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

For

***The Municipal Athletic Complex & Snack Bar
Township of Hopewell
Titusville, NJ 08560***

Project Number: LGEA16



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INTRODUCTION

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

This report addresses the Athletic Complex building located at 201 Washington Crossing-Pennington Rd, Titusville, NJ 08560. Current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The Municipal Athletic Complex is comprised of several lighted ball fields: Chamberlain, Hansen, Kelly, Bacon and a new ball field. The Complex also contains two buildings, a wooden barn type building with a press / judge booth on one field and on another field a cinder block building with a Snack Bar downstairs and a press / judge booth above. The Snack Bar building is a two story structure built in 1972. The building consists of approximately 1,000 square feet of conditioned main space. This building contains a snack bar area for sports and it is seasonally operated. The building houses various appliances including refrigerators, pizza and pretzel warmers, slushy maker, coffee pot and an ice maker. The Athletic Complex & Snack Bar building are operated seasonally with typically three people working the snack bar during the game season, April 15 - July 31 and 4 nights per week (6:00pm - 10:00 pm) September - October.

The goal of this energy audit is to provide sufficient information to the Township of Hopewell to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the Athletic Complex & Snack Bar building.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Athletic Complex & Snack Bar building located at 201 Washington Crossing-Pennington Rd, Titusville, NJ 08560. The Municipal Athletic Complex is comprised of several lighted ball fields: Chamberlain, Hansen, Kelly, Bacon and a new ball field. The Snack Bar building located at the Municipal Athletic Complex and it is a two story building with a combined floor area of approximately 1,000 square feet, built in 1972.

Based on the field visits performed by the SWA staff on July 9th, August 6th and 7th 2009 and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling, and electric usage.

In 2008, the Athletic Complex & Snack Bar building consumed 117,680 kWh or \$37,484 worth of electricity. The energy consumption for the building was 402 MM-Btus. A few fluctuations showed up for a couple of months on the utility bills which may be due to adjustments between estimated and actual meter readings and facility schedule.

PSE&G set up the Large Power and Lighting - Secondary service rate for the Athletic Complex & Snack Bar building at the time the electric meter was installed. The rate is approximately twice as high as the other municipal buildings (excluding demand charges). SWA recommends that the Township of Hopewell ask PSE&G for a rate investigation and discuss what would be the most beneficial rate for the Athletic Complex & Snack Bar based on activities at the site in recent years.

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

Based on the assessment of the Athletic Complex & Snack Bar building, SWA has separated the investment opportunities into three recommended categories:

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

Category I Recommendations: Capital Improvements

- Roof Replacement - The Snack Bar building sloped roof areas with asphalt shingles appear in poor condition. SWA recommends that the Township of Hopewell put in its capital spending plans this roof with insulation for replacement.

Category II Recommendations: Operations and Maintenance

- SWA recommends that during periods of inactivity at the Athletic Complex, electric usage be kept to a minimum, refrigerated items be relocated and refrigerators unplugged.
- 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.
- Gutters - Gutters should be regularly inspected for clogs from leaves or branches. SWA recommends extending the gutter downspouts two feet or more from the building.

- Create an educational program that teaches maintenance personnel how to minimize the energy use in the buildings. The US Department of Energy offers free information.

Category III Recommendations: Energy Conservation Measures

At this time, SWA recommends a total of **3** Energy Conservation Measures (ECMs) for the Athletic Complex & Snack Bar building, summarized in the following table. The total investment cost for these ECMs with incentives is **\$5,985**. SWA estimates a first year savings of **\$6,484** with a simple payback of **0.9 years**. SWA estimates that implementing the considered ECMs will reduce the carbon footprint of the Athletic Complex & Snack Bar building by **27,849 lbs of CO₂**.

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

Specifically, the building could qualify for \$25 for installation of metal halide with pulse start lamp. There is also a utility-sponsored loan program through PSE&G that would allow the building to pay for the installation of the Wind system through a loan issued by PSE&G.

The following table summarizes the proposed Energy Conservation Measures (ECM) and their economic relevance.

PROPOSED													
ECM #	ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO ₂)
		Estimate \$	Source	Use	Unit	Demand /mo	Unit	Savings / year \$			Cost Savings \$		
1	Install Drinks Cooling machine miser	\$1,590	www.usatech.com	14,976	kWh	13.7	-	4,777	0.3	12	46,991	238.	20,517
2	Replace 2 AC window units with one split high eff unit	\$4,000	Similar Projects	4,968	kWh	4.6	-	1,585	2.5	12	15,588	24.1	6,806
3.1	replace 9 incandescent lamps to CFL	\$180	RS Means, Lit Search	324	kWh	0.3	kW	103	1.7	7	637	36.3	444
3.2	replace 1 mercury vapor lamp to pulse start metal halide with INCENTIVES	\$215	RS Means, Lit Search	60	kWh	0.1	kW	19	11.3	7	118	-6.4	82
	Total Proposed	\$5,985	-	-	-	18.6	kW	\$6,484	0.9	12	62,330	80.7	27,849

