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

For

***Mount Olive Senior Center
Budd Lake, NJ 07828***

Project Number: LGEA27



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INTRODUCTION

On September 22nd and October 19th Steven Winter Associates, Inc. (SWA) performed an energy audit and assessment for the Township of Mount Olive municipal buildings. The audit included a review of the:

- Mount Olive Township Municipal Building
- Mount Olive Township Public Library
- Mount Olive Township Senior Citizen Center
- Mount Olive Township Garage

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

This report addresses the Mount Olive Senior Center located at 204 Flanders-Drakestown Road, Budd Lake, NJ 07828. The current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The single-story Mt. Olive Senior Center was built in 2000, without any major renovations or additions since then. The building consists of 6,000 square feet of conditioned space and houses a large meeting room in the center, a card room, a craft room and an office on one side with bathrooms, a kitchen and a mechanical room on the other side. The Mt. Olive Senior Center is open Monday through Friday, 8am to 5pm, 2 nights/week 6:30-8:00pm, 2 nights / month to 9pm and also has events on weekends. Occupancy is between 100 seniors on weekdays up to 200 people for special events.

The goal of this Local Government Energy Audit (LGEA) is to provide sufficient information to the Township of Mount Olive to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the Mt. Olive Senior Center. SWA was informed that the Township of Mount Olive has been certified under the Sustainable Jersey program as one of 34 communities state wide to achieve the status.

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

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Mt. Olive Senior Center located at 204 Flanders-Drakestown Road, Budd Lake, NJ 07828. The Mt. Olive Senior Center is a single-story building with a floor area of 6,000 square feet. The original structure was built in 2000, without any major renovations or additions since then.

Based on the field visits performed by the SWA staff on September 22nd and October 19th 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 September 2008 and August 2009 the Mt. Olive Senior Center consumed 54,840 kWh or \$10,541 worth of electricity at an approximate rate of \$0.192/kWh and 5,009 therms or \$7,697 worth of natural gas at an approximate rate of \$1.537/therm. The joint energy consumption for the building, including both electricity and natural gas, was 688 MMBtu of energy that cost a total of \$18,238.

SWA has entered energy information about the Mt. Olive Senior Center building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. This social / meeting facility is comprised of non-eligible (Other) space type. SWA encourages the Township of Mount Olive 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 116 kBtu/ft²/yr compared to the national average of social/meeting buildings consuming 52 kBtu/ft²/yr. Implementing this report's recommendations will reduce use by approximately 66.8 kBtu/ft²/yr, which when implemented would make the building energy consumption better than the national average. There may be energy procurement opportunities for the Mt. Olive Senior Center to reduce annual utility costs, which are \$2,238 higher, when compared to the average estimated NJ commercial utility rates.

Based on the assessment of the Mt. Olive Senior Center, 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

- Select NEMA Premium motors when replacing motors at the end of their useful operating lives

Category II Recommendations: Operations and Maintenance

- Thoroughly and evenly insulate space (with batt insulation) above the ceiling tiles
- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly
- Maintain downspouts - Repair / install missing downspouts as needed
- Provide weather stripping / air sealing
- Repair / seal wall cracks and penetrations
- Provide water efficient fixtures and controls
- Use Energy Star labeled appliances
- Use smart power electric strips
- Create an energy educational program

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

At this time, SWA highly recommends a total of **5** Energy Conservation Measures (ECMs) for the Mt. Olive Senior Center that are summarized in the following Table 1. The total investment cost for these ECMs with incentives is **\$19,982**. SWA estimates a first year savings of **\$7,781** with a simple payback of **2.6 years**. SWA estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the Mt. Olive Senior Center by **35,909 lbs of CO₂**, which is equivalent to removing approximately 3 cars from the roads each year or avoiding the need of 87 trees to absorb the annual CO₂ generated. SWA also recommends **3** ECMs with a total first year savings of **\$28,527** that is summarized in Table 2.

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

Renewable ECMs require application approval and negotiations with the utility and proof of performance. There is also a utility-sponsored loan program through JCP&L that would allow the building to pay for the installation of the PV 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	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
1.1	replace (24) incandescent lamps with CFLs	RS Means, Lit Search, NJ Clean Energy Program	600	none at this time	600	2,472	1.7	0	0.2	53	527	5	2,373	1.1	339	68	84	1,814	3,387
1.2	install (2) occupancy sensors	RS Means, Lit Search, NJ Clean Energy Program	440	50	390	833	0.6	0	0.1	18	177	12	1,919	2.2	446	37	45	1,376	1,141
2	install 2 programmable thermostats with temper-proof covers to control baseboard electric heaters, tie into BMS	similar projects	2,300	none at this time	2,300	435	0.3	0	0.2	910	994	12	1,002	2.3	418	35	43	7,590	596
3	retro commissioning	similar projects	7,500	none at this time	7,500	2,316	1.6	501	9.7	1,820	3,035	12	14,575	2.5	386	32	40	22,706	9,033
4	install 7.5 kW Wind rooftop system (with \$3.20/kWh upfront INCENTIVE)	similar projects	60,000	50,808	9,192	15,878	7.5	0	9.0	0	3,048	25	76,212	3.0	729	29	33	43,892	21,752
	TOTALS		70,840	50,858	19,982	21,934	11.6	501	19.2	2,800	7,781	-	96,081	2.6	-	-	-	77,377	35,909

Assumptions: Discount Rate: 3% per DOE FEMP; Energy Price Escalation Rate: 0% per DOE FEMP Guidelines

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

Table 2 - Recommended 5-10 Year Payback ECMs

ECM #	ECM description	Source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
5	install CO2 based demand controlled ventilation	similar projects	8,000	none at this time	8,000	2,413	1.6	496	9.6	0	1,225	12	14,705	6.5	84	7	11	4,198	9,108
6	install 30 kW PV rooftop system (with \$1/W INCENTIVE and \$600/1MWh SREC)	similar projects	225,000	30,000	195,000	34,033	30.0	0	19.4	0	26,934	25	163,356	7.2	141	6	12	162,316	46,625
1.3	replace (7) old style Metal Halide lamps with pulse start Metal Halide lamps	RS Means, Lit Search, NJ Clean Energy Program	3,360	175	3,185	1,130	0.8	0	0.1	150	367	15	3,254	8.7	73	5	8	1,196	1,548
	TOTALS		236,360	30,175	206,185	37,575	32.4	496	29.1	150	28,527	-	181,316	7.2	-	-	-	167,710	57,280

1. HISTORIC ENERGY CONSUMPTION

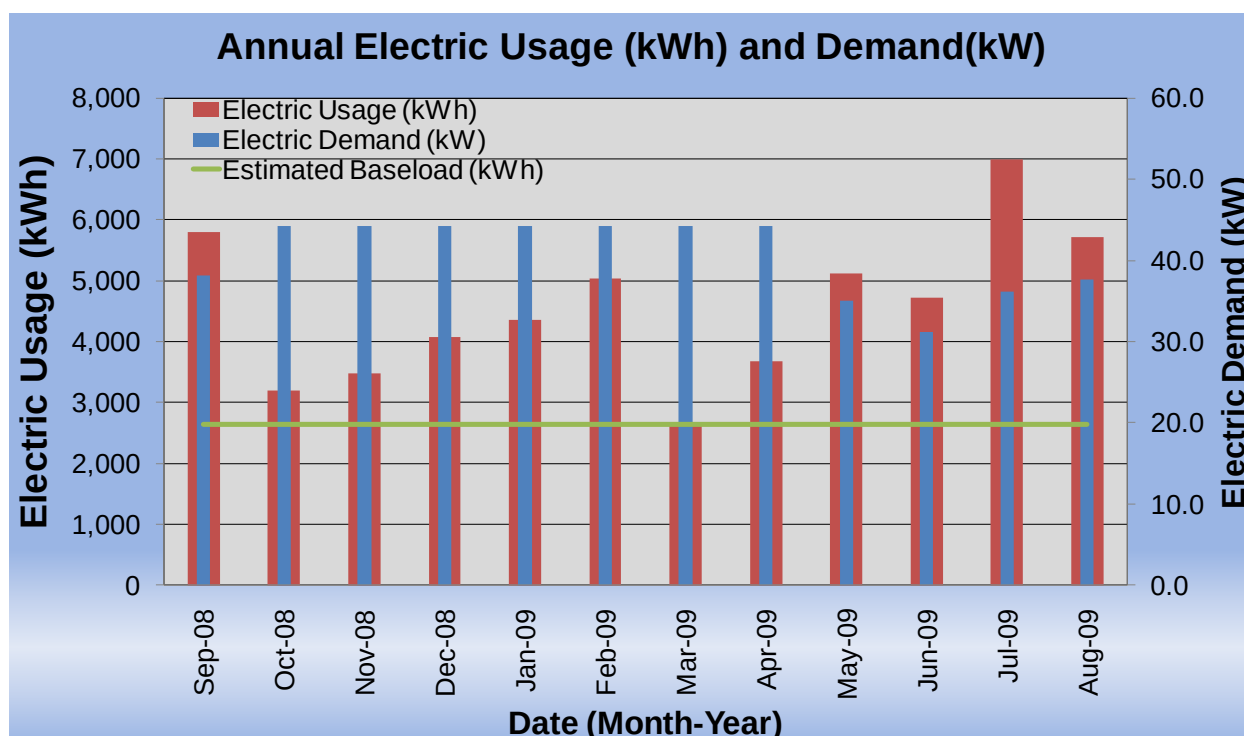
1.1. Energy usage and cost analysis

SWA analyzed utility bills from October 2007 through August 2009 that were received from the utility companies supplying the Mount Olive Senior Center with electric and natural gas.

