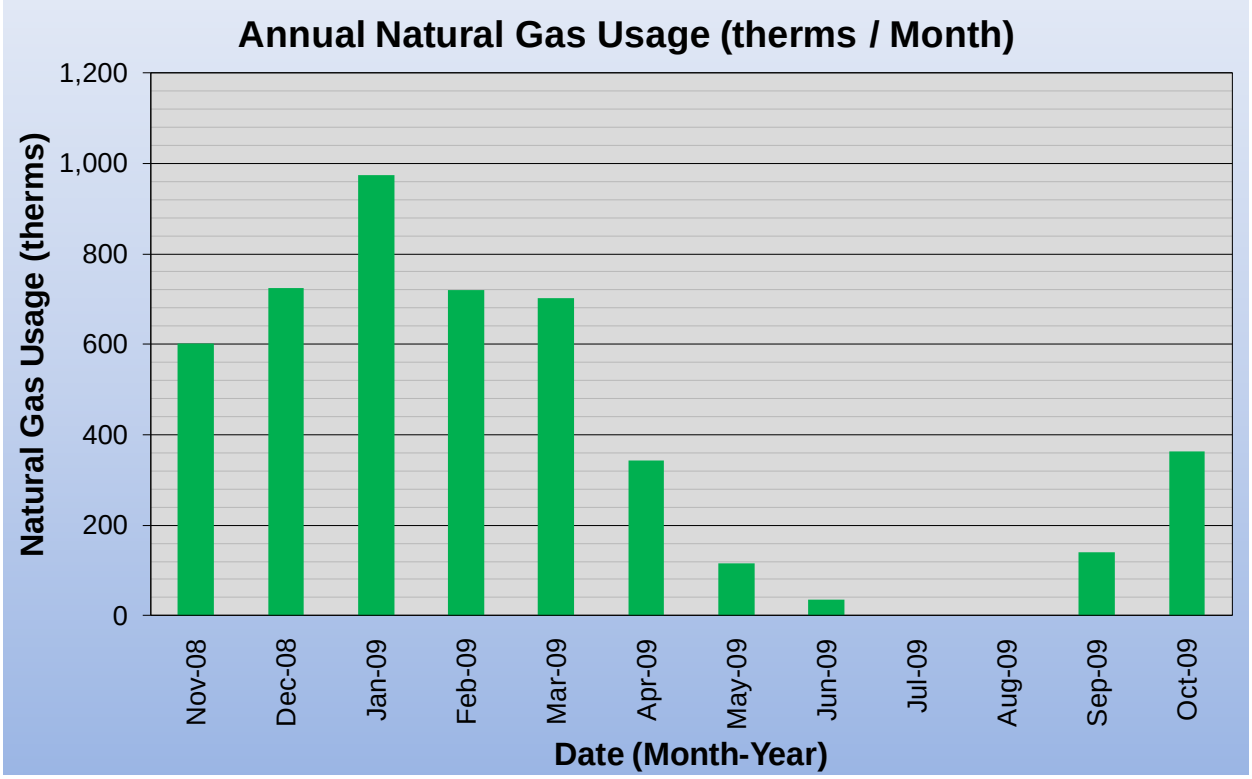
Electricity - The Franklin Lakes Ambulance Corps is currently served by one electric meter. The Franklin Lakes Ambulance Corps building currently buys electricity from Orange Rockland Electric at **an average rate of $0.213/kWh** based on 12 months of utility bills from November 2008 to October 2009. The Franklin Lakes Ambulance Corps building purchased **approximately 39,840 kWh or $8,474 worth of electricity** in the previous year. The average monthly demand was 24 kW.

Natural gas - The Franklin Lakes Ambulance Corps is currently served by one meter for natural gas. The Franklin Lakes Ambulance Corps buys natural gas from PSE&G at **an average aggregated rate of $1.203/therm** based on 12 months of utility bills for November 2008 to October 2009. The Franklin Lakes Ambulance Corps purchased **approximately 4,716 therms or $5,676 worth of natural gas** in the previous year.

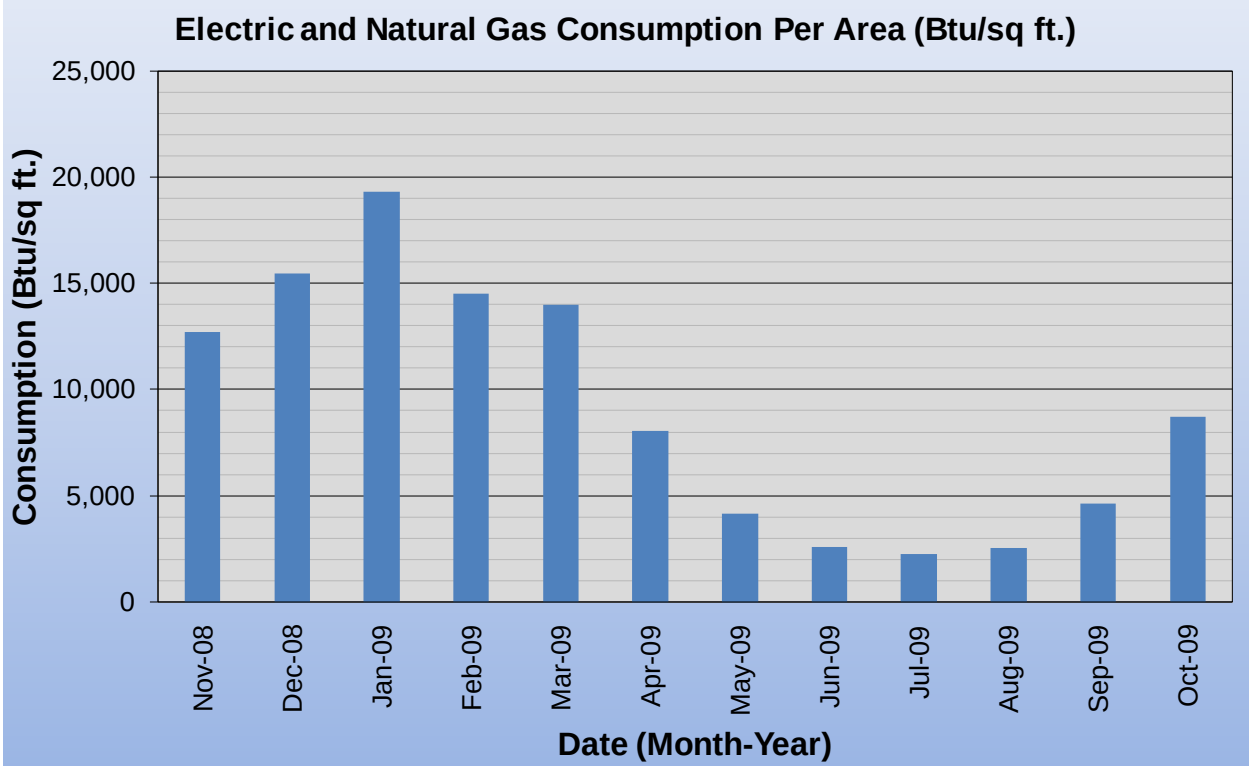
The following chart shows electricity use for the Franklin Lakes Ambulance Corps building based on utility bills for the 12 month period of November 2008 through October 2009. The electric use in December is noticeably high, most likely due to the 5 kW electric heater installed as the only heat source for the file room which is attached to the garage and consists of two exterior walls.



The following chart shows the natural gas consumption for the Franklin Lakes Ambulance Corps building based on natural gas bills for the 12 month period of November 2008 through October 2009.

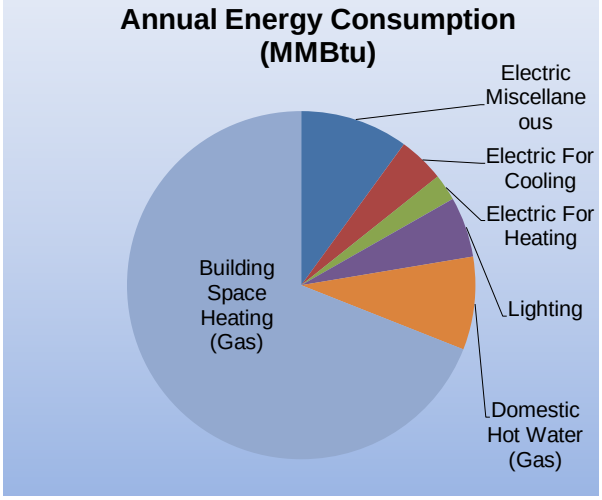


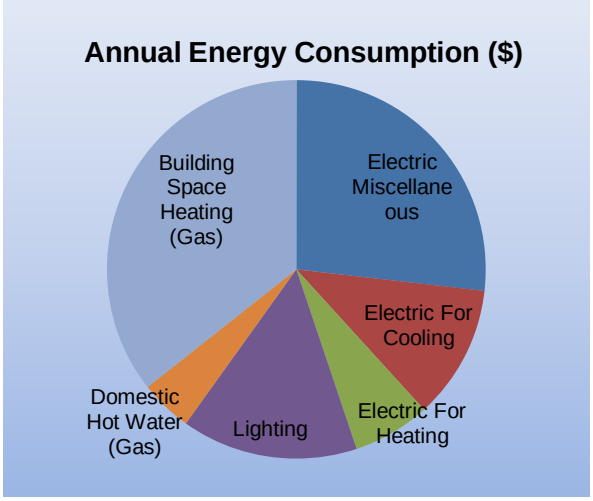
The following chart shows combined natural gas and electric consumption in Btu/sq ft for the Franklin Lakes Ambulance Corps building based on utility bills for the 12 month period of November 2008 through October 2009.



The following table and pie charts show energy use for the Franklin Lakes Ambulance Corps building based on utility bills for the 12 month period of November 2008 through October 2009. Note electrical cost at $62/MMBtu of energy is more than 5 times as expensive to use as natural gas at $12/MMBtu.

2009 Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	55	9%	$3,449	24%	62
Electric For Cooling	26	4%	$1,617	11%	62
Electric For Heating	15	2%	$936	7%	62
Lighting	40	6%	$2,472	17%	62
Domestic Hot Water (Gas)	61	10%	$733	5%	12
Building Space Heating (Gas)	413	68%	$4,943	35%	12
Totals	611	100%	$14,150	100%	-
Total Electric Usage	136	22%	$8,474	60%	62
Total Gas Usage	475	78%	$5,676	40%	12
Totals	611	100%	$14,150	100%	--





1.2 Utility rate

The Franklin Lakes Ambulance Corps building currently purchases electricity from Orange Rockland Electric based on kWh consumption and pays an average rate of approximately $0.213/kWh based on the 12 months of utility bills from November 2008 through October 2009.

