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Local Government Energy Program
Final Energy Audit Report

For

The Union Fire Co. & Rescue Building
Township of Hopewell
Titusville, NJ 08560

Project Number: LGEA14

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INTRODUCTION

On July 9th, August 6th and 7th Steven Winter Associates, Inc. (SWA) performed an energy audit and assessment for the Township of Hopewell municipal buildings. The audit included a review of the Union Fire Co. & Rescue Building, the Municipal Building, the Athletic Complex, the Public Works Garage, the Princeton Farms Pump Station, and the Brandon Farms Pump Station. The buildings are located in Titusville and Pennington, NJ. A separate energy audit report is issued for each of the referenced buildings.

This report addresses the Union Fire Co. & Rescue Building located at 1396 River Rd., Titusville, NJ 08560. 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 Union Fire Co. & Rescue Building was built in 1935 and had major renovations in 1950 and 1993. The building houses a large banquet hall, a commercial grade kitchen, training room, office spaces, a bunk room, a member / conference room, and 7 fire engine garage bays. The building consists of 17,532 square feet. The building has one full time employee from 8:00 am to 4:00 pm and many volunteers. It is operated Monday through Friday 8am to 4pm and utilized on weekends and evenings for emergencies.

The goal of this energy audit is to provide sufficient information to the Township of Hopewell to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the Union Fire Co. & Rescue Building.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses The Union Fire Co. & Rescue Building located at 1396 River Rd., Titusville, NJ 08560. The Union Fire Co. & Rescue Building is a one story building (with basement) with a combined floor area of 17,532 square feet. The original structure was built in 1935 and renovated in 1950 and 1993.

Based on the field visits performed by the SWA staff on July 9th, August 6th and 7th, 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.

In 2008, the most recent year, the Union Fire Co. & Rescue Building consumed 80,680 kWh or $15,637 worth of electricity and 5,383 gallons or $15,030 worth of fuel oil #2. The joint energy consumption for the building, including both electricity and fuel oil, was 1,024 MM-Btus of energy that cost a total of $30,667.

SWA benchmarked the Union Fire Co. & Rescue Building using the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building did not receive a performance rating due to size, nature of activity inside the building and hours occupied.

Based on the assessment of the Department of Public Works, SWA has separated the recommendations into three categories. These are summarized as follows:

Category I Recommendations: Capital Improvements

- Replace Boiler - The existing boiler is at the end of its statistical life cycle and should be replaced rather than wait for a catastrophic failure of a cracked cast iron section for example. The proposed boiler is a MPC5 or equivalent, oil fired, with 770 MBH input, 652 MBH gross output and is designed to operate at 88.8% thermal efficiency. The total replacement cost based on similar projects is $30,000. The expected annual fuel oil savings are approximately 743 gallons, or $2,074, which will give a 14.5 year simple payback. This recommended replacement cannot be justified by energy savings alone. SWA recommends that this capital investment be highly prioritized in the Township of Hopewell capital plan.

Category II Recommendations: Operations and Maintenance

- Controls Optimization - On the day of the audit SWA observed a number of un-occupied spaces that were air conditioned. SWA recommends that the schedules for all attic HVAC equipment and heaters serving key public spaces be reviewed and optimized. During periods when the spaces are not occupied, the equipment may be shut-off or controlled to minimize the amount of fresh air conditioned by the equipment. The cost and effort associated with implementation of this recommendation will depend upon the capabilities of the existing building automation control system. Energy and cost savings associated with this recommendation will vary, depending occupancy schedules and means of control utilized.
- Programmable thermostats - Some of the building thermostats are manual and not programmable. There could be opportunities to contain the cooling / heating to only areas that require it per an advanced agreed upon schedule, implement setbacks and thermostat upgrades.
- Boiler Room Piping Insulation - Insulate hot water piping to efficiently deliver heat where required.
- Roof Maintenance - SWA recommends regular maintenance to verify water is draining correctly.
- Weather Stripping / Air Sealing - Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.

- Exterior Wall Integrity - SWA observed water damage near the parking lot entrance on the stucco façade and below the left side entrance. Extra maintenance and care should be taken to these exterior areas as moisture will work into the walls.
- Water Efficient Fixtures & Controls - There are many retrofit options, which can be installed now or incorporated as equipment is replaced. 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.
- Energy Star labeled appliances such as refrigerators should replace older energy inefficient equipment.
- Smart power electric strips with occupancy sensors should be used to power down computer equipment when left unattended for extended periods of time.
- Create an educational program that teaches maintenance personnel how to minimize the energy use in the buildings. The US Department of Energy offers free information.

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

At this time, SWA recommends a total of **6** Energy Conservation Measures (ECMs) for the Union Fire Co. & Rescue Building that are summarized in the following table. The total investment cost for these ECMs with incentives is **$94,400**. SWA estimates a first year savings of **$52,826** with a simple payback of **1.8 years**. SWA estimates that implementing the recommended ECMs will reduce the carbon footprint of the Union Fire Co. & Rescue Building by **55,088 lbs of CO_2.**

There are various incentives that the Township of Hopewell could apply for that could also help lower the cost of installing the ECMs. SWA recommends that the Union Fire Co. & Rescue Building apply for the NJ SmartStart program through the New Jersey Office of Clean Energy. This incentive can help provide technical assistance for the building in the implementation phase of any energy conservation project. A new NJ Clean Power program, Direct Install, to be rolled out soon, could also assist to cover 80% of the capital investment.

Specifically, the building could qualify for $160 for installing the recommended wall-mounted occupancy sensors and $60 for installing LED Exit signs. The Union Fire Co. & Rescue Building could also take advantage of incentives based on the installation of a photovoltaic (PV) system. Currently, the New Jersey Office of Clean Energy offers a Renewable Energy Incentive program that would pay $5,000 for the installation of a 5kW PV system. There is also an incentive that issues a Solar Renewable Energy Certificate for every 1,000kWh (1MWh) of electricity generated that can be sold or traded for the current market rate of electricity. $3,600 of SRECs may be received annually; however it requires proof of performance, application approval and negotiations with the utility. Wind Upfront Incentive Program, Expected performance buy-down (EPBB) is modeled on an annual kWh production of 1-16,000 kWh and may pay $3.20/kWh upfront incentive level. However, it requires proof of performance, application approval and negotiations with the utility. There is also a utility-sponsored loan program through JCP&L that would allow the building to pay for the installation of the PV or Wind system through a loan issued by JCP&L.

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

PROPOSED														
ECM #	ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
		Estimate $	Source	Use	Unit	Demand /mo	Unit	Savings / year $			Cost Savings $		
1	Install Drinks Cooling machine miser	$265	www.usatech.com	728	kWh	0.4	-	141	1.9	12	1,389	35.4	997
2.1	replace 48 incandescent lamps to CFL	$960	RS Means, Lit Search	2,451	kWh	1.2	kW	475	2.0	7	2,940	29.5	3,357
2.2	install 8 occupacy sensors with INCENTIVES	$720	RS Means, Lit Search, NJ Clean Energy Program	861	kWh	0.4	kW	167	4.3	12	1,644	10.7	1,180
2.3	install 3 EXIT LED signs with INCENTIVES	$540	RS Means, Lit Search, NJ Clean Energy Program	561	kWh	0.3	kW	109	5.0	20	1,589	9.7	768
3	Retro-Commission-ing	$21,915	Similar Projects	8,068	kWh	3.9	kW	3,066	7.1	12	30,160	3.1	22,889
				538	gal oil	-	-						
4	Install 5 kW Wind System with INCENTIVE ($3.20/kWh)	$40,000	Similar Projects	13,000	kWh	5.0	kW	44,122	0.9	25	751,458	71.1	17,810
5	Install 5 kW PV System (with $1/W INCENTIVE and $600/1MWh SREC)	$30,000	Similar Projects	5,902	kWh	5.0	kW	4,745	6.3	25	80,814	6.8	8,086
	Total Proposed	**$94,400**	-	-	-	**16.1**	**kW**	**$52,826**	**1.8**	**22**	**815,704**	**35.3**	**55,088**

Definitions: SPP – Simple Payback (years)
LoM: Life of Measure (years)
ROI: Return on Investment (%)

Assumptions: Discount Rate: 3.2% per DOE FEMP Guidelines
Energy Price Escalation Rate: 0% per DOE FEMP Guidelines

CONSIDERED													
ECM #	ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI, %	Annual Carbon Reduced (lbs of CO2)
		Estimate $	Source	Use	Unit	Demand /mo	Unit	Savings / year $			Cost Savings $		
2.4	replace building internal lights: T12s to T8s with INCENTIVES (incl. 75% labor)	$36,260	RS Means, Lit Search, NJ Clean Energy Program	5,741	kWh	2.8	kW	1,114	32.6	20	16,268	-2.8	7,865

Definitions:
SPP – Simple Payback (years)
LoM: Life of Measure (years)
ROI: Return on Investment (%)

Assumptions:
Discount Rate: 3.2% per DOE FEMP Guidelines
Energy Price Escalation Rate: 0% per DOE FEMP Guidelines

1. HISTORIC ENERGY CONSUMPTION

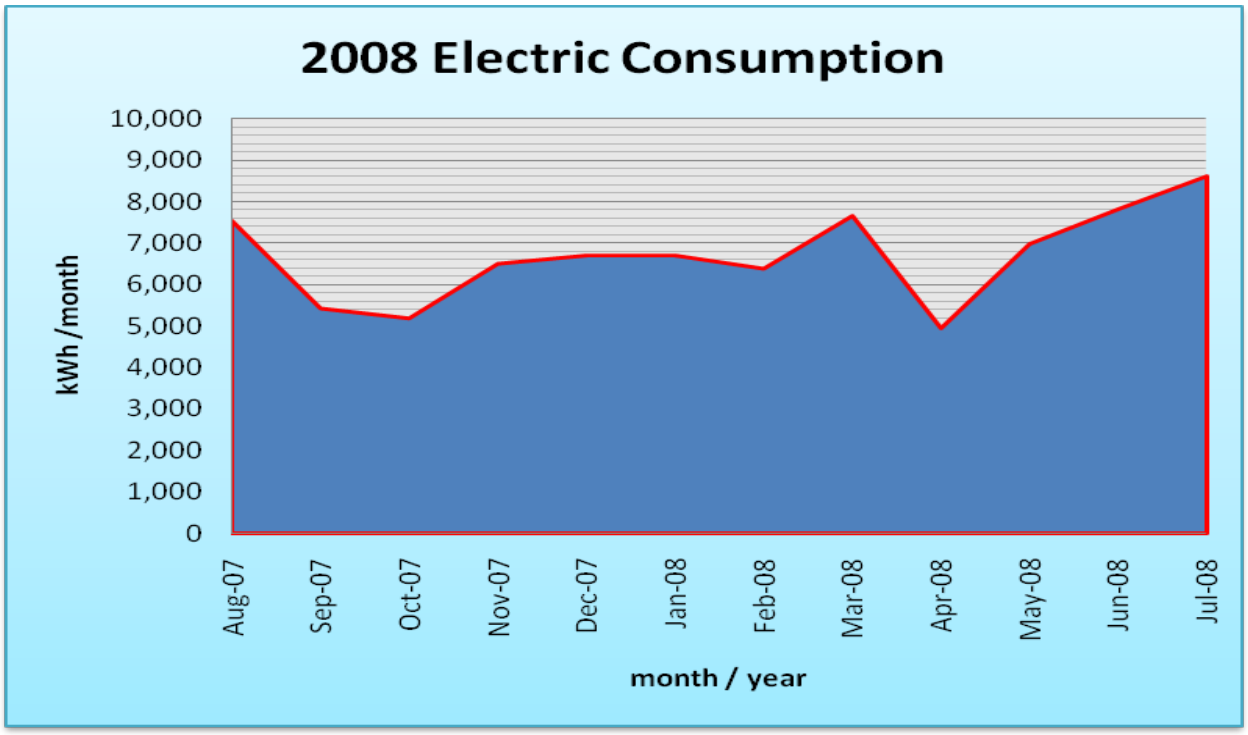
1.1. Energy usage and cost analysis

SWA analyzed utility bills from June 2007 through May 2009 that were received from the utilities and energy companies supplying the Union Fire Co. & Rescue Building with electric and fuel oil.

