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*January 20, 2010*

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

***For***

***The Monroe Hall***
***Township of Hanover***
***Whippany, NJ 07981***

***Project Number: LGEA14***

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## INTRODUCTION

On July 2nd and 27th Steven Winter Associates, Inc. (SWA) performed an energy audit and assessment for the Township of Hanover municipal buildings. The audit included a review of the Monroe Hall, Municipal Building, Community Center, Department of Public Works, and the Parks and Recreation Garage. All these buildings are located in Whippany, NJ. A separate Energy Audit Final Report is issued for each of the referenced buildings.

This report addresses the Monroe Hall located at 324 Whippany Road, Whippany, NJ 07981. Current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The Monroe Hall building was built in 1890 and houses a community meeting room and kitchen used by various organizations for meetings, such as girl scouts, boy scouts, and Knights of Columbus. The Township of Hanover has implemented several minor upgrades to the infrastructure and mechanical systems in recent years. The building was used as a church in the past. It is not registered as a historic building. The building consists of 1,727 square feet of conditioned main space. The building does not house any permanent staff members and does not have any set operating schedules at this time. It is for functions and is occupied roughly 20 hours / week at various times during the year.

The goal of this energy audit is to provide sufficient information to the Township of Hanover to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the Monroe Hall building.

## EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Monroe Hall building located at 324 Whippany Road, Whippany, NJ 07981. The Monroe Hall building is a one story building (with basement) with a combined floor area of 1,727 square feet. The building has undergone several renovations over the years to the original 1890 building structure.

Based on the field visits performed by the SWA staff on July 2nd and 27th, 2009 and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling, and electric usage.

In 2008, the most recent year, the Monroe Hall building consumed 5,878 kWh or $1,192 worth of electricity and 1,433 therms or $2,410 worth of natural gas. The joint energy consumption for the building, including both electricity and natural gas, was 163 MMBtus of energy that cost a total of $3,602. 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. The Township of Hanover should demand a full accounting from the energy providers and ask that billings be based only on realistic and actual meter readings.

SWA benchmarked the Monroe Hall 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 Monroe Hall, SWA has separated the recommendations into three categories. These are summarized as follows:

Category I Recommendations: Capital Improvements

- Building Envelope Insulation - The existing building is poorly insulated based on age and practice of construction when it was built in 1890 and follow-up renovations. An opportunity to install adequate insulation could be at the time that asbestos abatement (in the tiles and abandoned flue stack) will occur. Building windows have already been upgraded to double pane low-E type. This recommendation cannot be cost justified by energy savings alone. However, the age and condition of the building warrant attention and this recommendation is intended to provide guidance to help the building management staff prioritize upgrades within the facility.
- Basement Windows - SWA recommends replacing the basement windows with newer vinyl double-pane low-E glass windows, preferably at the same time when other upgrades are being worked for increased insulation.

Category II Recommendations: Operations and Maintenance

- Controls Optimization - SWA recommends that the schedules for all heating / cooling equipment serving building spaces be reviewed and optimized. During periods when the spaces are not occupied, the equipment may be shut-off or controlled to minimize the amount of fresh air conditioned by the equipment. The cost and effort associated with implementation of this recommendation will depend upon the capabilities of the existing building control system. Energy and cost savings associated with this recommendation will vary, depending upon the current occupancy schedules and means of control utilized.

- 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.
- Penetration energy losses - SWA recommends sealing air handler plenums, ductwork trunks, take-offs, boots and registers. As conditioned air is lost to unconditioned spaces such as the attic and basement, sealing ductwork will save current energy losses.
- Prevent efflorescence and mold growth - SWA recommends re-grading the perimeter of the building as much as possible to generate a slope away from the basement walls in addition to leading any down spouts away from the same wall at least 4 feet. In a second step SWA recommends an impermeable sealer to be applied to the inside walls and slab where possible.
- Maintain foundation walls - In areas where the brick foundation walls show excessive deterioration, CMU blocks should be used for replacement
- Water Efficient Fixtures & Controls - Retrofitting with more efficient water-consumption fixtures / appliances will save both energy and money through reduced energy consumption for water heating, while also decreasing water / sewer bills.
- Energy Star labeled appliances such as refrigerators should replace older energy inefficient equipment.
- Create an educational program that teaches maintenance personnel how to minimize the energy use.