The Franklin Lakes Ambulance Corps building currently purchases natural gas supply from the PSE&G at a general service market rate for natural gas (therms). PSE&G also acts as the transport company. The average aggregated rate (supply and transport) for service is approximately $1.203/therm based on 12 months of utility bills for November 2008 through October 2009.

1.3 Energy benchmarking

SWA has entered energy information about the Franklin Lakes Ambulance Corps building in the U.S. Environmental Protection Agency's (EPA) Energy Star Portfolio Manager Energy benchmarking system. This Ambulance Corps facility is comprised of non-eligible, "Other" space type since the building functions does not fall into any of the available space types categories. Consequently, the Franklin Lakes Ambulance Corps is not eligible to receive a national energy performance rating at this time.

The Site Energy Use Intensity is 109.0 kBtu/sq ft yr compared to the national average of a Ambulance Corp building 104.0 kBtu/sq ft yr. Implementing this report's highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 1.1 kBtu/sqft yr, with an additional 7.2 kBtu/sq ft yr from the recommended ECMs. These recommendations could account for at least 8.3 kBtu/sq ft yr and therefore reduce the site energy use intensity below the national average, to 100.7 kBtu/sq ft yr.

Per the LGEA program requirements, SWA has assisted the Borough of Franklin Lakes to create an Energy Star Portfolio Manager account and share the Franklin Lakes Ambulance Corps facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager information with the Borough of Franklin Lakes (user name of "FranklinLakesBoro" with a password of "FRANKLINLAKES") and TRC Energy Services (user name of TRC-LGEA).

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Borough of Franklin Lakes - Ambulance Corp. Building

Building ID: 1977112
For 12-month Period Ending: October 31, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: February 08, 2010

Facility
Borough of Franklin Lakes - Ambulance Corp. Building
1 Bender Court
Franklin Lakes, NJ 07417

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1972
Gross Floor Area (ft²): 5,580

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	136,066
Natural Gas (kBtu)[4]	473,936
Total Energy (kBtu)	610,002

Energy Intensity[5]	
Site (kBtu/ft²/yr)	109
Source (kBtu/ft²/yr)	170

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	38

Electric Distribution Utility
Rockland Electric 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.

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The single story 5,580 square feet Ambulance Corps building was built in 1972 and totally renovated with an addition (3,399 square feet included above) in 2007. Besides the 3 ambulance van / rig bays, the building houses storage areas, a large meeting room, a dinning room, a kitchen, bathrooms, locker rooms, a laundry area, a file room, a mechanical room, a debriefing room, a ready room, an oxygen cylinder storage room, a general office and an entrance lobby.

2.2. Building occupancy profiles

Occupancy for the Ambulance Corps building is sporadic, usually 3 and up to 6 volunteers for approximately 10 hours per week. There is usually one special event held in the large meeting room area every couple of months for volunteer Ambulance Corps members.

2.3. Building envelope

2.3.1. Exterior Walls

There are three typical exterior envelopes. The first consist of a 4" brick veneer façade supported by 2X6 wood studs 16" apart with horizontal R-19 batt fiberglass insulation in-between and 5/8" gypsum board on the inside. The second exterior façade style uses HardiPlank fiber cement clapboard siding in place of the brick veneer, which means that it is a combination of cellulose fibers, along with cement-like materials. In other words, it's partly wood, partly cement. The third exterior façade style is a decorative stucco band finish over scratch coat over wire mesh on exterior sheathing on 5/8" metal studs 16" apart. The rig bay garage area has an 8" CMU masonry wall on the inside. Based on design drawings, the R-19 insulation is installed throughout the envelope of the building, although this could not be confirmed in the field without damaging the wall construction.

Cosmetically the facade is in age appropriate condition. Exterior and interior finishes of the envelope wall were found to be age-appropriate and in good condition.

Façade brick veneer, HardiPlank and stucco finishes

Brick re-pointing and sidewall repairs needed around a couple of the overhead doors

2.3.2. Roof

The sloped roof rafters are 2X8 and 16" apart, framed over a metal stud gusset framing. For the majority of the building, the ceilings are well insulated with R-30 fiberglass batts. A 30 year GAF-ELK Timberline® Natural Shadow fiberglass shingle roof was installed in 2007 on 15 lb roofing felt and 5/8" plywood, with ice and snow shield extending 24" beyond the inside face of the wall and wrapped behind the gutter. Ridge vents on peaks provide for attic space ventilation. The leaders and gutters are 6" aluminum and in good condition.

SWA recommends that the Ambulance Corps continue with a regular maintenance schedule to clean the gutters

As per visual inspection, the new section of attic was found to have significant gaps in the insulation between the drop ceiling and the attic space. Therefore it is not properly insulated and sealed and the conditioned air can be drawn into the attic space.

2.3.3. Base

The building's base is a 4" concrete slab-on grade with a perimeter footing. There weren't any reported problems with water seepage through the slab or other issues related to thermal performance or moisture. As seen on design drawings, there is 2" of EPS rigid board insulation at the interior of the foundation walls and extending 2 feet from the foundation walls under the slab. This is standard for this type of structure. SWA does not recommend any additional insulation as it would not be cost effective. The slab edge or perimeter insulation could not be verified.

2.3.4. Windows

The building contains vinyl clad wood, double hung, double glazed windows with low-e rating. There are a few original windows which are not low-e. Some of the windows are non-operable. The operable windows were observed to be in good working condition and seal tightly. According to design specifications, all of the windows are installed with thermal breaks. There weren't any comfort related complaints or signs of condensation found. There weren't any visible damage to the window frames or to the caulking.

2.3.5. Exterior doors

The aluminum framed exterior doors and hollow metal doors were generally observed to be in good condition. During visual inspection the doors were found to be insulated with a thermocol type material. SWA also recommends checking the weather-stripping of each door on a regular basis and replacing any broken seals immediately. Tight seals around the doors will help ensure that the building is kept insulated.

2.3.6. Building air tightness

Based on a visual inspection, the Ambulance Corps building has tightly sealed windows and doors, ductwork, plumbing and wire penetrations. Any water damage due to condensing un-insulated pipes, condensate lines dripping, plumbing leaks, or roof leaks should be repaired immediately and ceiling tiles should be replaced. Ceiling tiles act as an air barrier containing expensive conditioned air from leaking into ceiling or wall cavities.

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 and windows.

The renovation in 2007 included adding a new attic space above the ready room. During visual inspection of this attic space, there appears to be gaps in the insulation between the drop ceiling and the attic. Therefore it is not properly insulated and sealed and the conditioned air is being drawn into the attic space. The issue is exaggerated in this location since there is an attic exhaust fan controlled by a manual thermostat which draws the conditioned air through the attic and out to the atmosphere, as waste. Proper sealing is necessary to avoid wasted energy. See section 2.4.3 for more details.

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

The Franklin Lakes Ambulance Corps office and meeting spaces are heated by two direct vented natural gas furnaces as well as a package unit located outside the building. The units also provide cooling in the summer with split DX cooling systems. The garage areas are only provided heat.

The operation of the heating and cooling equipment is regulated by programmable Honeywell thermostats. The furnaces are controlled by dedicated Honeywell programmable thermostats with a minimum temperature dead band of 3˚F, which requires heating and cooling set points to have a minimum of 3˚F difference. The unit heaters are controlled by manual thermostats.

The air distribution system is a fully ducted supply and return system, complete with blanket-type wrap exterior insulation. The R value of the insulation could not be estimated in the field by visual inspection alone – SWA recommends the township to engage a Professional Engineer to check compliance with building codes, specifically ASHRAE 90.1.

2.4.1 Heating

The truck bay area is heated by a Reznor ceiling mounted natural gas unit with 200,000 Btu/hr capacity. The file room off of the truck garage is heated by a 5 kW Dimplex unit heater.

The meeting room, two offices, kitchen and the ready room are heated by two York direct vented furnaces. Each 135,000 Btu/hr furnace transfers heat generated from the combustion of natural gas to a mixture of outside air and return air, and then supply fans send the heated air through ductwork distribution system to occupied spaces.

Attic Furnace 2 – 135MB, Condensing Type

The main hall is heated in a similar manner by an 180,000 Btu/hr Lennox package “rooftop unit” which is located outside at ground level in the back of the building. There is a barometric spill damper in the return air duct which opens when building pressure exceeds atmospheric pressure. This mechanism ensures that building remains at a slight positive pressure. SWA feels that this damper alone may not be sufficient to correct pressure imbalance within the building, and recommends the township to engage a Professional Engineer to check compliance with local building codes.

All heating equipment is well within remaining useful life and should be properly maintained.

2.4.2 Cooling

The Franklin Lakes Ambulance Corps meeting room, ready room, kitchen and offices are cooled by split DX systems. Using R-22 refrigerant as the cooling medium, heat is expelled to the atmosphere, aided by condenser fans. Two 5 Ton York condensers are installed in the back of the building to serve the furnaces and have an estimated 90% remaining life and appear in good condition.

The Lennox package unit has a built in condenser with a 7.5 Ton capacity and has an estimated 60% remaining useful life.

York Condensing units serving Furnace 1 & 2, located outside

2.4.3 Ventilation

The Franklin Lakes Ambulance Corps ventilation is achieved by several rooftop exhaust fans which serve locker rooms, the file room, bathrooms, the oxygen room, attic space and the kitchen hood. The exhaust fans are typically switch activated and used intermittently with the exception of two fans. The kitchen hood activates based on switch and a temperature sensor. The attic exhaust fan operates by manual temperature dial. The kitchen hood exhaust fan has a 1.5 HP motor and an airflow capacity of 1875 CFM which is nearly a third of total air volume. During the field visit there did not appear to be a makeup air fan for this area. Therefore while the hood is operating it may cause a negative pressure in the building, creating a pressure imbalance that cannot be corrected by the barometric spill damper alone, as referenced in section 2.4.1. SWA recommends investigating adding an air makeup fan to operate in conjunction with the kitchen exhaust fan. Installing a new makeup fan will potentially increase electric costs, but will enhance the indoor air quality.

Kitchen exhaust fan mounted on roof

The Lennox rooftop unit has a gravity damper connected to the return air duct, which allows for excess pressure to force the damper open and purge air out of the system as exhaust, without using mechanical power. Gravity dampers are used to provide an air purge to allow the air system to reach equilibrium. There did not appear to be an economizer on the unit; an economizer system can reduce energy when the outside air conditions are desirable. Based on HDD analysis, an estimated 10% of the year an economizer mode can be used to reduce cooling and heating energy costs. An in depth HVAC model would be necessary to accurately determine the energy savings of implementing an economizer to the HVAC system.

Lennox RTU gravity damper on return duct

The furnaces and rooftop units have a supply fan to mechanically provide conditioned air, however there is no independent outside air fans or motorized dampers on the units.

