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**Local Government Energy Program
Energy Audit Final Report**

For

***Netcong Borough Hall / Police Department
Netcong, NJ 07857***

Project Number: LGEA25



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INTRODUCTION

On September 8th and 15th Steven Winter Associates, Inc. (SWA) performed an energy audit and assessment of the Netcong Borough Hall / Police Department municipal building.

This report addresses the Netcong Borough Hall / Police Department building located at 23 Maple Avenue, Netcong, NJ 07857. 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 Netcong Borough Hall / Police Department building was built in 1974 and houses the borough administrative on one side and law enforcement personnel and operations on the other. In addition to the typical offices, the building contains one large court room, one small meeting room and records storage. It was built as retail Cumberland Farms store, then became an Auto Parts store, part Library at one time. In 1993 major work and additions were put on the building. The building consists of 6,384 square feet of conditioned space. The building houses approximately 25 employees.

The building is operated approximately a hundred hours per week including periodic evening activities such as night court and borough council meetings. Normal weekday operating hours are 8:00 am to 4:00 pm. The Police Department operates 24/7.

The goal of this energy audit is to provide sufficient information to the Borough of Netcong to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the Netcong Borough Hall / Police Department building.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Netcong Borough Hall / Police Department building located at 23 Maple Avenue, Netcong, NJ 07857. The Netcong Borough Hall / Police Department building is a one story building with attic with a combined floor area of 6,384 square feet. The original structure was built in 1974 with additions / renovations in 1993.

Based on the field visits performed by the SWA staff on September 8th and 15th 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.

From Sept 2008 to Aug 2009 the Netcong Borough Hall / Police Department building consumed 72,840 kWh or \$12,400 worth of electricity and 4,169 therms or \$6,329 worth of natural gas. The joint energy consumption for the building, including both electricity and natural gas, was 665 MMBtu of energy that cost a total of \$18,729.

SWA has entered energy information about the Netcong Borough Hall / Police Department building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. This mixed use facility (borough hall offices / police station / courthouse) is comprised of non-eligible (Other) space type. SWA encourages the Borough of Netcong 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 104 kBtu/ft²yr compared to the national average of a fire house / police station building consuming 78 kBtu/ft²yr. Implementing this report's highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 11.8 kBtu/ft²yr, with an additional 3.6 kBtu/ft²yr from the recommended ECMs, 1 kBtu/ft²yr from improved door and attic insulation and 11.1 kBtu/ft²yr from replacing old HVAC with updated Energy Star efficient equipment. These recommendations could account for at least 27.5 kBtu/ft²yr reduction, which when implemented would make the building energy consumption better than the national average.

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

Category I Recommendations: Capital Improvement Measures

- HVAC System - The three existing independent furnaces and their associated condensers have another 5 years of useful operating life left on them. However, they are inefficient and some of the cooling coils are mismatched. Replacing the entire HVAC system is estimated to cost \$40,000 with a payback of 27 years and an approximate reduction of 11.1 kBtu/ft² yr, which cannot be justified by energy savings alone and should be considered as part of a major renovation plan.
- Replace Domestic Hot Water (DHW) heater - as it has reached the end of its useful operating life. SWA recommends its replacement with a gas fired Energy Star EF 0.63 rated unit with a 4.1 year payback.
- Premium Motors - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives.

Category II Recommendations: Operations and Maintenance

- Roof Maintenance - SWA recommends regular maintenance to verify water is draining correctly.
- Downspouts - Repair missing downspouts and areas of brick veneer damage to prevent water infiltration
- Under-roof-sheathing Ventilation - Adequate under-roof-sheathing ventilation is accomplished most effectively by installing soffit and ridge vents that let air move freely from soffits out the ridge vent.
- 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.
- Water Efficient Fixtures & Controls - Retrofitting with more efficient water-consumption fixtures / appliances will save both energy and money through reduced energy consumption for water heating
- Domestic Hot Water - Set the heaters to produce water at or below 120 °F.
- 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 how to minimize energy use. The US Department of Energy offers free information.

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

At this time, SWA highly recommends a total of **6** Energy Conservation Measures (ECMs) for the Netcong Borough Hall / Police Department building that are summarized in the following Table 1. The total investment cost for these ECMs with incentives is **\$49,320**. SWA estimates a first year savings of **\$47,935** with a simple payback of **1 year**. SWA estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the Netcong Borough Hall / Police Department building by **36,082 lbs of CO₂**. SWA also recommends another **3** ECMs with 5-10 year payback that are summarized in Table 2.

There are various incentives that the Borough of Netcong could apply for that could also help lower the cost of installing the ECMs. SWA recommends that the Borough of Netcong 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 \$280 for installing the recommended wall-mounted occupancy sensors, \$200 for installing LED Exit signs, \$60 for replacing T12 with T8 fixtures and \$50 for installing an Energy Star gas fired hot water heater. The Netcong Borough Hall / Police Department 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 two tables summarize the proposed Energy Conservation Measures (ECM) and their economic relevance.

Table 1 - Highly Recommended 0-5 Year Payback ECMs

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 \$	kBtu /sq ft			Cost Savings \$		
1	install 1 programmable thermostat in court room and assoc areas	\$150	RS Means, Lit Search, Similar Projects	274	kWh	0.1	kW	663	1.8	0.2	12	6,518	354	1,616
				106	therms	-	-							
2	Install 5 kW Wind System with INCENTIVE (upfront \$3.20/kWh)	\$40,000	Similar Projects	13,000	kWh	5.0	kW	43,810	6.9	0.9	25	746,145	70.6	17,810
3.1	replace 4 incand lamps to CFL	\$80	RS Means, Lit Search	217	kWh	0.1	kW	46	0.1	1.8	7	282	36.1	297
3.2	install 14 occupancy sensors, with INCENTIVES	\$1,260	RS Means, Lit Search, NJ Clean Energy Program	2,275	kWh	0.8	kW	387	1.2	3.3	12	3,804	16.8	3,117
4	Retro-Commissioning	\$7,980	Similar Projects	7,284	kWh	2.4	kW	3,692	10.4	2.2	12	36,316	29.6	14,858
				417	therms	-	-							
	Total Proposed	\$49,320	-	-	-	8.3	kW	\$47,935	11.8	1.0	23	761,370	64.1	36,082

Definitions:

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

Assumptions:

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

Note:

A 0.0 electrical demand / month indicates that it is very low / negligible

Table 2 - Recommended 5-10 Year Payback ECMs

ECM #	M 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 \$	kBtu /sq ft			Cost Savings \$		
5	Install 5 kW PV System (with \$1/W INCENTIVE and \$600/1MWh SREC)	\$30,000	Similar projects	5,902	kWh	5.0	kW	4,603	3.2	6.5	25	78,401	6.5	8,086
3.3	replace 10 Fluorescent EXIT sign with LED type, with INCENTIVES	\$1,000	RS Means, Lit Search, NJ Clean Energy Program	613	kWh	0.2	kW	104	0.3	9.6	20	1,523	2.6	840
3.4	replace building internal lights: T12s to T8s with INCENTIVES (incl. 75% labor)	\$370	RS Means, Lit Search, NJ Clean Energy Program	205	kWh	0.1	kW	35	0.1	10.6	20	509	1.9	281