CONSIDERED													
ECM #	ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI, %	Annual Carbon Reduced (lbs of CO2)
		Estimate \$	Source	Use	Unit	Demand	Unit	Savings / year \$			Cost Savings \$		
3.3	replace building internal lights: T12s to T8s with INCENTIVES (incl. 75% labor)	\$925	RS Means, Lit Search, NJ Clean Energy Program	61	kWh	0.1	kW	19	47.5	20	284	-3.5	84

Definitions:

SPP – Simple Payback (years)

LoM: Life of Measure (years)

ROI: Return on Investment (%)

Assumptions:

Discount Rate: 3.2% per DOE FEMP Guidelines

Energy Price Escalation Rate: 0% per DOE FEMP Guidelines

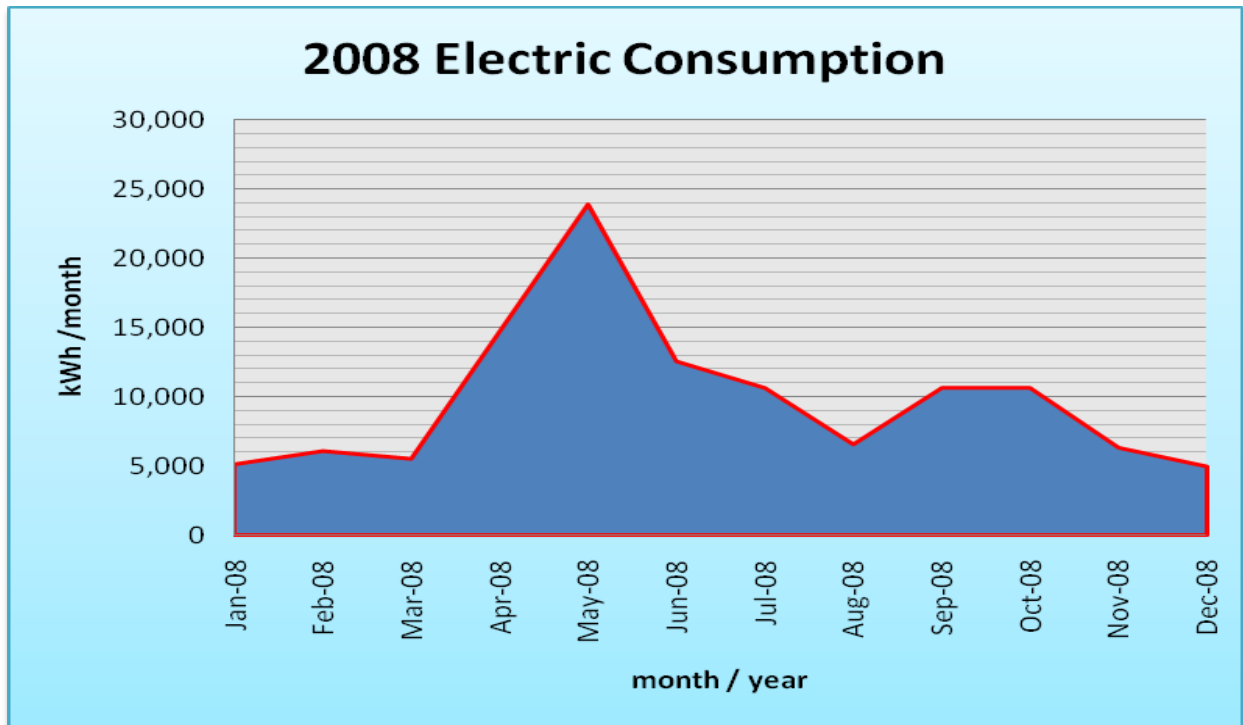
1. HISTORIC ENERGY CONSUMPTION

1.1. Energy use and cost analysis

SWA analyzed utility bills from November 2008 through February 2009 that were received from PSE&G supplying the Athletic Complex & Snack Bar building with electric power.

Electricity - The Athletic Complex & Snack Bar building is currently served by one electric meter. The Athletic Complex & Snack Bar building currently buys electricity from PSE&G at **an average rate of \$0.319/kWh** based on 12 months of utility bills for 2008. The Athletic Complex & Snack Bar building purchased **approximately 117,680 kWh or \$37,484 worth of electricity** in the previous year. The average monthly demand was 109 kW peaking in May, June, September and October at approximately 190 kW. Some electric fluctuations may be due to adjustments between estimated and actual meter readings and facility schedule.

The following chart shows electricity use for the Athletic Complex & Snack Bar building based on utility bills for the 12 month period of 2008. The annual electric use is 402 MM-Btus.



1.2. Utility rate

The Athletic Complex & Snack Bar building currently purchases from PSE&G at a Large Power and Lighting - Secondary service rate for electricity use (kWh) with a separate (kW) demand charge. The Athletic Complex & Snack Bar building currently pays an average rate of approximately \$0.319/kWh based on 12 months of utility bills for 2008.