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

At this time, SWA recommends **3** Energy Conservation Measures (ECMs) for the Monroe Hall building that are summarized in the following table. The total investment cost for these ECMs with incentives is **$1,020**. SWA estimates a first year savings of **$209** with a simple payback of **4.9 years**. SWA estimates that implementing the recommended ECMs will reduce the carbon footprint of the Monroe Hall building by **1,177 lbs of $CO_2$.**

There are various incentives that the Township of Hanover could apply for that could also help lower the cost of installing the ECMs. SWA recommends that the Monroe Hall 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, will be rolled out soon and could also assist to cover 80% of the capital investment.

Specifically, the building could qualify for $40 for installing the recommended Exit LED signs. There is also a utility-sponsored loan program through JCP&L that would allow the building to pay for the energy efficient installations.

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

| PROPOSED | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECM # | ECM description | Installed Cost | | 1st year energy savings | | | | | SPP | LoM | Lifetime | ROI % | Annual Carbon Reduced (lbs of CO2) |
| | | Estimate $ | Source | Use | Unit | Demand /mo | Unit | Savings / year $ | | | Cost Savings $ | | |
| 1.1 | replace 8 incandescent lamps to CFL | $160 | RS Means, Lit Search | 318 | kWh | 0.1 | kW | 100 | 1.6 | 7 | 616 | 40.7 | 436 |
| 1.2 | install 2 EXIT LED signs with INCENTIVES | $360 | RS Means, Lit Search, NJ Clean Energy Program | 175 | kWh | 0.0 | kW | 36 | 10.1 | 20 | 519 | 2.2 | 240 |
| 2 | replace kitchen refrigerator with Energy Star model | $500 | Manufacturer and Store Info | 366 | kWh | 0.1 | kW | 74 | 6.7 | 20 | 1,085 | 5.9 | 501 |
| | **Total Proposed** | **$1,020** | | **859** | **kWh** | **0.2** | **kW** | **209** | **4.9** | **15** | **2,506** | **9.5** | **1,177** |

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

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

| CONSIDERED | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECM # | ECM description | Installed Cost | | 1st year energy savings | | | | | SPP | LoM | Lifetime | ROI, % | Annual Carbon Reduced (lbs of CO2) |
| | | Estimate $ | Source | Use | Unit | Demand / mo | Unit | Savings / year $ | | | Cost Savings $ | | |
| 1.3 | replace building internal lights: T12s to T8s with INCENTIVES (incl. 75% labor) | $1,850 | RS Means, Lit Search, NJ Clean Energy Program | 329 | kWh | 0.1 | kW | 55 | 33.5 | 20 | 806 | -2.8 | 451 |