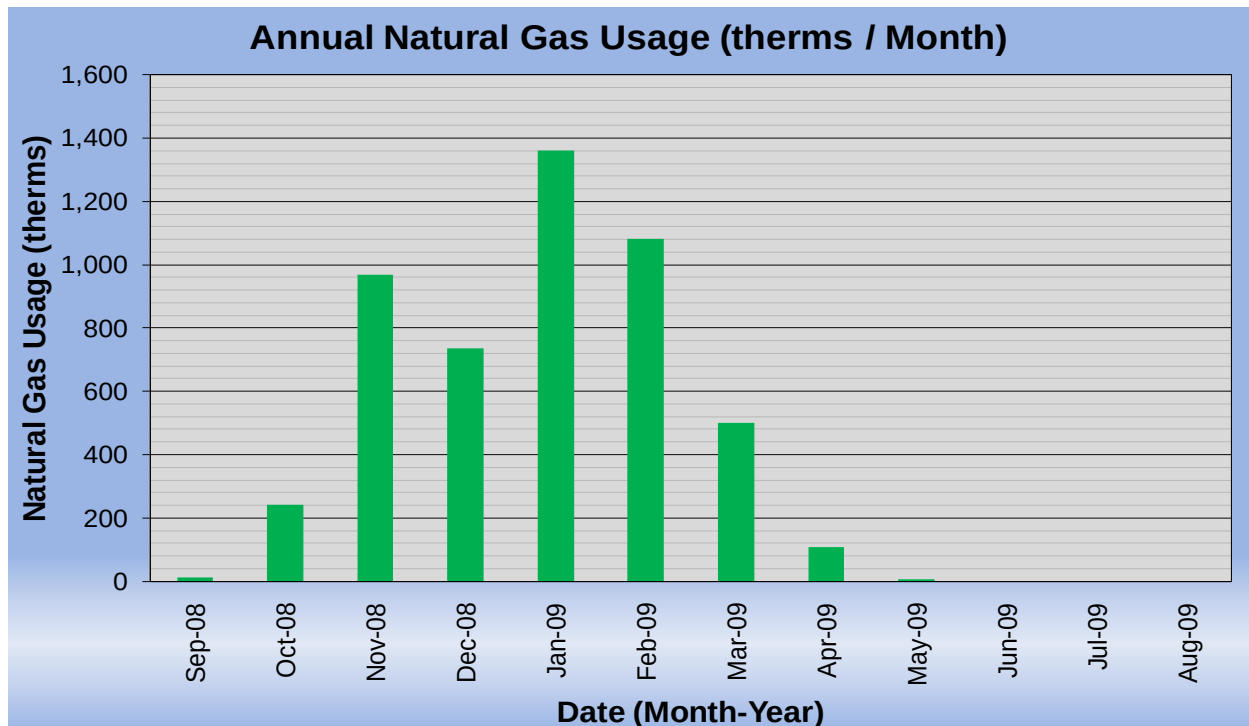
Electricity - The Mount Olive Senior Center is currently served by one electric meter. The Mt. Olive Senior Center currently buys electricity from JCP&L at **an average rate of \$0.192/kWh** based on 12 months of utility bills from September 2008 and August 2009. The Mt. Olive Senior Center purchased **approximately 54,840 kWh or \$10,541 worth of electricity** in the previous year. The average monthly demand was 41 kW.

Natural gas - The Mount Olive Senior Center is currently served by one meter for natural gas. The Mount Olive Senior Center currently buys natural gas from Elizabethtown Gas Co. at **an average aggregated rate of \$1.537/therm** based on 12 months of utility bills for September 2008 and August 2009. The Mount Olive Senior Center purchased **approximately 5,009 therms or \$7,697 worth of natural gas** in the previous year.

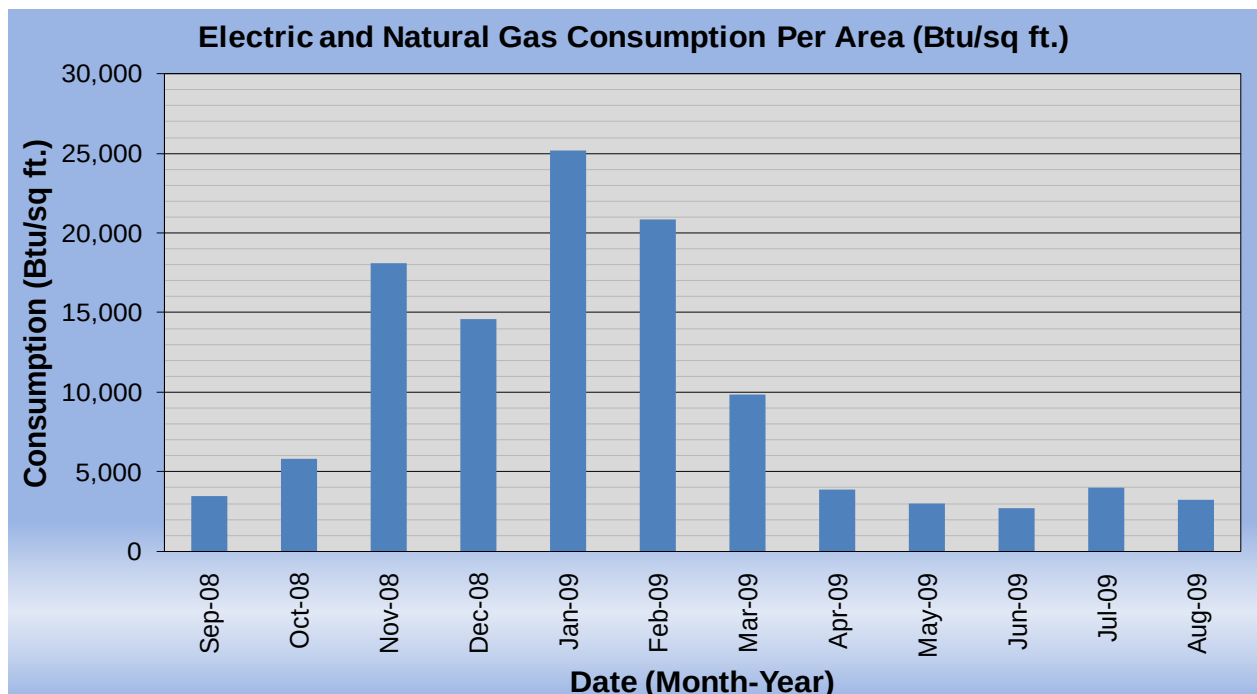
The following chart shows electricity use for the Mt. Olive Senior Center based on utility bills for the 12 month period of September 2008 and August 2009.



The following chart shows the natural gas consumption for the Mt. Olive Senior Center based on natural gas bills for the 12 month period of September 2008 and August 2009.

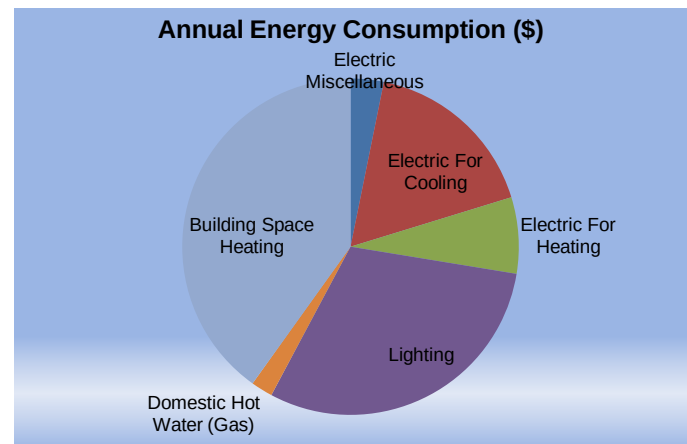
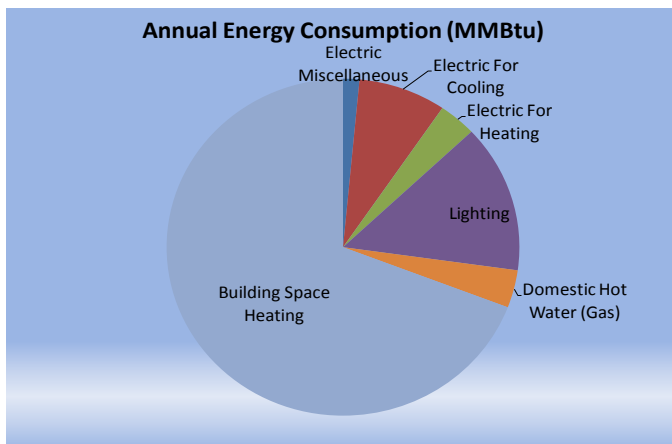


The following chart shows combined natural gas and electric consumption in Btu/sq ft for the Mt. Olive Senior Center based on utility bills for the 12 month period of September 2008 and August 2009.