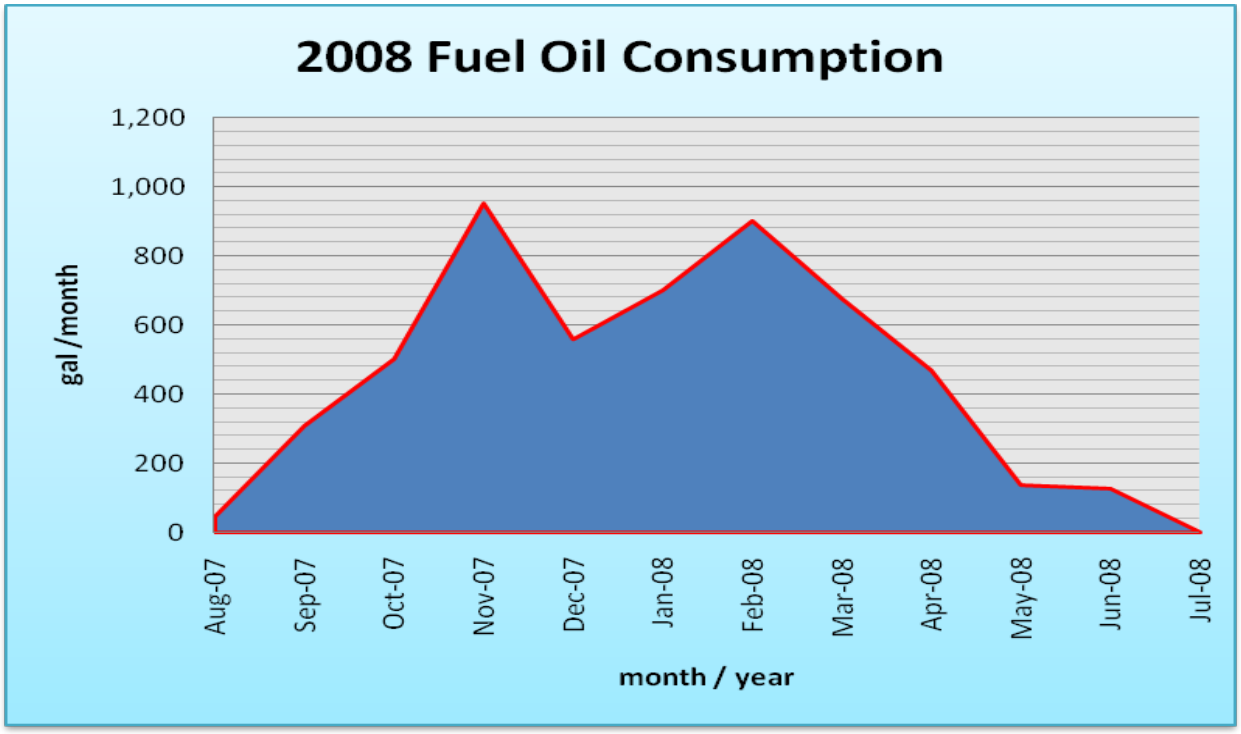
Electricity - The Union Fire Co. & Rescue Building is currently served by one electric meter. The Union Fire Co. & Rescue Building currently buys electricity from JCP&L at **an average rate of $0.194/kWh** based on 12 months of utility bills for 2008. The Union Fire Co. & Rescue Building purchased **approximately 80,680 kWh or $15,637 worth of electricity** in the previous year. The average monthly demand was 39 kW.

Fuel Oil #2 - The Union Fire Co. & Rescue Building is currently served by one fuel oil company, Majestic Oil. Last year, the building purchased fuel oil from Ways Heating and Cooling Co. at **an average rate of $2.79/gal** based on 12 months of bills for mid 2007 to mid 2008. The Union Fire Co. & Rescue Building purchased **approximately 5,383 gals or $15,030 worth of fuel oil** in the previous year.

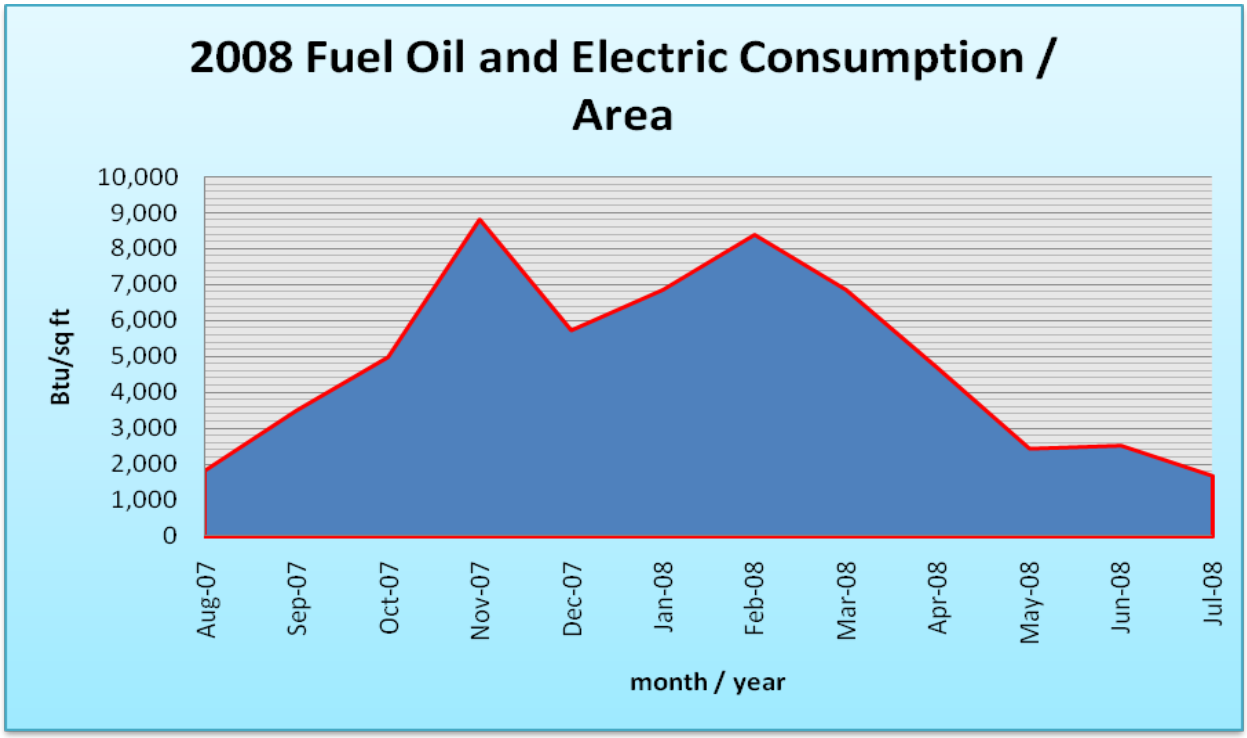
The following chart shows electricity use for the Union Fire Co. & Rescue Building based on utility bills for the 12 month period of August 2007 - July 2008.



The following chart shows the approximate fuel oil consumption for the Union Fire Co. & Rescue Building based on utility bills for the 12 month period of August 2007 - July 2008.



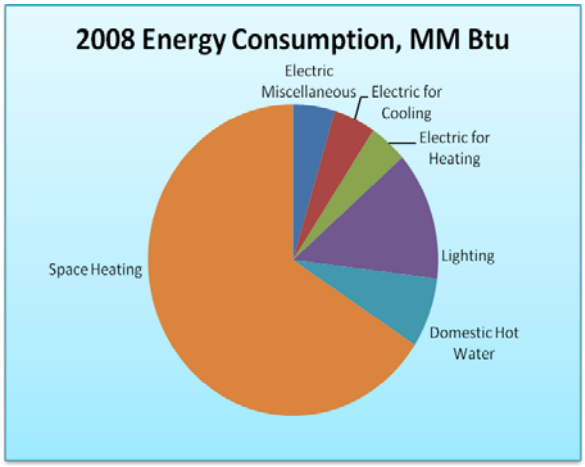
The following chart shows combined fuel oil and electric consumption in Btu/ft2 for the Union Fire Co. & Rescue Building, based on utility bills for the 12 month period of August 2007 - July 2008.

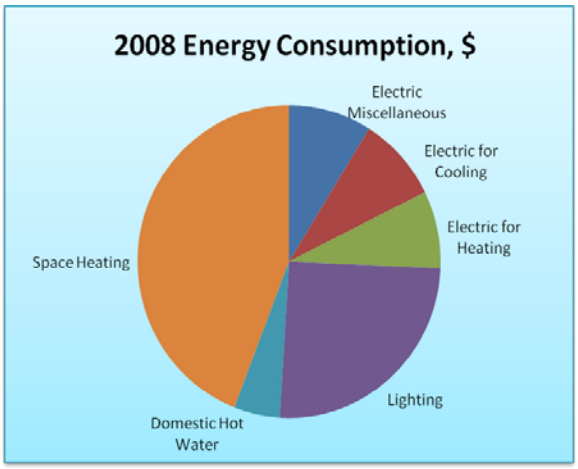


The following table and chart pies show energy use for the Union Fire Co. & Rescue Building based on utility bills for the 12 month period of August 2007 - July 2008. Note electrical cost at $57/MM-Btu of

energy is approximately 3 times as expensive to use as fuel oil at $20/MM-Btu. It is assumed that the electrical miscellaneous usage includes some building fans that operate throughout the year.

2008 Annual Energy Consumption / Costs					
	MM-Btu	% MM Btu	$	% $	$/MM Btu
Electric Miscellaneous	48	5%	$2,711	9%	$57
Electric for Cooling	48	5%	$2,710	9%	$57
Electric for Heating	43	4%	$2,462	8%	$57
Lighting	137	13%	$7,755	25%	$57
Domestic Hot Water	74	7%	$1,495	5%	$20
Building Space Heating	674	66%	$13,535	44%	$20
Totals	1,024	100%	$30,667	100%	$30
Total Electric Use	275	27%	$15,637	51%	$57
Total Fuel Oil Use	748	73%	$15,030	49%	$20
Totals	1,024	100%	$30,667	100%	$30





1.2. Utility rate

The Union Fire Co. & Rescue Building currently purchases electricity from JCP&L Electric at a general service market rate for electricity use (kWh) with a separate (kW) demand charge. The Union Fire Co. & Rescue Building currently pays an average rate of approximately $0.194/kWh based on 12 months of utility bills for 2008.

The Union Fire Co. & Rescue Building currently purchases fuel oil from Majestic Oil. In 2008 it purchased fuel oil from Ways Heating & Cooling Co. at a general market rate for fuel oil (gals). The average rate fuel oil is approximately of $2.79/gal based on 12 months of utility bills for 2008.

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 readings.