A few unusual utility fluctuations showed up for a couple of months on the utility bills which may be due to adjustments between estimated and actual meter readings and facility schedule such as games in the late spring, summer and early fall requiring lighting.

1.3. Energy benchmarking

The Athletic Complex Snack Bar building information and utility data were entered into the U.S. Environmental Protection Agency’s (EPA) Energy Star Portfolio Manager Energy benchmarking system. The building did not receive a performance rating due to size, nature of activity inside the building and hours occupied.

Per the LGEA program requirements, SWA has assisted the Township of Hopewell to create an *Energy Star Portfolio Manager* account and share the Athletic Complex Snack Bar facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager site information with the Township of Hopewell (user name of “hopewelladmin” with a password of “hopewelltwp1”) and TRC Energy Services (user name of TRC-LGEA).

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Athletic Complex Snack Bar building is a two story structure built in 1972. The Snack Bar is located downstairs with a press / judge booth above. The building consists of approximately 1,000 square feet of conditioned main space. This building contains a snack bar area for sports and is seasonally operated. The snack bar houses various appliances including refrigerators, pizza and pretzel warmers, slushy maker, coffee pot and an ice maker.

2.2. Building occupancy profiles

The Athletic Complex Snack Bar building is operated seasonally by typically three people during game season, April 15 - July 31 and 4 nights per week (6:00pm - 10:00 pm) September - October.

2.3. Building envelope

2.3.1. Exterior Walls

The exterior walls consist of un-insulated 8” CMU blocks. As the building is only operated seasonally, it is not cost effective to add insulation. Regular maintenance should be performed on the exterior walls to maintain appropriate conditions.



2.3.2. Roof

The sloped roof areas with medium gray colored asphalt shingles appeared to be in poor condition. At the time of the audit the 2nd level could not be accessed and there are no drawings on record for this building. SWA suspects no roof insulation. Due to the current occupancy uses for the building, SWA does not have additional recommendations for adding insulation. SWA recommends the roof be replaced as signs of wear and tear increase with age.



2.3.3. Base

The building's base could not be verified due to a lack of building drawings. SWA suspects there is no slab or perimeter insulation. The slab edge or perimeter insulation could not be verified and should be confirmed at the time of an insulation inspection during cooler months for usable infrared data evaluation. SWA recommends extending the gutter downspouts two feet or more from the building. Currently rain run-off is deposited around the perimeter of the building, settling near the foundation of the building. This may result in future foundation issues.



2.3.4. Windows

The windows at the Athletic Complex Snack Bar are single pane, wood framed windows. If increased use for the building changes, SWA recommends replacement with double paned, low-e rated windows.



2.3.5. Exterior doors

The hollow metal exterior doors were observed to be in good condition except for some missing or worn weather-stripping. SWA recommends installing tight-fitting insulated doors with 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 immediately. Tight seals around the doors will help ensure that the building is kept continuously tight and insulated.

2.3.6. Building air tightness

Based on a visual inspection, the Athletic Complex Snack Bar building would benefit from air sealing any penetrations throughout the structure. SWA recommends air sealing attic top-plates. SWA recommends performing regular maintenance caulking, foaming, and sealing around penetrations and verifying proper weather-stripping around doors. Air tight building envelopes result in conserving energy while lowering heating and cooling costs.

2.4. HVAC Systems

2.4.1. Heating

In the Athletic Complex Snack Bar building is generally shutdown during months requiring heating and as such, when needed portable electric space heaters are used occasionally for localized heat source.

2.4.2. Cooling

The Athletic Complex Snack Bar building is air conditioned by three window units, two downstairs and one upstairs. Any other cooling and fresh air circulation is achieved via cross-currents when opening doors and use of fans.

On the day of SWA's field audit, it was observed that the two downstairs air conditioners were in operation in the snack bar area, mainly to keep the ice-cream cooler with a Pyrex top cover cool. SWA recommends that in such cases and whenever possible the ice-cream be moved to other freezers in the room and air conditioners are turned off when space is unoccupied. Also noted is that the two downstairs window units are low efficiency and should be replaced with a Goodman Split System

Central Air Conditioner 2 Ton 13 Seer R410A or equivalent. SWA is addressing this below in ECM#2.

2.4.3. Ventilation

Ventilation is achieved via cross-currents when opening doors and use of fans.

2.4.4. Domestic Hot Water

There is one small electric 30 gal DHW unit in the building available for the bathrooms, snack bar and hand washing.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting - The Athletic Complex Snack Bar building currently consists of mostly T12 fluorescent fixtures with magnetic ballasts. Based on measurements of lighting levels for each space, there are not any vastly over-lighted areas. SWA recommends replacing T12 lighting including magnetic ballasts whenever possible with T8 lighting and electronic ballasts. As this option may not be very cost effective, the changeover could take place as fixtures break down and are taken out of service. The building also has a number of lights with incandescent bulbs. SWA recommends replacing all incandescent bulbs with CFLs. See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building and estimated power consumption.