# 1. HISTORIC ENERGY CONSUMPTION

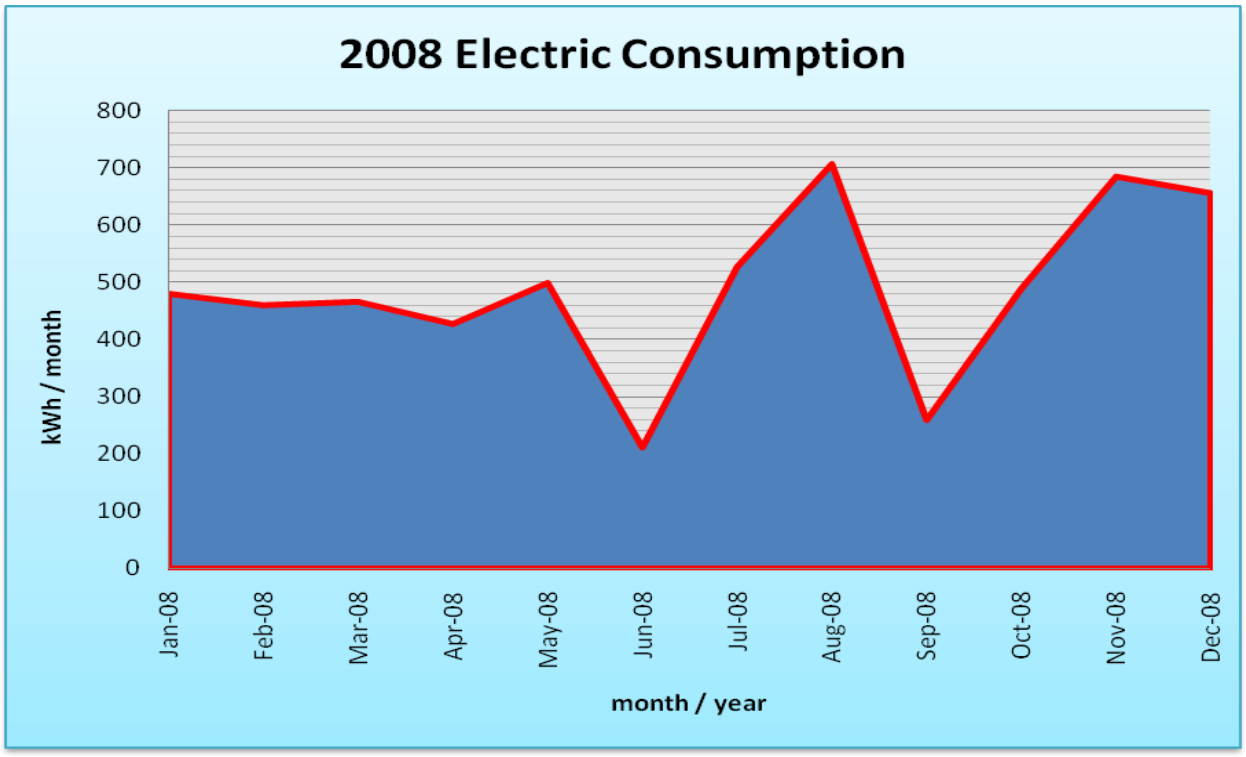
## 1.1. Energy usage and cost analysis

SWA analyzed utility bills from June 2007 through May 2009 that were received from the utilities supplying the Monroe Hall building with electric and natural gas.