1. HISTORIC ENERGY CONSUMPTION

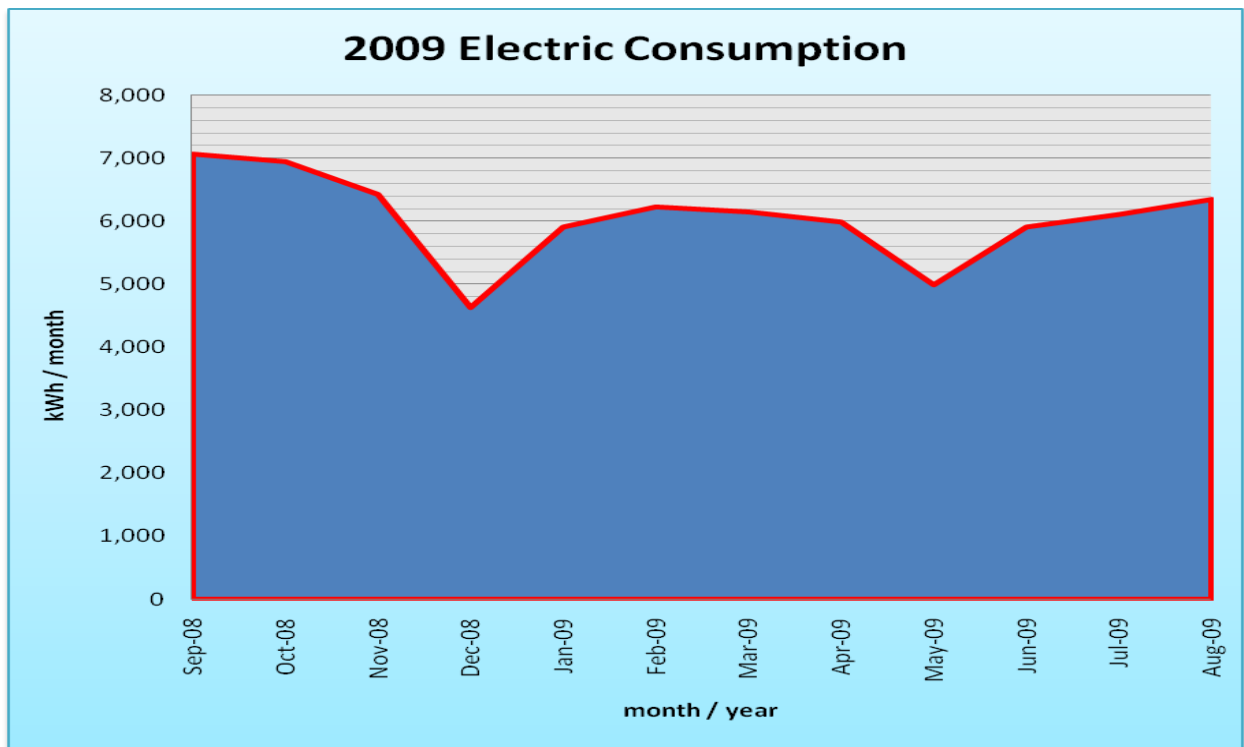
1.1. Energy usage and cost analysis

SWA analyzed utility bills from October 2007 through August 2009 that were received from the utilities supplying the Netcong Borough Hall / Police Department building with electric and natural gas.

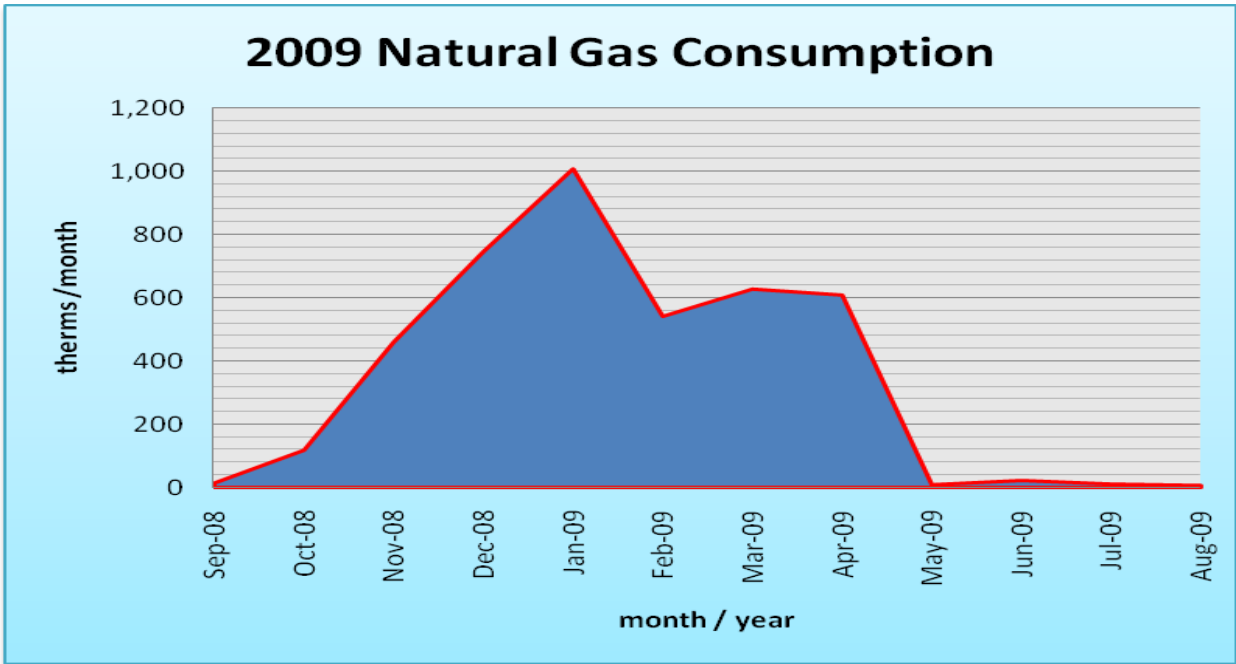
Electricity - The Netcong Borough Hall / Police Department building is currently served by one electric meter. The Netcong Borough Hall / Police Department building currently buys electricity from JCP&L at **an average rate of \$0.170/kWh** based on 12 months of utility bills from Sept 2008 to Aug 2009. The Netcong Borough Hall / Police Department building purchased **approximately 72,840 kWh or \$12,400 worth of electricity** in the previous year. The average monthly demand was 24 kW.

Natural Gas - The Netcong Borough Hall / Police Department building is currently served by one meter for natural gas. The Netcong Borough Hall / Police Department building currently buys natural gas from NJNG at **an average aggregated rate of \$1.518/therm** based on 12 months of utility bills from Sept 2008 to Aug 2009. The Netcong Borough Hall / Police Department building purchased **approximately 4,169 therms or \$6,329 worth of natural gas** in the previous year.

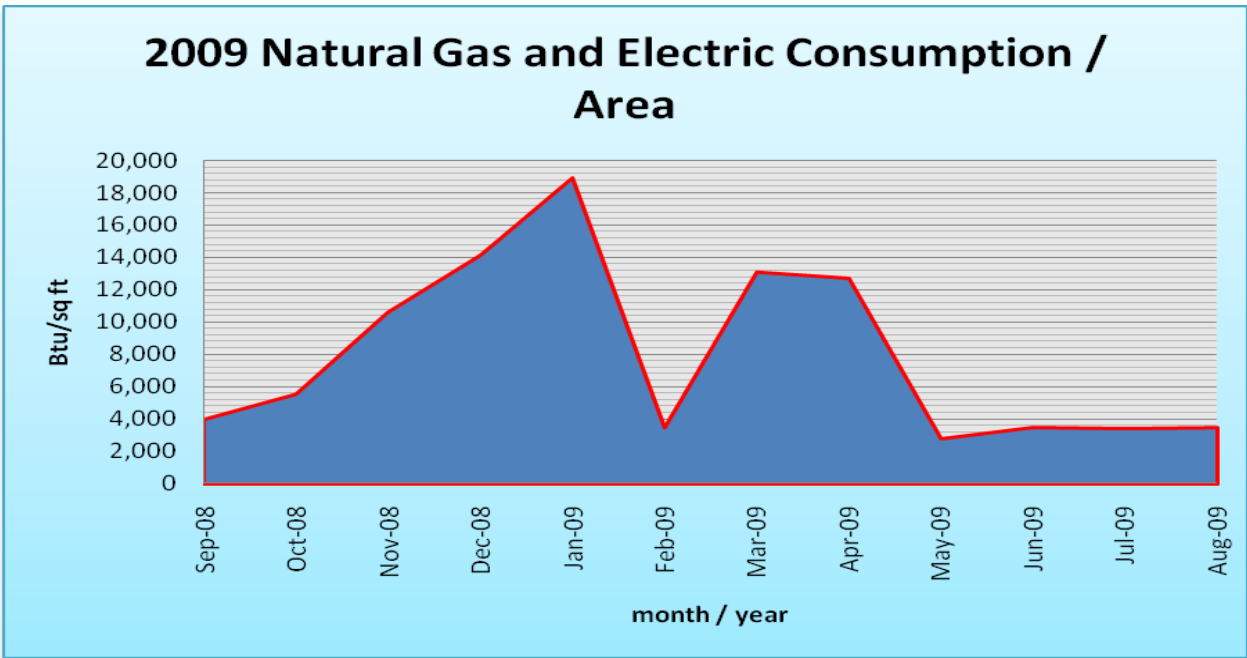
The following chart shows electricity use for the Netcong Borough Hall / Police Department building based on utility bills for the 12 month period of September 2008 - August 2009.



The following chart shows the natural gas consumption for the Netcong Borough Hall / Police Department building based on utility bills for the 12 month period of September 2008 - August 2009.

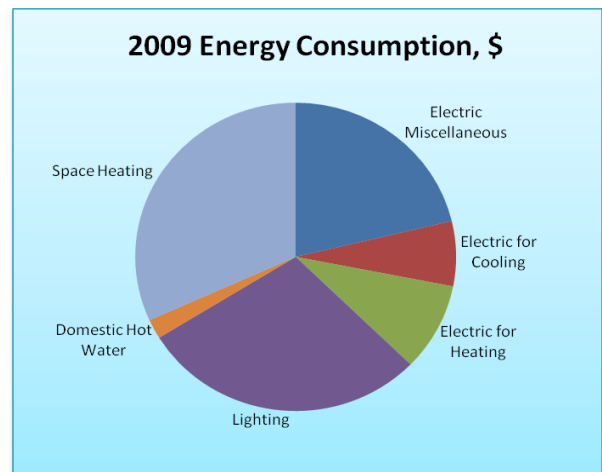
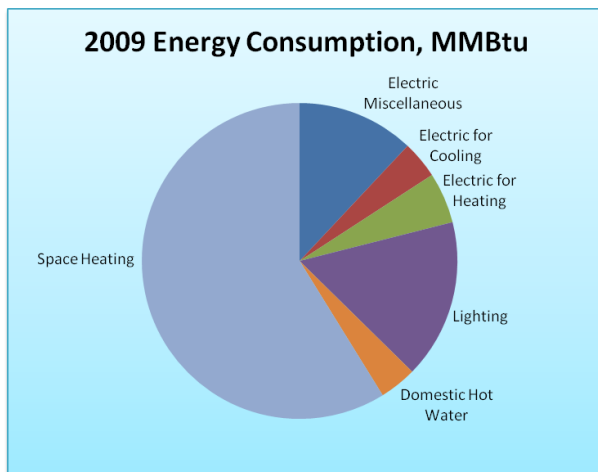


The following chart shows combined natural gas and electric consumption in Btu/ft² for the Netcong Borough Hall / Police Department building based on utility bills for the 12 month period of September 2008 - August 2009.