1.3. Energy benchmarking

The Union Fire Co. & Rescue Building information and utility data were entered into the U.S. Environmental Protection Agency's (EPA) Energy Star Portfolio Manager Energy benchmarking system. The building did not receive a performance rating due to size, nature of activity inside the building and hours occupied.

Per the LGEA program requirements, SWA has assisted the Township of Hopewell to create an *Energy Star Portfolio Manager* account and share the Union Fire Co. & Rescue Building facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager site information with the Township of Hopewell (user name of "hopewelladmin" with a password of "hopewelltwp1") and TRC Energy Services (user name of TRC-LGEA).

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Union Fire Co. and Rescue Building is a two level building (garage floor with banquet room / offices, etc… upstairs) with major renovation in 1950 and 1993. The building consists of 17,532 square feet. The Union Fire Co. and Rescue Building was built in 1935 and houses the following function areas: a banquet hall, a commercial kitchen, a training room, offices, a bunk room, six bathrooms, and a locker room.

2.2. Building occupancy profiles

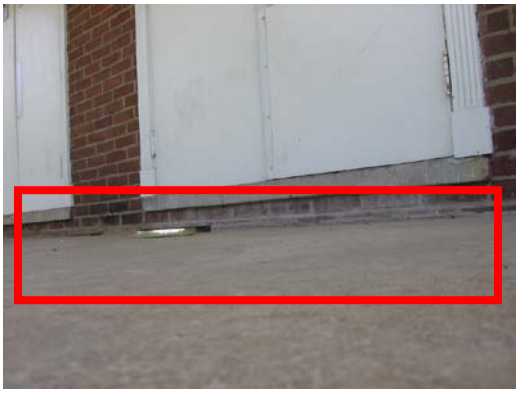
There is one full time employee at the Union Fire and Rescue building, working from 8:00 am to 4:00 pm. There are approximately 60 volunteers working at various times in the building. The building is normally operated approximately 126 hours per week.

2.3. Building envelope

2.3.1. Exterior Walls

The exterior walls consist of 8" CMU blocks with either a brick veneer or stucco façade. Due to warm temperature conditions at the time of the field visits, insulation levels could not be verified with help of infrared technology. If desired, the Municipality could contract a separate envelope inspection during cooler months.

The exterior walls appear to be in good condition. SWA observed water damage near the parking lot entrance on the stucco façade and below the left side entrance. Extra maintenance and care should be taken to these exterior areas as moisture will work into the walls. The water spigot should have an end cap so water does not drip causing water damage.



The following image shows water stains, potentially from overflowing gutters or an unsealed gutter end cap. Special attention and maintenance should be given to this area as the water could be soaked both into the exterior façade and the wall cavity.

2.3.2. Roof

The asphalt shingle roof appeared to be in good condition, original to the 1993 renovations. The northeast roof area (shown in the image below) shows signs of moisture or mildew. Regular maintenance should track any unusual signs of leaks, interior moisture or mold in the attic below this roof area. The building appears to have proper attic ventilation as there weren't any signs of moisture or mildew on the ceiling. Insulation could not be verified above the garage bays. Due to warm temperature conditions at the time of the field visits, insulation levels could not be verified with help of infrared technology. If desired, the building could contract a separate envelope inspection during cooler months.

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 penetration or moisture. The slab edge or perimeter insulation could not be verified and should be confirmed at the time of the above-recommended insulation inspection during cooler months for usable infrared data evaluation.

2.3.4. Windows

The building contains double pane, double hung vinyl windows. The windows appeared to be in age-appropriate condition. SWA recommends regular maintenance on the windows verifying the seals are in good condition and caulking around the frame is performed. When replacement is warranted, SWA recommends Energy Star rated low-e windows as replacements.

2.3.5. Exterior doors

The aluminum framed exterior doors were observed to be in good condition except for some missing or worn weather-stripping. SWA recommends that all exterior doors of the office area be weather-stripped in order to decrease the amount of conditioned air that is lost around each door. 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 continuously tight and insulated; this includes the overhead doors in the truck/ garage bays.

2.3.6. Building air tightness

Based on a visual inspection, the building was observed to be a relatively well-sealed building. There weren't any major observed deficiencies of air tightness within the building besides the exterior doors.

2.4. HVAC Systems

2.4.1. Heating

The heating system consists of one cast iron boiler; model FD-304, manufactured by Burnham, installed in year 1975. The boiler has a gross capacity of 620 MBH and is at the end of its statistical life cycle. The thermal efficiency of the boiler is 75%.

The heating system has five zones, each zone being provided with a circulating pump. The garage bays are heated by unit heaters installed at the garage ceiling. The Banquet Hall and the offices are heated by perimeter baseboard radiation.

The existing boiler is at the end of its statistical life cycle and should be replaced rather than wait for a catastrophic failure of a cracked cast iron section for example. The proposed boiler is a MPC5 or equivalent, oil fired, with 770 MBH input, 652 MBH gross output and 567 IBR rating. The boiler is designed to operate at 88.8% thermal efficiency. The total replacement cost based on similar projects is $30,000. The expected annual fuel oil savings are approximately 743 gallons, or $2,074, which will give a 14.5 year simple payback. This recommended replacement cannot be justified by energy savings alone.

Some of the building thermostats are manual and not programmable. There could be opportunities to contain the cooling / heating to only areas that require it per an advanced agreed upon schedule, implement setbacks and thermostat upgrades. SWA also recommends retro-commissioning the HVAC equipment and especially the associated controls to insure that they are operating at the designed efficiency.

2.4.2. Cooling

The Banquet Hall is provided with a total of 20 ton of cooling from two split systems. One evaporator is model TWE120A 100 BA, manufactured by Trane and it is installed in the attic. The second similar evaporator is also installed in the attic (and could not be accessed at the time of SWA's visit). There are three condensing units serving the two evaporators. The condensing units are model TTA-120, manufactured by Carrier (typ. of two), and model 2A7A106A, manufactured by American Standard.

The office area is provided with cooling from two split systems. The evaporators are model TWE120A 100 BA, manufactured by Trane and CBH19-31-1P-TXV, manufactured by Lenox. Evaporators are installed in the attic. The condensing units are model TTA-120, manufactured by Trane and HS23-311-5P, manufactured by Lenox.

The kitchen is served by a dedicated split system. The evaporator is model TWH054, manufactured by Trane and it is installed in the attic. The condensing unit is model ATR060C100AO, manufactured by Trane.

The cooling equipment is in satisfactory condition. The garage area is not provided with cooling.

All the evaporator units are provided with air purifier units manufactured by Honeywell.

2.4.3. Ventilation

Union Fire House Building is provided with outside air thru the Evaporators installed in the attic.
The garage is provided with fume exhaust system. There are two pressure differential activated exhaust fans installed at the sides of the building.

2.4.4. Domestic Hot Water

There are two Domestic Hot Water (DHW) heaters in the building besides the DHW coil in the main boiler. One fuel oil fired DHW heater, manufactured by Vaughn, Model S50TP with a 50 gal storage tank serves the general building. The kitchen is provided with a dedicated electric DHW heater, manufactured by State, Model PV40 20LSO with a 4.5 kW upper element, a 4.5 kW lower element and 40 gal storage tank.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting - The Union Fire Co. & Rescue Building currently consists of mostly T12 fluorescent fixtures with magnetic ballasts with a few areas already retrofitted from T12 to T8 fixtures. Based on measurements of lighting levels for each space, there are not any vastly over-lighted areas. SWA recommends replacing T12 lighting including magnetic ballasts whenever possible with T8 lighting and electronic ballasts. As this option may not be very cost effective, the changeover could take place as fixtures break down and are taken out of service. SWA also recommends installing occupancy sensors in bathrooms, offices and areas that are occupied only part of the day. Since bathrooms are used sporadically throughout the day and lighting is commonly left on far beyond the necessary hours of operation, SWA recommends installing occupancy sensors with time delay and acoustic capabilities. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion or sound is detected within a set time period. The building also has lights with incandescent bulbs. SWA highly recommends replacing all incandescent

bulbs with CFLs. See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

Exit Lights - The building has mostly LED exit signs installed with a few exceptions. The LED lights are low energy users. SWA recommends that any newly installed exit signs be LED type exit signs.

Exterior Lighting - The exterior lighting was surveyed during the building audit, and it is a mix of CFLs and metal halide lamps. Since this lighting is mainly for Safety as well as for Security, SWA has deemed it not cost effective to replace exterior metal halide lamp lighting at this time. SWA encourages change-out of incandescent lamps to CFLs. All exterior lighting is controlled by astronomical timers and photocells. There is not any immediate need to upgrade these lighting, astronomical timers or photocells.

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. Look for the Energy Star label when replacing appliances and equipment, including: 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 in meeting areas use approximately 3-5 watts of electricity when turned off. SWA recommends all computers and all appliances (i.e. fridges, coffee makers, televisions, etc) be plugged in to power strips and turned off each evening just as the lights are turned off. The Union Fire Co. & Rescue Building computers are generally 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 Union Fire Co. & Rescue Building does not have an installed elevator.

2.5.4. Others electrical systems

There are two emergency generators: 25 kVA and 60 kVA, serving the Union Fire Co. & Rescue Building.

There are not currently any other electrical systems installed at the Union Fire Co. & Rescue Building.

Incoming Electrical Service - Presently, the incoming service is 120 VAC, single phase. Consideration has been given to upgrading the existing electrical service to 277 VAC, three phase, with the conclusions listed below.

The power companies produces three phases of power at very high voltages (to aid transmission over long distances), and those voltages are periodically stepped down lower, the closer they get to a

building's service entrance. There will be a ground mounted or pole mounted transformer that does a final step down before the wires enter the building. When they do enter the building, they are the same three phases generated miles away at the power company. Commercial services aren't stepped down as low as residential services. They come in at 277 volts phase to ground, or 480 volts from phase to phase. Inside the building, there are more transformers that produce the 120 volt 'household' voltages for receptacles by stepping down even further.

Distribution transformers are very efficient, with losses of less than 0.25% in large units. According to the U.S. Environmental Protection Agency's (EPA) Energy Star program, most large facility distribution transformers convert at least 95% of input power into usable output power. Smaller units have efficiencies of 98% or above. However, when the overall losses of the many transformation steps in a distribution system are considered, these losses can add up.

Three phases are a good source for heavy motors. Three-phase power allows heavy duty industrial equipment to operate more smoothly and efficiently. Three phase power can be transmitted over long distances with smaller conductor size. Three phases naturally provide a rotating magnetic field for three phase motors. A single phase motor needs a capacitor or shading coils to make the magnetic field rotate. Three phase system is more efficient in that it provides constant power (not more power) to a motor load. The motor can deliver steady torque at every point in its rotation. With single phase there are surges and lulls in the power output. These happen so quickly that it doesn't matter in light use. In heavy use, it is important for the motor to supply constant, steady torque. The big advantage to three phases is that motors can be smaller for the same horse power. Three-phase is much more costly to install, but is much more efficient for high horsepower motor loads. By the use of three conductors, a three phase system can provide significantly more power than the two conductors of a single-phase system.

For instance, a single phase 1 Hp motor rated 66% efficient at 6.7 amps, 230 volts uses 1541 watts of power while a three phase 1 Hp motor rated 79% efficient at 3.2 amps, 230 volts (times the square root of 3) uses 1275 watts of power. In this case, the three phases motor is ~21% more efficient because it is a smaller motor unencumbered by the single phase motor capacitor losses and losses due to the higher current in the windings.