Exterior Lighting - The exterior lighting was surveyed during the building audit. Metal Halide lamps are used predominantly for field lighting. These are efficient lamps in consideration of the time in use. Around the ball fields, the site lighting is a mix of just a few high pressure sodium, metal halide and one mercury vapor lamps on astronomical timers and photocells. SWA recommends replacing the mercury vapor lamp with a metal halide with pulse start lamp. SWA does not recommend any changes to the ball field lighting at this time considering the visibility and safety required on the sport fields. Any incandescent lamps are recommended for changeover to CFLs. Ball field lighting is controlled by switches.

2.5.2. Appliances and process

The Athletic Complex Snack Bar houses 2 refrigerators, 2 drink refrigerators, 2 freezers, 1 ice cream freezer, 2 coolers, 1 hot dog roller, 1 pizza warmer, 1 slush poppy machine, 1 pretzel warmer, 1 microwave, 1 coffee pot and 1 ice maker.

Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. For example, Energy Star refrigerators use as little as 315 kWh / yr. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large savings. Look for the Energy Star label when replacing appliances and equipment, including: refrigerators, printers, computers, copy machines, etc. More information can be found in the "Products" section of the Energy Star website at: <http://www.energystar.gov>.

2.5.3. Elevators

The Athletic Complex Snack Bar building is a single story building and does not contain any elevator equipment.

2.5.4. Others electrical systems

There are not currently any other electrical systems installed at the Athletic Complex & Snack Bar building other than normal switchgear and control panels.

3. EQUIPMENT LIST

Inventory

The Municipal Athletic Complex & Snack Bar						
Building System	Description	Location	Model#	Fuel	Space served	Estimated Remaining useful life %
Domestic Hot water heater	30 gal tank	next to snack bar area	A.O. Smith ELJF-30	Electric	Municipal Athletic Complex Snack Bldg.	15%
Cooling	3 window AC units	upstairs, snack bar and adjacent room	various	Electric	Municipal Athletic Complex Snack Bldg.	0%
Sewer	2 sump pumps	outside snack bar area	-	Electric	Municipal Athletic Complex Snack Bldg.	90%
Lighting	See details - Appendix A	See details - Appendix A	-	Electric	Union Fire & Rescue House	varies, average 60%

Note:

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

4. ENERGY CONSERVATION MEASURES

Based on the assessment of the Athletic Complex & Snack Bar building, SWA has separated the investment opportunities into three recommended categories:

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

Category I Recommendations: Capital Improvements

- Roof Replacement - The Snack Bar building sloped roof areas with medium gray colored asphalt shingles appear to be in poor condition due to age. SWA recommends that the Township of Hopewell put in its capital spending plans this roof with insulation for replacement.

Category II Recommendations: Operations and Maintenance

- SWA recommends that during periods of inactivity at the Athletic Complex, electric usage be kept to a minimum, refrigerated items be relocated and refrigerators unplugged.
- 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. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.
- Gutters - Gutters should be regularly inspected for clogs from leaves or branches. SWA recommends extending the gutter downspouts two feet or more from the building.
- Create an educational program that teaches maintenance personnel how to minimize the energy use in the buildings. The US Department of Energy offers free information for hosting energy efficiency educational programs and for more information please visit: <http://www1.eere.energy.gov/education/>

Category III Recommendations: Energy Conservation Measures

Summary table

ECM#	Description
1	Install Cooling Misers on Drinks Cooling Refrigerators and Vending Machines
2	Replace 2 Air Conditioning window units with a more efficient split system
3	Upgrade building lighting: incandescent to CFLs, occupancy sensors for some offices, Exit fluorescents to LED and T12 magnetic fixtures to T8 electronic fixtures

ECM#1: Install Vending Misers

Description:

The Municipal Athletic Complex has 4 Drinks vending machines near and next to the Athletic Complex Snack Bar building and 2 Drinks refrigerated coolers inside the Snack Bar. Energy vending / cooler miser devices are now available for conserving energy with these vending machines / coolers. There isn't a need to purchase new machines to reduce operating costs and greenhouse gas emissions. When equipped with the vending miser devices, refrigerated beverage vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines. Vending miser devices incorporate innovative energy-saving technology into small plug-and-play devices that installs in minutes, either on the wall or on the vending machine. Vending miser devices use a Passive Infrared Sensor (PIR) to: Power down the machine when the surrounding area is vacant; Monitor the room's temperature; Automatically repower the cooling system at one- to three-hour intervals, independent of sales; Ensure the product stays cold.