The following table and chart pies show energy use for the Netcong Borough Hall / Police Department building based on utility bills for the 12 month period of September 2008 - August 2009. Note electrical cost at \$50/MMBtu of energy is more than 3 times as expensive to use as natural gas at \$15/MMBtu. It is assumed that the electrical miscellaneous usage includes building fans that operate throughout the year.

2009 Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	\$	% \$	\$/MMBtu
Electric Miscellaneous	80	12%	\$3,984	21%	\$50
Electric for Cooling	26	4%	\$1,273	7%	\$50
Electric for Heating	35	5%	\$1,730	9%	\$50
Lighting	109	16%	\$5,413	29%	\$50
Domestic Hot Water	25	4%	\$386	2%	\$15
Building Space Heating	391	59%	\$5,943	32%	\$15
Totals	665	100%	\$18,729	100%	\$28
Total Electric Use	249	37%	\$12,400	66%	\$50
Total Gas Use	417	63%	\$6,329	34%	\$15
Totals	665	100%	\$18,729	100%	\$28



1.2. Utility rate

The Netcong Borough Hall / Police Department building currently purchases electricity from JCP&L at a general service market rate for electricity use (kWh) with a separate (kW) demand charge. The Netcong Borough Hall / Police Department building currently pays an average rate of approximately \$0.170/kWh based on the previous 12 months of utility bills for 2009.

The Netcong Borough Hall / Police Department building currently purchases natural gas supply from NJNG at a general service market rate for natural gas (therms). NJNG also acts as the transport company. There is one gas meter that provides natural gas service to the Netcong Borough Hall / Police Department building currently. The average aggregated rate (supply and transport) for the meter is approximately of \$1.518/therm based on 12 months of utility bills of September 2008 - August 2009.

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

1.3. Energy benchmarking

SWA has entered energy information about the Netcong Borough Hall / Police Department building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. This mixed use facility (borough hall offices / police station / courthouse) is comprised of non-eligible (Other) space type. Police Station / Courthouse space or "Other" can be used to classify a facility or a portion of a facility where the primary activity does not fall into any of the available space types. Consequently, the Netcong Borough Hall / Police Department building is not eligible to receive a national energy performance rating at this time.

The Site Energy Use Intensity is 104 kBtu/ft²yr compared to the national average of a fire house / police station building consuming 78 kBtu/ft²yr. Implementing this report's recommendations will reduce use by approximately 27.5 kBtu/ft²yr, which when implemented would make the building energy consumption better than the national average. SWA encourages the Borough of Netcong 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. As new space types become available, the Borough of Netcong will be able to reclassify spaces accordingly if they have previously been entered as "Other". Per the LGEA program requirements, SWA has assisted the Borough of Netcong to create an *Energy Star Portfolio Manager* account and share the Netcong Borough Hall / Police Department 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 Borough of Netcong (user name of "netcongboro" with a password of "EAUDIT2009") and TRC Energy Services (user name of TRC-LGEA).



STATEMENT OF ENERGY PERFORMANCE

Borough of Netcong - Borough Hall/Police Department

Building ID: 1857626
 For 12-month Period Ending: August 31, 2009¹
 Date SEP becomes ineligible: N/A

Date SEP Generated: October 07, 2009

Facility	Facility Owner	Primary Contact for this Facility
Borough of Netcong - Borough Hall/Police Department 23 Maple Avenue Netcong, NJ 07857	N/A	N/A

Year Built: 1974
 Gross Floor Area (ft²): 6,384

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	248,530
Natural Gas (kBtu) ⁴	416,746
Total Energy (kBtu)	665,276

Energy Intensity⁵

Site (kBtu/ft ² /yr)	104
Source (kBtu/ft ² /yr)	198

Emissions (based on site energy use)

Greenhouse Gas Emissions (MTCO ₂ e/year)	60
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Electric Distribution Utility

Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	78
National Average Source EUI	157
% Difference from National Average Source EUI	26%
Building Type	Fire Station/Police Station

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.

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

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 approvals are received from EPA.
2. The EPA Energy Performance Rating is based on total on-site 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 this report are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, PE facility inspection, and notarizing the SEP) and we hereby request that you reduce this time to a minimum. Send comments (including OMB control number) to the Director, Collection Strategies Division, U.S. EPA (2022), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The single story (with attic) 6,384 square feet Netcong Borough Hall / Police Department building was originally built in 1974 as a Cumberland Farm store. Later it was used as an auto parts store and library. In 1993 it was expanded to its current size. The building today houses municipal administrative offices and the Police Department headquarters for the Borough of Netcong.

2.2. Building occupancy profiles

Occupancy for the Netcong Borough Hall / Police Department building is approximately 25 employees. The Police Department operates 24/7, the borough part of the building operated about 100 hours per week, from 8:00 am to 4:00 pm on weekdays with some evening meeting.

2.3. Building envelope

2.3.1. Exterior Walls

Side and rear exterior walls are finished with painted 8” CMU (concrete masonry unit) block with 2x framing and insulation behind it. Interior finishes are mostly GWB (gypsum wall board). The front ground floor wall is finished with brick veneer over 8” CMU. The front and rear gables are finished with clapboard siding over un-insulated 2x wood framing. The interior walls of the attic are unfinished.

Due to warm temperature conditions at the time of the field visits, insulation levels and uniformity in walls could not be verified with help of infrared technology. If desired, the borough could contract a separate envelope inspection during cooler months.

Some dislocated clogged and defective down-spouts and under soffit bird nesting were found and need to be repaired and cleaned. Structurally, the minor cracks observed in a few areas in the exposed CMU sidewalls seem to reveal past moisture issues and should be filled with proper mortar / epoxy, and should be fixed and regularly inspected and maintained to prevent potential water/ moisture infiltration. Overall, exterior and interior finishes of the envelope walls were found to be in age-appropriate, good condition.



Dislocated, Clogged and Missing Down-Spouts at Side Walls



Bird Nesting under Soffit

2.3.2. Roof

The wood truss, low slope asphalt shingle covered roof dates back to 1993. The attic below is unconditioned and unfinished. The attic floor is insulated with 8” fiberglass batts, providing a R-28, assuming perfect uniformity. The recommended levels of attic insulation in the building’s geographical location are R-30-50. As mentioned under 2.3.1 Exterior Walls, a separate envelope inspection should be conducted during cooler months. SWA suggests basing further insulation related improvement discussions on the outcome of those future findings.

Warranty, performance and longevity of asphalt shingle roofs might be compromised by inadequate under-roof-sheathing ventilation. This is accomplished most effectively by installing soffit and ridge vents that let air move freely from soffits up and out the ridge vent. Soffit vents were identified, but no ridge vent. SWA discourages passive or active gable vents as they were found not to be effective in reducing excessive attic heat. SWA suggests installing a ridge vent and inspecting the existing soffit vent for maximum performance.

*Existing Attic
Insulation Conditions*



2.3.3. Base

The building’s base is assumed to be 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’s double glazed, double / single hung, vinyl clad windows were installed during the 1993 upgrade. All the windows inspected showed proper caulking and sealing around both interior and exterior perimeters and without signs of condensation or other problems.

2.3.5. Exterior doors

The metal framed exterior doors were observed to be in fair condition and need to have missing or worn weather stripping installed 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 insulated.



Missing or Worn Weather-Stripping at front door

2.3.6. Building air tightness

Based on a visual inspection, the Netcong Borough Hall / Police Department building was observed to be a relatively well-sealed building except at exterior doors as mentioned under 2.3.5 Exterior Doors. Additionally, using manufacturer's approved materials and methods; SWA recommends air sealing all envelope penetrations around plumbing, HVAC, structural and electrical installations.

2.4. HVAC Systems

2.4.1. Heating

Heat and air conditioning is delivered via a forced air system. Forced hot air is provided by three York natural gas furnaces located in the building attic. The building is divided into three zones (three duct systems): Police, Administrative and Meeting rooms. The Meeting room temperature is controlled by a manual wall thermostat while the other zones have wall mounted programmable thermostats. The furnace AFUE is 70% compared to today's York standard of 80% or higher.