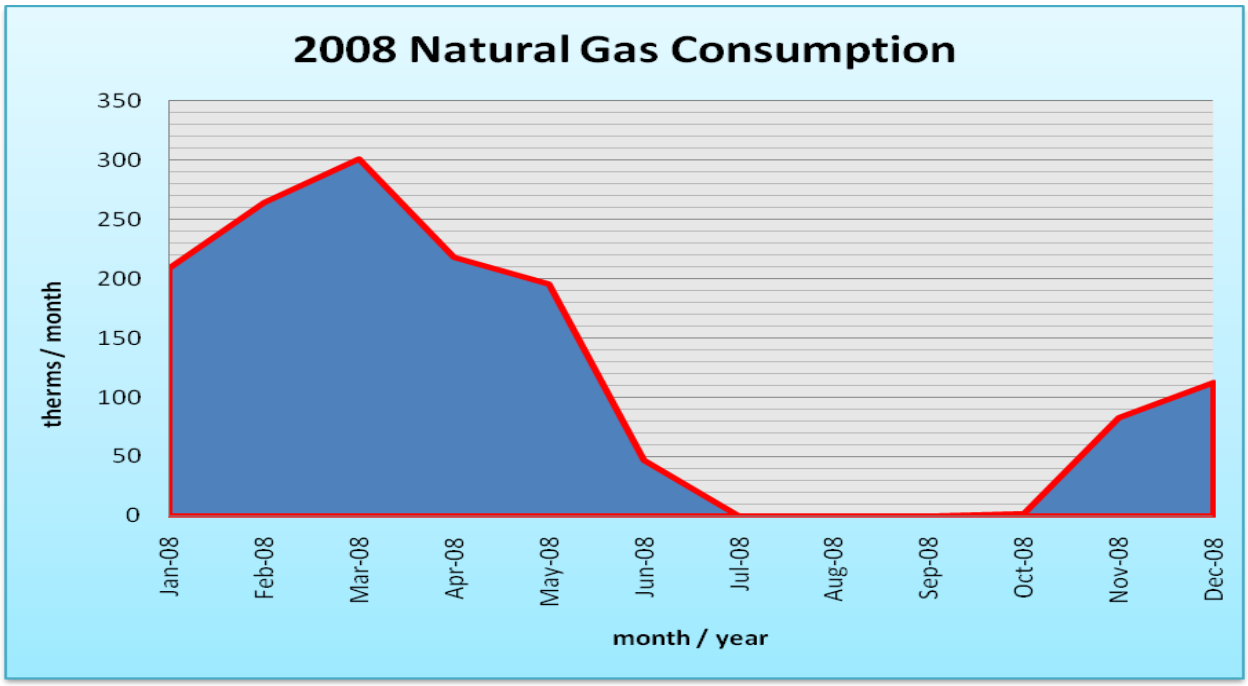
Electricity - The Monroe Hall building is currently served by a single electric meters. The Monroe Hall building currently buys electricity from JCP&L at **an average rate of $0.203/kWh** based on 12 months of utility bills for 2008. The Monroe Hall building purchased **approximately 5,878 kWh or $1,192 worth of electricity** in the previous year. The average monthly demand was not reported by the utility on this relatively low use. The unusual electric fluctuations shown in Jan 09 and Dec 08 may be due to adjustments between estimated and actual meter readings and also to the building's occupancy.

Natural Gas - The Monroe Hall building is currently served by a single meter for natural gas. The Monroe Hall building currently buys natural gas from PSE&G at **an average aggregated rate of $1.682/therm** based on 12 months of utility bills for 2008. The Monroe Hall building purchased **approximately 1,433 therms or $2,410 worth of natural gas** in the previous year. Some natural gas fluctuations shown in the data may be due to adjustments between estimated and actual meter readings.

The following chart shows electricity use for the Monroe Hall building based on utility bills for the 12 month period of January 2008 - December 2008: electric blower use for heating in the winter and air conditioning electric use during the summer.




The following chart shows the natural gas consumption for the Monroe Hall building, based on utility bills for the 12 month period of January 2008 - December 2008.




### 1.2. Utility rate

The Monroe Hall building currently purchases electricity from JCP&L at a general service market rate for electricity use (kWh) with a separate (kW) demand charge. The Monroe Hall building currently pays an average rate of approximately $0.203/kWh based on 12 months of utility bills for 2008.

The Monroe Hall building currently purchases natural gas supply from PSE&G at a general service market rate for natural gas (therms). There is one gas meter that provides natural gas service to the Monroe Hall building currently. The average aggregated rate for the meter is approximately of $1.682/therm 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.

### 1.3. Energy benchmarking

The Monroe Hall 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. The Site Energy Use Intensity is 95 kBtu/ft$^2$yr compared to the national average for similar type building consuming 52 kBtu/ft$^2$yr. Implementing this report's recommendations will make the building energy consumption better than the national average.

Per the LGEA program requirements, SWA has assisted the Township of Hanover to create an *Energy Star Portfolio Manager* account and share the Parks and Recreation Garage 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 Hanover (user name of "Hanovertwp" and same password administered by David W. Leo, Assistant Township Engineer for the Township of Hanover) and TRC Energy Services (user name of TRC-LGEA).