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

Installation cost:

Estimated installed cost: \$1,590

Source of cost estimate: www.usatech.com and established costs

Economics (without incentives):

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
	Estimate \$	Source	Use	Unit	Demand / mo	Unit	Savings / year \$			Cost Savings \$		
Install Drinks Cooling machine miser	\$1,590	www.usatech.com	14,976	kWh	13.7	-	4,777	0.3	12	46,991	238.0	20,517

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

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

Options for funding ECM:

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

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

ECM#2: Air Conditioning Upgrade

Description:

Currently, the Athletic Complex Snack Bar building first floor is air conditioned by two window units of approximately 2 Ton capacity. These window units are older models of low efficiency and SWA recommends that they be replaced with a Goodman Split System Central Air Conditioner 2 Ton 13 Seer R410A or equivalent. The replacement should be Energy Star rated. The split system installation should include but not limited to: 13 SEER rated compressor or higher, air handler, line-set, unit pad, digital thermostat, mechanical and electrical inspections, disposal of existing equipment and a minimum of one year labor warranty and five year equipment warranty. Depending on requirements for future heating needs, a heat pump may also be considered.

Installation cost:

Estimated installed cost: \$4,000
 Source of cost estimate: Similar projects

Economics:

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
	Estimate \$	Source	Use	Unit	Demand / mo	Unit	Savings / year \$			Cost Savings \$		
Replace 2 AC window units with one split high eff unit	\$4,000	Similar projects	4,968	kWh	4.6	-	1,585	2.5	12	15,588	24.1	6,806

Assumptions: SWA assumed electrical loads calculated using modeling and by conducting the billing analysis. In order to estimate savings for this measure, SWA assumed in the model an energy reduction based on the difference in efficiencies of existing vs. the proposed equipment.

Rebates/financial incentives:

This measure does not qualify for a rebate or other 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#3: Upgrade existing lighting

Description:

On the day of the site visit, SWA completed a lighting inventory of the Athletic Complex & Snack Bar building (see Appendix A). The existing Snack Bar lighting consists of T12 fluorescent fixtures with magnetic ballasts, and incandescent lights. SWA has performed an evaluation of upgrading all the T12 magnetic ballast fixtures to T8 electronic ballast fixtures, incandescent bulbs to CFLs and one mercury vapor lamp to a metal halide with pulse start lamp. The labor in all these installations was evaluated using prevailing electrical contractor wages. The Township of Hopewell 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 any incandescent bulbs be replaced with CFLs. See Appendix A for recommendations.

Installation cost:

Estimated installed cost: \$395

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

Economics:

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI %	Annual Carbon Reduced (lbs of CO2)
	Estimate \$	Source	Use	Unit	Demand /mo	Unit	Savings / year \$			Cost Savings \$		
replace 9 incandescent lamps to CFL	\$180	RS Means, Lit Search	324	kWh	0.3	kW	103	1.7	7	637	36.3	444
replace 1 mercury vapor lamp to pulse start metal halide with INCENTIVES	\$215	RS Means, Lit Search	60	kWh	0.1	kW	19	11.3	7	118	-6.4	82
Total Proposed	\$395		384	kWh	0.4	kW	122	3.2	7	755	13.0	526

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

ECM description	Installed Cost		1st year energy savings					SPP	LoM	Lifetime	ROI, %	Annual Carbon Reduced (lbs of CO2)
	Estimate \$	Source	Use	Unit	Demand /mo	Unit	Savings / year \$			Cost Savings \$		
replace building internal lights: T12s to T8s with INCENTIVES (incl. 75% labor)	\$925	RS Means, Lit Search, NJ Clean Energy Program	61	kWh	0.1	kW	19	47.5	20	284	-3.5	84

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

Rebates/financial incentives:

NJ Clean Energy - Prescriptive Lighting Incentive, Incentive based on installing metal halide with pulse start lamps in existing facilities (\$25 per fixture, depending on quantity of lamps). Maximum incentive amount is \$25.

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 \$150.

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>

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There are currently no existing renewable energy systems. The Township of Hopewell is commissioning a 40 kW photovoltaic system located on the lawn of the Public Works Garage.

5.2. Wind

Description:

Small vertical axis Wind power production may be applicable for the Athletic Complex & Snack Bar location; however there isn't a good way to properly protect the wind turbines from the field activities such as stray balls.

5.3. Solar Photovoltaic

Description:

Solar photovoltaic power production would be applicable for the Athletic Complex & Snack Bar location, however there isn't sufficient open space to lay out the panels and properly protect them from the field activities such as stray balls.

5.4. Solar Thermal Collectors

Solar thermal collectors are not cost effective for this building and would not be recommended because Domestic Hot Water is not consistently and extensively used.

5.5. Combined Heat and Power

Description:

CHP is not applicable for this building because there isn't any available gas service and it is costly to bring to the building at this time.