2.4.2. Cooling

As described above, cooling is delivered via a forced air system to the three zones. There are three separate air cooled York condensers on the side of the building providing refrigerant to DX cooling coils located in the attic duct work. Some of the air coils may be undersized and mismatched, such as the Administrative unit which freezes up when the condenser's two compressors come on (one has been now disconnected). On hot days due to distribution, balancing and insufficient cooling issues, employees in the Administrative section are uncomfortable.

2.4.3. Ventilation

The Netcong Borough Hall / Police Department building is provided with outside air via the forced air system. The attic has four small roof exhaust fans to keep it cool and the air circulated.

2.4.4. Domestic Hot Water

There is a natural gas fired domestic hot water (DHW) heater with 50 gallons storage located in the ground floor utility room supplying the building sinks and one shower in the Police Department. This unit is operating beyond its useful operating life and should be replaced prior to catastrophic failure and associated damage.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting - The Netcong Borough Hall / Police Department building currently consists of mostly updated T8 fluorescent fixtures with electronic ballasts. There are a few incandescent bulbs found in closets and attic. SWA recommends replacement of all incandescent bulbs with compact fluorescents. SWA also recommends installing occupancy sensors in bathrooms, closets, 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. 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 have fluorescent bulbs. SWA recommends replacing all fluorescent Exit signs with LED bulbs.

Exterior Lighting - The exterior lighting surveyed during the building audit were found to be a mix of metal halide and fluorescent and incandescent lamps. Since this lighting is mainly for Safety as well as for Security, SWA has deemed it not cost effective to replace the exterior metal halide lamp lighting at this time. SWA recommends the replacement of all incandescent flood lights with compact fluorescent lights and T12 with T8 fixtures. Exterior lighting is controlled by astronomical timers. There is not any immediate need to upgrade these lighting or astronomical timers. Other street lighting also shines on the building's perimeter.

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 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 Netcong Borough Hall /

Police Department 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 Netcong Borough Hall / Police Department building is a one story building and therefore there are no elevators.

2.5.4. Others electrical systems

There is a Kohler 70 kVA emergency generator operated on diesel located at the back of the building that is capable of backing up the entire building.

The Netcong Borough Hall / Police Department building could be eligible for enrollment in a Demand Response Program, if this Kohler 70 kVA generator together with the Main Fire House (across the street) Katolight 60 kVA emergency generator would be wired in such a way to offer capability 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. This setup could allow the Borough of Netcong to negotiate a reimbursement program with the utility company.

There are not currently any other electrical systems installed at the Netcong Borough Hall / Police Department building.

3. EQUIPMENT LIST

Inventory

Building System	Description	Location	Model #	Fuel	Space Served	Year Installed	Estimated Remaining Useful Life %
Heating / Cooling / Ventilation	2 furnaces, York, 190,000 Btu/hr input	attic	P4USB30N19031A	Natural Gas / Electric	Town Hall; Council Chamber and Court Room	1989	20%
Heating / Cooling / Ventilation	1 furnaces, York, 140,000 Btu/hr input	attic	P2DUDD2QN13301C	Natural Gas / Electric	Police Dept	1989	20%
Ventilation	4 small attic exhaust fans	attic	-	Electric	Attic	1993	30%
Cooling	2 condensers, uses R-22, 3/4 Hp fan, 3 Hp motor	next to bldg	York H1CE090A25A	Electric	Town Hall; Council Chamber and Court Room	1989	20%
Cooling	1 condenser	next to bldg	York	Electric	Police Dept	1989	20%
Domestic Hot Water	State 50 gal, 65,000 btu/hr input	utility closet	PRX 50 NORT6 5F	Natural Gas	Municipal Building	1991	0%
Generator	Kohler 70 kVA	back of building	Kohler	Electric / Diesel	Municipal Building	2003	80%
Lighting	See details - Appendix A	see Appendix A	-	Electric	Municipal Building	varies	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 Netcong Borough Hall / Police Department, 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

- HVAC System - The three existing independent furnaces and their associated condensers have another 5 years of useful operating life left on them. However, they are inefficient and some of the cooling coils are mismatched. Ductwork may need to be adjusted and balanced for improved air distribution. The Administrative zone condenser is operating only on one of its two compressors. York has discontinued these furnace and condenser models. Instead, the standard today for furnaces is >80% AFUE (Annual Fuel Utilization Efficiency) vs. the existing 70% and condensers with friendly environmentally refrigerants and >11.2 EER (Energy Efficiency Ratio) vs. 8.9 for the existing. Replacing the entire HVAC system is estimated to cost \$40,000 with a payback of 27 years and an approximate reduction of 11.1 kBtu/ft² yr, which cannot be justified by energy savings alone and should be considered as part of a major renovation plan.
- Replace Domestic Hot Water (DHW) heater - as it has reached the end of its useful operating life. SWA recommends its replacement with a natural gas fired Energy Star EF 0.63 rated unit with a 40 gallon storage tank and 40,000 Btu/hr input.

The Netcong Borough Hall / Police Department building State Industries hot water heater with a 50 gal storage tank is located in the ground floor utility room and supplying the building sinks and one shower in the Police Department. This unit is operating beyond its useful operating life and should be replaced prior to a catastrophic failure and associated damage. SWA recommends its replacement with a natural gas fired Energy Star EF 0.63 rated unit with a 40 gallon (since use is relatively low) storage tank and 40,000 Btu/hr input. SWA also evaluated replacing the old heater with a 40 gal, 40,000 Btu/hr condensing EF 0.96 heater type unit; however the payback is in excess of 11 years. Replacing the existing heater in kind with labor evaluated at prevailing wages is estimated to cost \$950. For an additional \$100 (inclusive of \$50 NJ Smart Start rebate) the recommended Energy Star model has a 4.1 year payback based on fuel savings.

- Premium Motors - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives.

Category II Recommendations: Operations and Maintenance

- Roof Maintenance - SWA recommends regular maintenance to verify water is draining correctly.
- Downspouts - Repair missing downspouts and areas of brick veneer damage to prevent water / moisture infiltration and insulation damage.
- Under-roof-sheathing Ventilation - Performance and longevity of asphalt shingle roofs might be compromised by inadequate under-roof-sheathing ventilation. This is accomplished most effectively by installing soffit and ridge vents that let air move freely from soffits up and out the ridge vent.
- 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.

- 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.
- Domestic Hot Water - Consider setting the heaters to produce hot water at or below 120 °F.
- 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 to minimize 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
1	Install programmable thermostat in court room area
2	Install 5 kW Wind system
3.1 & 3.2	Install lighting CFLs and occupancy sensors
4	Undertake retro-commissioning of building systems and controls to optimize performance
Description of Recommended 5-10 Year Payback ECMs	
5	Install 5 kW Photovoltaic system
3.3 & 3.4	Upgrade building lighting: T12 to T8 fixtures and Exit fluorescents to LED

ECM#1: *Install Programmable Thermostat in Court Room Area*

Description:

The Court Room and meeting room area contains a number of ceiling diffusers which are controlled by a wall mounted manual thermostat. These spaces have a dedicated zone furnace and condenser. On the day of SWA's visit these spaces were unoccupied and air conditioned. Temperature control in these spaces can be changed by any passerby; it is without setback and just poor accuracy. These spaces are generally occupied evenings and only several times a week. These spaces are not setback at night or after-hours and additional energy is used to keep the spaces warm or cool, which would not be expanded if controls could be properly operated.

SWA proposes that the Borough of Netcong replace the existing manual thermostat with a strategically placed programmable wall mounted and tampering secure thermostat that will greatly improve the control, heat and cool energy expanded in the spaces.

Installation cost:

Estimated installed cost: \$150

Source of cost estimate: *RS Means; Published 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 \$	kBtu /sqft			Cost Savings \$		
install 1 programmable thermostat in court room and assoc areas	\$150	RS Means, Lit Search, Similar Projects	274	kWh	0.1	kW	663	1.8	0.2	12	6,518	354	1,616
			106	therms	-	-							

Assumptions: Since the utility bills have some accounting fluctuations, it is difficult to determine the energy used for heating / cooling the Netcong Borough Hall / Police Department building. SWA estimated the heating / cooling energy usage from the electric and natural gas bills. SWA assumed typical heating / cooling savings of 9% for scheduled setbacks and controls. Estimated programmable thermostat cost / installation are based on similar project. SWA also assumed on the average 1/4 hr/wk operational savings when systems are operating per design and schedule vs. the need to make more frequent manual adjustments and included this with the annual savings.

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#2: Install 5kW Wind System

Please see section 5: RENEWABLE AND DISTRIBUTED ENERGY MEASURES

ECM#3: Building Lighting Upgrades

Description:

On the day of the site visit, SWA completed a lighting inventory of the Netcong Borough Hall / Police Department building (see Appendix A). The existing lighting consists of many T8 fluorescent fixtures with electronic ballasts, and a few incandescent lights and T12s. Many of the lights in the Netcong Borough Hall / Police Department building appear to have been upgraded to T8 fixtures. SWA has performed an evaluation of upgrading incandescent bulbs to CFLs, installing occupancy sensors in offices and bathrooms that may be left unoccupied a considerable amount of time throughout the day and replacing fluorescent EXIT sign with LED type. The labor in all these installations was evaluated using prevailing electrical contractor wages. The Borough of Netcong 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 and occupancy sensors be installed in a number of offices and bathrooms. See Appendix A for recommendations.