The following table and chart pies show energy use for the Mt. Olive Senior Center based on utility bills for the 12 month period of September 2008 and August 2009. Note electrical cost at \$56/MMBtu of energy is more than 3.5 times as expensive to use as natural gas at \$15/MMBtu.

2009 Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	\$	% \$	\$/MMBtu
Electric Miscellaneous	10	1%	\$579	3%	56
Electric For Cooling	55	8%	\$3,114	17%	56
Electric For Heating	24	3%	\$1,338	7%	56
Lighting	98	14%	\$5,510	30%	56
Domestic Hot Water (Gas)	25	4%	\$382	2%	15
Building Space Heating	476	69%	\$7,316	40%	15
Totals	688	100%	\$18,238	100%	27
Total Electric Usage	187	27%	\$10,541	58%	56
Total Gas Usage	501	73%	\$7,697	42%	15
Totals	688	100%	\$18,238	100%	27



1.2. Utility rate

The Mt. Olive Senior Center currently purchases electricity from JCP&L at a general service market rate for electricity use (kWh) with a separate (kW) demand charge. The Mt. Olive Senior Center currently pays an average rate of approximately \$0.192/kWh based on the 12 months of utility bills of September 2008 and August 2009.

The Mt. Olive Municipal main building currently purchases natural gas supply from the Elizabethtown Gas Co. at a general service market rate for natural gas (therms). Elizabethtown Gas Co. also acts as the transport company. There is one gas meter that provides natural gas service to the Mt. Olive Senior Center currently. The average aggregated rate (supply and transport) for the meter is approximately \$1.537/therm based on 12 months of utility bills for September 2008 and 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 Mt. Olive Senior Center building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. This social / meeting facility is comprised of non-eligible (Other) space type. Social / Meeting 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 Mt. Olive Senior Center building is not eligible to receive a national energy performance rating at this time.

The Site Energy Use Intensity is 116 kBtu/sq ft yr compared to the national average of a township offices / police station building consuming 52 kBtu/sq ft yr. Implementing this report's highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 19.2 kBtu/sqft yr, with an additional 29.1 kBtu/sq ft yr from the recommended ECMs and 18.5 kBtu/sq ft yr from improved ceiling insulation and sealing upgrades. These recommendations could account for at least 66.8 kBtu/sq ft yr reduction, which when implemented would make the building energy consumption better than the national average.

Per the LGEA program requirements, SWA has assisted the Township of Mount Olive to create an *Energy Star Portfolio Manager* account and share the Mt. Olive Senior Center 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 Mount Olive (user name of "mtolivetwp" with a password of "mtolivetwp") and TRC Energy Services (user name of TRC-LGEA).



STATEMENT OF ENERGY PERFORMANCE

Township of Mount Olive - Senior Center

Building ID: 1924927

For 12-month Period Ending: August 31, 2009¹

Date SEP becomes ineligible: N/A

Date SEP Generated: November 23, 2009

Facility

Township of Mount Olive - Senior Center
204 Flanders-Drakestown Road
Budd Lake, NJ 07828

Facility Owner

N/A

Primary Contact for this Facility

N/A

Year Built: 2000**Gross Floor Area (ft²):** 6,000**Energy Performance Rating² (1-100):** N/A**Site Energy Use Summary³**

Electricity - Grid Purchase (kBtu)	187,114
Natural Gas (kBtu) ⁴	500,900
Total Energy (kBtu)	688,014

Energy Intensity⁵

Site (kBtu/ft ² /yr)	116
Source (kBtu/ft ² /yr)	192

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	55
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Electric Distribution Utility

Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	52
National Average Source EUI	102
% Difference from National Average Source EUI	88%
Building Type	Social/Meeting

Stamp of Certifying Professional

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

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 approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on: Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, PE facility inspection, and entering the SEP) and we welcome suggestions for reducing this time or effort. Send comments (including OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2622T), 1200 Pennsylvania Ave., NW, Washington, DC 20460.

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The single-story Mt. Olive Senior Center was built in 2000, without any major renovations or additions since then. The single-story Mt. Olive Senior Center was built in 2000, without any major renovations or additions since then. The building consists of 6,000 square feet of conditioned space and houses a large meeting room in the center, a card room, a craft room and an office on one side with bathrooms, a kitchen and a mechanical room on the other side.

2.2. Building occupancy profiles

Occupancy for the entire Mt. Olive Senior Center is approximately 100 to 130 Seniors during weekdays from 8am to 5pm and up to 200 people during special events and some weekends. There are also evening events from 6:30pm to 8pm twice a week and occasionally events on weekends approximately twice per month. The building is staffed with 4 to 5 nutrition employees three days a week and one employee for the rest of the week to coordinate the Senior Center activities.

2.3. Building envelope

2.3.1.Exterior Walls

The exterior envelope wall of the building consists of split block veneer wall on a metal stud frame with gypsum wall board interior finish. Insulation installed, where visible, was consistent with information on the available drawings, namely 5.5” fiberglass batt in the stud cavities.

The exterior walls were inspected and found to be in overall good condition with only a few areas of cracked caulk in the expansion joints.



Cracked caulk in expansion joints

SWA recommends fixing all faulty or missing caulk to prevent costly future repairs and energy losses.

2.3.2.Roof

The sloped roof has a dark colored asphalt shingle type finish. The condition of the 9 year old roof was visually inspected from the exterior and found to be age appropriate. There weren't any leaks

reported or detected during the field audit. Insulation was visible and found to be R-38 installed under the sheathing with vent baffles in between. Infrared pictures did not reveal any major energy leaks or insulation deficiencies however the insulation in some places above the ceiling tiles was not packed down tight, which could allow conditioned air to escape to the outside. At two locations damaged or disconnected downspouts were found. In the front of the building insect nesting and possible sub-veneer moisture issues were detected when further investigated with the help of infrared technology.



Dislocated downspouts and insect nesting with possible water or moisture damage detected

2.3.3.Base

The building's base is a 4" concrete slab-on grade with a perimeter foundation. There was not any moisture or water related issue reported or detected.

2.3.4.Windows

Windows were found to be low-e type double glazed mostly fixed aluminum frame units in good condition.

2.3.5.Exterior doors

The aluminum exterior doors were inspected and observed to be in overall good condition except for some weather-stripping that started to show wear and tear at the time of the inspection.



Doors not closing completely and missing weather stripping

SWA recommends replacing worn weather-stripping 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. Tight seals around doors will help ensure the building to be is kept continuously insulated.

2.3.6. Building air tightness

In addition to the above mentioned recommendations SWA suggests air sealing, caulking and / or insulating around all plumbing, electrical, HVAC and structural envelope penetrations. This should include bottom and top plates, recessed light fixtures, electrical boxes and windows.

The air tightness of buildings helps to maximize other implemented energy measures and investments and minimizes long term maintenance and repair cost.

2.4. HVAC Systems

The Mount Olive Senior Center heating is provided by under floor radiant heat and supplemented by electric baseboard radiators on the perimeter, under windows. Cooling is provided by two centrally located air handling units with associated condensing units outside.

2.4.1. Heating

Heating to the building is provided by a network of hot water piping below the floor which uses radiant heat to warm the space. The hot water is produced by a Slant / Fin Corp natural gas boiler with Bell & Gossett circuit setters for balancing. The boiler flue is equipped with an automatic flue gas control damper valve to avoid back draft to the burner. There are also supplemental electrical baseboard heaters along the perimeter of the building to offset infiltration through windows.

There is a heating / cooling / ventilation schedule controlled by a Building Management System (BMS) with 7 manual thermostats that allow 3-4 deg limited control of the radiant floor heating made up of 10 circuits. Separately, there are two manual thermostats to control electric baseboard heating and independent of the BMS.



Slant / Fin Corp natural gas boiler

2.4.2. Cooling

The Mt. Olive Senior Center is provided with cooling via the air handlers DX coils and condensing units located on the perimeter at the back of the building, which have dual compressors and two independent circuits totaling 30 Tons of refrigeration.

A typical arrangement draws fresh air via a plenum equipped with a bird screen and brings it into a mixing box where it is combined with return air. A small portion of the return air is purged and vented outside via an exhaust fan prior to entering the mixing box. The mixed air inside the air handler is filtered before passing through a DX coil (which cools air during the summer months). The air handler blower then pushes the filtered, conditioned air to the distribution system. The air is then distributed via VAV boxes and diffusers into the building spaces.