## 2. FACILITY AND SYSTEMS DESCRIPTION

### 2.1. Building Characteristics

The Monroe Hall building consists of a main meeting hall, kitchen and a basement. It was originally built in 1890 and functioned as a church for many years prior to the Township of Hanover taking possession of the building. The building consists of 1,727 square feet of conditioned main space.

### 2.2. Building occupancy profiles

The Monroe Hall building does not house any permanent staff members and is occupied roughly 20 hours / week at various times during the year. The building does not have any set operating schedules at this time. The community meeting room and kitchen are used by various organizations for meetings, such as girl scouts, boy scouts, and Knights of Columbus.

### 2.3. Building envelope

#### 2.3.1. Exterior Walls

The exterior walls consist of (painted) wood clapboards. SWA was told by Township of Hanover maintenance that the exterior walls are poorly or non-insulated. Most basement walls appeared to be in poor condition. Moisture penetration from the outside is apparent, through the original brick and mortar stem walls and the window frames. As a first and cost effective measure, SWA recommends re-grading the perimeter of the building as much as possible to generate a slope away from the basement walls in addition to leading any down spouts away from the same wall at least 4 feet. In a second step SWA recommends an impermeable sealer to be applied to the inside walls and slab where possible. In areas where the brick foundation walls show excessive deterioration, CMU blocks should be used for replacement as already done in some areas.

Due to warm temperature conditions at the time of the field visits, insulation levels on the main floor could not be verified with help of infrared technology. If desired, the Township of Hanover could contract a separate envelope inspection during cooler months.

*Gutter Extension should be directed away from Exterior Walls*

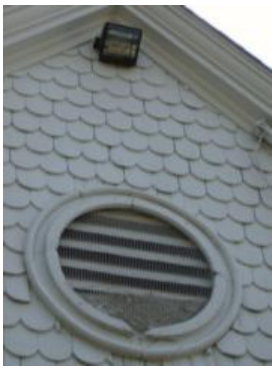
*Signs of Water Penetration on Updated Foundation Walls*

*Signs of Water Penetration on Original Foundation Walls*

### 2.3.2. Roof

The recently replace asphalt shingle roof seems to be in good condition. Insulation on the attic floor was found to be inadequate, outdated insulation material with signs of infiltration from below and sagging ceiling tiles. SWA recommends replacing the current attic insulation with a blown-in type to reflect current minimum code requirements ideally at the same time when dealing with the asbestos flue insulation as mentioned below. SWA does not recommend installing an active gable end fan but rather reconditioning the existing passive gable end louver vents for appropriate attic ventilation. With reconditioning of the gable vents and existing ridge vents, the ventilation will be sufficient for the building. As mentioned under 2.3.1 Exterior Walls, a separate envelope inspection should be conducted during cooler months. SWA suggests basing further insulation related improvement discussions on the outcome of those future findings.

The Township of Hanover has plans to abate asbestos from the chimney flue (presently not utilized) and a couple of other areas in the building ceiling and walls.



*Gable End Louvered Vent were found to be either partially clogged or closed at the time of the field visit*

*Outdated, Compacted and un-uniform Attic Insulation*

### 2.3.3. Base

The building's base seems to be a 4" concrete slab in the basement with a perimeter original brick and mortar footing. As mentioned in 2.3.1, a coating of concrete sealer is recommended to eliminate moisture penetration through the slab surface into the basement. Also, the main floor should be inspected and fiberglass insulation (R-19) added between the floor joists or replaced where missing / defective.

***Water Penetrating from Basement Slab***

***Defective Fiberglass Insulation under Main Floor***

### 2.3.4. Windows

The building contains a couple of original round stained glass windows and newer vinyl double-pane low-E glass windows on the ground floor. Basement windows are older steel casement type. SWA recommends replacing the basement windows, preferably at the same time when other upgrades are being worked on as suggested above.

### 2.3.5. Exterior doors

The wood framed exterior doors were observed to be in good condition except for some missing or worn weather-stripping. SWA recommends that the exterior doors of the building be weather-stripped in order to decrease the amount of conditioned air that is lost around each door. SWA also recommends checking the weather-stripping of each door on a regular basis and replacing any broken seals immediately. Tight seals around doors drastically improve overall energy performance.