The renovation in 2007 included adding a new attic space above the ready room. The attic is partially finished for use as storage space. There are exposed sections of the unfinished attic which show gaps in the R-19 insulation which is laid in between the rafters. This section of the attic has a dedicated exhaust fan which operates based on a manual thermostat to purge hot air out of the attic; SWA recommends the township to engage a Professional Engineer to study local building codes compliance for attic ventilation. The attic also had gable louvers at one end of the building for ventilation. There is a plywood panel which is designed to separate the finished attic space from the non-finished space which is not currently screwed in. SWA recommends tightly packing insulation between the drop ceiling and the attic and then closing off the unfinished area of the attic with the provided panel and grill assembly. See photos below for further clarification.

Unfinished attic space with gaps in insulation.

Panel separating unfinished and finished sections of attic which should be screwed in.

2.4.4 D

The domestic hot water (DHW) for the Franklin Lakes Ambulance Corps building is provided by a Bradford White Ultra High Efficiency fully condensing natural gas heater with 100 gal storage, 90% thermal efficiency and 199,000 Btu/hr capacity. There is a 3" PVC air inlet and 3" PVC exhaust which are both piped to the roof. The heater has 90% estimated useful operating life remaining and appears in good condition.

2.5 Electrical systems

2.5.1 Lighting

Interior Lighting - The Franklin Lakes Ambulance Corps building currently consists of mostly T8 fluorescent fixtures, a few incandescent and compact fluorescent lamps. Several of the lights are control with an occupancy sensor, but over 50% of the sensors do not operate properly; the lights either never turn off, or never turn on. Based on measurements of lighting levels for each space, there are not any vastly over-illuminated areas. SWA recommends replacing the incandescent lights with CFLs and installation of new and reliable occupancy sensors. See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

Exit Lights - Exit signs were found to be LED type. SWA is not recommending any upgrades at this time.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of CFL and halogen lights. Exterior lighting is controlled by an automatic timer. SWA recommends replacing the halogen lights with CFLs to decrease the energy usage for the same amount of light and longer useful life. SWA does not recommend any changes to the timer control at this time.

2.5.2 Appliances and process

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. Also, energy vending miser devices are now available for conserving energy usage by Drinks and Snacks vending machines. When equipped with the vending miser devices, vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines.

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, DVDs, stereos, computers, and kitchen appliances often have internal memories or clocks which consume approximately 3-5 watts of electricity when turned off. SWA recommends all computers and all appliances, (other than refrigerators and freezers), be plugged into power strips and turned off each evening just as the lights are turned off. The Franklin Lakes Ambulance Corps computers are generally NOT programmed for the power save mode, to shut down after a period of time that they have not been used.

2.5.3 Elevators

The Franklin Lakes Ambulance Corps is a single-story building without elevators.

2.5.4 Others electrical systems

There are not currently any other significant energy impacting electrical systems installed at the Franklin Lakes Ambulance Corps building.

3. EQUIPMENT LIST

Building System	Description	Location	Make, Model #	Fuel	Space Served	Date Installed	Est. Remaining Useful Life %
Cooling	CU1, Condenser, 5 Tons	BACK OF BLDG	YORK, M#H1RA060525G/ WON7520733	Electric	OFFICE	2008	90%
Cooling	CU2, Condenser, 5 Tons, 10.6 SEER	BACK OF BLDG	YORK, M#H1RA060525G/ WOL7375872	Electric	KITCHEN	2008	90%
Cooling	COIL1, Refrigerant Coil for FURN-1	CLOSET	YORK, M#FC60D3N1A/ AOK7254413	R-22	Furn-1	2008	90%
Cooling	COIL2, Refrigerant Coil for FURN-2	ATTIC	YORK, M#FC60D3XN1A/ AOK7254429	R-22	Furn 2	2008	90%
Domestic Hot Water	Condensing Hot Water Heater100 GAL, 199,999 btu/hr	Mech Closet	Bradford White M#EF100T199E3NA2/ DJ9632858	Natural Gas	Ambulance Corp. Bldg.	2007	90%
Heating	Unit heater 3.75 - 5 kW	File Rm by truck bay	Dimplex cat#euh05b31t	electric	storage by truck bay	2007	90%
Heating	HTR1 200,000/ 166,00 btu/hr, 83% Eff.	TRUCK AREA	REZNOR, M#UDAP200/ BHB79U2N33504X	Natural Gas	TRUCK AREA	2008	90%
Heating / Cooling	FURN1, Direct Vented Heating and DX Split Unit with supply fan condensing 135/127 btu/hr, 94% Eff, 5 Tons cooling; 2,000 CFM, 1HP Motor	CLOSET	YORK, M#GY9S135D20UP11K /FC60D3XN1A/ WOL7348425 / AOK7254413	Natural Gas / Electric	meeting room, 2 offices, ready room	2008	90%
Heating / Cooling	FURN2, Direct Vented Heating and DX Split Unit with supply fan 93% eff., 135 Btu/hr In, 5 Tons Cooling; 2,000 CFM, 1HP Motor	ATTIC	YORK, M#GY9S135D20UP11K/ WOL7348454	Natural Gas / Electric	KITCHEN	2008	90%
Heating / Cooling	RTU1, 7.5 Tons Cooling, 180/130 MBH, 72% Eff., 10.1EER, 2HP Motor	BACK OF BLDG	LENNOX, M#TGA090S2BM1Y/ 5604E00279	Natural Gas / Electric	HALL	2003	60%
Ventilation	EF-1, Exhaust fan, 1.5 HP, 1875 CFM	Back side of building	Cook, M#SDB-135	Electric	Kitchen Hood	2008	90%
Ventilation	EF-2, Exhaust fan, 122 W	Rooftop	Cook, M#100W15DH	Electric	Oxygen Rm	2008	90%
Ventilation	EF-3, Exhaust fan, 103W	Rooftop	Cook, M#GN-180	Electric	Locker Rm	2008	90%
Ventilation	EF-4, Exhaust fan, 103W	Rooftop	Cook, M#GN-180	Electric	Toilets	2008	90%
Ventilation	EF-5, Exhaust fan, 147W	Rooftop	Cook, M#GN-180	Electric	File Room	2008	90%
Lighting	See Appendix A	All Areas	NA	Electric	All Areas	NA	NA

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 Franklin Lakes Ambulance Corps, SWA has separated the investment opportunities into three recommended categories:

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

Category I Recommendations: Capital Improvements

- Install a garage air cleaning system controlled by CO sensors to ensure that while trucks are on, the garage air does not become toxic. This type of system is more efficiency than an exhaust type system, which purges a large volume of conditioned air from the garage based on CO sensor, wasting thermal energy.

- Install premium motors when replacements are required - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives.

- Investigate adding air makeup fan to operate in conjunction with kitchen exhaust fan

Category II Recommendations: Operations and Maintenance

- Maintain / repair garage doors so that they fully close and are sealed all around.

- Thoroughly and evenly insulate space (with batt insulation) and plug all penetrations to the outside. SWA recommends properly maintaining exterior wall and roof insulation in an effort to minimize energy loss. Properly insulated buildings have an estimated 8% to 10% energy savings annually.

- Install a removable, seasonal, insulated cover (or gravity louvers) for the exhaust fans.

- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.

- Maintain downspouts - Repair / install missing downspouts as needed to prevent water / moisture infiltration and insulation damage.

- Provide weather stripping / air sealing - Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. The perimeter of all window frames should also be regularly inspected and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frames. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.

- Repair / seal wall cracks and penetrations - SWA recommends as part of the maintenance program to install proper flashing and seal wall penetrations wherever necessary in order to keep insulation dry and effective.

- Repair / seal space between drop ceiling and attic – SWA recommends providing additional air sealing, between the drop ceiling and attic space near the attic exhaust fan

- 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.

- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.

- Create an energy educational program - that teaches how to minimize their energy use. The US Department of Energy offers free information for hosting energy efficiency educational programs and plans, for more information please visit: http://www1.eere.energy.gov/education/.

Category III Recommendations: Energy Conservation Measures - Summary table

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1a & 1b	Building Lighting Upgrades
	Description of Recommended 5-10 Year Payback ECMs
2	Install 10 kW Photovoltaic System on Roof

ECM# 1a & 1b: Building Lighting Upgrades

Description:

On the days of the site visits, SWA completed a lighting inventory of the Franklin Lakes Ambulance Corps building (see Appendix A). SWA recommends replacing interior incandescent lights and exterior halogen lights with compact fluorescent lights. CFLs typically operate at a third of the wattage for the same lumen output and longer life. Also it was observed that over 50% of the installed occupancy sensors were not operating properly and should be replaced for bathrooms, offices and locker rooms to reduce lights being left on when the spaces are unoccupied. The labor in all these installations was evaluated using prevailing electrical contractor wages. The Borough of Franklin Lakes may decide to perform this work with in-house resources from its Maintenance Department to obtain savings.

Installation cost:
Estimated installed cost: $1,702 (includes approx. $700 labor)
Source of cost estimate: RS Means; Published and established costs, NJ Clean Energy Program; Quoted bids

Economics (Some of the options considered with incentives):

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, $	est. 1st year cost savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO2 reduced, lbs/yr
10 New CFL fixtures to be installed with incentives	RS Means, lit search	502	none at this time	502	599	0.1	0	0.4	0	127	12	1,530	3.9	205	17	23	752	820
6 New occupancy sensors to be installed with incentives	RS Means, lit search	1,320	120	1,200	1,128	0.2	0	0.7	0	240	12	2,884	5.0	140	12	17	1,164	1,546

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 2 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

NJ Clean Energy – Occupancy Sensor Wall Mounted - ($20 per fixture, depending on quantity and lamps) - Maximum incentive amount is $120

Options for funding the Lighting ECM: This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.

http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#2: Install 10 kW PV system

Description:

Currently, the Franklin Lakes Ambulance Corps building does not use any renewable energy systems. Renewable energy systems such as photovoltaic panels, can be mounted on the building slated roof south and/or west and can offset a portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc… being used within the region, demand charges go up to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems not only offset the amount of electricity use by a building, but also reduce the building's electrical demand, resulting in a higher cost savings as well. SWA presents below the economics, and recommends at this time that Borough of Franklin Lakes further review installing a 10 kW PV system to offset electrical demand and reduce the annual net electric consumption for the building, and review guaranteed incentives from NJ rebates to justify the investment. The Borough of Franklin Lakes may consider applying for a grant and / or engage a PV generator / leaser who would install the PV system and then sell the power at a reduced rate. Orange Rockland Electric provides the ability to buy SRECs at $600 / MWh or best market offer.

The size of the system was determined using the amount of roof surface area as a limiting factor, as well as the facilities annual base load. A PV system could be installed on a portion of the sloped roof that faces South or West. A commercial multi-crystalline 123 watt panel (17.2 volts, 7.16 amps) has 10.7 square feet of surface area (11.51 watts per square foot). A 10 kW system needs approximately 80 panels which would take up 870 square feet. Below are possible locations to install the panels.