Installation cost:

Estimated installed cost: \$2,710

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 \$	kBtu /sqft			Cost Savings \$		
3.1 - replace 4 incand lamps to CFL	\$80	RS Means, Lit Search	217	kWh	0.1	kW	46	0.1	1.8	7	282	36.1	297
3.2 - install 14 occupancy sensors, with INCENTIVES	\$1,260	RS Means, Lit Search, NJ Clean Energy Program	2,275	kWh	0.8	kW	387	1.2	3.3	12	3,804	16.8	3,117
3.3 - replace 10 Fluorescent EXIT sign with LED type, with INCENTIVES	\$1,000	RS Means, Lit Search, NJ Clean Energy Program	613	kWh	0.2	kW	104	0.3	9.6	20	1,523	2.6	840
3.4 - replace building internal lights: T12s to T8s with INCENTIVES (incl. 75% labor)	\$370	RS Means, Lit Search, NJ Clean Energy Program	205	kWh	0.1	kW	35	0.1	10.6	20	509	1.9	281
Total Proposed	\$2,710		3,310	kWh	1.1	kW	571	1.8	4.7	16	7,035	10.0	4,535

Assumptions: SWA calculated the savings for this measure using measurements taken the day of the field visit and using the billing analysis. SWA also assumed an aggregated 1/4 hr/yr to replace aging burnt out lamps vs. newly installed and included this with the annual savings.

Rebates/financial incentives:

*NJ Clean Energy - Wall Mounted occupancy sensors (\$20 per control)
Maximum incentive amount is \$280.*

*NJ Clean Energy - LED Exit signs (\$10-\$20 per fixture)
Maximum incentive amount is \$200.*

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 \$60.

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#4: 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 Netcong Borough Hall / Police Department building have undergone renovations in recent 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. The retro-commissioning process should include a review of existing operational parameters for both newer and older installed equipment. During retro-commissioning, the individual loop temperatures should also be reviewed to identify opportunities for optimizing system performance.

Installation cost:

Estimated installed cost: \$7,980

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 \$	kBtu /sqft			Cost Savings \$		
Retro-Commissioning	\$7,980	Similar Projects	7,284	kWh	2.4	kW	3,692	10.4	2.2	12	36,316	29.6	14,858
			417	therms	-	-							

Assumptions: Since the utility bills have some accounting fluctuations, it is difficult to determine the amount of energy used for heating and cooling the Netcong Borough Hall / Police Department 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 6,384. SWA also assumed on the average 1 hr/wk operational savings when systems are operating per design vs. the need to make more frequent adjustments and included this with the annual savings.

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#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.

5.2. Wind

ECM#2: *Install 5kW Wind system*

Description:

Wind power production may be applicable for the Netcong Borough Hall / Police Department building location, because of the thermal winds generated in the area. Currently, the Netcong Borough Hall / Police Department 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 of installing a 5kW Wind system to offset electrical demand for the building and reduce the annual net electric consumption for the building, however there are insufficient guaranteed incentives for NJ rebates at this time for this investment. The Netcong Borough Hall / Police Department building is not eligible for a 30% federal tax credit. The Netcong Borough Hall / Police Department 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 \$	kBtu /sqft			Cost Savings \$		
Install 5 kW Wind System with INCENTIVE (upfront \$3.20/kWh)	\$40,000	Similar Projects	13,000	kWh	5.0	kW	43,810	6.9	0.9	25	746,145	70.6	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 Netcong Borough Hall / Police Department 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, and recommends at this time that Borough of Netcong further review installing a 5kW 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 Netcong Borough Hall / Police Department building is not eligible for a 30% federal tax credit. Instead, the Borough of Netcong 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 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 \$	kBtu /sqft			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	4,603	3.2	6.5	25	78,401	6.5	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 (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

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 existing split system cooling, furnaces and insufficient domestic hot water use.

5.6. Geothermal

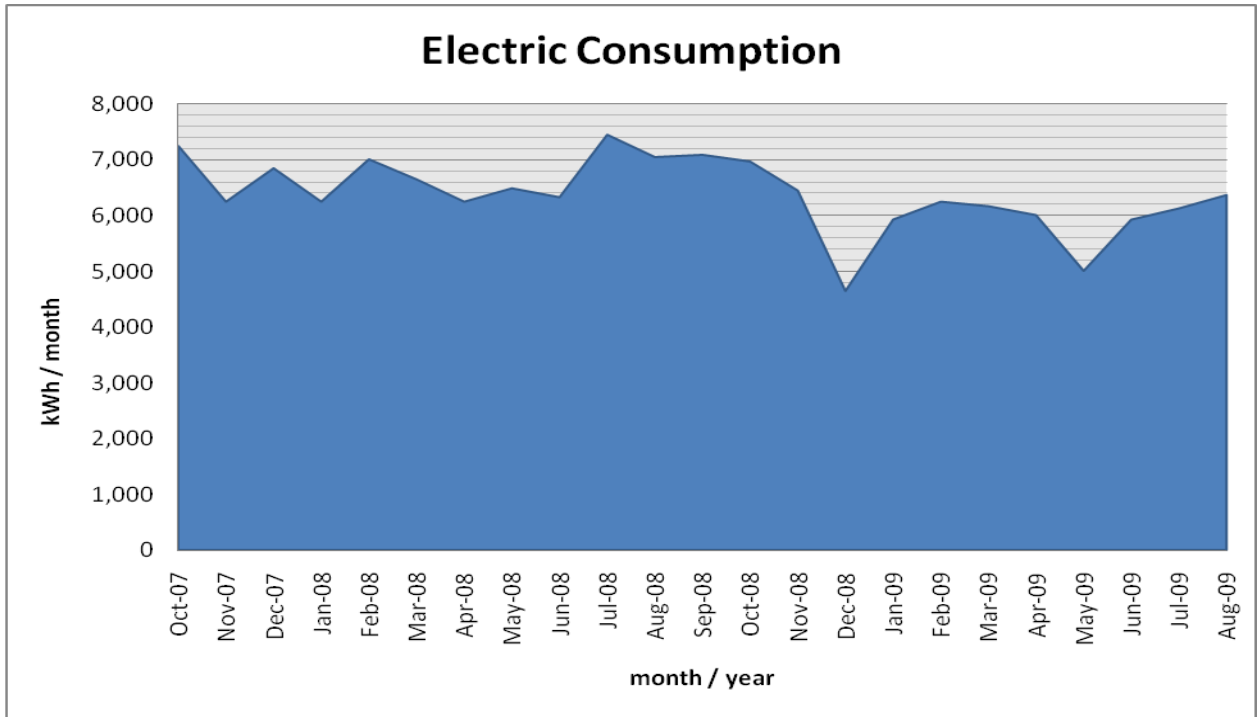
Description:

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

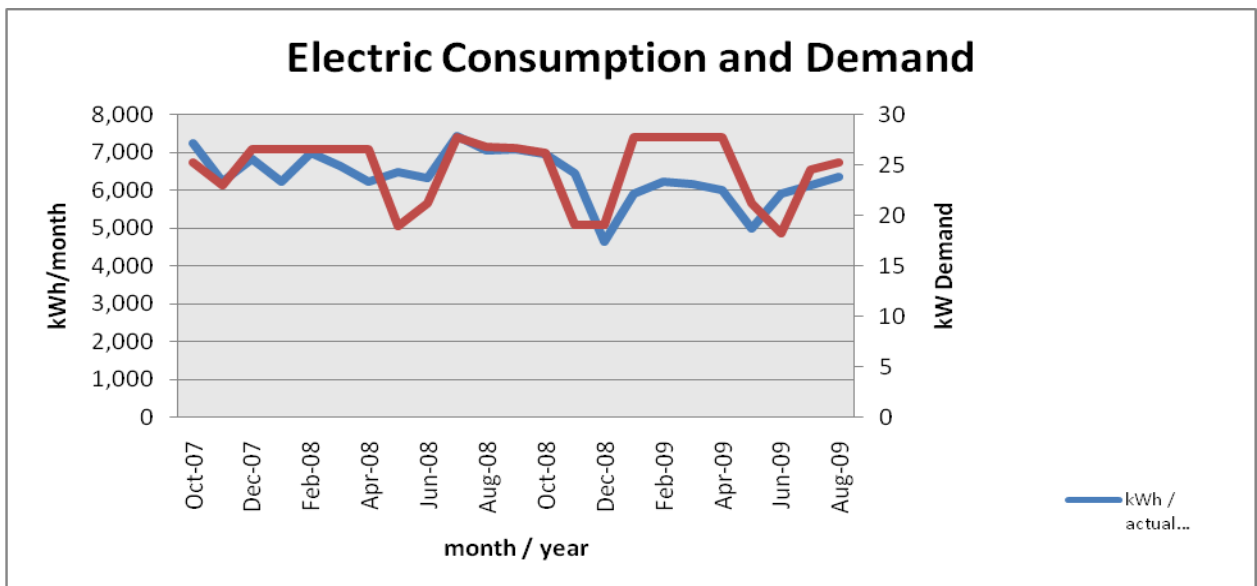
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles

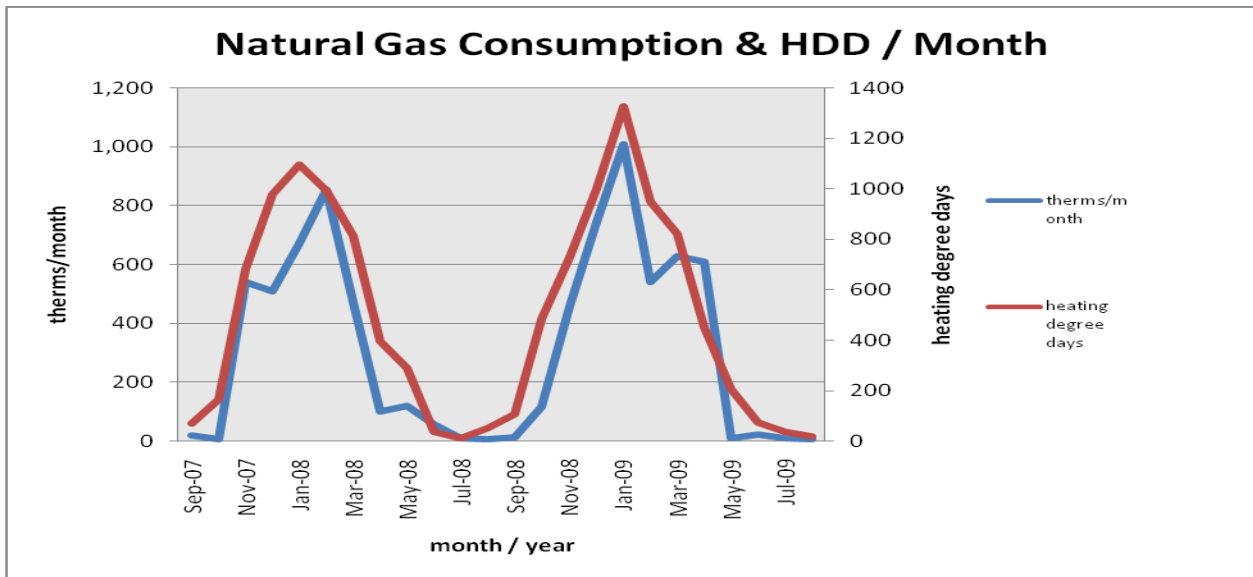
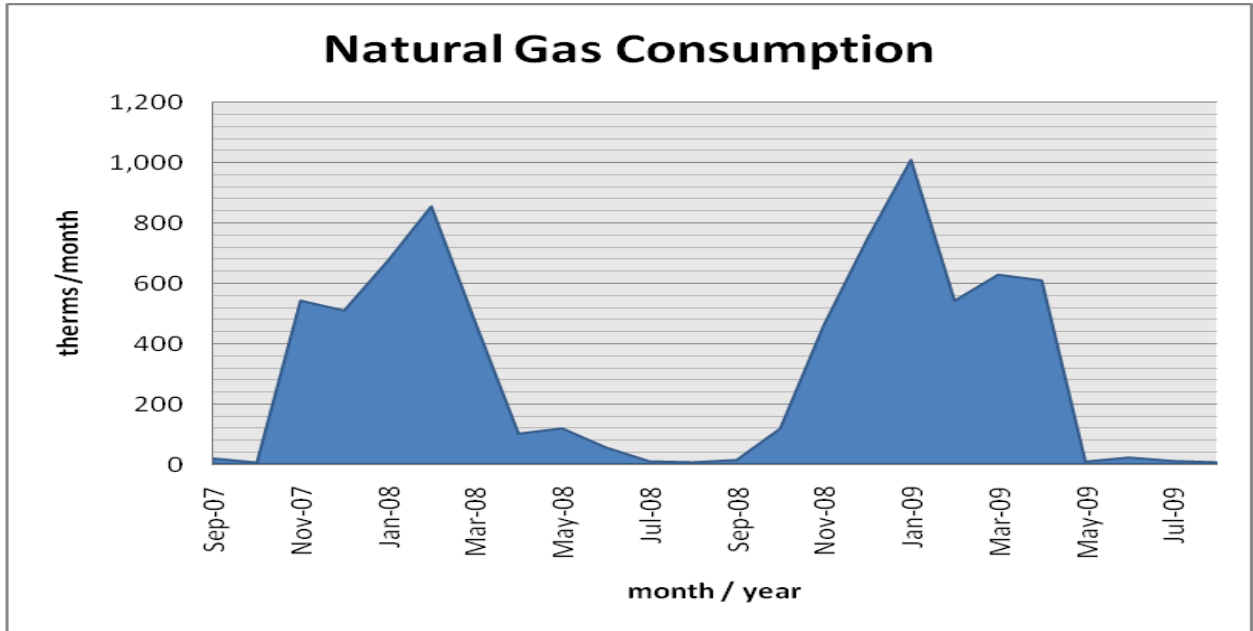
The following are charts that show the annual electric and natural gas load profiles for the Netcong Borough Hall / Police Department building.



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.



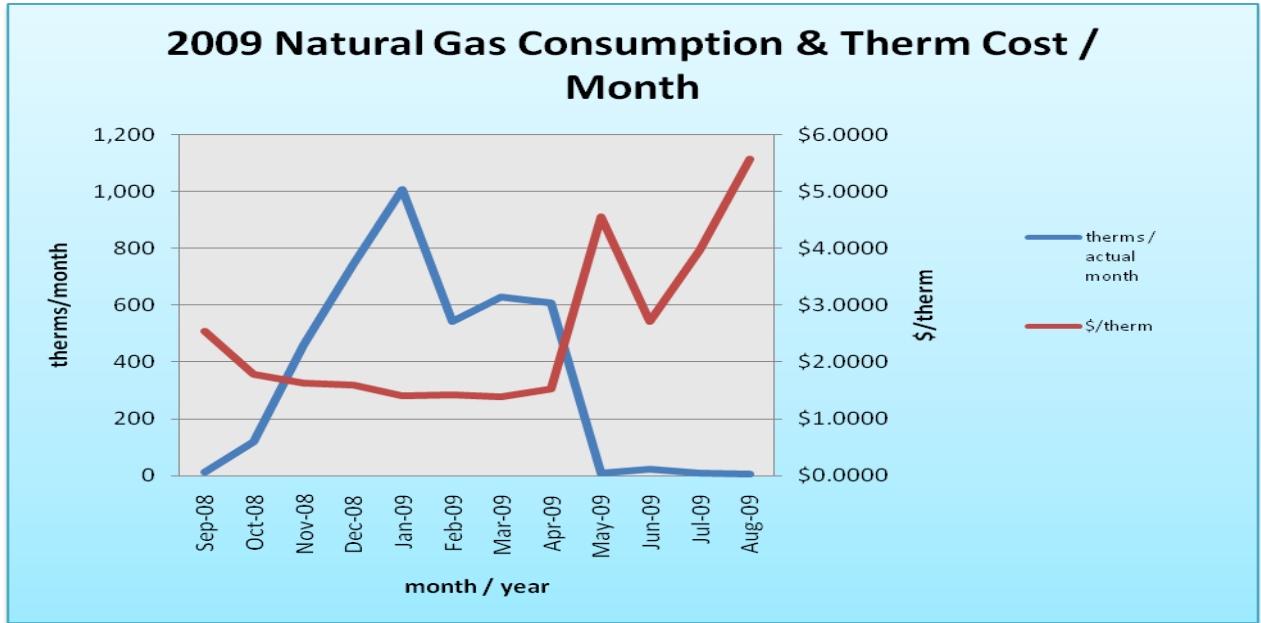
The following is a chart of the natural gas annual load profile for the building, peaking in the coldest months of the year and a chart showing gas consumption following the “heating degree days” curve.



6.2. Tariff analysis

Currently, natural gas is provided to the Netcong Borough Hall / Police Department building via one gas meter with NJNG acting as the supply and transport company. Gas is provided by NJNG at a general service rate. The suppliers’ general service rate for natural gas charges a market-rate price based on use and the Netcong Borough Hall / Police Department 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 building furnaces. The high gas price per therm fluctuations in the summer may be due to high energy costs that occurred in 2008 and low use caps for the non-heating

months. Thus the building pays for fixed costs such as meter reading charges during the summer months. So June, July and August cap payments are relatively high in the following chart.