As far as the Union Fire Co. & Rescue Building is concerned, all the equipment is already installed and distribution is single phase. The bigger motors (a few and mostly in the 1 Hp range) in the building are not operated continuously or often enough to warrant bringing in three phase power now, pulling new feeders and replacing existing motors. The building now is generally on standby and scarcely occupied due to the nature of the services it provides as a volunteer rescue force. However, should a major expansion be planned in the future, SWA recommends that at that time, three phase power be incorporated into the design of the major renovation or expansion.

3. EQUIPMENT LIST

Inventory

The Union Fire Co. & Rescue Building						
Building System	**Description**	**Location**	**Model#**	**Fuel**	**Space served**	**Estimated Remaining useful life %**
Heating	One Burnham cast iron boiler; gross capacity of 620 MBH, 75% thermal efficiency	boiler room back of engine bay	FD-304	Fuel Oil	Union Fire & Rescue House	0%
Heating, cooling and ventilation	2 Trane evaporators	ceiling above banquet room	TWE120A 100 BA	Electric	Union Fire & Rescue House	45%
Heating, cooling and ventilation	Trane evaporator	ceiling above kitchen	TWH054	Electric	Kitchen	45%
Heating, cooling and ventilation	Lenox evaporator	ceiling of side room next to banquet room	CBH19-31-1P-TXV	Electric	Union Fire & Rescue House	45%
Cooling	2 Trane condensing unit	next to bldg	TTA-120	Electric	Union Fire & Rescue House	45%
Cooling	Trane condensing unit	next to bldg	ATR060C100AO	Electric	Kitchen	45%
Cooling	Lenox condensing unit	next to bldg	HS23-311-5P	Electric	Union Fire & Rescue House	45%
Heating	a # of hot water radiators (space heaters in truck bay areas)	engine bays	-	Electric	Truck Bays	40%
Cooling	4 offices have through wall A/C units	offices	-	Electric	Union and Rescue Fire house	varies, average 50%
Cooling	2 training rooms have through wall A/C units	training room	-	Electric	Training Rooms	varies, average 40%
Ventilation	truck bay exhaust system with fan that kicks on detected exhaust pressure	engine bays	-	Electric	Truck Bays	55%
Domestic Hot water heater	Manufacturer: Vaughn, 50 gal storage	boiler room back of engine bay	S50TP	Fuel Oil	Union Fire & Rescue House	35%
Domestic Hot water heater	Manufacturer: State, 4.5 kW upper element, 4.5 kW lower element, 40 gal storage	kitchen	PV40 20LSO	Electric	Kitchen	35%
Generator	25kVA	next to bldg	Generac	Diesel	Union Fire & Rescue House	45%
Generator	75kVA	next to bldg	Generac	Diesel	Union Fire & Rescue House	55%
Oil Tank	Inground 1,000 gal double walled	inground next to bldg	-	Fuel Oil	Union Fire & Rescue House	55%
Lighting	See details - Appendix A	See details - Appendix A	-	Electric	Union Fire & Rescue House	varies, average 60%

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 Union Fire Co. & Rescue 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

- Replace Boiler - The existing boiler is at the end of its statistical life cycle and should be replaced rather than wait for a catastrophic failure of a cracked cast iron section for example. The proposed boiler is a MPC5 or equivalent, oil fired, with 770 MBH input, 652 MBH gross output and 567 IBR rating. The boiler is designed to operate at 88.8% thermal efficiency. The total replacement cost based on similar projects is $30,000. The expected annual fuel oil savings are approximately 743 gallons, or $2,074, which will give a 14.5 year simple payback. This recommended replacement cannot be justified by energy savings alone. SWA recommends that this capital investment be highly prioritized in the Township of Hopewell capital plan.

Category II Recommendations: Operations and Maintenance

- Controls Optimization - On the day of the audit SWA observed a number of un-occupied spaces that were air conditioned. SWA recommends that the schedules for all attic HVAC equipment and heaters serving key public spaces be reviewed and optimized. During periods when the spaces are not occupied, the equipment may be shut-off or controlled to minimize the amount of fresh air conditioned by the equipment. The cost and effort associated with implementation of this recommendation will depend upon the capabilities of the existing building automation control system. Energy and cost savings associated with this recommendation will vary, depending upon the current occupancy schedules and means of control utilized.
- Programmable thermostats - Some of the building thermostats are manual and not programmable. There could be opportunities to contain the cooling / heating to only areas that require it per an advanced agreed upon schedule, implement setbacks and thermostat upgrades.
- Boiler Room Piping Insulation - Insulate un-insulated hot water piping to efficiently deliver heat where required and provide personnel protection.
- Roof Maintenance - SWA recommends regular maintenance to verify water is draining correctly.
- Weather Stripping / Air Sealing - SWA observed that exterior door weather-stripping in places was beginning to deteriorate. 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.
- Exterior Wall Integrity - SWA observed water damage near the parking lot entrance on the stucco façade and below the left side entrance. Extra maintenance and care should be taken to these exterior areas as moisture will work into the walls. The water spigot should have an end cap so water does not drip causing water damage.
- Water Efficient Fixtures & 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.

- Energy Star labeled appliances such as refrigerators should replace older energy inefficient equipment.
- Smart power electric strips with occupancy sensors should be used to power down computer equipment when left unattended for extended periods of time.
- Create an educational program that teaches maintenance personnel how to minimize the energy use in the buildings. The US Department of Energy offers free information for hosting energy efficiency educational programs and for more information please visit: http://www1.eere.energy.gov/education/

Category III Recommendations: Energy Conservation Measures

Summary table

ECM#	Description
1	**Install Cooling / Vending Misers on Cooling Refrigerators**
2	**Upgrade building lighting: incandescent to CFLs, occupancy sensors for some offices, Exit fluorescents to LED and T12 magnetic fixtures to T8 electronic fixtures**
3	**Undertake retro-commissioning of building systems and controls to optimize performance**
4	**Install a 5kW Wind system to reduce annual electric consumption and demand**
5	**Install a 5kW PV system to reduce annual electric consumption and demand**

ECM#1: *Install Cooling / Vending Misers*

Description:

The Union Fire Co. & Rescue Building has one Coke Cooling Refrigerator in the members' room. Energy cooling / vending miser devices are now available for conserving energy with these cooling machines. There isn't a need to purchase new machines to reduce operating costs and greenhouse gas emissions. When equipped with the cooling / vending miser devices, refrigerated beverage cooling / vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines. Cooling / vending miser devices incorporate innovative energy-saving technology into small plug-and-play devices that installs in minutes, either on the wall or on the cooling / vending machine. Cooling / vending miser devices use a Passive Infrared Sensor (PIR) to: Power down the machine when the surrounding area is vacant; Monitor the room's temperature; Automatically repower the cooling system at one- to three-hour intervals, independent of sales; Ensure the product stays cold.

Also, snacks vending miser devices can be used on Snacks vending machines to achieve maximum energy savings that result in reduced operating costs and decreased greenhouse gas emissions with existing machines. Snacks vending miser devices also use a Passive Infrared Sensor (PIR) to determine if there is anyone within 25 feet of the machine. It waits for 15 minutes of vacancy, then powers down the machine. If a customer approaches the machine while powered down, the snacks vending miser will sense the presence and immediately power up.

Installation cost:

Estimated installed cost: $265
Source of cost estimate: www.usatech.com *and established costs*

Economics (without incentives):

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
	Estimate $	Source	Use	Unit	Demand /mo	Unit	Savings / year $			Cost Savings $		
Install Drinks Cooling machine miser	$265	www.usatech.com	728	kWh	0.4	-	141	1.9	12	1,389	35.4	997

Assumptions: SWA assumes energy savings based modeling calculator found at www.usatech.com. or http://www.usatech.com/energy_management/energy_calculator.php

Rebates/financial incentives: *This measure does not qualify for a rebate or financial incentive at this time.*

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

ECM#2: *Upgrade Existing Lighting*

Description:

On the day of the site visit, SWA completed a lighting inventory of the Union Fire Co. & Rescue Building (see Appendix A). The existing lighting consists of many T12 fluorescent fixtures with electronic ballasts, and incandescent lights and a few T8s. Some of the lights in the Union Fire Co. & Rescue Building appear to have been upgraded to T8 fixtures and LED lighted Exit signs. SWA has performed an evaluation of upgrading all the T12 magnetic ballast fixtures to T8 electronic ballast fixtures, incandescent bulbs to CFLs and installing occupancy sensors in offices and bathrooms that may be left unoccupied a considerable amount of time throughout the day. The labor in all these installations was evaluated using prevailing electrical contractor wages. The Union Fire Co. & Rescue Building may decide to perform this work with in-house resources from its Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor, to obtain savings. SWA recommends at a minimum that the incandescent bulbs be replaced with CFLs, occupancy sensors be installed in a number of offices and bathrooms. See Appendix A for recommendations.

Installation cost:

Estimated installed cost: $2,220
Source of cost estimate: RS *Means; Published and established costs*

Economics (Some of the options considered with incentives):

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
	Estimate $	Source	Use	Unit	Demand /mo	Unit	Savings / year $			Cost Savings $		
replace 48 incandescent lamps to CFL	$960	RS Means, Lit Search	2,451	kWh	1.2	kW	475	2.0	7	2,940	29.5	3,357
install 8 occupacy sensors with INCENTIVES	$720	RS Means, Lit Search, NJ Clean Energy Program	861	kWh	0.4	kW	167	4.3	12	1,644	10.7	1,180
install 3 EXIT LED signs with INCENTIVES	$540	RS Means, Lit Search, NJ Clean Energy Program	561	kWh	0.3	kW	109	5.0	20	1,589	9.7	768
Total Proposed	$2,220		3,873	kWh	1.9	kW	751	3.0	12	7,280	19.3	5,306

Economics (Option with incentives considered that do not appear cost effective):

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI, %	Annual Carbon Reduced (lbs of CO2)
	Estimate $	Source	Use	Unit	Demand /mo	Unit	Savings / year $			Cost Savings $		
replace building internal lights: T12s to T8s with INCENTIVES (incl. 75% labor)	$36,260	RS Means, Lit Search, NJ Clean Energy Program	5,741	kWh	2.8	kW	1,114	32.6	20	16,268	-2.8	7,865

Assumptions: SWA calculated the savings for this measure using measurements taken the day of the field visit and using the billing analysis.

Rebates/financial incentives:

NJ Clean Energy - Wall Mounted occupancy sensors ($20 per control)
Maximum incentive amount is $160.

NJ Clean Energy - LED Exit Signs ($10 - $20 per fixture)
Maximum incentive amount is $60.

NJ Clean Energy - Prescriptive Lighting Incentive, Incentive based on installing T5 or T8 lamps with electronic ballasts in existing facilities ($10-$30 per fixture, depending on quantity of lamps). Maximum incentive amount is $5,880.

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#3: *Retro-Commissioning*

Description:

Retro-commissioning is a process that seeks to improve how building equipment and systems function together. Depending on the age of the building, retro-commissioning can often resolve problems that occurred during design or construction and / or address problems that have developed throughout the building's life. Owners often undertake retro-commissioning to optimize building systems, reduce operating costs, and address comfort complaints from building occupants.

Since the systems at the Union Fire Co. & Rescue Building have undergone renovations in the last ten years, and the building continues to have concerns with thermal comfort control, SWA recommends undertaking retro-commissioning to optimize system operation as a follow-up to completion of the upgrades. There have been concerns from the Maintenance Department that the control systems are not operating as designed. The retro-commissioning process should include a review of existing operational parameters for both newer and older installed equipment. In particular, SWA observed potential energy savings associated with optimizing the scheduled operating hours and outdoor air fraction of rooftop equipment serving large public areas, such as the Banquet Room. During retro-commissioning, the individual loop temperatures should also be reviewed to identify opportunities for optimizing system performance. Programmable thermostats could be considered for improved setback control.