Installation cost:

Estimated installed cost: $60,000 (labor included at $3/Watt, totaling $30,000)
Source of cost estimate: Similar projects

Economics (with incentives):

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 cost 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
Install 10 kW Solar Photovoltaic system	Similar Projects	70,000	10,000	60,000	11,800	10.0	0	7.2	$0	9,593	25	169,035	6.3	181.7	7.3	14.2	186,117	21,128

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Polycrystalline Solar Panel (123 Watts, Model ND-123UJF). PV systems are sized based on Watts and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on $1.00 / watt Solar PV application for systems 50kW or less. Incentive amount for this application is $10,000 for the Franklin Lakes Ambulance Corps.

http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-

metered in order to earn SRECs as well as sell power back to the electric grid. A total of $7,080 / year, based on $600/SREC, has been incorporated in the above costs for the Ambulance Corps however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.

http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1 Existing systems

There aren't currently any existing renewable energy systems.

5.2 Wind

Description:

There aren't any recommendations for this renewable energy source at this time due to lack of necessary wind conditions in this region.

5.3 Solar Photovoltaic

Pleases see the above recommended ECM#2.

5.4 Solar Thermal Collectors

Description:

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.

5.5 Combined Heat and Power

Description:

CHP is not applicable for this building because of absence of a major cooling system and insufficient domestic hot water use.

5.6 Geothermal

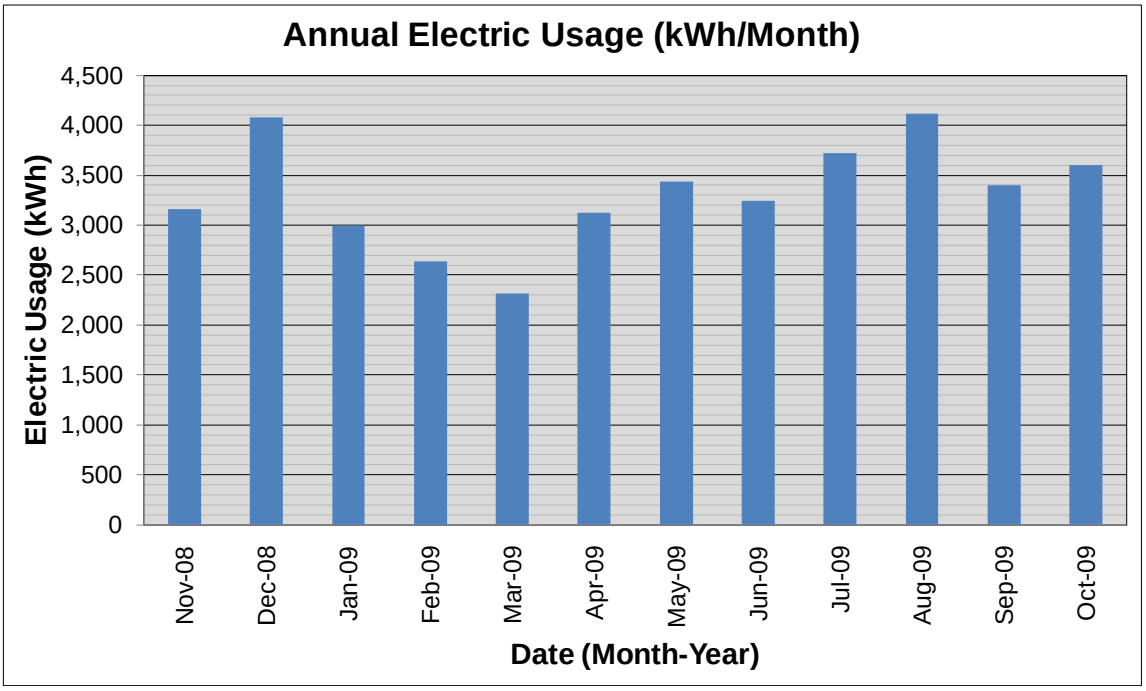
Description:

Geothermal is not applicable for this building because it would not be cost effective, since it would require replacement of the existing HVAC system, of which major components still have as a whole a number of useful operating years.

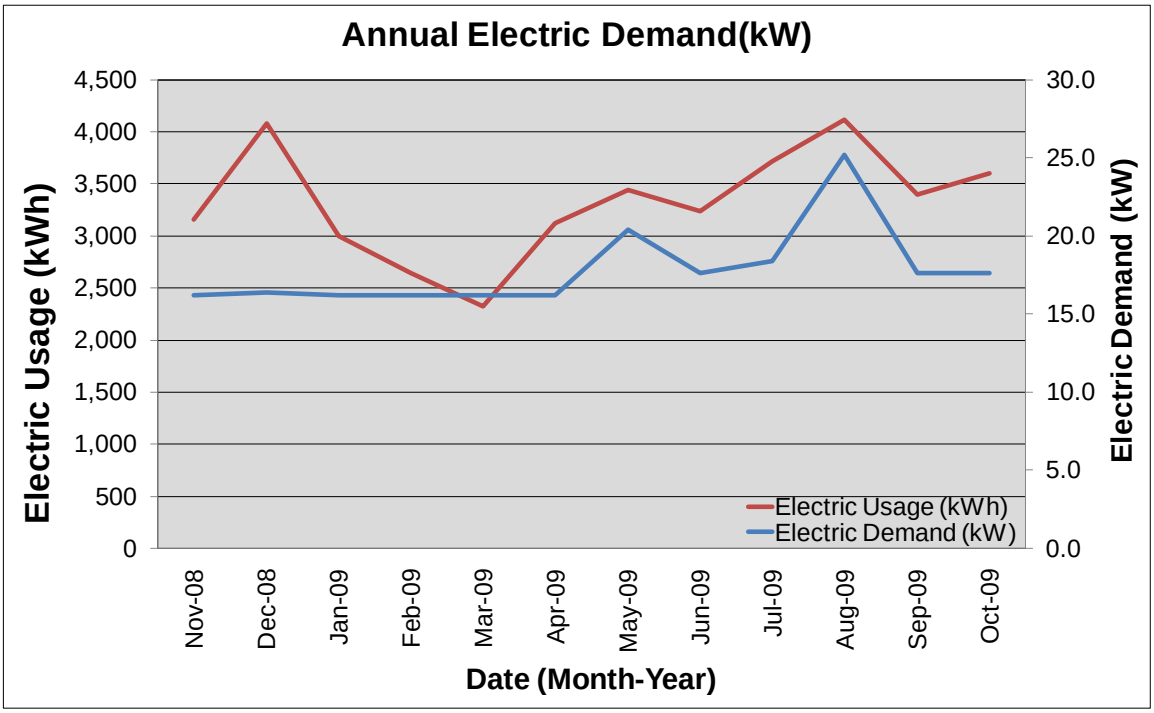
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1 Load profiles

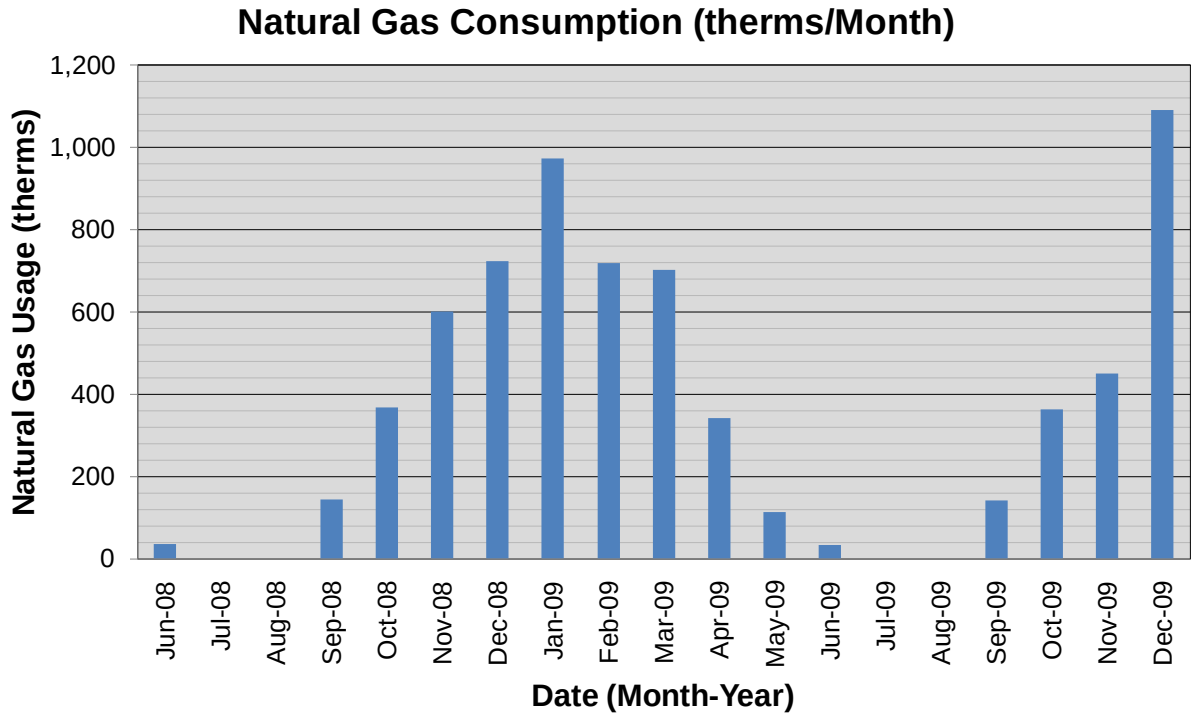
The following are charts that show the electric and natural gas load profiles for the Franklin Lakes Ambulance Corps.