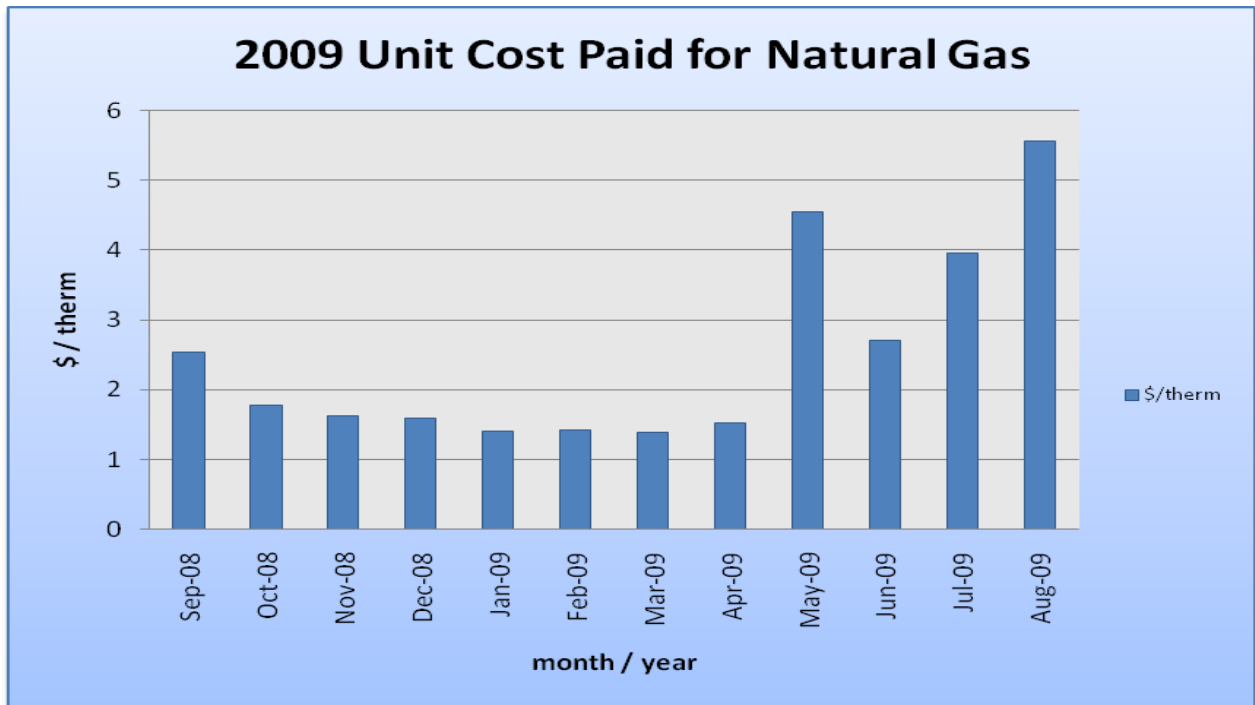
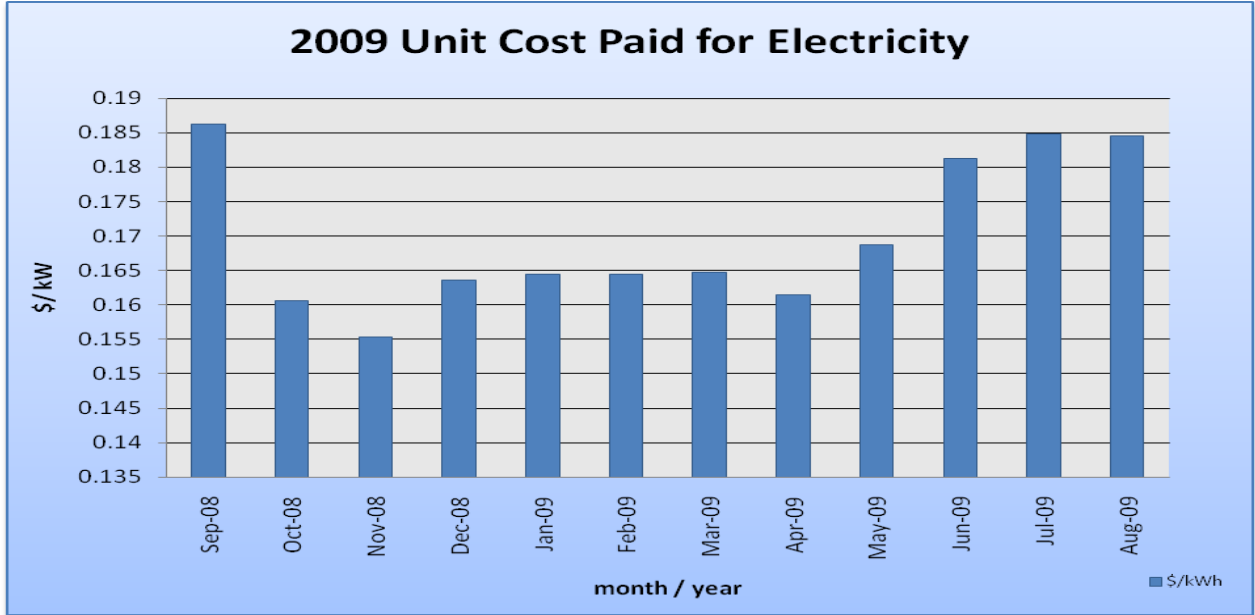


The Netcong Borough Hall / Police Department building is direct-metered (via one main meter) and currently purchases electricity from JCP&L at a general service rate. The general service rate for electric charges are market-rate based on use and the Netcong Borough Hall / Police Department building billing 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.

6.3. Energy Procurement strategies

The Netcong Borough Hall / Police Department building receives natural gas via one incoming meter. NJNG 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 also purchased via one incoming meter directly for the Netcong Borough Hall / Police Department building from JCP&L 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 33% over the most recent 12 month period. Natural gas bill analysis shows fluctuations up to 40% 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 escalating energy costs in 2008. The average estimated NJ commercial utility rates for electric and gas are \$0.150/kWh and \$1.550/therm respectively. This building's annual utility costs are \$1,459 higher for electric and \$133 lower for natural gas for a total of \$1,325 higher, when compared to the average estimated NJ commercial utility rates. SWA recommends that the Borough of Netcong 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 Netcong Borough Hall / Police Department building. Appendix B contains a complete list of third party energy suppliers for the Borough of Netcong service area. The Netcong Borough Hall / Police Department 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 Netcong Borough Hall / Police Department building could be eligible for enrollment in a Demand Response Program, if the Kohler 70 kVA generator together with the Main Fire House (across the street) Katolight 60 kVA emergency generator would be wired in such a way to offer capability 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. This setup could allow the Borough of Netcong to negotiate a reimbursement program with the utility company. The following charts show the Netcong Borough Hall / Police Department building monthly spending per unit of energy from Sept 2008 to Aug 2009.