Each air handler (located above the ceiling and difficult to access for maintenance) has its associated distribution ductwork, which leads to variable air volume (VAV) dampers. The VAV boxes regulate the amount of flow through each segment of ductwork based on individual air temperature sensors in each zone. The BMS system and thermostats control each of the air handling units. Despite these control measures the seniors often feel cold. This may be due to thermostat location or thermostat settings. Many a time, during the heating season, the yoga and exercise classes start just after the seniors leave in the afternoon and there is need to open the doors to cool the large center room.

The air handlers and outdoor condensers, installed in 2000, have an estimated 40% useful operating life remaining.



Two condensers for building DX cooling located outside the building

2.4.3. Ventilation

The various spaces of the building are ventilated by the air handler units that serve the respective spaces as described in the “Cooling” sections above. Bathrooms and kitchen also have exhaust fans

that purge air to the outside via plenums with bird screen covers. In general, the building exhaust fans have 60% estimated useful operating life remaining.

2.4.4.Domestic Hot Water

The domestic hot water (DHW) for the Mt. Olive Senior Center is provided by a Bradford White natural gas heater with 50 gal storage and 40,000 Btu/hr input. This heater has 30% estimated useful operating life left and appears in good condition. Considerations should be given to replacing it with a high efficiency condensing type heater when it has reached the end of its operating life in a couple of years.



Domestic Hot Water heater

2.5. Electrical systems

2.5.1.Lighting

Interior Lighting - The Mt. Olive Senior Center currently consists of T8 fluorescent fixtures with electronic ballasts and screw-in incandescent lights. Based on measurements of lighting levels for each space, there are not any vastly over-illuminated areas. SWA recommends installing occupancy sensors in closets, offices and areas that are occupied only part of the day and payback on savings are justified. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion is detected within a set time period. Advance micro-phonic lighting sensors include sound detection as a mean to control lighting operation. SWA also highly recommends replacing screw-in incandescent bulbs with screw-in compact fluorescent bulbs. Compact fluorescents produce the same lumen output with less wattage than incandescent bulbs and last up to 5 times longer. See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

Exit Lights - Exit signs were found to be efficient LED type.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of Metal Halide lamp fixtures. Exterior lighting is controlled by photocells. SWA recommends replacing the Metal Halide lamps with pulse start Metal Halide lamps. Pulse-start metal halide (MH) lamps offer the advantages of standard (probe-start) MH lamps, but minimize the disadvantages. They

produce higher light output both initially and over time, operate more efficiently, produce whiter light, and turn on and re-strike faster. Due to these characteristics, energy savings can be realized via one-to-one substitution of lower-wattage systems, or by taking advantage of higher light output and reducing the number of fixtures required in the space. SWA is not recommending at this time any upgrades to the exterior 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. Building management should select Energy Star label appliances and equipment when replacing: refrigerators, printers, computers, copy machines, etc. More information can be found in the “Products” section of the Energy Star website at: <http://www.energystar.gov>. Also, energy vending miser devices are now available for conserving energy usage by Drinks and Snacks vending machines. When equipped with the vending miser devices, vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines.

Computers left on in the building consume a lot of energy. A typical desk top computer uses 65 to 250 watts and uses the same amount of energy when the screen saver is left on. Televisions (DVDs, stereos, computers, and kitchen appliances which now have internal memories or clocks which always require a trickle of power) 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 Mount Olive Senior Center computers are generally NOT programmed for the power save mode, to shut down after a period of time that they have not been used.

2.5.3.Elevators

The Mount Olive Senior Center is a single-story building without elevators.

2.5.4.Others electrical systems

There are not currently any other significant energy impacting electrical systems installed at the Mt. Olive Senior Center.

3. EQUIPMENT LIST

Inventory

Building System	Description	Location	Model #	Fuel	Space Served	Equip Age	Estimated Remaining Useful Life %
Heating	hot water boiler for floor radiant heat - 10 circuits with B&G circuit setter balance valves, 210,000 Btu/hr input, water heating capacity of 152,000 Btu/hr	mechanical room	Slant / Fin Corp SX-210 DP	Natural Gas	Senior Citizen Center	2000	60%
Cooling	AC1 and AC2 air handlers, blower coils with 3 Hp blowers capable of 6,000 cfm each	above ceiling	York	Electric	Senior Citizen Center	2000	40%
Cooling	2 outside condensing units in back of building - 15 Tons each	back of building	York H3CE18046A (R-22)	Electric	Senior Citizen Center	2000	40%
Heating / Cooling	controls: 2 programmable thermostats for AC, 2 manual thermostats for electric radiant heat, 7 manual thermostats for radiant floor heat	main control in mech room, other thermostats in various rooms	N/A	N/A	Senior Citizen Center	2000	40%
Ventilation	EF1 and EF2 exhaust fans, 3,000 cfm, 3/4 Hp motor	above ceiling	L Cook 180SQ1-B	Electric	Senior Citizen Center	2000	60%
Domestic Hot Water	50 gal, 40,000 Btu/hr input	mechanical room	Bradford White MI5036E10	Natural Gas	Senior Citizen Center	2000	30%
Lighting	See details - Appendix A	See details - Appendix A	-	Electric	Senior Citizen Center	2000	40%

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 Mount Olive Senior Center, 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

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

Category II Recommendations: Operations and Maintenance

- Thoroughly and evenly insulate space (with batt insulation) above the ceiling tiles and plug all ceiling penetration. Check air ducting for tight gaskets that prevent conditioned air from escaping / leaking into the attic space.
- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.
- Maintain downspouts - Repair / install missing downspouts as needed to prevent water / moisture infiltration and insulation damage.
- Provide weather stripping / air sealing - 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.
- Repair / seal wall cracks and penetrations - SWA recommends as part of the maintenance program to install weep holes, install proper flashing, and correct masonry efflorescence and seal wall cracks and penetrations wherever necessary in order to keep insulation dry and effective.
- Provide water efficient fixtures and controls - Adding controlled on / off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and / or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures / appliances will save both energy and money through reduced energy consumption for water heating, while also decreasing water / sewer bills.
- Use Energy Star labeled appliances - such as Energy Star refrigerators that should replace older energy inefficient equipment.
- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.

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

Category III Recommendations: Energy Conservation Measures - Summary table

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1.1, 1.2 & 1.3	install occupancy sensors, replace incandescent lamps with CFLs and Metal Halide with pulse start Metal Halide fixtures
2	install programmable thermostats for baseboard electric heat
3	retro-commission mechanical equipment
4	install 7.5 kW Wind rooftop system
	Description of Recommended 5-10 Year Payback ECMs
5	install CO2 based demand control ventilation
6	install 30 kW PV rooftop system

ECM#1: *Building Lighting Upgrades*

Description:

On the days of the site visits, SWA completed a lighting inventory of the Mt. Olive Senior Center (see Appendix A). The existing lighting consists of mostly T8 fluorescent fixtures with electronic ballasts and a few incandescent lamps. SWA recommends installing occupancy sensors in bathrooms, closets, offices and areas that are occupied only part of the day and payback on savings are justified. 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. SWA recommends replacing the exterior Metal Halide lamps with pulse start Metal Halide lamps. Pulse-start metal halide (MH) lamps offer the advantages of standard (probe-start) MH lamps, but minimize the disadvantages. They produce higher light output both initially and over time, operate more efficiently, produce whiter light, and turn on and re-strike faster. Due to these characteristics, energy savings can be realized via one-to-one substitution of lower-wattage systems, or by taking advantage of higher light output and reducing the number of fixtures required in the space. The labor in all these installations was evaluated using prevailing electrical contractor wages. The Township of Mount Olive 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.

Installation cost:

Estimated installed cost: \$4,175

Source of cost estimate: *RS Means; Published and established costs, NJ Clean Energy Program*

Economics (Some of the options considered with incentives):

ECM #	ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
1.1	replace (24) incandescent lamps with CFLs	RS Means, Lit Search, NJ Clean Energy Program	600	none at this time	600	2,472	1.7	0	0.2	53	527	5	2,373	1.1	339	68	84	1,814	3,387
1.2	install (2) occupancy sensors	RS Means, Lit Search, NJ Clean Energy Program	440	50	390	833	0.6	0	0.1	18	177	12	1,919	2.2	446	37	45	1,376	1,141
1.3	replace (7) old style Metal Halide lamps with pulse start Metal Halide lamps	RS Means, Lit Search, NJ Clean Energy Program	3,360	175	3,185	1,130	0.8	0	0.1	150	367	15	3,254	8.7	73	5	8	1,196	1,548
	TOTALS		4,400	225	4,175	4,435	3.0	0	0.3	220	1,072	-	7,547	3.9	-	-	-	4,386	6,076

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA also assumed an aggregated 4 hrs/yr to replace aging burnt out lamps vs. newly installed.