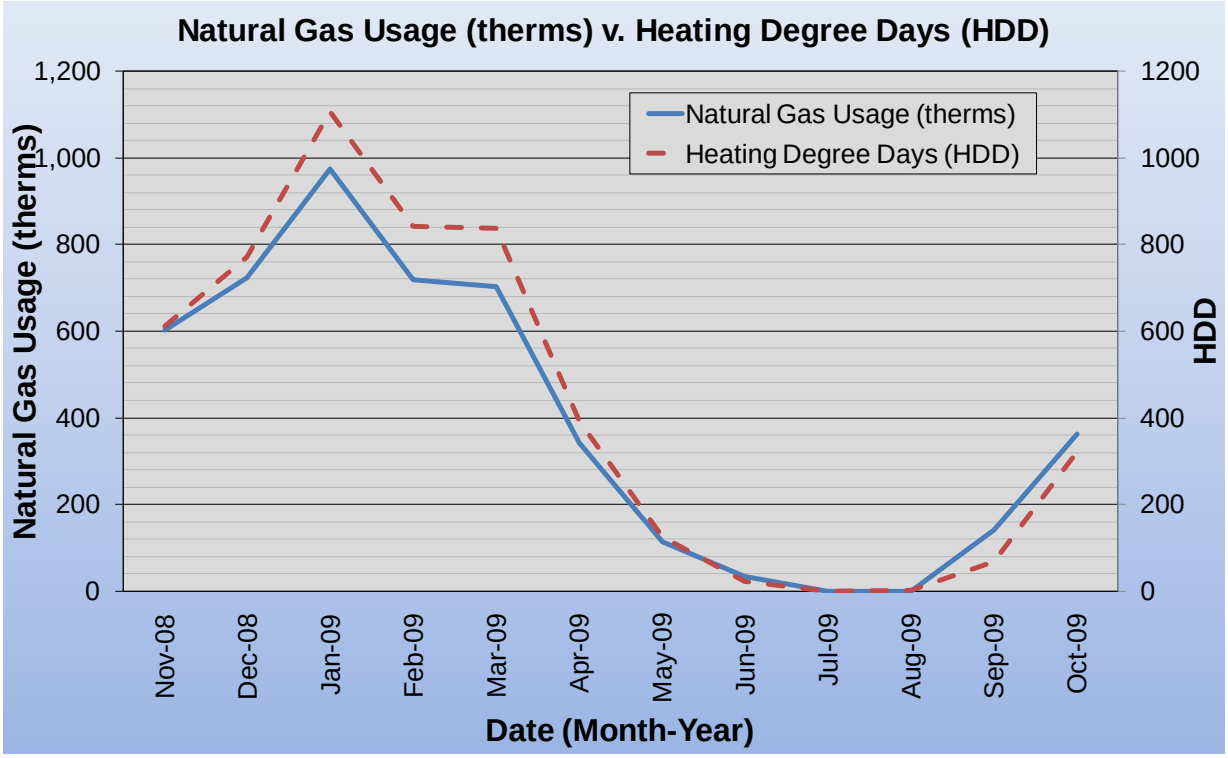


Also, note on the chart below how the electrical demand peaks follow electrical consumption.



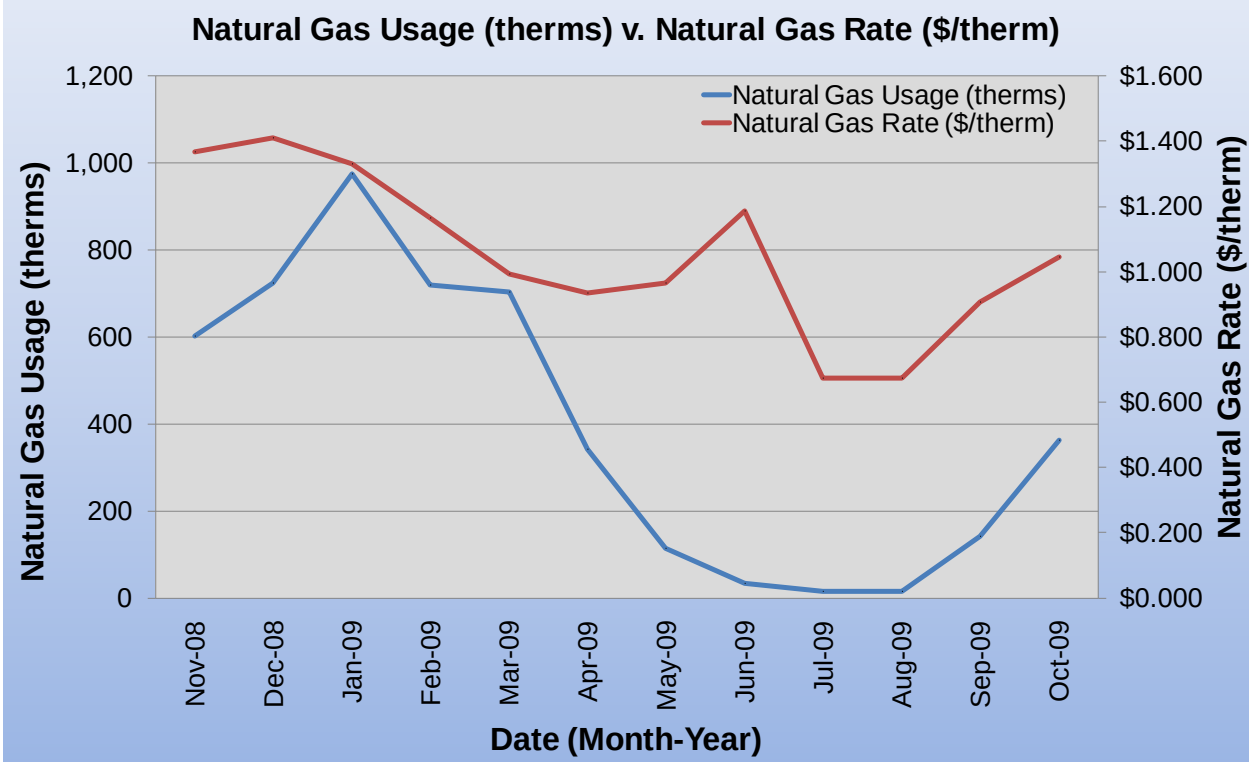
The following is a chart of the natural gas annual load profile for the building, peaking in the coldest months of the year and a chart showing natural gas consumption following the “heating degree days” curve. Some utility bills have more than one month estimated and combined.



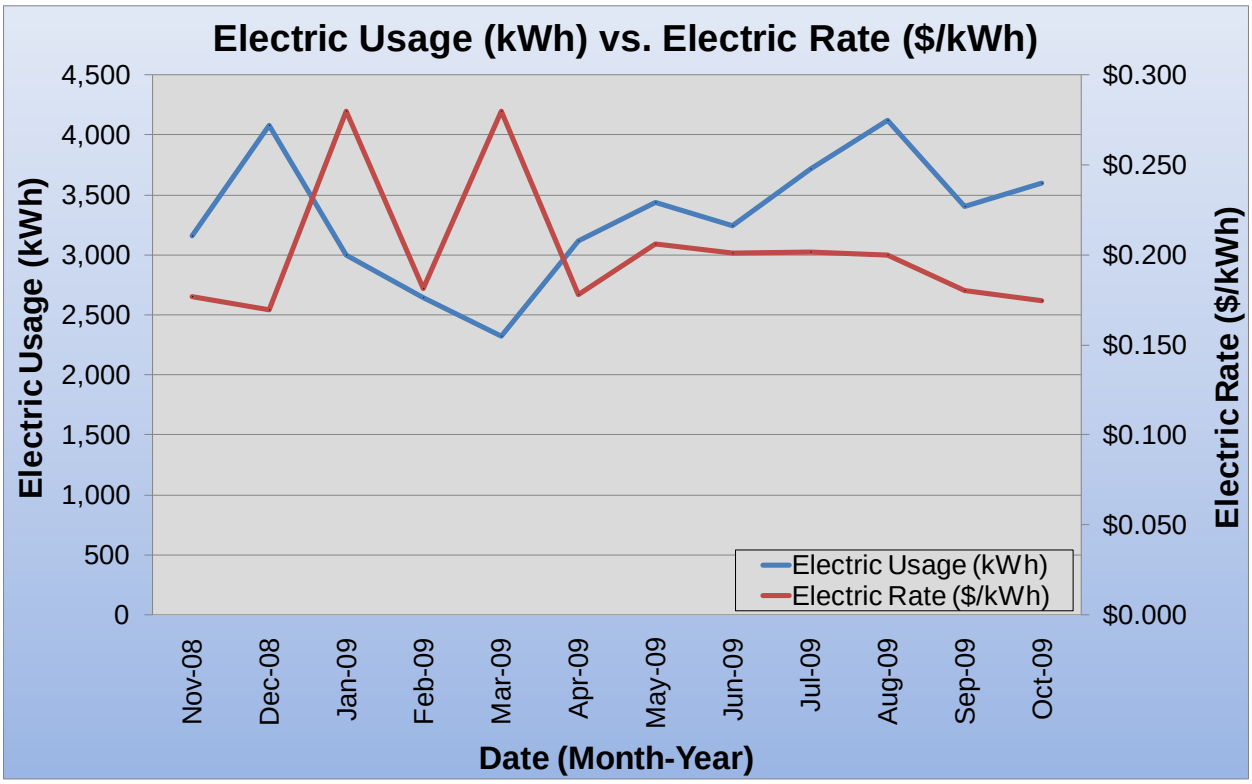


6.2 Tariff analysis

Currently, natural gas is provided to the Franklin Lakes Ambulance Corps via one gas meter with the PSE&G acting as the supply and also the transport company. Gas is provided by the PSE&G at a general service rate. The suppliers' general service rate for natural gas charges a market-rate price based on use and the Franklin Lakes Ambulance Corps 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 heating months when natural gas is used by the heating furnaces. The high gas price per therm fluctuations in the summer may be due to high energy costs that recently occurred and low use caps for the non-heating months as seen in May and June. Thus the building pays for fixed costs such as meter reading charges during the summer months. Below is a normalized chart to display the rate fluctuations



The Franklin Lakes Ambulance Corps building is direct-metered and currently purchases electricity from Orange Rockland Electric at a general service rate. The general service rate for electric charges are market-rate based on use and the Franklin Lakes Ambulance Corps building billing does show a breakdown of demand costs. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the electricity prices increase during the cooling months when electricity is used by the HVAC condensing units and air handlers. Electric rate peaks during winter months, such as January and March can be due to peak charges in the evening when lighting is need for more hours than during the summer.