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

Netcong Borough Hall Existing Lighting Conditions														Proposed Lighting												
#	Bldg	Fir	Rm #	Location in Building	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	
1	NBH	GF	-	Conf Rm	T8 4'	E	4	4	F	32	2	1024	S	no	T8 4'	E	4	4	F	32	2	1024	S	512		
2	NBH	GF	-	Court Rm	T8 4'	E	12	3	F	32	2	2304	S	no	T8 4'	E	12	3	F	32	2	2304	S	1152		
3	NBH	GF	-	Court Rm	CFL	E	1	1	CFL	26	2	52	S	no	CFL	-	1	1	CFL	26	2	52	S	26		
4	NBH	GF	-	Court Rm	Fluoresc. Exit	E	2	1	F	12	24	576	none	no	LED Exit	-	2	1	LED	5	24	240	none	10		
5	NBH	GF	-	Corridor	T8 4'	E	11	2	F	32	8	5632	S	no	T8 4'	E	11	2	F	32	8	5632	S	704		
6	NBH	GF	-	Corridor	Fluoresc. Exit	E	3	1	F	12	24	864	none	no	LED Exit	-	3	1	LED	5	24	360	none	15		
7	NBH	GF	-	Offices	T8 4'	E	25	4	F	32	8	25600	S	no	T8 4'	E	25	4	F	32	8	25600	S	3200		
8	NBH	GF	-	Offices	Fluoresc. Exit	E	1	1	F	12	24	288	none	no	LED Exit	-	1	1	LED	5	24	120	none	5		
9	NBH	GF	-	Office A	T8 4'	E	2	4	F	32	8	2048	S	no	T8 4'	E	2	4	F	32	8	2048	S	256	512	
10	NBH	GF	-	Office A	CFL	E	1	1	CFL	26	8	208	S	no	CFL	-	1	1	CFL	26	8	208	S	26	52	
11	NBH	GF	-	Office B	T8 4'	E	2	4	F	32	8	2048	S	no	T8 4'	E	2	4	F	32	8	2048	S	256	512	
12	NBH	GF	-	Office B	CFL	E	1	1	CFL	26	8	208	S	no	CFL	-	1	1	CFL	26	8	208	S	26	52	
13	NBH	GF	-	Court Office	T8 4'	E	4	4	F	32	8	4096	S	no	T8 4'	E	4	4	F	32	8	4096	S	512		
14	NBH	GF	-	Rec. Rm	T8 4'	E	2	4	F	32	10	2560	S	no	T8 4'	E	2	4	F	32	10	2560	S	256	640	
15	NBH	GF	-	Star	T8 4'	E	3	2	F	32	24	4608	S	no	T8 4'	E	3	2	F	32	24	4608	S	192		
16	NBH	GF	-	Bathroom	T8 4'	E	1	4	F	32	8	1024	S	no	T8 4'	E	1	4	F	32	8	1024	S	128	256	
17	NBH	GF	-	Lunch Rm	T8 4'	E	4	3	F	32	8	3072	S	no	T8 4'	E	4	3	F	32	8	3072	S	384		
18	NBH	GF	-	Closet	Incand	none	1	1	I	100	2	200	S	no	CFL	-	1	1	CFL	30	2	60	S	30		
19	NBH	GF	-	Janitor	Incand	none	1	1	I	100	2	200	S	no	CFL	-	1	1	CFL	30	2	60	S	30		
20	NBH	GF	-	Men's Bath	T8 4'	E	1	4	F	32	8	1024	S	no	T8 4'	E	1	4	F	32	8	1024	S	128	256	
21	NBH	GF	-	Women's Bath	T8 4'	E	1	4	F	32	8	1024	S	no	T8 4'	E	1	4	F	32	8	1024	S	128	256	
22	NBH	GF	-	Foyer	T8 4'	E	1	2	F	32	24	1536	S	no	T8 4'	E	1	2	F	32	24	1536	S	64		
23	NBH	GF	-	Foyer	Fluoresc. Exit	E	1	1	F	12	24	288	none	no	LED Exit	-	1	1	LED	5	24	120	none	5		
24	NBH	2nd	-	Attic	T8 4'	E	4	4	F	32	1	512	S	no	T8 4'	E	4	4	F	32	1	512	S	512		
25	NBH	2nd	-	Attic	Incand	none	1	1	I	60	1	60	S	no	CFL	-	1	1	CFL	15	1	15	S	15		
26	NPD	GF	-	Lobby	T8 4'	E	8	2	F	32	24	12288	S	no	T8 4'	E	8	2	F	32	24	12288	S	512		
27	NPD	GF	-	Corridor	T8 4'	E	7	2	F	32	24	10752	S	no	T8 4'	E	7	2	F	32	24	10752	S	448		
28	NPD	GF	-	Corridor	Fluoresc. Exit	E	3	1	F	12	24	864	none	no	LED Exit	-	3	1	LED	5	24	360	none	15		
29	NPD	GF	-	Office	T8 4'	E	3	4	F	32	12	4608	S	no	T8 4'	E	3	4	F	32	12	4608	S	384	1,152	
30	NPD	GF	-	Closet	T8 4'	E	1	2	F	32	2	128	S	no	T8 4'	E	1	2	F	32	2	128	S	64		
31	NPD	GF	-	Office	T8 4'	E	2	4	F	32	12	3072	S	no	T8 4'	E	2	4	F	32	12	3072	S	256	768	
32	NPD	GF	-	Bathroom 1	T8 U	E	2	1	F	32	24	1536	S	no	T8 U	E	2	1	F	32	24	1536	S	64	384	
33	NPD	GF	-	Bathroom 2	T8 U	E	2	1	F	32	24	1536	S	no	T8 U	E	2	1	F	32	24	1536	S	64	384	
34	NPD	GF	-	Closet	T8 U	E	2	1	F	32	2	128	S	no	T8 U	E	2	1	F	32	2	128	S	64		
35	NPD	GF	-	Processing Rm	T8 4'	E	4	2	F	32	24	6144	S	no	T8 4'	E	4	2	F	32	24	6144	S	256	1,536	
36	NPD	GF	-	Squad Rm	T8 4'	E	3	4	F	32	24	9216	S	no	T8 4'	E	3	4	F	32	24	9216	S	384	2,304	
37	NBH	ext	-	Vestibule	CFL	E	13	1	CFL	26	12	4056	Timer	N/A	CFL	-	13	1	CFL	26	12	4056	Timer	338		
38	NBH	ext	-	Vestibule	T12 3'	M	2	2	F	68	12	3264	S	N/A	T8 4'	M	2	4	F	32	12	2448	S	256		
39	NBH	ext	-	Rear	Metal Halide	E	1	1	MH	70	12	840	Timer	N/A	Metal Halide	-	1	1	MH	70	12	840	Timer	70		
40	NBH	ext	-	Parking Post Light	Metal Halide	E	2	1	MH	70	12	1680	Timer	N/A	Metal Halide	-	2	1	MH	70	12	1680	Timer	140		
41	NBH	ext	-	Wall Sconce	Incand	none	1	1	I	60	12	720	Timer	N/A	CFL	-	1	1	CFL	15	12	180	Timer	15		
					TOTALS exterior							10,560										9,204				
					TOTALS interior							111,328											109,323		11,902	9,064
					annual consumption (kWh)							31,798											28,524			includes occupancy sensors
					estimated cost (\$/year)							\$5,406											\$4,849			OS
					Netcong Borough Hall total light power (Watt)							12,218											11,902			
					Netcong Borough Hall light power density (Watt/sq ft)							1.91											1.86			
					Proposed Annual Savings (kWh)							3,273														
					Proposed Annual Cost Savings (\$)							\$556														
					Proposed Investment (\$)							\$2,710														
					surface area (sq ft)							6,384											6,384			

Legend: NBH - Netcong Borough Hall, M - Magnetic, E - Electronic, F - fluorescent, incand - incandescent, CFL - compact fluorescent lamp, HPS - high pressure sodium, MH - Metal Halide, S - on/off Switch, Hal - Halogen, NPD - Netcong Police Department, GF - Ground Floor, ext - exterior, I - incandescent, OS - Occupancy motion sensor Switch,

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		
<p>Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095 (800) 437-7872 www.hess.com</p>	<p>BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974 (800) 247-2644 www.boc.com</p>	<p>Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728 (800) 556-8457 www.commerceenergy.com</p>
<p>Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446 (888) 635-0827 www.newenergy.com</p>	<p>Direct Energy Services, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830 (866) 547-2722 www.directenergy.com</p>	<p>FirstEnergy Solutions Corp. 300 Madison Avenue Morristown, NJ 07962 (800) 977-0500 www.fes.com</p>
<p>Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640 (877) 569-2841 www.glacialenergy.com</p>	<p>Integrus Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830 (877) 763-9977 www.integrusenergy.com</p>	<p>Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960 (888) 925-9115, www.sel.com</p>
<p>Liberty Power Holdings, LLC Park 80 West, Plaza II, Suite 200 Saddle Brook, NJ 07663 (866) 769-3799 www.libertypowercorp.com</p>	<p>Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833 (800) ENERGY-9 (363-7499) www.pepco-services.com</p>	<p>PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002 (800) 281-2000 www.pplenergyplus.com</p>
<p>Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8th Floor Woodbridge, NJ 07095 (877) 273-6772 www.semprasolutions.com</p>	<p>South Jersey Energy Company One South Jersey Plaza Route 54 Folsom, NJ 08037 (800) 800-756-3749 www.southjerseyenergy.com</p>	<p>Suez Energy Resources NA, Inc. 333 Thornall Street 6th Floor Edison, NJ 08837 (888) 644-1014 www.suezenergyresources.com</p>
<p>UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057 (856) 273-9995 www.ugienergyservices.com</p>	<p>American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009 (800) 437-7872 www.hess.com</p>	<p>ConEdison Solutions Cherry Tree, Corporate Center 535 State Highway 38 Cherry Hill, NJ 08002 (888) 665-0955 www.conedsolutions.com</p>
<p>Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450 212-538-3124 www.creditsuisse.com</p>	<p>Sprague Energy Corp. 12 Ridge Road Chatham Township NJ 07928 (800) 225-1560 www.spragueenergy.com</p>	

NJ NATURAL GAS CO. NATURAL GAS SERVICE TERRITORY

Last Updated: 06/15/09

<p>Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109 800-6-BUYGAS (6-289427) www.cooperativenet.com</p>	<p>Direct Energy Services, LLP 120 Wood Avenue, Suite 611 Iselin, NJ 08830 866-547-2722 www.directenergy.com</p>	<p>Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701 800-805-8586 www.gesc.com</p>
<p>UGI Energy Services, Inc. d/b/a/ GASMARK 704 East Main Street, Suite 1 Moorestown, NJ 08057 856-273-9995 www.ugienergyservices.com</p>	<p>Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095 800-437-7872 www.hess.com</p>	<p>Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024 800-724-1880 www.intelligentenergy.org</p>
<p>Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724 877-750-7046 www.metromediaenergy.com</p>	<p>MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837 800-375-1277 www.mxenergy.com</p>	<p>NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050 800-840-4GAS www.natgasco.com</p>
<p>NJ Gas & Electric 1 Bridge Plaza, Fl. 2 Fort Lee, NJ 07024 866-568-0290 www.NewJerseyGasElectric.com</p>	<p>Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833 800-363-7499 www.pepco-services.com</p>	<p>PPL EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002 800-281-2000 www.pplenergyplus.com</p>
<p>South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037 800-756-3749 www.sjindustries.com/sje.htm</p>	<p>Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928 800-225-1560 www.spragueenergy.com</p>	<p>Woodruff Energy 73 Water Street Bridgeton, NJ 08302 800-557-1121 www.woodruffenergy.com</p>