Rebates/financial incentives:

- *NJ Clean Energy - Wall Mounted occupancy sensors (\$25 per control) - Maximum incentive amount is \$50.*
- *NJ Clean Energy - Metal Halide with pulse start (\$25 per fixture) - Maximum incentive amount is \$175.*

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

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

ECM#2: Install Programmable Thermostats for Baseboard Electric Heat

Description:

The Mt Olive Senior Center has 2 perimeter electric baseboard heating zones controlled by individual wall mounted manual thermostats. Temperature controls in these zones are without setback and not tied back to the BMS system. Temperatures are not setback at night or after-hours and additional expensive electric heating is used to keep the zones warm, which would not need to be expanded if controls could be properly operated.

SWA proposes that the Township of Mount Olive replace the existing manual thermostats with a strategically placed, Energy Star, programmable-wall mounted and tamper secure thermostats, tied back to the BMS which will greatly improve the control and heat energy expanded in the building.

Installation cost:

Estimated installed cost: \$2,300

Source of cost estimate: RS Means; Published and established costs and Similar Projects

Economics (without incentives):

ECM #	ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
2	install 2 programmable thermostats with temper-proof covers to control baseboard electric heaters, tie into BMS	similar projects	2,300	none at this time	2,300	435	0.3	0	0.2	910	994	12	1,002	2.3	418	35	43	7,590	596

Assumptions: Since the utility bills have some accounting fluctuations, it is difficult to determine the energy used for heating the Mt. Olive Senior Center. SWA estimated the heating / cooling energy usage from the utility bills. SWA assumed heating savings of 6% for scheduled setbacks and controls based on contribution of 2 of 12 heating zoned sections. Estimated programmable thermostat cost / installation are based on similar projects. SWA also assumed on the average 1/2 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. However, periodically the local utility and the state of NJ have incentives for this measure. Generally there are incentives for the residential sector.*

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#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 Mt. Olive Senior Center have undergone some minor 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: \$7,500

Source of cost estimate: Similar projects

Economics (without incentives):

ECM #	ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
3	retro commissioning	similar projects	7,500	none at this time	7,500	2,316	1.6	501	9.7	1,820	3,035	12	14,575	2.5	386	32	40	22,706	9,033

Assumptions: Since the utility bills have some accounting fluctuations, it is difficult to determine the amount of energy used for heating and cooling the Mt. Olive Senior Center. 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 6,000. 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.

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 7.5 kW Wind system*

Description:

Wind power production may be applicable for the Mount Olive Senior Center location, because of the thermal winds generated in the area. Currently, the Mount Olive Senior Center 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 7.5 kW 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 Mount Olive Senior Center is not eligible for a 30% federal tax credit. The Mount Olive Senior Center 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 7.5kW 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 7.5 kW 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: \$60,000

Source of cost estimate: Similar projects

Economics (with incentives):

ECM #	ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
4	install 7.5 kW Wind rooftop system (with \$3.20/kWh upfront INCENTIVE)	similar projects	60,000	50,808	9,192	15,878	7.5	0	9.0	0	3,048	25	76,212	3.0	729	29	33	43,892	21,752

Assumptions: SWA estimated the cost and savings of the system based on past wind projects. SWA projected physical dimensions based on a 7.5 kW-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>

ECM#5: Carbon Dioxide Based Demand Control Ventilation

Description:

On the day of the site visit, SWA observed that there were not any air flow controls for the Mt. Olive Senior Center based on occupancy. SWA recommends that carbon dioxide sensors be installed (in return air ducts) in the Mt. Olive Senior Center to sense occupancy and improve Indoor Air Quality (IAQ). Signals from these sensors need to be taken back to the HVAC air flow controls and BMS for programming to regulate the amount of cooling and heating for the Municipal Building and vary air flows according to occupancy. Thus, many a time when the Municipal Mt. Olive Senior Center is sparsely occupied, savings will be realized in the heating and cooling of these spaces, by bringing into the spaces the right amount of fresh air (rather than too much unconditioned air). This measure is to optimize the amount of outdoor air entering the building based on occupancy. Typical applications are theaters, meeting rooms and anywhere when occupancy can vary significantly. For predetermined schedules and repeatable occupancy levels, such as offices or classrooms, a timer based control would be sufficient.

Installation cost:

Estimated installed cost: \$8,000

Source of cost estimate: RS Means; Published and established costs; Similar projects

Economics (without incentives):

ECM #	ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
5	install CO2 based demand controlled ventilation	similar projects	8,000	none at this time	8,000	2,413	1.6	496	9.6	0	1,225	12	14,705	6.5	84	7	11	4,198	9,108

Assumptions: SWA assumes thermal savings based on heating and cooling loads calculated using modeling and by conducting the billing analysis. In order to estimate savings for this measure, SWA assumed in the model an occupancy reduction equivalent to a conservative 10% (in

view that the space is used at the full designed capacity less than half of the time during weekdays) of the total heating and cooling used for the Mt. Olive Senior Center based on the described use schedules. This estimate also does not overlap retro-commissioning assumptions.

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#6: *Install 30 kW PV system*

Description:

Currently, the Mt. Olive Senior Center 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 Township of Mount Olive further review installing a 30 kW PV system to offset electrical demand and reduce the annual net electric consumption for the building, and review guaranteed incentives from NJ rebates to justify the investment. The Mt. Olive Senior Center is not eligible for a 30% federal tax credit. Instead, the Township of Mount Olive 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 30 kW PV installation on the building roofs and away from shade. A commercial multi-crystalline 230 Watts panel (37.0 volts, 8.24 amps) has 17.5 square feet of surface area (13. 1 Watts per square foot). A 30 kW system needs approximately 130 panels, which would take up 2,283 square feet. The installation of a renewable Solar Photovoltaic power generating system could also serve as a good educational tool and exhibit for the community.

Installation cost:

Estimated installed cost: \$195,000

Source of cost estimate: Similar projects

Economics (with incentives):

EC M #	ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
6	install 30 kW PV rooftop system (with \$1/W INCENTIVE and \$600/1MWh SREC)	similar projects	225,000	30,000	195,000	34,033	30.0	0	19.4	0	26,934	25	163,356	7.2	141	6	12	162,316	46,625

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 (230 Watts, model #ND-U230C1). PV systems are sized based on Watts and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on \$1.00 / watt Solar PV application for systems 50kW or less. Incentive amount for this application is \$30,000 for the Mt. Olive Senior Center.

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

NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. A total of \$20,400 / year has been incorporated in the above costs for the Township of Mount Olive, however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

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

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

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There aren't currently any existing renewable energy systems.

5.2. Wind

Description:

Plases see the above recommended ECM#4.

5.3. Solar Photovoltaic

Plases see the above recommended ECM#6.

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 several existing split system cooling and insufficient domestic hot water use.

5.6. Geothermal

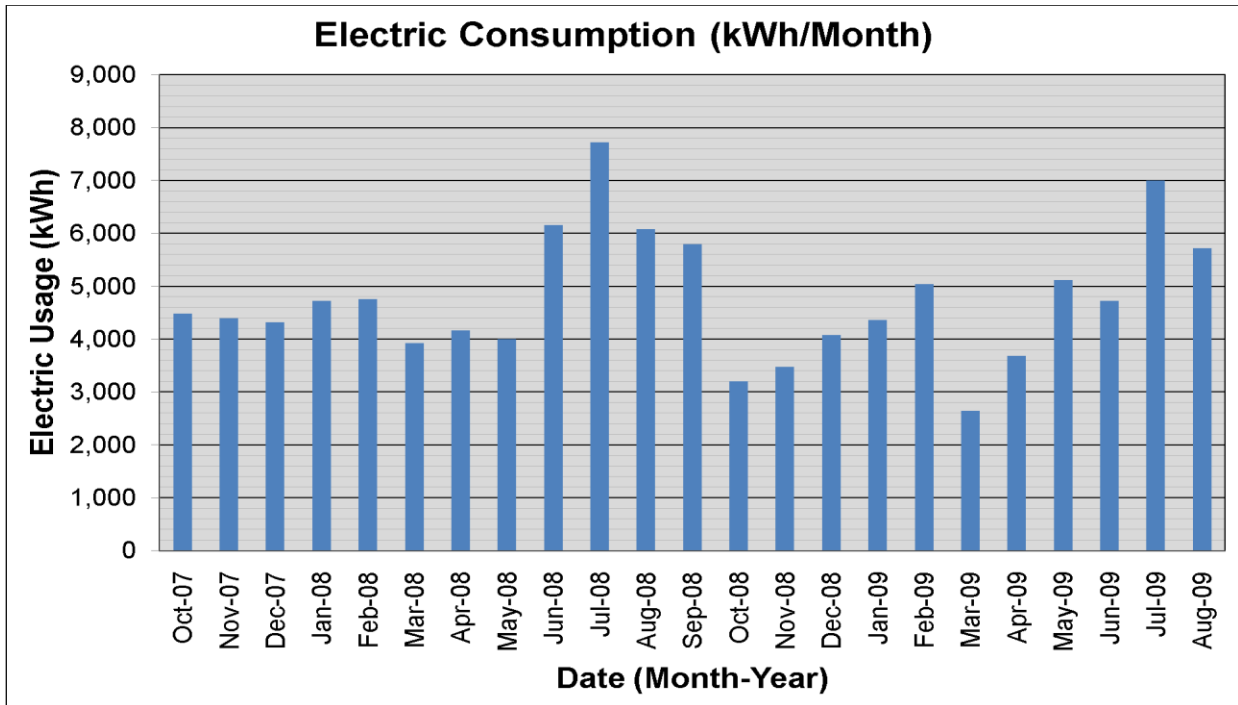
Description:

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

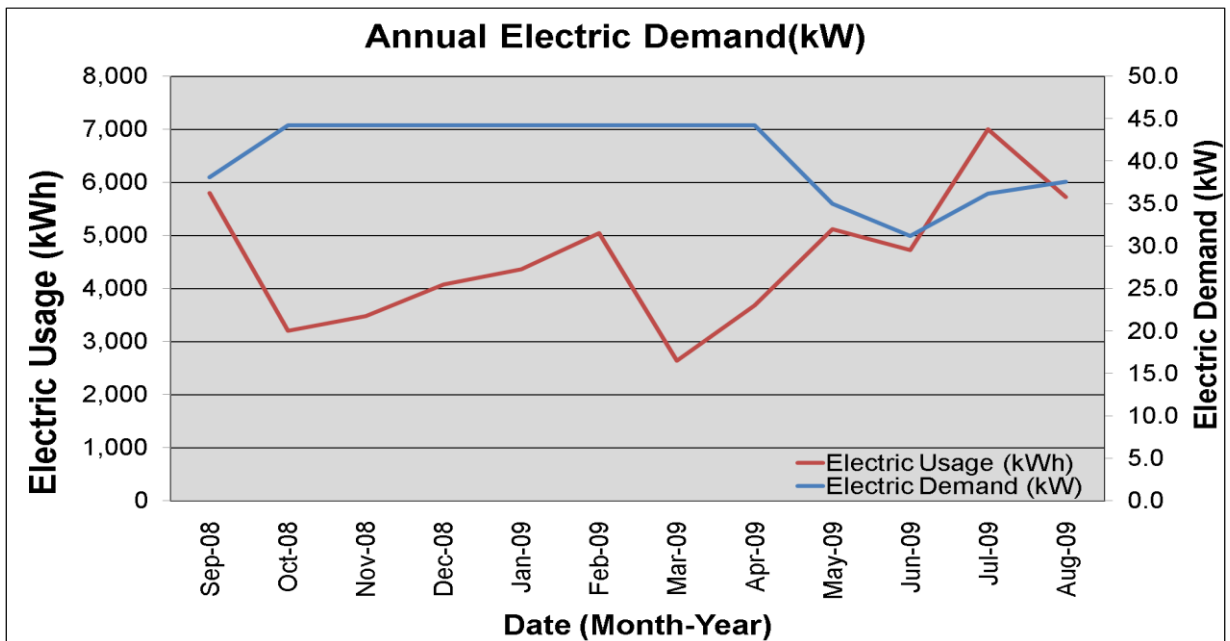
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles

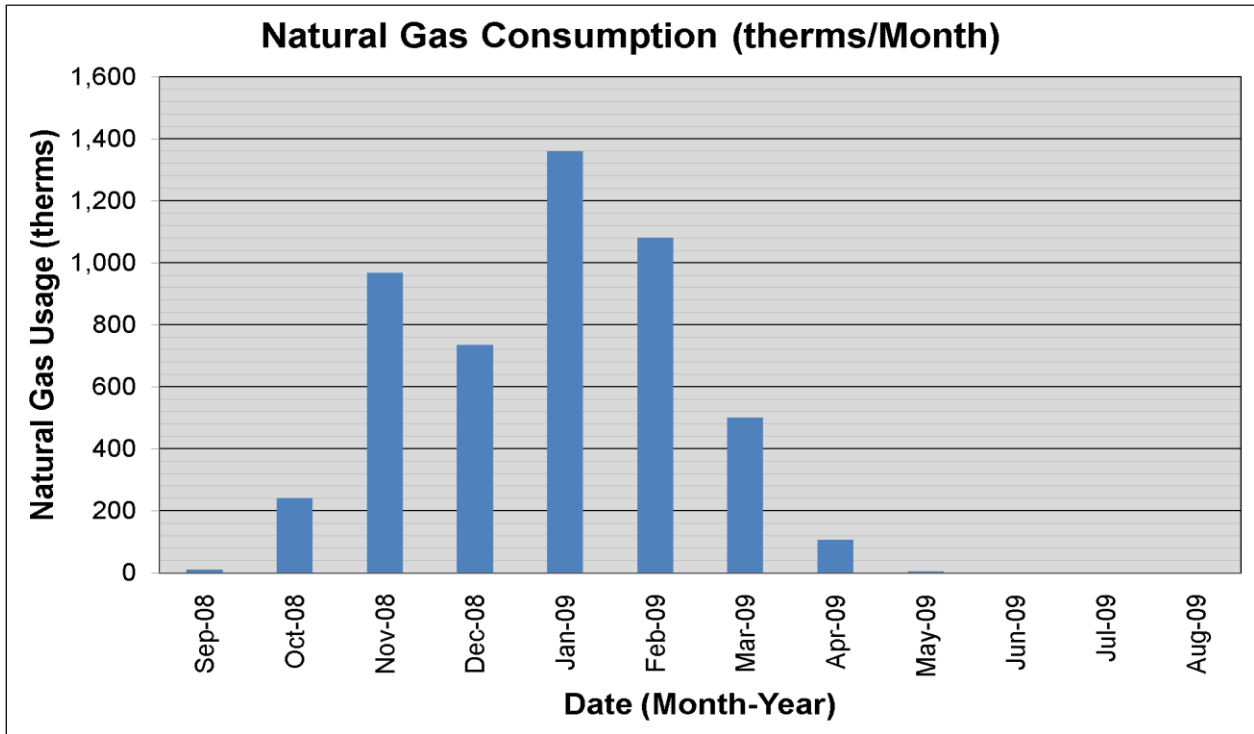
The following are charts that show the annual electric and natural gas load profiles for the Mount Olive Senior Center.



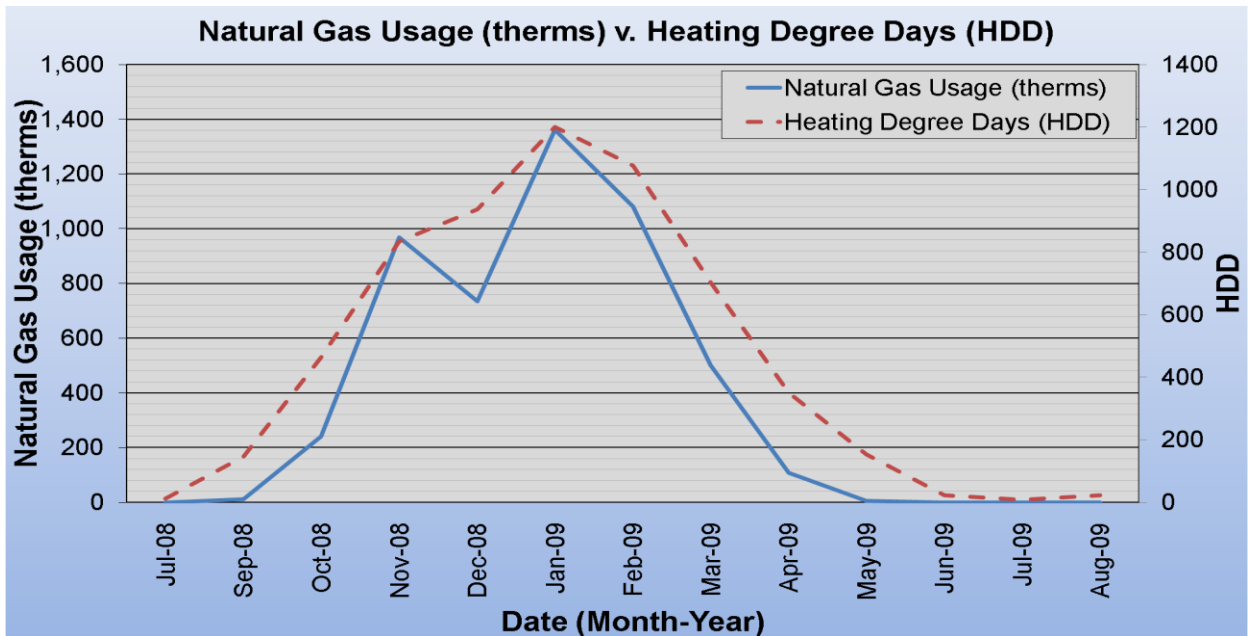
Some minor unusual electric fluctuations shown may be due to adjustments between estimated and actual meter readings. Also, note on the following chart how the electrical Demand is held constant during heating months (perhaps due to the electric baseboard heating) then follows electric consumption during cooling months.