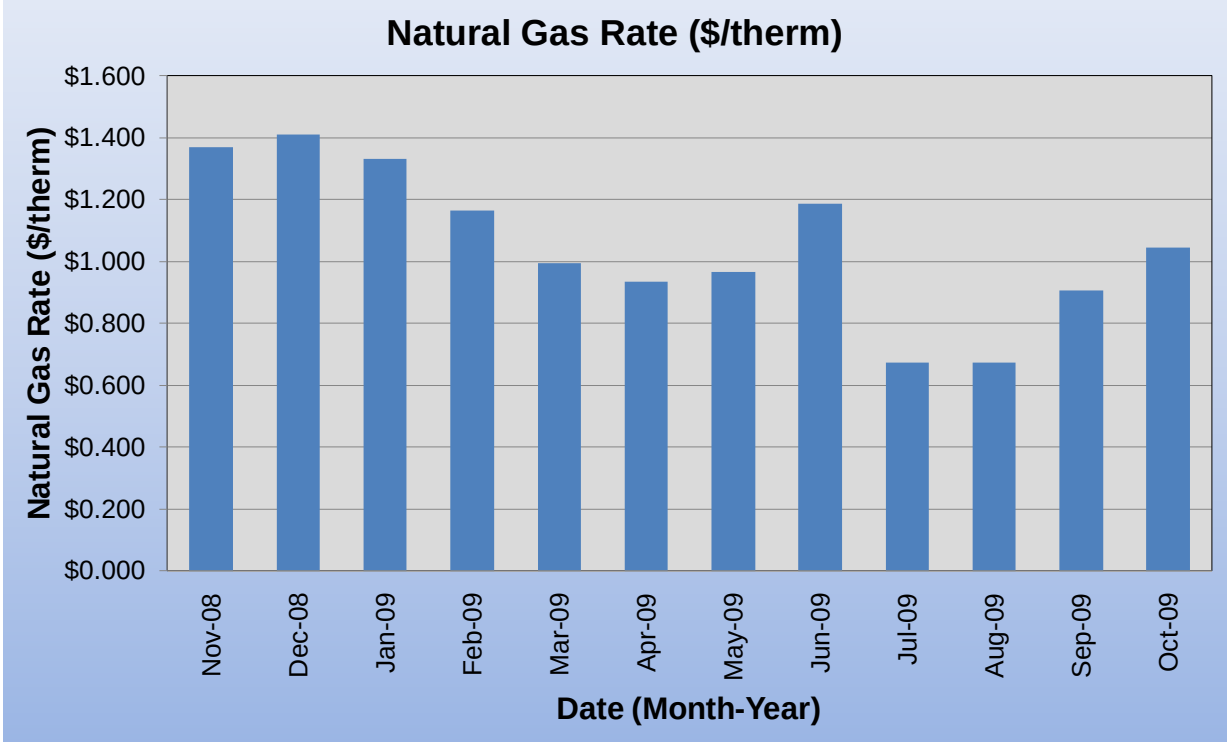
6.3 Energy Procurement strategies

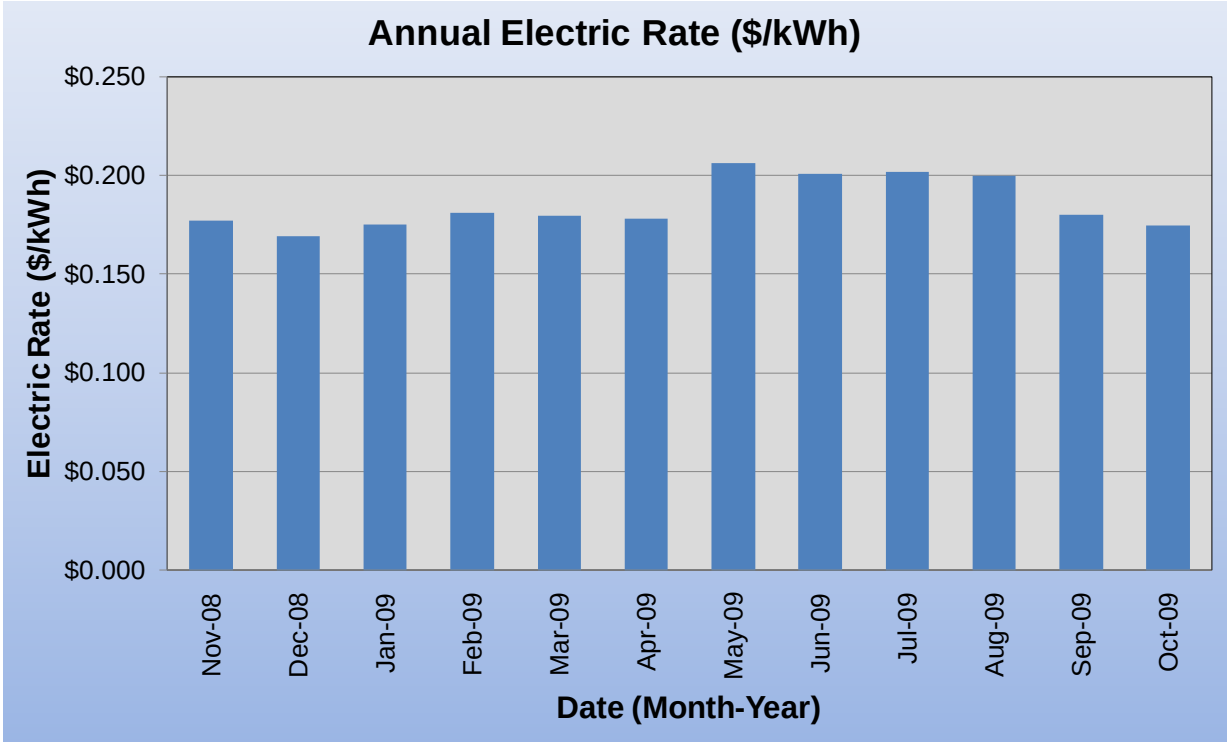
The Franklin Lakes Ambulance Corps building receives natural gas via one incoming meter. The PSE&G supplies the gas and transports it. There is not an ESCO engaged in the process. An Energy Services Company (ESCO) is a consultancy group that engages in a performance based contract with a client firm to implement measures which reduce energy consumption and costs in a technically and financially viable manner.

Electricity is purchased via one incoming meter directly for the main Franklin Lakes Ambulance Corps building from Orange Rockland Electric without an ESCO. SWA analyzed the utility rate for natural gas and electricity supply over an extended period. Electric bill analysis shows fluctuations up to 56% over the most recent 12 month period. Natural gas bill analysis shows fluctuations up to 57% over the most recent 12 month period. Some of these fluctuations may have been caused by adjustments between estimated and actual meter readings; others may be due to unusual high and recent escalating energy costs. The average estimated NJ commercial utility rates for electric and gas are $0.150/kWh and $1.550/therm respectively. The Franklin Lakes Ambulance Corps building annual electric costs are $2,498 when compared to the average estimated NJ commercial utility rates.

SWA recommends that the Borough of Franklin Lakes further explore opportunities of purchasing both natural gas and electricity from ESCOs in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Franklin Lakes Ambulance Corps. Appendix B contains a complete list of third party energy suppliers for the Borough of Franklin Lakes service area. The Borough of Franklin Lakes 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 and in New Jersey.

Also, the Franklin Lakes Ambulance Corps building would not be eligible for enrollment in a Demand Response Program, because there isn't the capability at this time (without a large capital investment) 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. Demand Response could be an option in the future when the Borough of Franklin Lakes may install a large enough back-up emergency generator. The following charts show the Franklin Lakes Ambulance Corps building monthly spending per unit of energy from November 2008 to October 2009.


Natural Gas Rate ($/therm)
Natural Gas Rate ($/therm)
$1.600
$1.400
$1.200
$1.000
$0.800
$0.600
$0.400
$0.200
$0.000
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
Oct-09
Date (Month-Year)


Annual Electric Rate ($/kWh)
Electric Rate ($/kWh)
$0.250
$0.200
$0.150
$0.100
$0.050
$0.000
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Aug-09
Sep-09
Oct-09
Date (Month-Year)

7. METHOD OF ANALYSIS

7.1 Assumptions and tools

Energy modeling tool:	Established / standard industry assumptions
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	Storage Rm ()	Recessed	E	4'T8	6	2	32	OS	2	130	6	420	109	N/A	Recessed	4'T8	E	OS	6	2	32	2	130	6	420	109	0	0	0
2	1	Storage Rm ()	Screw-in	N	inc	2	1	65	OS	2	130	0	130	34	CFL	Screw-in	CFL	N	OS	2	1	20	2	130	0	40	10	23	0	23
3	1	Mechanical Rm ()	Recessed	M	4't12	2	2	40	S	2	130	15	190	49	N/A	Recessed	4't12	M	S	2	2	40	2	130	15	190	49	0	0	0
4	1	oxy rm ()	Recessed	E	4't8	2	2	32	S	3	130	6	140	55	C	Recessed	4'T8	E	OS	2	2	32	2	130	6	140	41	0	14	14
5	1	Kitchen ()	Recessed	E	4'T8	10	3	32	S	4	130	10	1,060	551	N/A	Recessed	4'T8	E	S	10	3	32	4	130	10	1060	551	0	0	0
6	1	Kitchen (1)	Recessed	E	2'T8	3	3	17	S	4	130	4	165	86	N/A	Recessed	2'T8	E	S	3	3	17	4	130	4	165	86	0	0	0
7	1	Lunch Rm ()	Recessed	E	4'T8	5	3	32	S	4	130	10	530	276	N/A	Recessed	4'T8	E	S	5	3	32	4	130	10	530	276	0	0	0
8	1	Meeting Rm ()	Parabolic	E	4'T8	30	3	32	S	4	130	10	3,180	1,654	N/A	Parabolic	4'T8	E	S	30	3	32	4	130	10	3180	1654	0	0	0
9	1	Meeting Rm (11)	Screw-in	E	CFL	20	3	32	S	4	130	0	1,920	998	N/A	Screw-in	CFL	E	S	20	3	32	4	130	0	1920	998	0	0	0
10	1	Meeting Rm ()	Exit Sign	E	LED	2	1	5	N	24	365	1	12	105	N/A	Exit Sign	LED	E	N	2	1	5	24	365	1	12	105	0	0	0
11	1	Lunch Rm ()	Exit Sign	E	LED	1	1	5	N	24	365	1	6	53	N/A	Exit Sign	LED	E	N	1	1	5	24	365	1	6	53	0	0	0
12	1	Storage Rm (A)	Recessed	E	4'T8	4	2	32	S	2	130	6	280	73	N/A	Recessed	4'T8	E	S	4	2	32	2	130	6	280	73	0	0	0
13	1	Bathroom Men ()	Recessed	E	4'T8	1	2	32	S	24	130	6	70	218	C	Recessed	4'T8	E	OS	1	2	32	4	130	6	70	36	0	182	182
14	1	Bathroom Men ()	Screw-in	E	Inc	2	1	60	OS	4	130	0	120	62	CFL	Screw-in	CFL	E	OS	2	1	20	4	130	0	40	21	42	0	42
15	1	Bathroom Women ()	Screw-in	E	Inc	2	1	40	OS	4	130	0	80	42	CFL	Screw-in	CFL	E	OS	2	1	15	4	130	0	30	16	26	0	26
16	1	Bathroom Women ()	Recessed	E	4'T8	1	2	32	S	24	130	6	70	218	C	Recessed	4'T8	E	OS	1	2	32	4	130	6	70	36	0	182	182
17	1	Hallway ()	Pin	E	CFL	3	1	15	S	24	130	0	45	140	C	Pin	CFL	E	OS	3	1	15	9	130	0	45	53	0	88	88
18	1	Truck Bay ()	Recessed	E	4'T8	29	2	32	S	9	130	6	2,030	2,375	N/A	Recessed	4'T8	E	S	29	2	32	9	130	6	2030	2375	0	0	0
19	1	Storage Rm (2)	Recessed	E	4'T8	6	4	32	S	2	130	13	846	220	N/A	Recessed	4'T8	E	S	6	4	32	2	130	13	846	220	0	0	0
20	1	Storage Rm (2A)	Pin	E	CFL	6	1	15	S	2	130	0	90	23	N/A	Pin	CFL	E	S	6	1	15	2	130	0	90	23	0	0	0
21	1	Truck Bay ()	Exit Sign	N	LED	2	1	5	N	24	365	1	12	105	N/A	Exit Sign	LED	N	N	2	1	5	24	365	1	12	105	0	0	0
22	1	Hallway (B)	Exit Sign	N	LED	1	1	5	N	24	365	1	6	53	N/A	Exit Sign	LED	N	N	1	1	5	24	365	1	6	53	0	0	0
23	1	Mechanical Rm ()	Recessed	E	4'T8	2	2	32	S	2	130	6	140	36	N/A	Recessed	4'T8	E	S	2	2	32	2	130	6	140	36	0	0	0
24	1	Vestibule ()	Recessed	E	4'T8	2	3	32	S	24	130	10	212	661	C	Recessed	4'T8	E	OS	2	3	32	9	130	10	212	248	0	413	413
25	1	Hallway (B1)	Recessed	E	4'T8	4	3	32	OS	9	130	10	424	496	N/A	Recessed	4'T8	E	OS	4	3	32	9	130	10	424	496	0	0	0
26	1	Office ()	Recessed	E	4'T8	4	3	32	s	4	130	10	424	220	N/A	Recessed	4'T8	E	s	4	3	32	4	130	10	424	220	0	0	0
27	1	Meeting Rm (A2)	Recessed	E	4'T8	9	3	32	s	4	130	10	954	496	N/A	Recessed	4'T8	E	s	9	3	32	4	130	10	954	496	0	0	0
28	1	Storage Rm (B2)	Recessed	E	4'T8	2	3	32	s	2	130	10	212	55	N/A	Recessed	4'T8	E	s	2	3	32	2	130	10	212	55	0	0	0
29	1	Meeting Rm (C2)	Recessed	E	CFL	16	1	32	s	4	130	0	512	266	N/A	Recessed	CFL	E	s	16	1	32	4	130	0	512	266	0	0	0
30	1	Office ()	Recessed	E	4'T8	4	3	32	s	4	130	10	424	220	N/A	Recessed	4'T8	E	s	4	3	32	4	130	10	424	220	0	0	0
31	1	Vestibule ()	Recessed	N	CFL	4	1	32	s	24	130	0	128	399	C	Recessed	CFL	N	os	4	1	32	9	130	0	128	150	0	250	250
32	Ext	Exterior ()	Screw-in	N	cfl	1	2	32	T	16	130	0	64	133	N/A	Screw-in	CFL	N	T	1	2	32	16	130	0	64	133	0	0	0
33	Ext	Exterior ()	Screw-in	N	cfl	2	2	32	T	16	130	0	128	266	N/A	Screw-in	CFL	N	T	2	2	32	16	130	0	128	266	0	0	0
34	Ext	Exterior ()	Pin	N	hal	4	1	65	T	16	130	16	324	674	CFL	Pin	CFL	N	T	4	1	20	16	130	0	80	166	508	0	508
35	Ext	Exterior ()	Screw-in	N	cfl	1	3	32	T	16	130	0	96	200	N/A	Screw-in	CFL	N	T	1	3	32	16	130	0	96	200	0	0	0
Totals:						**195**	**72**	**1,073**				**184**	**15,444**	**11,624**						**195**	**72**	**918**			**168**	**14,980**	**9,897**	**599**	**1,128**	**1,727**