Installation cost:

Estimated installed cost: $21,915 Source of cost estimate: Similar projects

Economics (without incentives):

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
	Estimate $	Source	Use	Unit	Demand /mo	Unit	Savings / year $			Cost Savings $		
Retro-Commission-ing	$21,915	Similar Projects	8,068	kWh	3.9	kW	3,066	7.1	12	30,160	3.1	22,889
			538	gal oil	-	-						

Assumptions: Since the utility bills have some accounting fluctuations, it is difficult to determine the amount of energy used for heating and cooling the Union Fire Co. & Rescue Building. Based on experience with similar buildings, SWA estimated the heating and cooling energy consumption. Typical savings for retro-commissioning range from 5-20%, as a percentage of the total space conditioning consumption. SWA assumed 10% savings. Estimated costs for retro-commissioning range from $0.50-$2.00 per square foot. SWA assumed $1.25 per square foot of a total square footage of 17,532.

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

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

ECM#4: *Install 5kW Wind System*

Please see section 5: RENEWABLE AND DISTRIBUTED ENERGY MEASURES

ECM#5: *Install 5kW PV System*

Please see section 5: RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There aren't currently any existing renewable energy systems. The Township of Hopewell is commissioning a 40 kW photovoltaic system located on the lawn of the Public Works Garage.

5.2. Wind

ECM#4: *Install 5kW Wind System*

Description:

Wind power production may be applicable for the Union Fire Co. & Rescue Building location, because of the thermal winds generated in the area. Currently, the Union Fire Co. & Rescue Building does not use any renewable energy systems. Updated renewable energy systems such as "magnetic" vertical axis wind turbines (MVAWT) can be mounted on building roofs 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. Wind 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, however does not recommend at this time installing a 5kW Wind system to offset electrical demand for the building and reduce the annual net electric consumption for the building, because there are insufficient guaranteed incentives for NJ rebates at this time to justify the investment. The Union Fire Co. & Rescue Building is also not eligible for a 30% federal tax credit. The Union Fire Co. & Rescue Building may consider applying for a grant and / or engage a Wind Power generator / leaser who would install the Wind system and then sell the power at a reduced rate.

There are many possible locations for a 5kW Wind system installation on top of the building ample roof area. The supplier would need to first determine via recorded analysis at the proposed location(s) consistency and wind speeds available. Area winds of 10 mph will run turbines smoothly and capture the needed power. This is a roof-mounted wind turbine (used for generating electricity) that spins around a vertical axis like a merry-go-round instead of like a windmill, as do more traditional horizontal axis wind turbines (HAWTs). A typical 5kW MVAWT wind system has a 20 ft diameter turbine by 10 ft tall.

The installation of a renewable Wind power generating system could serve as a good educational tool and exhibit for the community. **It is very important that Wind measurements and recordings are taken at the chosen location for at least a couple of months to assure that sufficient wind and speed is available for proper operation and to meet incentive requirements.**

Installation cost:

Estimated installed cost: $40,000
Source of cost estimate: Similar projects

Economics (with incentives):

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
	Estimate $	Source	Use	Unit	Demand /mo	Unit	Savings / year $			Cost Savings $		
Install 5 kW Wind System with INCENTIVE ($3.20/kWh)	$40,000	Similar Projects	13,000	kWh	5.0	kW	44,122	0.9	25	751,458	71.1	17,810

Assumptions: SWA estimated the cost and savings of the system based on past wind projects. SWA projected physical dimensions based on a 5kW-Enviro Energies turbine system. **SWA assumes that the relatively low height (~30 ft) compared to the taller horizontal axis turbines is acceptable to the NJ BPU as long as the average documented annual wind speed is 11 mph at the hub.**

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive at this time only for vertically spinning high altitude turbines
http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program

NJ Clean Energy - Wind Upfront Incentive Program, Expected performance buy-down (EPBB) is modeled on an annual kWh production of 1-16,000 kWh for a $3.20/kWh upfront incentive level. This has been incorporated in the above costs, 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

5.3. Solar Photovoltaic

ECM#5: *Install 5kW PV System*

Description:

Currently, the Union Fire Co. & Rescue Building does not use any renewable energy systems. Renewable energy systems such as photovoltaic panels, can be mounted on the building roofs, 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, however does not recommend at this time installing a 5kW PV system to offset electrical demand for the building and reduce the annual net electric consumption for the building, because there are insufficient guaranteed incentives from NJ rebates at this time to justify the investment. The Union Fire Co. & Rescue Building is also not eligible for a 30% federal tax credit. The Union Fire Co. & Rescue Building 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. JCP&L provides the ability to buy SRECs at $600 / MWh or best market offer.

There are many possible locations for a 5kW PV installation on the building roofs. 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 5kW system needs approximately 41 panels which would take up 435 square feet. The installation of a renewable Solar Photovoltaic power generating system could serve as a good educational tool and exhibit for the community.

Installation cost:

Estimated installed cost: $30,000
Source of cost estimate: Similar projects

Economics (with some incentives):

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
	Estimate $	Source	Use	Unit	Demand /mo	Unit	Savings / year $			Cost Savings $		
Install 5 kW PV System (with $1/W INCENTIVE and $600/1MWh SREC)	$30,000	Similar projects	5,902	kWh	5.0	kW	4,745	6.3	25	80,814	6.8	8,086

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 by Sharp Electronics (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. Incentive amount for this application is $5,000.
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. $3,600 has been incorporated in the above costs, 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

5.4. 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.

5.5. Combined Heat and Power

Description:

CHP is not applicable for this building because of existing split system cooling, HW boilers and insufficient domestic hot water use.

5.6. Geothermal

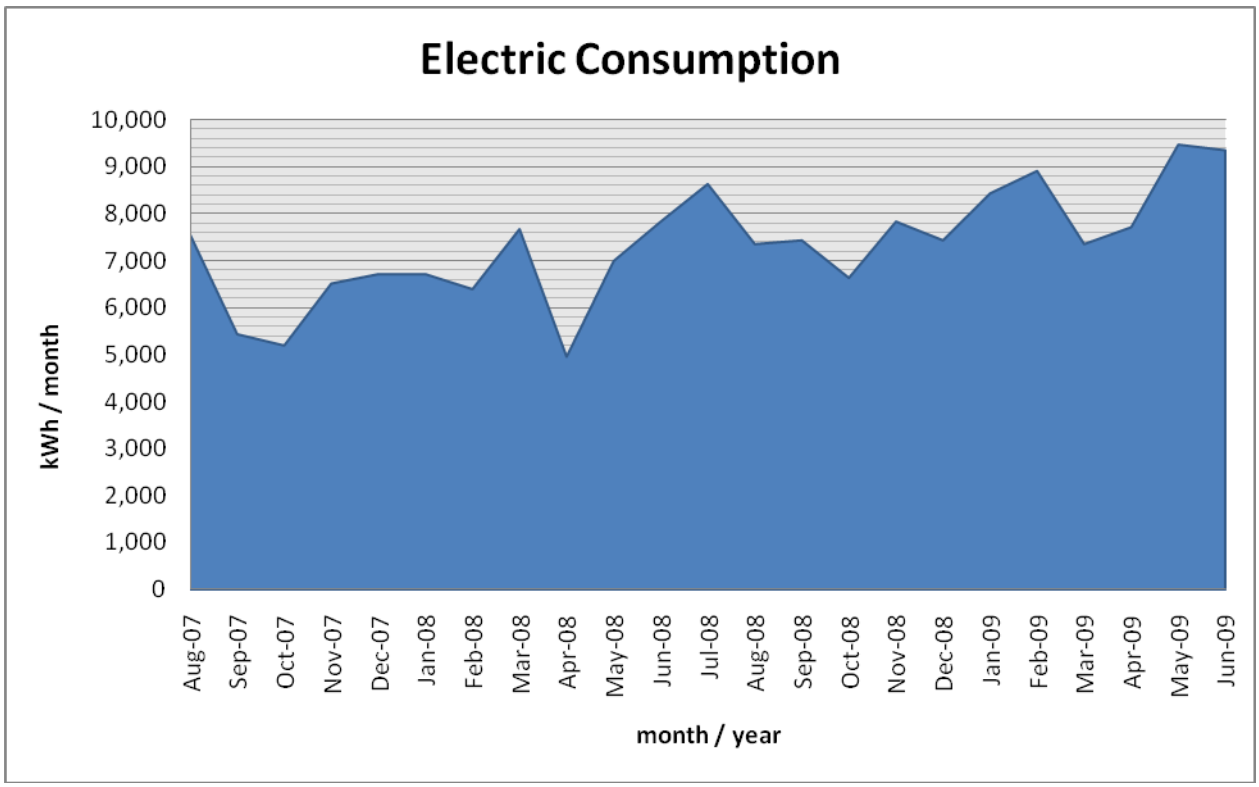
Description:

Geothermal is not applicable for this building because it would not be cost effective to change to a geothermal system at this location.

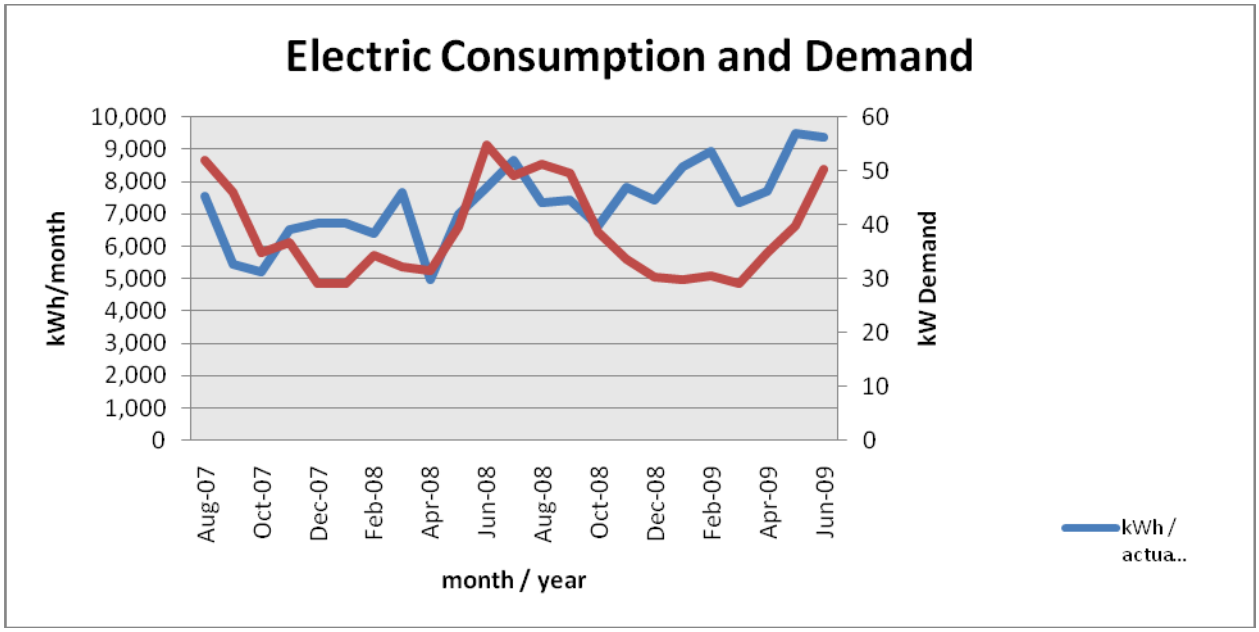
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles