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



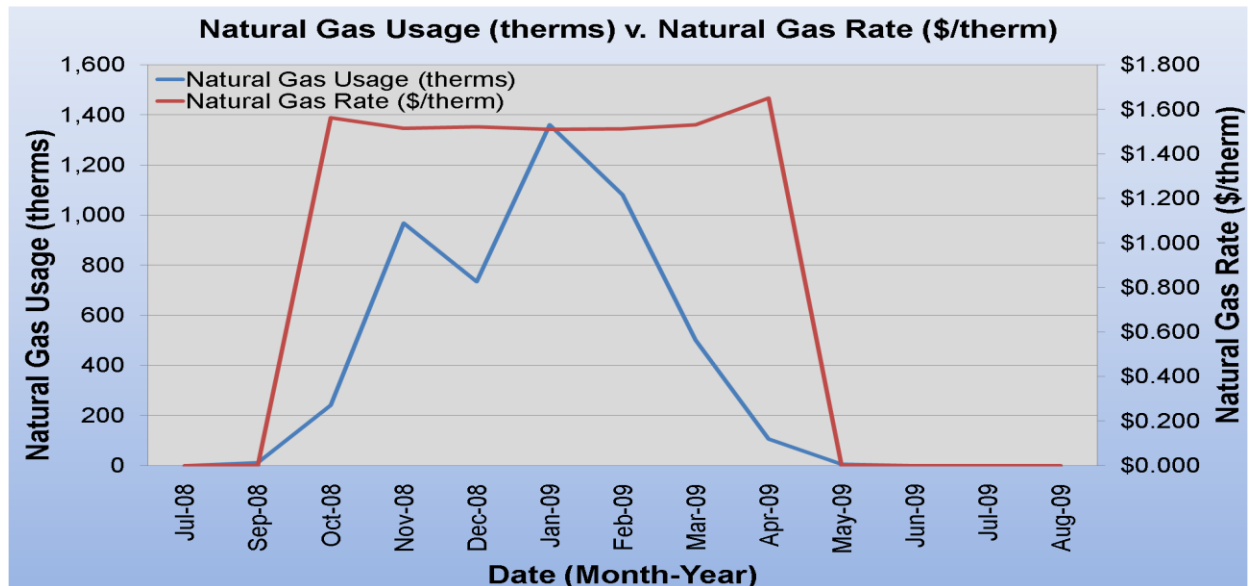
Below is a chart showing how the natural gas consumption follows the “heating degree days” curve. Some utility bills have more than one month estimated and combined.



6.2. Tariff analysis

Currently, natural gas is provided to the Mt. Olive Municipal main building via one gas meter with the Elizabethtown Gas Co. acting as the supply and also the transport company. Gas is provided by the Elizabethtown Gas Co. at a general service rate. The suppliers’ general service rate for natural gas charges

a market-rate price based on use and the Mt. Olive Senior Center 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 hot water boiler units. The high gas price per therm fluctuations in the summer may be due to high energy costs that recently occurred and low use caps for the non-heating months. Thus the building pays for fixed costs such as meter reading charges during the summer months. The following chart shows how the natural gas rate changes with usage and time.

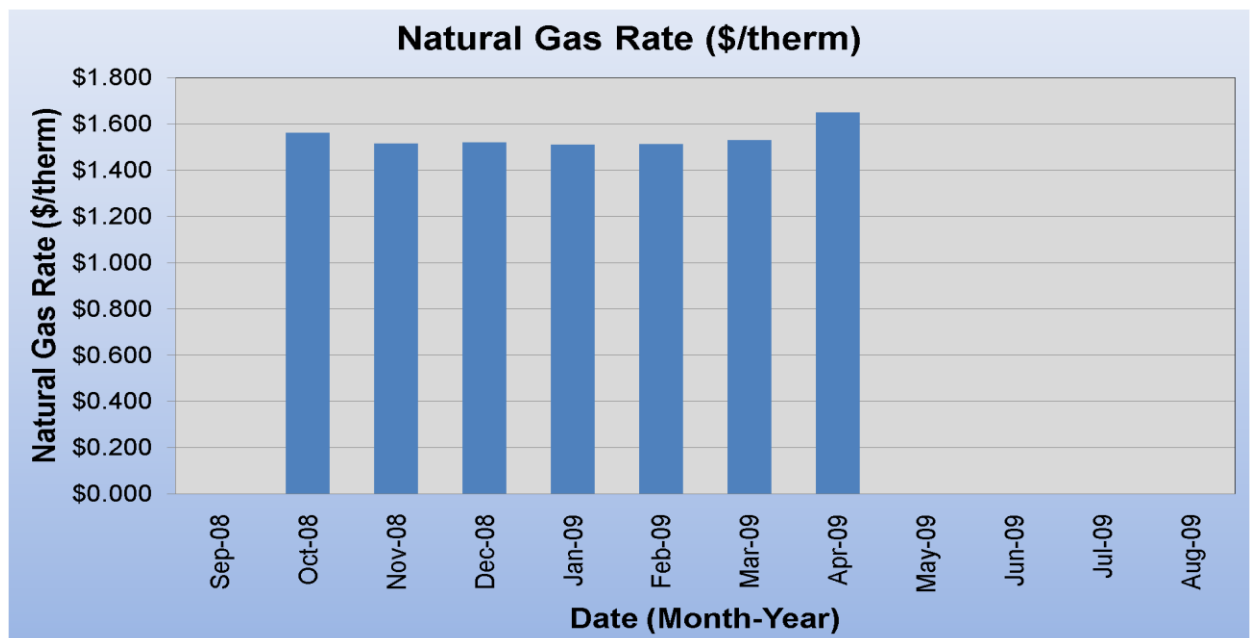
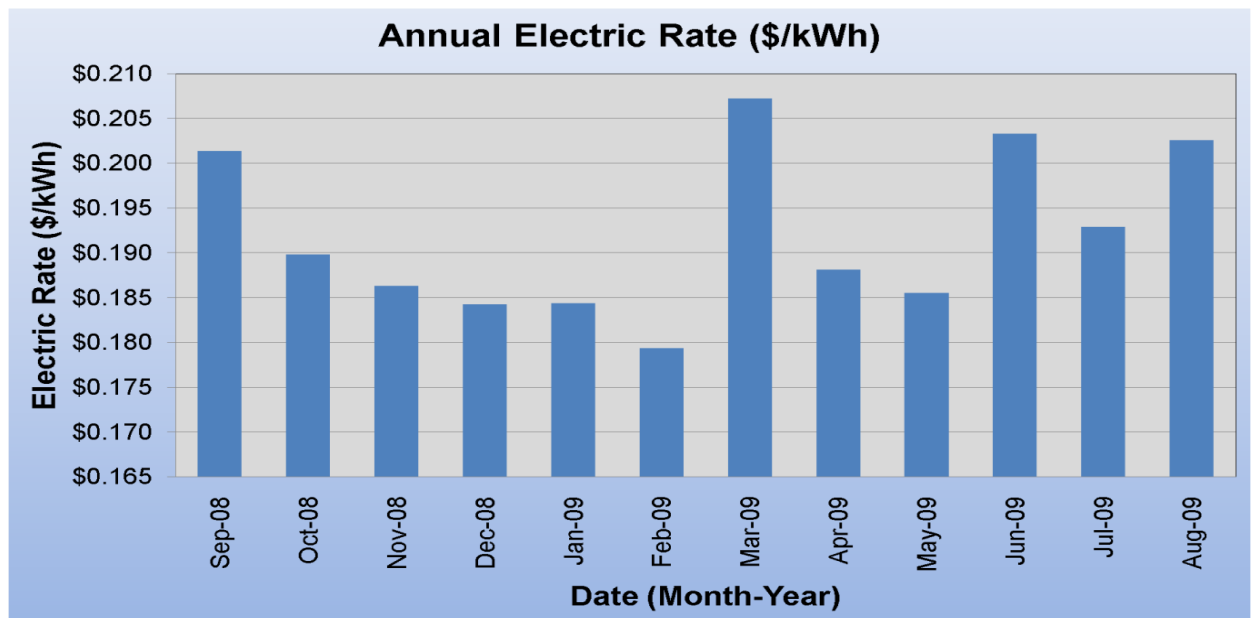


The Mt. Olive Senior Center is direct-metered and currently purchases electricity from JCP&L at a general service rate. The general service rate for electric charges are market-rate based on use and the Mt. Olive Senior Center billing does show a breakdown of demand costs. Demand prices are reflected 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 Mt. Olive Senior Center receives natural gas via one incoming meter. The Elizabethtown Gas Co. 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 main Mt. Olive Senior Center 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 22% over the most recent 12 month period. Some of these fluctuations may have been caused by adjustments between estimated and actual meter readings, others may be due to unusual high and recent escalating energy costs. The average estimated NJ commercial utility rates for electric and gas are \$0.150/kWh and \$1.550/therm respectively. The Mt. Olive Senior Center annual utility costs are \$2,303 higher for electric and \$65 lower for natural gas for a total of \$2,238 higher, when compared to the average estimated NJ commercial utility rates. SWA recommends that the Township of Mount Olive 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 Mt. Olive Senior Center. Appendix B contains a complete list of third party energy suppliers for the Mt. Olive Township service area. The Township of Mount Olive 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 Mt. Olive Senior Center would not be eligible for enrollment in a Demand Response Program, because there isn't the capability at this time (without a large capital investment) to shed a minimum of 150 kW electric demand when requested by the utility during peak demand periods, which is the typical threshold for considering this option. Demand Response could be an option in the future when the Township of Mount Olive may install a large enough back-up emergency generator. The following charts show the Mt. Olive Senior Center monthly spending per unit of energy in 2009.