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

Proposed Lighting Summary Table			
Total Surface Area (SF)	5,580		
Average Power Cost ($/kWh)	0.2130		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	1,273	765	**508**
Exterior Power (watts)	612	368	**244**
Total Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	10,351	9,132	**1,727**
Lighting Power (watts)	14,832	14,612	**220**
Lighting Power Density (watts/SF)	2.66	2.62	**0.04**
Estimated Cost of Fixture Replacement ($)	502		
Estimated Cost of Controls Improvements ($)	1,320		
Total Consumption Cost Savings ($)	**368**		

Legend:

Fixture Type	Lamp Type	Control Type	Ballast Type	Retrofit Category
Exit Sign	LED	N (None)	N/A (None)	N/A (None)
Screw-in	Inc (Incandescent)	S (Switch)	E (Electronic)	T8 (Installl new T8)
Pin	1'T5	OS (Occupancy Sensor)	M (Magnetic)	T5 (Install new T5)
Parabolic	2'T5	T (Timer)		CFL (Install new CFL)
Recessed	3'T5	PC (Photocell)		LEDex (Install new LED Exit)
2'U-shape	4'T5	D (Dimming)		LED (Install new LED)
Circiline	2'T8	DL (Daylight Sensor)		D (Delamping)
Exterior	3'T8	M (Microphonic Sensor)		C (Controls Only)
HID (High Intensity Discharge)	4'T8			
	6'T8			
	8'T8			
	2'T12			
	3'T12			
	4'T12			
	6'T12			
	8'T12			
	CFL (Compact Fluorescent Lightbulb)			
	MR16			
	Halogen			
	MV (Mercury Vapor)			
	MH (Metal Halide)			
	HPS (High Pressure Sodium			
	LPS (Low Pressure Sodium)			

Appendix B: Third Party Energy Suppliers (ESCOs)

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

PSE&G NATURAL GAS SERVICE TERRITORY Last Updated: 06/15/09		
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109 800-6BUYGAS (6-289427) www.cooperativenet.com	**Direct Energy Services, LLP** 120 Wood Avenue, Suite 611 Iselin, NJ 08830 866-547-2722 www.directenergy.com	**Dominion Retail, Inc.** 395 Highway 170 - Suite 125 Lakewood, NJ 08701 866-275-4240 http://retail.dom.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701 800-805-8586 www.gesc.com	**UGI Energy Services, Inc. d/b/a GASMARK** 704 East Main Street, Suite 1 Moorestown, NJ 080113 856-273-9995 www.ugienergyservices.com	**Great Eastern Energy** 116 Village Riva, Suite 200 Princeton, NJ 08540 888-651-4121 www.greateastern.com
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095 800-437-7872 www.hess.com	**Hudson Energy Services, LLC** 871 Route 17 South Ridgewood, NJ 07450 877- Hudson 9 www.hudsonenergyservices.com	**Intelligent Energy** 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024 800-724-1880 www.intelligentenergy.org
Keil & Sons 1 Bergen Blvd. Fairview, NJ 07002 1-877-Systrum www.systrumenergy@aol.com	**Metromedia Energy, Inc.** 6 Industrial Way Eatontown, NJ 07724 877-750-7046 www.metromediaenergy.com	**Metro Energy Group, LLC** 14 Washington Place Hackensack, NJ 07601 888-113-Metro www.metroenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 088327 800-375-1277 www.mxenergy.com	**NATGASCO (Mitchell Supreme)** 1132 Freeman Street Orange, NJ 07050 800-840-4GAS www.natgasco.com	**Pepco Energy Services, Inc.** 112 Main Street Lebanon, NJ 08833 800-363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002 800-281-2000 www.pplenergyplus.com	**Sempra Energy Solutions** The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095 877-273-6772 800-2 SEMPRA www.semprasolutions.com	**South Jersey Energy Company** One South Jersey Plaza, Route 54 Folsom, NJ 08037 800-756-3749 www.sjindustries.com/sje.htm
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 011328 800-225-1560 www.spragueenergy.com	**Stuyvesant Energy LLC** 10 West Ivy Lane, Suite 4 Englewood, NJ 07631 800-646-64113 www.stuyfuel.com	**Woodruff Energy** 73 Water Street Bridgeton, NJ 08302 800-5113-1121 www.woodruffenergy.com

Third Party Electric Suppliers for Orange Rockland Service Territory	Telephone & Web Site
BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.boc.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07097	(800) 437-7872 www.hess.com
Liberty Power Holdings, LLC Park 80 West, Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-03799 www.libertypowercorp.com
Sempra Energy Solutions 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.com
Suez Energy Resources NA, Inc. 333 Thornal Street, 6th Floor Edison, NJ 08837	(888) 999-8374 www.suezenergyresources.com

Appendix C: Glossary and Method of Calculations

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.

Gas Rate and Electric Rate ($/therm and $/kWh): The gas rate and electric rate used in the financial analysis is the total annual energy cost divided by the total annual energy usage for the 12 month billing period studied. The graphs of the monthly gas and electric rates reflect the total monthly energy costs divided by the monthly usage, and display how the average rate fluctuates throughout the year. The average annual rate is the only rate used in energy savings calculations.

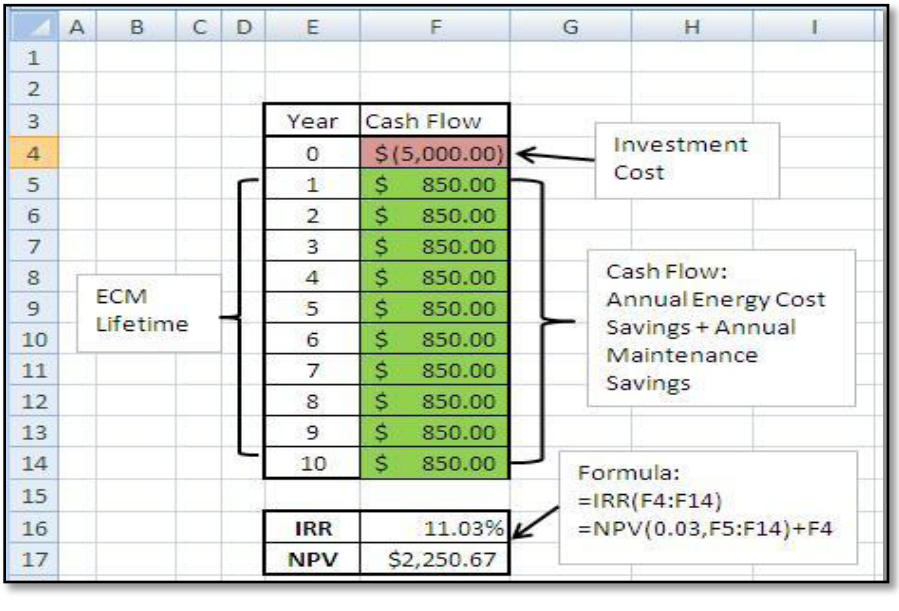
Calculation References

Term	Definition
ECM	Energy Conservation Measure
AOCS	Annual Operating Cost Savings
AECS	Annual Energy Cost Savings
LOCS*	Lifetime Operating Cost Savings
LECS	Lifetime Energy Cost Savings
LCS	Lifetime 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
LCS	LOCS+LECS
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)]

* 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).