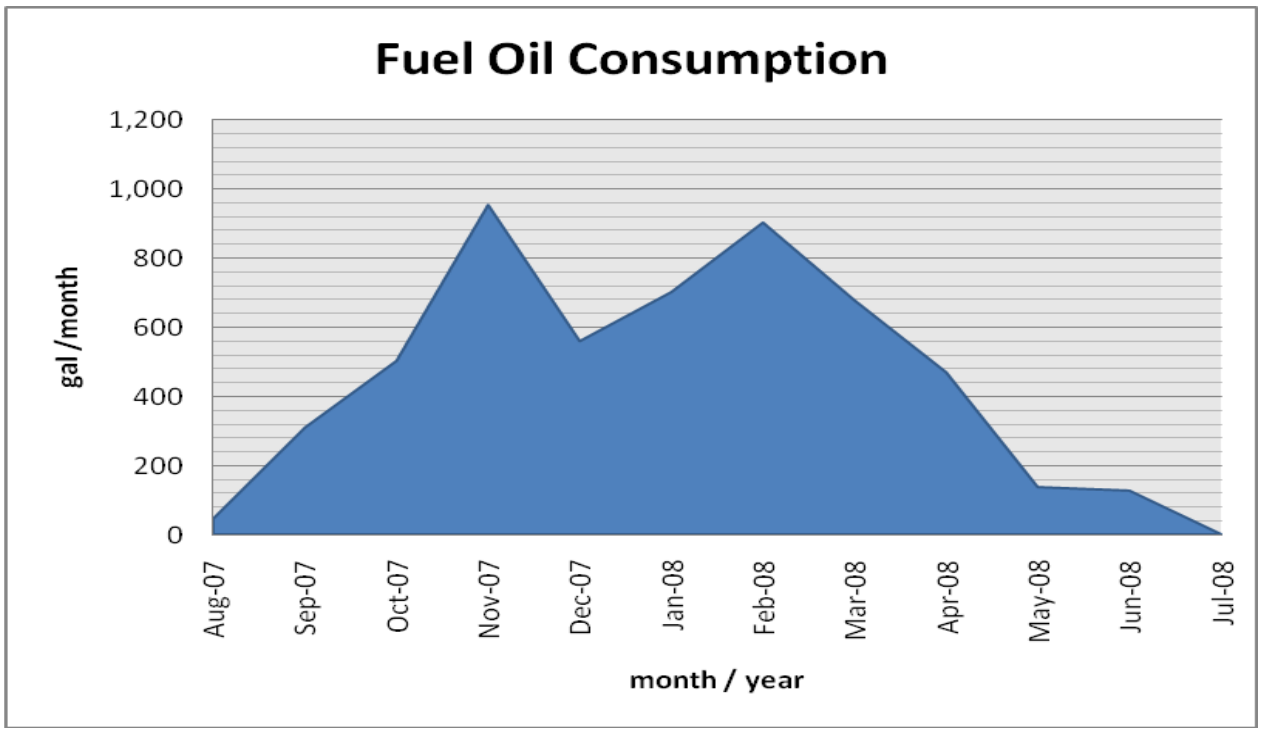
The following are charts that show the annual electric and natural gas load profiles for the Union Fire Co. & Rescue Building.

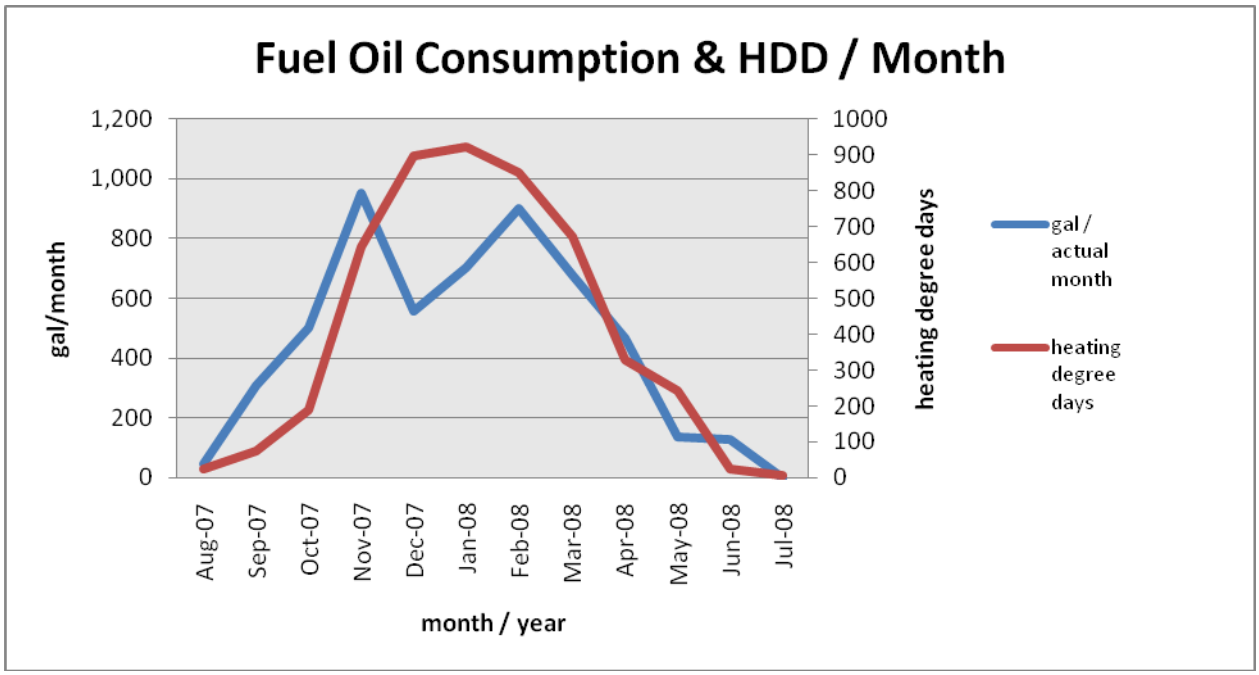


Some minor unusual electric fluctuations shown may be due to adjustments between estimated and actual meter readings. Also, note on the following chart how the electrical Demand peaks (except for a few unusual fluctuation anomalies) follow the electrical consumption peaks.



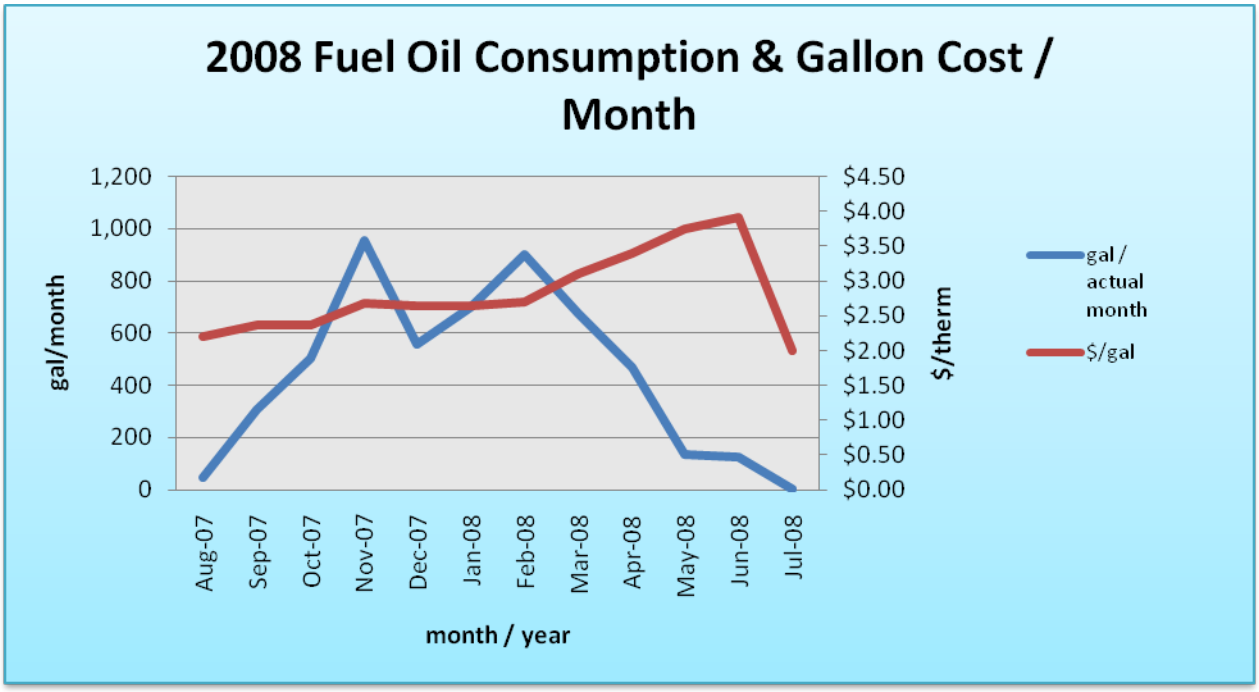
The following is a chart of the fuel oil #2 annual load profile for the building, peaking in the coldest months of the year and a chart showing fuel oil consumption mimicking the “heating degree days” curve.





6.2. Tariff analysis

Currently, in 2009, fuel oil is provided to the Union Fire Co. & Rescue Building by Majestic Oil, and in 2008 by Ways Heating & Cooling Co. Fuel Oil #2 was provided in 2008 by Ways Heating & Cooling Co. at a general service and delivered cost. Typically, the fuel oil prices increase during the heating months when fuel oil is used by the hot water boiler(s). The high fuel oil price per gal fluctuations shown on the following chart may be due to high energy costs that occurred in 2008.