7. METHOD OF ANALYSIS

7.1. Assumptions and tools

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

7.2. Disclaimer

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

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

Appendix A: Lighting Study

Location			Existing Fixture Information												Retrofit Information															Annual Savings			
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings	Total Savings (kWh)			
1	1	Kitchen	Screw-in	N	Inc	10	1	60	S	9	291	0	600	1,571	CFL	Screw-in	CFL	N	S	10	1	20	9	291	0	200	524	1,048	0	1,048			
2	1	Sprinkler room	Screw-in	N	Inc	1	1	60	S	2	291	0	60	35	CFL	Screw-in	CFL	N	S	1	1	20	2	291	0	20	12	23	0	23			
3	1	Main room	Parabolic	E	4'T8	56	3	32	S	9	291	10	5,386	15,546	N/A	Parabolic	4'T8	E	S	56	3	32	9	291	10	5,386	15,546	0	0	0			
4	1	Main room	Exit Sign	N	LED	5	1	5	N	24	365	1	26	263	N/A	Exit Sign	LED	N	N	5	1	5	24	365	1	26	263	0	0	0			
5	1	Boiler room	Parabolic	E	4'T8	1	2	32	S	2	291	6	70	41	N/A	Parabolic	4'T8	E	S	1	2	32	2	291	6	70	41	0	0	0			
6	1	Women's bathroom	Screw-in	N	Inc	5	1	60	S	9	291	0	300	786	CFL	Screw-in	CFL	N	S	5	1	20	9	291	0	100	262	524	0	524			
7	1	Men's bathroom	Screw-in	N	Inc	5	1	60	S	9	291	0	300	786	CFL	Screw-in	CFL	N	S	5	1	20	9	291	0	100	262	524	0	524			
8	1	Corridor	Parabolic	E	4'T8	1	3	32	S	9	291	10	106	278	N/A	Parabolic	4'T8	E	S	1	3	32	9	291	10	106	278	0	0	0			
9	1	Corridor	Screw-in	N	Inc	2	1	65	S	9	291	0	130	340	CFL	Screw-in	CFL	N	S	2	1	20	9	291	0	40	105	236	0	236			
10	1	Office	Parabolic	E	4'T8	3	3	32	S	9	291	10	298	833	C	Parabolic	4'T8	E	OS	3	3	32	6.75	291	10	298	625	0	208	208			
11	1	Storage / Meeting Space	Parabolic	E	4'T8	6	3	32	S	2	291	10	586	370	NA	Parabolic	4'T8	E	S	6	3	32	2	291	10	586	370	0	0	0			
12	1	Card room	Parabolic	E	4'T8	9	3	32	S	9	291	10	874	2,499	C	Parabolic	4'T8	E	OS	9	3	32	6.75	291	10	874	1,874	0	625	625			
13	1	Coat Room	Parabolic	E	4'T8	1	3	32	S	2	291	10	106	62	N/A	Parabolic	4'T8	E	S	1	3	32	2	291	10	106	62	0	0	0			
14	1	Storage closet	Parabolic	E	4'T8	1	3	32	S	2	291	10	106	62	N/A	Parabolic	4'T8	E	S	1	3	32	2	291	10	106	62	0	0	0			
15	1	Entrance area	Screw-in	N	Inc	1	1	65	S	9	291	0	65	170	CFL	Screw-in	CFL	N	S	1	1	20	9	291	0	20	52	118	0	118			
16	Ext	Exterior	Exterior	N	MH	5	1	50	PC	12	365	13	263	1,380	PSMH	Exterior	PSMH	N	PC	5	1	35	12	365	8	183	942	438	0	438			
17	Ext	Exterior	Exterior	N	MH	2	1	175	PC	12	365	44	394	1,918	PSMH	Exterior	PSMH	N	PC	2	1	115	12	365	25	255	1,226	692	0	692			
Totals:						114	32	856				134	9,670	26,939						114	32					8,476	22,504	3,602	833	4,435			
Rows Highlighted Yellow Indicate an Energy Conservation Measure is recommended for that space																																	

Proposed Lighting Summary Table			
Total Surface Area (SF)	35,000		
Average Power Cost (\$/kWh)	0.192		
Exterior Lighting	Existing	Proposed	Savings
Exterior Annual Consumption (kWh)	3,298	2,168	1,130
Exterior Power (watts)	657	438	219
Total Interior Lighting	Existing	Proposed	Savings
Annual Consumption (kWh)	23,641	20,336	3,305
Lighting Power (watts)	9,013	8,038	975
Lighting Power Density (watts/SF)	1.50	1.34	0.16
Estimated Cost of Fixture Replacement (\$)	3,785		
Estimated Cost of Controls Improvements (\$)	390		
Total Consumption Cost Savings (\$)	1,072		

Legend:				
<u>Fixture Type</u>	<u>Lamp Type</u>	<u>Control Type</u>	<u>Ballast Type</u>	<u>Retrofit Category</u>
Exit Sign	LED	N (None)	N/A (None)	N/A (None)
Screw-in	Inc (Incandescent)	S (Switch)	E (Electronic)	T8 (Install new T8)
Pin	1T5	OS (Occupancy Sensor)	M (Magnetic)	T5 (Install new T5)
Parabolic	2T5	T (Timer)		CFL (Install new CFL)
Recessed	3T5	PC (Photocell)		LEDex (Install new LED Exit)
2U-shape	4T5	D (Dimming)		LED (Install new LED)
Circiline	2T8	DL (Daylight Sensor)		D (Delamping)
Exterior	3T8	M (Microphonic Sensor)		C (Controls Only)
HID (High Intensity Discharge)	4T8			
	6T8			
	8T8			
	2T12			
	3T12			
	4T12			
	6T12			
	8T12			
	CFL (Compact Fluorescent Lightbulb)			
	MR16			
	Halogen			
	MV (Mercury Vapor)			
	MH (Metal Halide)			
	HPS (High Pressure Sodium)			
	LPS (Low Pressure Sodium)			

Appendix B: Third Party Energy Suppliers (ESCOs)

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

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. 1135 Mountain Avenue Murray Hill, NJ 011374 (800) 247-2644 www.boc.com	Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728 (800) 556-84113 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 0113113 (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	Integrus Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830 (877) 763-9977 www.integrusenergy.com	Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 011360 (888) 925-9115, www.sel.com
Liberty Power Holdings, LLC Park 80 West, Plaza II, Suite 200 Saddle Brook, NJ 07663 (866) 769-31139 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, 8 th 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.southjerseyenergy.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 080113 (856) 273-9995 www.ugienergyservices.com	American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009 (800) 437-7872 www.hess.com	ConEdison Solutions Cherry Tree, Corporate Center 1135 State Highway 38 Cherry Hill, NJ 08002 (888) 665-0955 www.conedsolutions.com
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450 212-1138-3124 www.creditsuisse.com	Sprague Energy Corp. 12 Ridge Road Chatham Township NJ 011328 (800) 225-1560 www.spragueenergy.com	

ELIZABETHTOWN GAS COMPANY NATURAL GAS SERVICE TERRITORY

Last Updated: 06/15/09

Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109 800-6BUYGAS (6-289427) www.cooperativenet.com	Direct Energy Services, LLP 120 Wood Avenue, Suite 611 Iselin, NJ 08830 866-547-2722 www.directenergy.com	Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640 1-877-569-2841 www.glacialenergy.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701 800-805-8586 www.gesc.com	UGI Energy Services, Inc. d/b/a GASMAR 704 East Main Street, Suite 1 Moorestown, NJ 08057 856-273-9995 www.ugienergyservices.com	Great Eastern Energy 116 Village Riva, Suite 200 Princeton, NJ 08540 888-651-4121 www.greateastern.com
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095 800-437-7872 www.hess.com	Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724 877-750-7046 www.metromediaenergy.com	Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024 800-724-1880 www.intelligentenergy.org
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 088327 800-375-1277 www.mxenergy.com	NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050 800-840-4GAS www.natgasco.com	Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601 888-53-Metro www.metroenergy.com
PPL EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002 800-281-2000 www.pplenergyplus.com	Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631 800-646-6457 www.stuyfuel.com	Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833 800-363-7499 www.pepco-services.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928 800-225-1560 www.spragueenergy.com	South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037 800-756-3749 www.sjindustries.com/sje.htm	Woodruff Energy 73 Water Street Bridgeton, NJ 08302 800-557-1121 www.woodruffenergy.com