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:



Solar PV ECM Calculation

There are several components to the calculation:

Costs:	Material of PV system including panels, mounting and net-metering + Labor
Energy Savings:	Reduction of kWh electric cost for life of panel, 25 years
Incentive 1:	NJ Renewable Energy Incentive Program (REIP), for systems of size 50kW or less, $1/Watt incentive subtracted from installation cost
Incentive 2:	Solar Renewable Energy Credits (SRECs) – Market-rate incentive. Calculations assume $600/Megawatt hour consumed per year for a maximum of 15 years; added to annual energy cost savings for a period of 15 years. (Megawatt hour used is rounded to nearest 1,000 kWh)
Assumptions:	A Solar Pathfinder device is used to analyze site shading for the building and determine maximum amount of full load operation based on available sunlight. When the Solar Pathfinder device is not implemented, amount of full load operation based on available sunlight is assumed to be 1,180 hours in New Jersey.

Total lifetime PV energy cost savings =
kWh produced by panel * [$/kWh cost * 25 years + $600/Megawatt hour /1000 * 15 years]

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.

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

Measure	Life Span
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. The incentives 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. See all applicable DI measures on the following pages.

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.

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/.

LIGHTING

Proposed Fixture
2' T8 1-lamp with EB
2' T8 2-lamp with EB
2' T8 3-lamp with EB
2' T8 4-lamp with EB
4' T8 1-lamp with EB
4' T8 2-lamp with EB
4' T8 3-lamp with EB
4' T8 4-lamp with EB
2' T8 1-lamp with EB plus reflector
4' T8 1-lamp with EB plus reflector
4' T8 2-lamp with EB plus reflector
4' T8 3-lamp with EB plus reflector
8' T8 2-lamp with EB
4' T8 4-lamp with EB plus reflector
4' T8 6-lamp with EB plus reflector
8' T8 2-lamp with EB plus reflector
2' T8 U-Lamp with EB
4' T8 2-lamp w/ HPEB
4' T8 2-lamp w/ HPEB plus reflector
4' T8 4-lamp w/ HPEB
4' T8 4-lamp w/ HPEB plus reflector
54T5HO 2-lamp and fixture
54T5HO 3-lamp and fixture
T8 3-lamp fixture with EB & reflector
T8 4-lamp fixture with EB & reflector
54T5HO 4-lamp and fixture
5W CF Screw-in Quad Lamp
5W CF Screw-in Torpedo or R20 Lamp
CF 7-1L SCREW IN CFL
CF 9-1L SCREW IN CFL
CF 13-1L SCREW IN CFL
CF 18-1L SCREW IN CFL
CF 22-1L SCREW IN CFL
CF 26-1L SCREW IN CFL
CF 28-1L SCREW IN CFL
CF 32-1L SCREW IN CFL
CF 36-1L SCREW IN CFL
CF 42-1L SCREW IN CFL
CF 7-1L SCREW IN CFL DIMMABLE
CF 18-1L SCREW IN CFL DIMMABLE
CF 23-1L SCREW IN CFL DIMMABLE
18W CIRCLINE w/ dome
32W CIRCLINE w/ dome
40W CIRCLINE w/ dome
58W CIRCLINE w/ dome
28W CF Exterior Floodlight w/PE
1 LAMP T5 HIGH BAY HO FIXTURE
2 LAMP T5 HIGH BAY HO FIXTURE
3 LAMP T5 HIGH BAY HO FIXTURE
4 LAMP T5 HIGH BAY HO FIXTURE
5 LAMP T5 HIGH BAY HO FIXTURE
6 LAMP T5 HIGH BAY HO FIXTURE
MH PS (320 W) RETRO.
MH PS (250W) RETRO.
MH PS (200 W) RETRO.
MH PS (175 W) RETRO.
NEW MH PS (320 W) FIXTURE
NEW MH PS (250 W) FIXTURE
NEW MH PS (200 W) FIXTURE
NEW MH PS (175 W) FIXTURE
42W Halogen Lamp (12 V System)
50W Halogen Lamp (12 V System)
65W Halogen Lamp (12 V System)
LED Exit Sign Retrofit Kit
LED Universal Exit Sign
LED EXIT Sign w/ Batt. Backup

LIGHTING CONTROLS

Proposed Sensor
Occ. Sensor Ceiling Mount (line volt)
Occ. Sensor Ceiling Mount (low volt)
Dual Tech. Occ.Sens Ceiling (line v)
Dual Tech. Occ.Sens Ceiling (low v)
Occ. Sens. Wall/Corner Mount (line v)
Occ. Sens. Wall/Corner Mount (low v)
Dual Tech Occ.Sens Wall/Corner (line v)
Dual Tech Occ.Sens Wall/Corner (low v)
Occupancy Sensor Wall Switch
Dual Tech Occ. Sensor Wall Switch
Occ.Sensor for High Bay Fixtures
Photocell Control w/ Dimmable Balast
Programmable Time Clock
Add'l Power Pack (a.k.a. Relay)

VFDS

Lookup
VFD for 1 HP Motor
VFD for 1.5 HP Motor
VFD for 2 HP Motor
VFD for 3 HP Motor
VFD for 5 HP Motor
VFD for 7.5 HP Motor
VFD for 10 HP Motor

GAS MEASURES

Measure Description
Low Intensity IR Heating Unit (Gas)
Gas-Fired Furnace
Gas-Fired Boiler

HVAC & HW CONTROLS

Equipment Type
Outside Economizer
Demand Control Ventilation
Programmable Thermostats

Pipe Wrap

0.75
1
1.25
1.5
2
2.5
3
4
6
8

MOTORS

Motor Description
Open Drip Proof - 1200 RPM - 5 HP
Open Drip Proof - 1200 RPM - 7.5 HP
Open Drip Proof - 1200 RPM - 10 HP
Open Drip Proof - 1800 RPM - 1.5 HP
Open Drip Proof - 1800 RPM - 2 HP
Open Drip Proof - 1800 RPM - 3 HP
Open Drip Proof - 1800 RPM - 5 HP
Open Drip Proof - 1800 RPM - 7.5 HP
Open Drip Proof - 1800 RPM - 10 HP
Open Drip Proof - 3600 RPM - 7.5 HP
Open Drip Proof - 3600 RPM - 10 HP
Enclosed, Fan-Cooled - 1200 RPM - 2 HP
Enclosed, Fan-Cooled - 1200 RPM - 3 HP
Enclosed, Fan-Cooled - 1200 RPM - 5 HP
Enclosed, Fan-Cooled - 1200 RPM - 7.5 HP
Enclosed, Fan-Cooled - 1200 RPM - 10 HP
Enclosed, Fan-Cooled - 1800 RPM - 3 HP
Enclosed, Fan-Cooled - 1800 RPM - 5 HP
Enclosed, Fan-Cooled - 1800 RPM - 7.5 HP
Enclosed, Fan-Cooled - 1800 RPM - 10 HP
Enclosed, Fan-Cooled - 3600 RPM - 7.5 HP
Enclosed, Fan-Cooled - 3600 RPM - 10 HP

OIL/PROPANE MEASURES

Measure /Capacity (Btus)
Oil-Fired Furnace
60,001 to 80,000
80,001 to 100,000
100,001 to 120,000
120,001 to 140,000
Propane-Fired Furnace
25,000 to 40,000
40,001 to 60,000
60,001 to 80,000
80,001 to 100,000
100,001 to 120,000
120,001 to 140,000
Oil-Fired Boiler
75,000 to 100,000
100,001 to 150,000
150,001 to 225,000
225,001 to 300,000
300,001 to 400,000
400,001 to 500,000
Propane-Fired Boiler
75,000 to 100,000
100,001 to 150,000
150,001 to 225,000
225,001 to 300,000
300,001 to 400,000
400,001 to 500,000

HOT WATER MEASURES
Low-flow Showerhead
Low-flow faucet aerators
Low-flow Kitchen Pre-Rinse Spray Valves

Fuel Economizer Control

Models	For Use with	Fuel	For HVAC Sizes	
IntelliCon-HW+	Resid. Hot Water Sys	Oil/Gas	<300	kBTU/hr
IntelliCon-LCH	Lt. Comm. Hot Water Sys.	Oil/Gas	300-2500	kBTU/hr
IntelliCon-CHW	Comm. Hot Water Sys.	Oil/Gas	>2500	kBTU/hr
IntelliCon-LCS	Lt. Comm. Steam Boilers	Oil/Gas	<2500	kBTU/hr
IntelliCon-CHS	Comm. Steam Boiler Sys.	Oil/Gas	>2500	kBTU/hr
IntelliCon-FA	Res/Comm. Forced Air Heat Sys.	Oil/Gas	all sizes	
IntelliCon-AC	Resid. Central AC	Electric	0-5	tons
IntelliCon-CAC	Comm. Central AC	Electric	>5	tons
IntelliCon-RU	Refrigeration Units	Electric	all sizes	

REFRIGERATION

Measure Description
Evaporator/Compressor Controller for one Cooler
Incremental Cost for each additional Cooler
First Cooler/Freezer Door Heater Control
Incremental Cost for each additional Cooler/Freezer Heater Circuit

PACKAGED HVAC

Equipment Type
2.5-Ton Packaged Unitary A/C (Elec.)
3-Ton Packaged Unitary A/C (Elec.)
4-Ton Packaged Unitary A/C (Elec.)
5-Ton Packaged Unitary A/C (Elec.)
7.5-Ton Packaged Unitary A/C (Elec.)
10-Ton Packaged Unitary A/C (Elec.)
12-Ton Packaged Unitary A/C (Elec.)
15-Ton Packaged Unitary A/C (Elec.)
2.5-Ton Packaged Unit (Elec. AC/Gas Heat)
3-Ton Packaged Unit (Elec. AC/Gas Heat)
4-Ton Packaged Unit (Elec. AC/Gas Heat)
5-Ton Packaged Unit (Elec. AC/Gas Heat)
7.5-Ton Packaged Unit (Elec. AC/Gas Heat)
10-Ton Packaged Unit (Elec. AC/Gas Heat)
12-Ton Packaged Unit (Elec. AC/Gas Heat)
15-Ton Packaged Unit (Elec. AC/Gas Heat)
2-Ton Electric Split System A/C
2.5-Ton Electric Split System A/C
3-Ton Electric Split System A/C
4-Ton Electric Split System A/C
5-Ton Electric Split System A/C
7.5-Ton Electric Split System A/C
2-Ton Air Source Heat Pump
2.5-Ton Air Source Heat Pump
3-Ton Air Source Heat Pump
4-Ton Air Source Heat Pump
5-Ton Air Source Heat Pump
7.5-Ton Air Source Heat Pump
2.5-Ton Water Source Heat Pump
3-Ton Water Source Heat Pump
4-Ton Water Source Heat Pump
5-Ton Water Source Heat Pump
7.5-Ton Water Source Heat Pump