### 2.3.6. Building air tightness

Based on visual inspection, the Monroe Hall building was observed not to be a well-sealed building, mostly due to its age and upkeep especially in the basement. Recommendations made in this section and above would all enhance the tightness of this beautiful building and bring it to an acceptable level for its age. Before any work is conducted to decrease the building infiltration, SWA recommends asbestos abatement. Once the asbestos is removed, SWA recommends air sealing all attic by-passes, top-plates, plumbing, wiring, and HVAC penetrations and by-passes. Installing a blown-in insulation, such as cellulose, will additionally decrease infiltration and save energy and conditioned air that is currently being lost.

## 2.4. HVAC Systems

### 2.4.1. Heating

The Monroe Hall is heated by hot air conditioned by a new furnace located in the basement. Outdoor air is brought directly into the furnace via a 3" PVC pipe. The furnace blower is designed to mix room air with outside air, condition the air as necessary, and deliver it to the building spaces through floor grilles. The furnace has a 90% AFUE efficiency. The system was installed in year 2008. SWA recommends sealing air handler plenums, ductwork trunks, take-offs, boots and registers. This should be done with a joint compound made for HVAC ducts called mastic. As conditioned air is lost to unconditioned spaces such as the attic and basement, sealing ductwork will save current energy losses. SWA observed that the 3" PVC furnace air intake and exhaust are only 2 ft apart and too close to an operable window. These distances should be rechecked and set to conform to Township of Hanover building standards.

### 2.4.2. Cooling

The Monroe Hall is served by a 5 ton split system manufactured by Fedders. The split system consists of a condensing unit, model C60ACD1V and a furnace, model FVSA108NH5R. The furnace is equipped with a cooling Direct Expansion (DX) coil.

### 2.4.3. Ventilation

The Monroe Hall building uses natural draft for ventilation. Based on the size of the building and its use this may be sufficient to provide adequate ventilation in the building spaces.

### 2.4.4. Domestic Hot Water

The domestic hot water for the kitchen and bathrooms is provided by a newer electric domestic hot water heater. The domestic hot water heater is model E61-20U-015sV, manufactured by Titan and has a storage capacity of 19 gallons and a heating element of 1.5 kW. SWA does not recommend making any changes to this unit at this time.

More efficient water-consuming fixtures and appliances save both energy and money through reduced energy consumption for water heating, as well decreased water and sewer bills. SWA recommends adding a controlled on / off timers on the lavatory faucets to reduce domestic hot water demand and save water. Building staff can also easily install the faucet aerators and to reduce hot water consumption. In addition, routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy.

## 2.5. Electrical systems

### 2.5.1. Lighting

*Interior Lighting* - The Monroe Hall 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. SWA also recommends installing occupancy sensors in spaces (not occupied fully during the day), bathrooms, offices and areas that are occupied only part of the day. Since bathrooms are used sporadically throughout the day and lighting is commonly left on far beyond the necessary hours of operation, SWA recommends installing occupancy sensors with time delay and acoustic capabilities. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion or sound is detected within a set time period. Since the Monroe Hall is occupied infrequently, occupancy sensors may not be justified in many of the spaces. 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.

*Exit Lights* - The building has mostly fluorescent exit signs installed. SWA recommends that any newly installed exit signs be LED type exit signs.

*Exterior Lighting* - The exterior lighting was surveyed during the building audit: a mix of 75 Watt halogen and hi pressure sodium lamps. Since this lighting is mainly for Safety as well as for Security, SWA has deemed it not cost effective to replace exterior hi pressure sodium lamp lighting at this time. All exterior lighting is controlled by photocells. There is not any immediate need to upgrade this lighting or photocells.