5.6. Geothermal

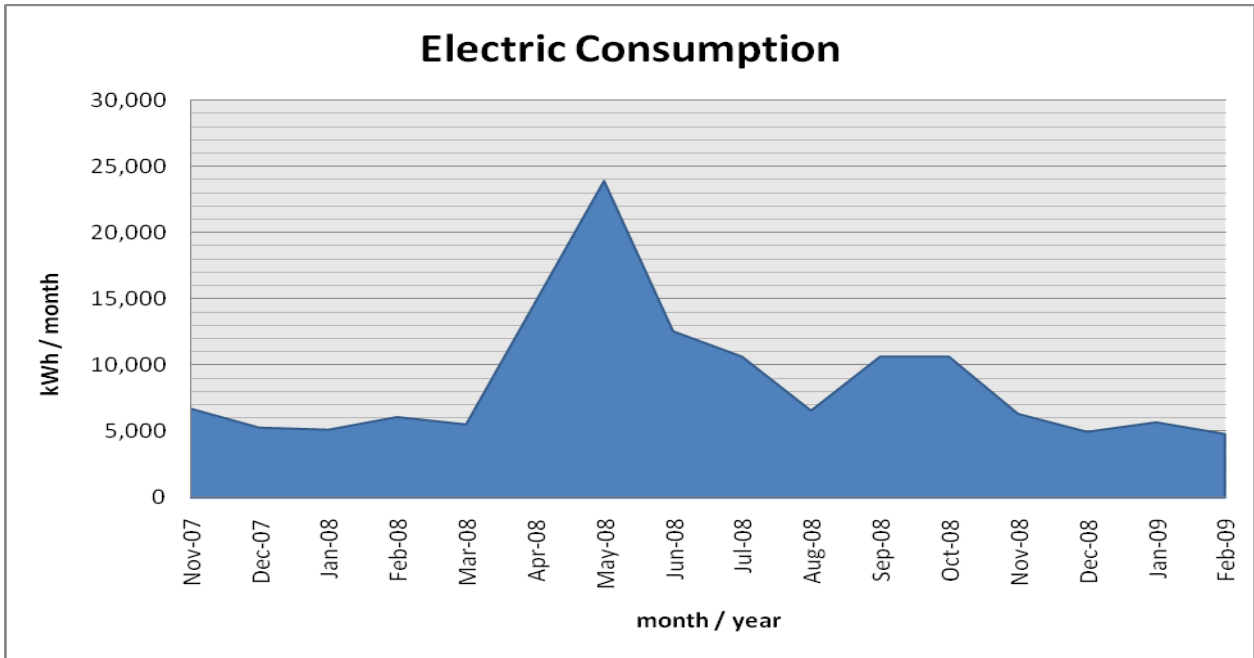
Description:

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

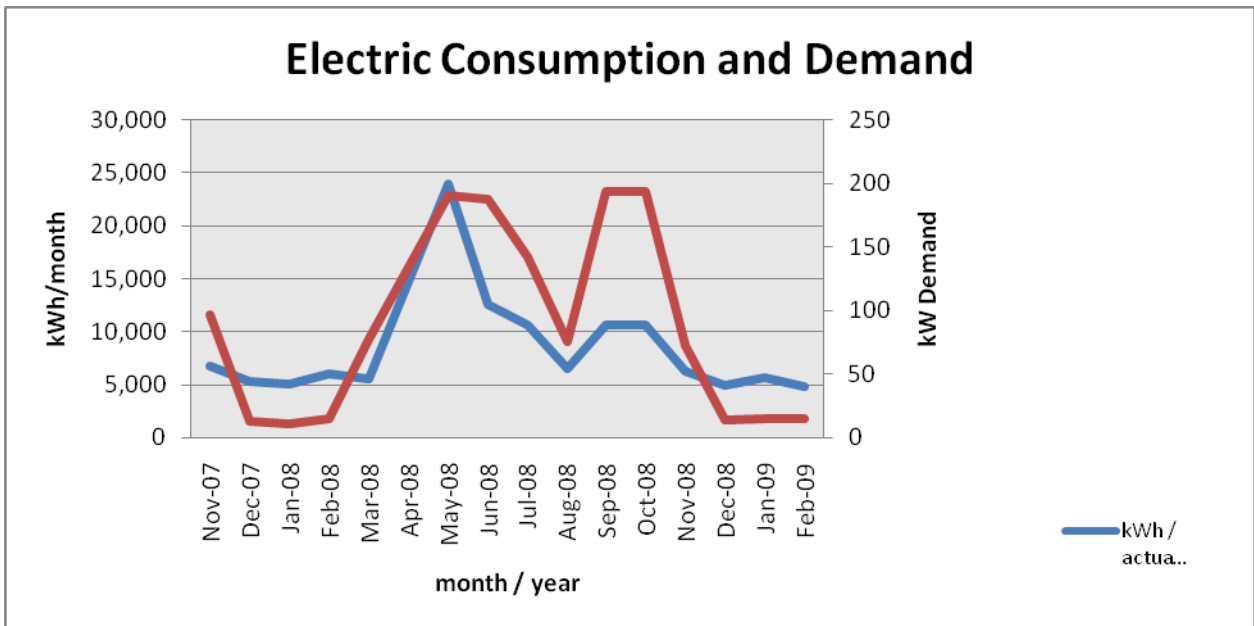
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles

The following are charts that show the annual electric load profiles for the Athletic Complex & Snack Bar building.



Also, note on the following chart how the electrical Demand peaks follow the electrical consumption peaks.