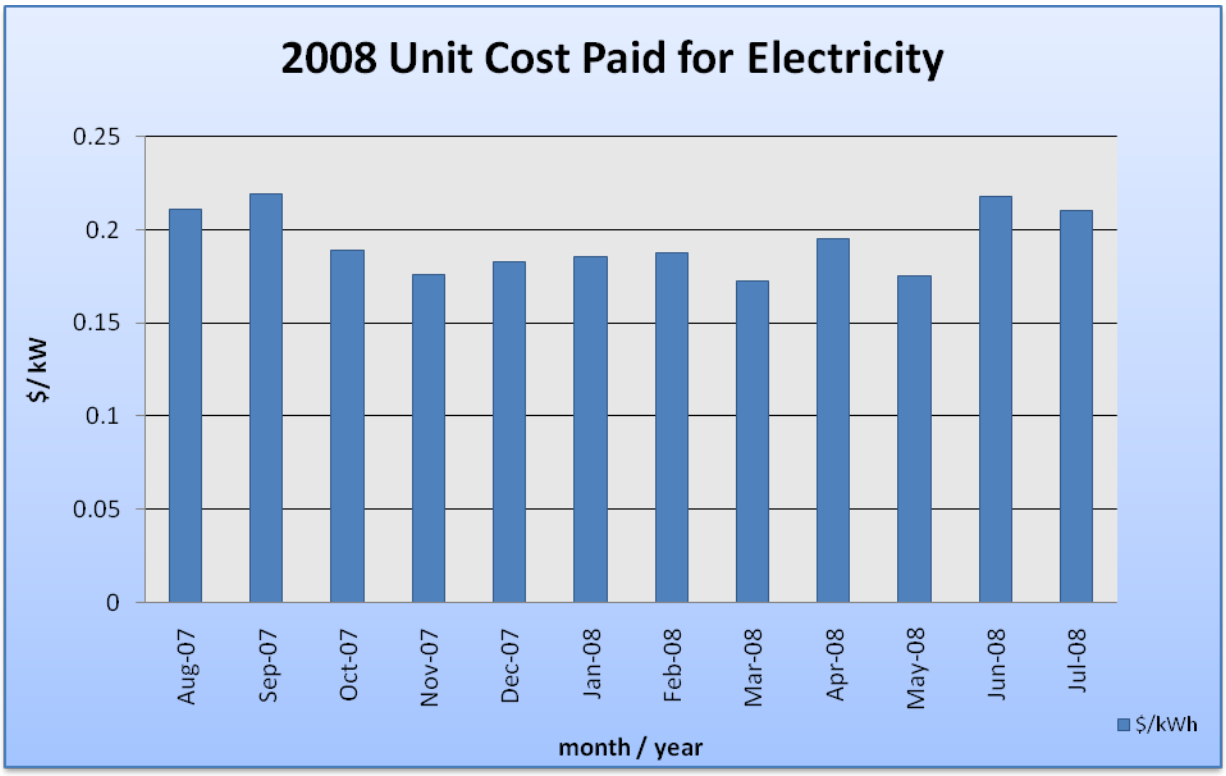


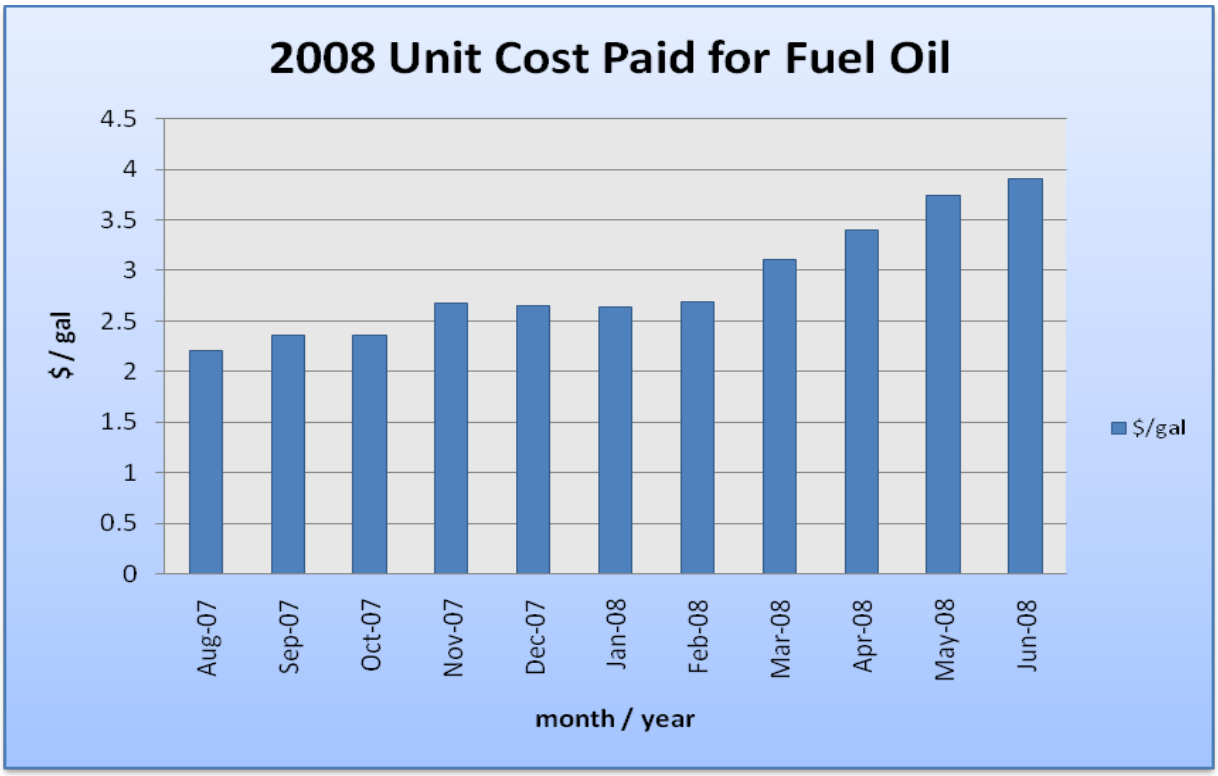
The Union Fire Co. & Rescue Building is direct-metered (via one main meter) and currently purchases electricity from JCP&L at a general service rate. The general service rate for electric charges are market-rate based on use and the Union Fire Co. & Rescue Building billing does show a breakdown of demand 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 rooftop air-handling units.

6.3. Energy Procurement strategies

The Union Fire Co. & Rescue Building receives fuel oil via truck. Ways Heating & Cooling Co. supplied the fuel oil in 2008. There is not and 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 Union Fire Co. & Rescue Building from JCP&L without an ESCO. SWA analyzed the utility rate for fuel oil and electricity supply over an extended period. Electric bill analysis shows fluctuations up to 26% over the most recent 12 month period. Fuel oil bill analysis shows fluctuations up to 49% over a 12 month period from mid 2007 to mid 2008. Some of these fluctuations may have been caused by adjustments between estimated and actual readings, others may be due to unusual high and escalating energy costs in 2008. SWA recommends that the Township of Hopewell further explore opportunities of purchasing both fuel oil and electricity from ESCOs in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Union Fire Co. & Rescue Building. Appendix B contains a complete list of third party energy suppliers for the Hopewell service area. The Township of Hopewell may want to consider partnering with other school districts, municipalities, townships and communities to aggregate a substantial electric and fuel oil 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 Union Fire Co. & Rescue 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 100 kW electric demand when requested by the utility during peak demand periods, which is the typical threshold for considering this option. The following

charts show the Union Fire Co. & Rescue Building monthly spending per unit of energy in 2008.





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

Union Fire and Rescue Lighting Conditions															Proposed Lighting										
#	Bldg	Flr	Location in Building	Measured Light Level in Foot-candles	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts /Lamp	Hrs/ Day	Energy Use (Watt hours / day)	Con-trols	Day-lighting possible?	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts/ Lamp	Hrs/ Day	Energy Use (Watt hours/ day)	Con-trols	Total Power (Watts)	further W-hr/day reduction with occupancy sensors
1	UFR	GF	Truck Bay	-	LED Exit	NA	2	1	LED	5	24	240	None	no	Exit LED	-	2	1	LED	5	24	240	None	10	
2	UFR	GF	Truck Bay	-	T12 8'	M	18	2	F	95	4	13680	S	no	**T8 4'**	**E**	**36**	**2**	**F**	**32**	**4**	**10260**	**S**	**2304**	
3	UFR	GF	Utility Rm	-	T12 4'	M	1	4	F	34	4	544	S	no	**T8 4'**	**E**	**1**	**4**	**F**	**32**	**4**	**408**	**S**	**128**	
4	UFR	GF	Communi-cations	-	T12 4'	M	2	2	F	34	12	1632	S	no	**T8 4'**	**E**	**2**	**2**	**F**	**32**	**12**	**1224**	**S**	**128**	**306**
5	UFR	GF	Ambulance Bays	-	T12 8'	M	5	2	F	68	4	2720	S	no	**T8 4'**	**E**	**10**	**2**	**F**	**32**	**4**	**2040**	**S**	**640**	
6	UFR	GF	Ambulance Bays	-	T12 8'	M	2	2	F	95	4	1520	S	no	**T8 4'**	**E**	**4**	**2**	**F**	**32**	**4**	**1140**	**S**	**256**	
7	UFR	GF	Ambulance Bays	-	CFL 13W	-	2	2	CFL	13	24	1248	S	no	CFL 13W	-	2	2	CFL	13	24	1248	S	52	**312**
8	UFR	GF	Line Officers Office	-	T12 4'	M	1	4	F	34	2	272	S	no	**T8 4'**	**E**	**1**	**4**	**F**	**32**	**2**	**204**	**S**	**128**	
9	UFR	GF	Entrance	-	T12 4'	M	1	4	F	34	2	272	S	no	**T8 4'**	**E**	**1**	**4**	**F**	**32**	**2**	**204**	**S**	**128**	
10	UFR	GF	Marine Bays	-	T12 4'	M	3	2	F	34	4	816	S	no	**T8 4'**	**E**	**3**	**2**	**F**	**32**	**4**	**612**	**S**	**192**	
11	UFR	GF	Marine Bays	-	T12 8'	M	2	2	F	95	4	1520	S	no	**T8 4'**	**E**	**4**	**2**	**F**	**32**	**4**	**1140**	**S**	**256**	
12	UFR	GF	Marine Bays	-	T8 8'	E	5	2	F	64	4	2560	S	no	T8 8'	E	5	2	F	64	4	2560	S	640	
13	UFR	GF	Marine Bays	-	T12 4'	M	3	4	F	34	4	1632	S	no	**T8 4'**	**E**	**3**	**4**	**F**	**32**	**4**	**1224**	**S**	**384**	
14	UFR	GF	Marine Bays	-	CFL 13W	-	1	1	CFL	13	24	312	S	no	CFL 13W	-	1	1	CFL	13	24	312	S	13	**78**
15	UFR	GF	Mechanical Rm	-	T12 4'	M	1	4	F	34	1	136	S	no	**T8 4'**	**E**	**1**	**4**	**F**	**32**	**1**	**102**	**S**	**128**	
16	UFR	GF	Mechanical Rm	-	T8 4'	E	1	2	F	32	8	512	S	no	T8 4'	E	1	2	F	32	8	512	S	64	**128**
17	UFR	GF	Locker Breezeway	-	T12 4'	M	1	2	F	34	2	136	S	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**2**	**102**	**S**	**64**	
18	UFR	GF	Bathroom	-	T12 4'	M	1	2	F	34	2	136	S	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**2**	**102**	**S**	**64**	
19	UFR	GF	Bathroom	-	T12 2'	M	1	2	F	20	2	80	S	no	**T8 2'**	**E**	**1**	**2**	**F**	**16**	**2**	**60**	**S**	**32**	
20	UFR	GF	Members Room	-	T8 4'	E	9	2	F	34	6	3672	S	no	T8 4'	E	9	2	F	34	6	3672	S	612	**918**
21	UFR	GF	Members Room	-	LED Exit	NA	1	1	LED	5	24	120	None	no	Exit LED	-	1	1	LED	5	24	120	None	5	
22	UFR	GF	Members Room	-	T12 4'	M	1	2	F	34	1	68	S	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**1**	**51**	**S**	**64**	
23	UFR	2nd	Utility Rm	-	T12 4'	M	5	2	F	34	1	340	S	no	**T8 4'**	**E**	**5**	**2**	**F**	**32**	**1**	**255**	**S**	**320**	
24	UFR	2nd	Display Case	-	T12 2'	M	2	1	F	17	6	204	S	no	**T8 2'**	**E**	**2**	**1**	**F**	**16**	**6**	**153**	**S**	**32**	
25	UFR	2nd	Hallway	-	T12 4'	M	1	2	F	34	2	136	S	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**2**	**102**	**S**	**64**	
26	UFR	2nd	Kitchen	-	T12 4'	M	17	2	F	34	2	2312	S	no	**T8 4'**	**E**	**17**	**2**	**F**	**32**	**2**	**1734**	**S**	**1088**	
27	UFR	2nd	Kitchen	-	LED Exit	NA	2	2	LED	5	24	480	S	no	Exit LED	-	2	2	LED	5	24	480	S	20	**120**
28	UFR	2nd	Banquet Hall	-	T12 4'	M	48	3	F	34	2	9792	S	no	**T8 4'**	**E**	**48**	**3**	**F**	**32**	**2**	**7344**	**S**	**4608**	
29	UFR	2nd	Banquet Hall	-	LED Exit	NA	2	1	LED	5	24	240	S	no	Exit LED	-	2	1	LED	5	24	240	S	10	
30	UFR	2nd	Breezeway	-	LED Exit	NA	1	1	LED	5	24	120	S	no	Exit LED	-	1	1	LED	5	24	120	S	5	
31	UFR	2nd	Storage Rm	-	T12 4'	M	5	2	F	34	1	340	S	no	**T8 4'**	**E**	**5**	**2**	**F**	**32**	**1**	**255**	**S**	**320**	
32	UFR	2nd	Coat Room	-	T12 4'	M	2	2	F	34	1	136	S	no	**T8 4'**	**E**	**2**	**2**	**F**	**32**	**1**	**102**	**S**	**128**	
33	UFR	2nd	Banquet ext Room	-	CFL 23W	-	1	1	CFL	23	1	23	S	no	CFL 23W	-	1	1	CFL	23	1	23	S	23	
34	UFR	2nd	Banquet ext Room	-	LED Exit	NA	1	1	LED	5	24	120	None	no	Exit LED	-	1	1	LED	5	24	120	None	5	
35	UFR	2nd	Banquet ext Room	-	T12 4'	M	8	3	F	34	2	1632	S	no	**T8 4'**	**E**	**8**	**3**	**F**	**32**	**2**	**1224**	**S**	**768**	
36	UFR	2nd	Banquet ext Room	-	LED Exit	NA	1	1	LED	5	24	120	S	no	Exit LED	-	1	1	LED	5	24	120	S	5	
37	UFR	2nd	Banquet ext Room	-	incand	-	4	4	I	65	1	1040	Dimmer	no	**CFL**	**-**	**4**	**4**	**CFL**	**15**	**1**	**240**	**Dimmer**	**240**	
38	UFR	2nd	Banquet ext Room	-	incand	NA	5	5	I	65	1	1625	Dimmer	no	**CFL**	**-**	**5**	**5**	**CFL**	**15**	**1**	**375**	**Dimmer**	**375**	
39	UFR	2nd	Banquet ext Room	-	incand	NA	1	1	I	65	1	65	S	no	**CFL**	**-**	**1**	**1**	**CFL**	**15**	**1**	**15**	**S**	**15**	
40	UFR	2nd	Banquet ext Room	-	LED Exit	NA	2	2	LED	5	24	480	None	no	Exit LED	-	2	2	LED	5	24	480	None	20	
41	UFR	2nd	Banquet ext Room	-	incand	NA	2	2	I	65	6	1560	Auto-Timer	no	**CFL**	**-**	**2**	**2**	**CFL**	**15**	**6**	**360**	**Auto-Timer**	**60**	**90**
42	UFR	2nd	Breezeway Restrooms	-	T12 4'	M	1	2	F	34	2	136	Auto-Timer	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**2**	**102**	**Auto-Timer**	**64**	
43	UFR	2nd	Breezeway Restrooms	-	LED Exit	NA	1	1	LED	5	24	120	None	no	Exit LED	-	1	1	LED	5	24	120	None	5	
44	UFR	2nd	Bathroom Women	-	T12 4'	M	4	2	F	34	2	544	S	no	**T8 4'**	**E**	**4**	**2**	**F**	**32**	**2**	**408**	**S**	**256**	
45	UFR	2nd	Bathroom Men	-	T12 4'	M	4	2	F	34	2	544	S	no	**T8 4'**	**E**	**4**	**2**	**F**	**32**	**2**	**408**	**S**	**256**	
46	UFR	2nd	Banquet Hall	-	incand	NA	20	1	I	65	2	2600	Dimmer	no	**CFL**	**-**	**20**	**1**	**CFL**	**15**	**2**	**600**	**Dimmer**	**300**	
47	UFR	2nd	Hallway	-	T12 2'	M	8	1	F	34	2	544	S	no	**T8 2'**	**E**	**8**	**1**	**F**	**16**	**2**	**408**	**S**	**128**	
48	UFR	2nd	Hallway	-	Exit Fluor	-	3	1	F	16	24	1152	None	no	**Exit LED**	**-**	**3**	**1**	**LED**	**1**	**24**	**72**	**None**	**3**	
49	UFR	2nd	Bathroom	-	T12 4'	M	1	2	F	34	2	136	S	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**2**	**102**	**S**	**64**	
50	UFR	2nd	Bathroom	-	T12 2'	M	1	2	F	17	2	68	S	no	**T8 2'**	**E**	**1**	**2**	**F**	**16**	**2**	**51**	**S**	**32**	
51	UFR	2nd	Bathroom	-	T12 2'	M	1	2	F	17	2	68	S	no	**T8 2'**	**E**	**1**	**2**	**F**	**16**	**2**	**51**	**S**	**32**	
52	UFR	2nd	Bathroom	-	T12 4'	M	1	2	F	34	2	136	S	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**2**	**102**	**S**	**64**	
53	UFR	2nd	Server Rm	-	T12 4'	M	1	2	F	34	2	136	S	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**2**	**102**	**S**	**64**	
54	UFR	2nd	Laundry	-	T12 4'	M	1	2	F	34	2	136	S	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**2**	**102**	**S**	**64**	
55	UFR	2nd	Exercise Rm	-	T12 4'	M	6	4	F	34	2	1632	S	no	**T8 4'**	**E**	**6**	**4**	**F**	**32**	**2**	**1224**	**S**	**768**	
56	UFR	2nd	Exercise Rm	-	Exit Fluor	-	1	1	F	16	24	384	None	no	**Exit LED**	**-**	**1**	**1**	**LED**	**1**	**24**	**24**	**None**	**1**	
57	UFR	2nd	Locker Rm	-	incand	NA	3	1	I	34	2	204	S	no	**CFL**	**-**	**3**	**1**	**CFL**	**15**	**2**	**90**	**S**	**45**	
58	UFR	2nd	Locker Rm	-	Exit Fluor	-	1	1	F	5	24	120	None	no	**Exit LED**	**-**	**1**	**1**	**LED**	**1**	**24**	**24**	**None**	**1**	
59	UFR	2nd	Locker Rm	-	T12 2'	M	1	1	F	17	2	34	S	no	**T8 2'**	**E**	**1**	**1**	**F**	**16**	**2**	**25.5**	**S**	**16**	

Union Fire and Rescue Lighting Conditions															Proposed Lighting										
#	Bldg	Flr	Location in Building	Measured Light Level in Foot-candles	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts /Lamp	Hrs/ Day	Energy Use (Watt hours / day)	Controls	Day-lighting possible?	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts/ Lamp	Hrs/ Day	Energy Use (Watt hours/ day)	Controls	Total Power (Watts)	further W-hr/day reduction with occupancy sensors
60	UFR	2nd	Locker Rm	-	T12 2'	M	1	1	F	17	2	34	S	no	**T8 2'**	**E**	**1**	**1**	**F**	**16**	**2**	**25.5**	**S**	**16**	
61	UFR	2nd	Chiefs office	-	T12 4'	M	2	4	F	34	2	544	S	no	**T8 4'**	**E**	**2**	**4**	**F**	**32**	**2**	**408**	**S**	**256**	
62	UFR	2nd	Bunkroom	-	T12 4'	M	2	4	F	34	2	544	S	no	**T8 4'**	**E**	**2**	**4**	**F**	**32**	**2**	**408**	**S**	**256**	
63	UFR	2nd	Admin office	-	T12 4'	M	4	4	F	34	4	2176	S	no	**T8 4'**	**E**	**4**	**4**	**F**	**32**	**4**	**1632**	**S**	**512**	**408**
64	UFR	2nd	Training Room	-	T12 4'	M	6	4	F	34	2	1632	S	no	**T8 4'**	**E**	**6**	**4**	**F**	**32**	**2**	**1224**	**S**	**768**	
65	UFR	2nd	Training Room	-	Incand	NA	13	1	I	65	2	1690	S	no	**CFL**	**-**	**13**	**1**	**CFL**	**15**	**2**	**390**	**S**	**195**	
66	UFR	2nd	Janitors closet	-	T12 4'	M	1	2	F	34	1	68	S	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**1**	**51**	**S**	64	
67	UFR	2nd	Copier Area	-	T12 4'	M	1	2	F	34	1	68	S	no	**T8 4'**	**E**	**1**	**2**	**F**	**32**	**1**	**51**	**S**	64	
68	UFR	GF	Truck Bay	-	LED Exit	NA	2	1	LED	5	24	240	None	no	Exit LED	-	2	1	LED	5	24	240	None	10	
69	UFR	GF	Truck Bay	-	T12 8'	M	18	2	F	95	4	13680	S	no	**T8 4'**	**E**	**36**	**2**	**F**	**32**	**4**	**10260**	**S**	**2304**	
70	UFR	ext	Back entrance	ext	CFL 23W	-	5	1	CFL	23	4	460	Auto-Timer	no	CFL 23W	-	5	1	CFL	23	4	460	Auto-Timer	115	
71	UFR	ext	Pole Lights	ext	Metal Halide	N/A	3	1	HPS	400	12	14400	S	photo-cells	Metal Halide	-	3	1	HPS	400	12	14400	S	photo-cells	
72	UFR	ext	Parking Lot Lights	ext	Metal Halide	N/A	6	1	HPS	150	12	10800	S	photo-cells	Metal Halide	-	6	1	HPS	150	12	10800	S	photo-cells	
				TOTALS exterior								25,660										25,660			
				TOTALS interior								83,963										59,984		21,121	2,360
annual consumption (kWh)												40,012										30,399	includes occupancy sensors		
estimated cost ($/year)												$7,762										$5,897			
Union Fire and Rescue total light power (Watt)												30,736										21,121			
Union Fire and Rescue light power density (Watt/sq ft)												1.75										1.20			
Proposed Annual Savings (kWh)												9,614													
Proposed Annual Cost Savings ($)												$1,865													
Proposed Investment ($)												$38,480													
surface area (sq ft)												17,532										17,532			
Legend: UFR - Union Fire and Rescue; M - magnetic; E - electronic; F - fluorescent; incand - incandescent; CFL - compact fluorescent lamp; HPS - high pressure sodium; MH - Metal Halide; S - on/off switch																									
GF - Ground Floor																									

Note: Last table column shows additional electrical savings if the decision is to change out switches to occupancy sensors.

Appendix B: Third Party Energy Suppliers (ESCOs)
http://www.state.nj.us/bpu/commercial/shopping.html

JCP&L ELECTRICAL SERVICE TERRITORY Last Updated: 06/15/09		
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095 (800) 437-7872 www.hess.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
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446 (888) 635-0827 www.newenergy.com	**Direct Energy Services, LLC** 120 Wood Avenue Suite 611 Iselin, NJ 08830 (866) 547-2722 www.directenergy.com	**FirstEnergy Solutions Corp.** 300 Madison Avenue Morristown, NJ 07962 (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	**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 (866) 769-3799 www.libertypowercorp.com	**Pepco Energy Services, Inc.** 112 Main St. Lebanon, NJ 08833 (800) ENERGY-9 (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 The Mac-Cali Building 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) 800-756-3749 www.south jerseyenergy.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		