6.2. Tariff analysis

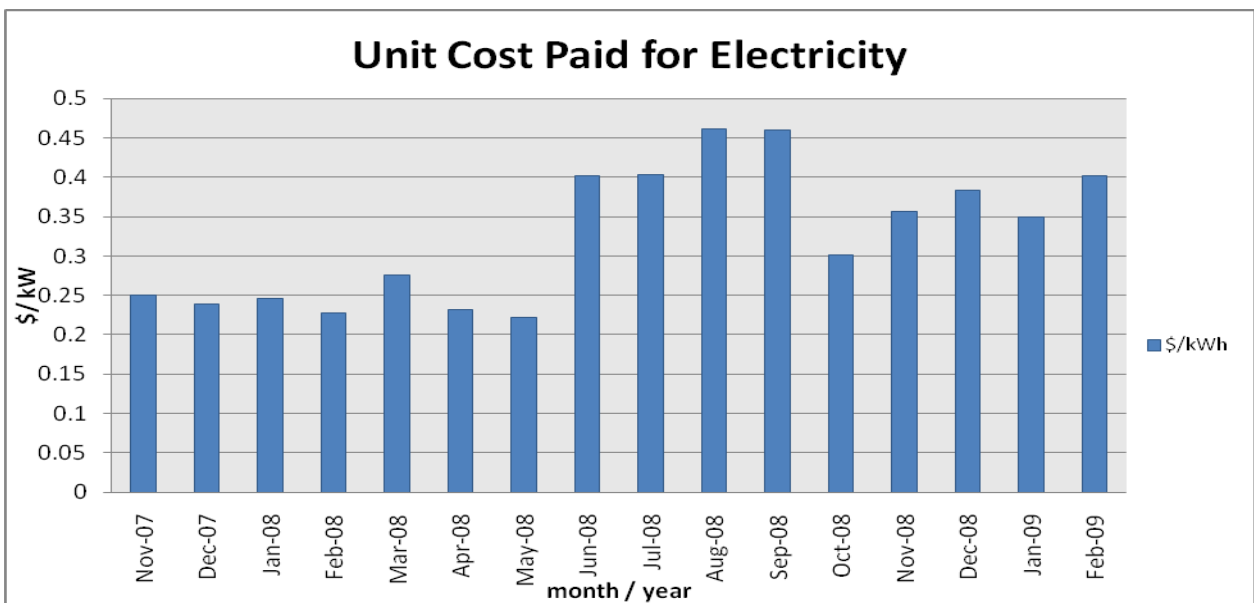
The Athletic Complex & Snack Bar building is direct-metered (via one main meter) and currently purchases electricity from PSE&G at a Large Power and Lighting - Secondary service rate. The service rate for electric charges are market-rate based on use and the Athletic Complex & Snack Bar billing does 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 air-handling units. The Athletic Complex & Snack Bar does use some air conditioning during the summer months and uses minimal electric heating during the winter months. The main power users are primarily the field lights and secondarily various refrigerators / coolers.

PSE&G set up the Large Power and Lighting - Secondary service rate for the Athletic Complex & Snack Bar building at the time the electric meter was installed. The rate is approximately twice as high as the other municipal buildings (excluding demand charges). SWA recommends that the Township of Hopewell ask PSE&G for a rate investigation and discuss what would be the most beneficial rate for the Athletic Complex & Snack Bar based on activities at the site in recent years.

6.3. Energy Procurement strategies

The Athletic Complex & Snack Bar does not have natural gas service. Electricity is purchased directly for the Athletic Complex & Snack Bar from PSE&G without an ESCO. There isn't 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. SWA analyzed the utility rate for electricity supply over an extended period. Electric bill analysis shows fluctuations in excess of 100% over the 12 month in 2008. Some of these fluctuations may have been caused by adjustments between estimated and actual meter readings, demand, others may be due to unusual high and escalating energy costs in 2008. SWA recommends that the Township of Hopewell further explore opportunities of purchasing electricity from ESCOs in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Athletic Complex & Snack Bar. Appendix B contains a complete list of third party energy suppliers for the Township of Hopewell service area. The Township of Hopewell may want to consider partnering with other school districts, municipalities, townships and communities to aggregate a substantial electric 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 Athletic Complex would not be eligible for enrollment in a Demand Response Program, because there isn't the capability at this time to shed a minimum of 100 kW electric demand when requested by the utility during peak demand periods, which is the typical threshold for considering this option. The following charts show the Athletic Complex & Snack Bar monthly \$/kW spending for energy in 2008.



7. METHOD OF ANALYSIS

7.1. Assumptions and tools

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

7.2. Disclaimer

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

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

Appendix A: Lighting Study

Municipal Athletic Complex Existing Lighting Conditions														Proposed Lighting																													
#	Bldg	Fir	Location in Building	Measured Lighting Level in Foot-candles	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts /Lamp	Hrs/ Day	Energy Use (Watt hours / day)	Controls	Day-lighting possible?	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Type of Lamp	Watts/ Lamp	Hrs/ Day	Energy Use (Watt hours/ day)	Controls	Total Power (Watts)	further W-hr/day reduction with occupancy sensors																		
1	MAC	1st	boys room	-	incand	-	1	1	I	75	2	150	S	n	CFL	-	1	1	CFL	15	2	30	S	15																			
2	MAC	1st	girls room	-	incand	-	1	1	I	75	2	150	S	n	CFL	-	1	1	CFL	15	2	30	S	15																			
3	MAC	1st	kitchen	-	incand	-	2	1	I	75	2	300	S	n	CFL	-	2	1	CFL	15	2	60	S	30																			
4	MAC	1st	kitchen	-	CFL	-	1	1	CFL	26	2	52	S	n	CFL	-	1	1	CFL	26	2	52	S	26																			
5	MAC	1st	kitchen	-	T8-4ft	E	4	4	F	32	2	1024	S	n	T8-4ft	E	4	4	F	32	2	1024	S	512																			
6	MAC	1st	snack bar	-	T12 4'	M	4	4	F	34	2	1088	S	n	T8 4'	E	4	4	F	32	2	816	S	512																			
7	MAC	2nd	kitchen	-	T12 4'	M	1	2	F	34	2	136	S	n	T8 4'	E	1	2	F	32	2	102	S	64																			
8	MAC	ext	Snack Bar wallpacks	-	HPS	-	2	1	HPS	150	12	3600	photo-cells	N/A	HPS	-	2	1	HPS	150	12	3600	photo-cells	300																			
9	MAC	ext	Snack Bar flood	-	incand	-	4	1	I	75	4	1200	S	N/A	CFL	-	4	1	CFL	15	4	240	S	60																			
10	MAC	ext	barn bldg	-	Mercury Vapor	-	1	1	MV	75	12	900	photo-cells	N/A	Metal Halide	pulse start	1	1	MH	50	12	600	photo-cells	50																			
11	MAC	ext	barn bldg	-	incand	-	1	1	I	60	4	240	S	N/A	CFL	-	1	1	CFL	15	4	60	S	15																			
12	MAC	ext	Hansen Field	-	Metal Halide	M-48	18	1	MH	1500	2	54000	S	N/A	Metal Halide	-	18	1	MH	1500	2	54000	S	27000																			
13	MAC	ext	Kelly Field	-	Metal Halide	M-48	24	1	MH	1500	2	72000	S	N/A	Metal Halide	-	24	1	MH	1500	2	72000	S	36000																			
14	MAC	ext	Chamberlain Field	-	Metal Halide	M-48	24	1	MH	1500	2	72000	S	N/A	Metal Halide	-	24	1	MH	1500	2	72000	S	36000																			
15	MAC	ext	New Field	-	Metal Halide	M-48	20	1	MH	1500	2	60000	S	N/A	Metal Halide	-	20	1	MH	1500	2	60000	S	30000																			
16	MAC	ext	Bacon Field	-	Metal Halide	M-48	20	1	MH	1500	2	60000	S	N/A	Metal Halide	-	20	1	MH	1500	2	60000	S	30000																			
TOTALS exterior																						323,940																					
TOTALS interior																						2,900																					
annual consumption (kWh)																						81,710																					
estimated cost (\$/year)																						\$8,988																					
Municipal Athletic Complex total light power (Watt)																						161,185																					
Municipal Athletic Complex light power density (Watt/sq ft)																						161.19																					
Proposed Annual Savings (kWh)																						557																					
Proposed Annual Cost Savings (\$)																						\$61																					
Proposed Investment (\$)																						\$1,320																					
surface area (sq ft)																						1,000											1,000										

Legend: MAC - Municipal Athletic Complex; M - magnetic; E - electronic; F - fluorescent; incand - incandescent; CFL - compact fluorescent lamp; HPS - high pressure sodium; MH - Metal Halide; S - on/off switch

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

PSE&G ELECTRICAL SERVICE TERRITORY		
Last Updated: 06/15/09		
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095 (800) 437-7872 www.hess.com	BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974 (800) 247-2644 www.boc.com	Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728 (800) 556-8457 www.commerceenergy.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446 (888) 635-0827 www.newenergy.com	Direct Energy Services, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830 (866) 547-2722 www.directenergy.com	FirstEnergy Solutions Corp. 300 Madison Avenue Morristown, NJ 07962 (800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640 (877) 569-2841 www.glacialenergy.com	Integritys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830 (877) 763-9977 www.integritysenergy.com	Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960 (888) 925-9115, www.sel.com
Liberty Power Holdings, LLC Park 80 West, Plaza II, Suite 200 Saddle Brook, NJ 07663 (866) 769-3799 www.libertypowercorp.com	Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833 (800) ENERGY-9 (363-7499) www.pepco-services.com	PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002 (800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 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 08057 (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 535 State Highway 38 Cherry Hill, NJ 08002 (888) 665-0955 www.conedsolutions.com
Credit Suisse, (USA) Inc. 700 College Road East Brandon, NJ 08450 212-538-3124 www.creditsuisse.com	Sprague Energy Corp. 12 Ridge Road Chatham Township NJ 07928 (800) 225-1560 www.spragueenergy.com	