### 2.5.2. Appliances and process

Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. For example, Energy Star refrigerators use as little as 315 kWh / yr. The refrigerator in the kitchen area, an Admiral (manufactured in 1997) uses 773 kWh/yr. When compared to the average electrical consumption of older equipment, Energy Star equipment results in large savings. Look for the Energy Star label when replacing appliances and

equipment, including: window air conditioners, 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.

SWA recommends all computers and all appliances (i.e. fridges, coffee makers, televisions, etc) be plugged into power strips and turned off each evening just as the lights are turned off.

Educating staff is a great way for buildings to save energy while raising awareness about the importance of energy-efficiency. Prizes and challenges can be used to get groups involved in finding creative ways to reduce and monitor energy use. There are many free resources available to help incorporate energy into every day activities. 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/ . NJ Clean Energy will also be coming out soon with a Teach Program maintenance staff.

### 2.5.3. Elevators

The Monroe Hall building is single story building (with basement) and does not contain any elevator equipment.

### 2.5.4. Others electrical systems

There are not currently any other electrical systems installed at the Monroe Hall building.

## 3. EQUIPMENT LIST

### Inventory

| Township of Hanover Monroe Hall | | | | | | |
|---|---|---|---|---|---|---|
| **Building System** | **Description** | **Location** | **Model#** | **Fuel** | **Space served** | **Estimated Remaining useful life %** |
| Heating, cooling and ventilation | 5 ton split system Manufactured by Fedders The furnace has a 90% AFUE efficiency. The system was installed in 2008 | condenser - back of bldg; furnace in basement | C60ACD1V/ FVSA108NH5R | Gas / electric | Monroe Hall | 95% |
| Domestic hot water heater | Domestic hot water heater manufactured by Titan and has a storage capacity of 19 gallons and a heating element of 1.5 kW | basement | E61-20U-015SV | electric | Monroe Hall | 90% |
| Lighting | See details - Appendix A | See details - Appendix A | - | electric | Monroe Hall | varies, average 25% |

**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 Monroe Hall 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

- Building Envelope Insulation - The existing building is poorly insulated based on age and practice of construction when it was built in 1890 and follow-up renovations. An opportunity to install adequate insulation could be at the time that asbestos abatement (in the tiles and abandoned flue stack) will occur. Building windows have already been upgraded to double pane low-E type. This recommendation cannot be cost justified by energy savings alone. However, the age and condition of the building warrant attention and this recommendation is intended to provide guidance to help the building management staff prioritize upgrades within the facility. The existing sparse insulation is inadequate relative to newer technology, and based on discussions with building staff. SWA recommends installing the highest energy insulation systems available and that can be reasonably installed in ceilings and outside walls. SWA recommends adding blown-in cellulose over the current attic insulation to reflect current minimum code requirements, ideally right after dealing with the asbestos flue insulation.
- Basement Windows - SWA recommends replacing the basement windows with newer vinyl double-pane low-E glass windows, preferably at the same time when other upgrades are being worked for increased insulation.

**Category II Recommendations: Operations and Maintenance**

- Controls Optimization - SWA recommends that the schedules for all heating / cooling equipment serving building spaces be reviewed and optimized. During periods when the spaces are not occupied, the equipment may be shut-off or controlled to minimize the amount of fresh air conditioned by the equipment. The cost and effort associated with implementation of this recommendation will depend upon the capabilities of the existing building control system. Energy and cost savings associated with this recommendation will vary, depending upon the current occupancy schedules and means of control utilized.
- 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.
- Penetration energy losses - SWA recommends sealing air handler plenums, ductwork trunks, take-offs, boots and registers. This should be done with a joint compound made for HVAC ducts called mastic. As conditioned air is lost to unconditioned spaces such as the attic and basement, sealing ductwork will save current energy losses.
- Prevent efflorescence and mold growth - SWA recommends re-grading the perimeter of the building as much as possible to generate a slope away from the basement walls in addition to leading any down spouts away from the same wall at least 4 feet. In a second step SWA recommends an impermeable sealer to be applied to the inside walls and slab where possible. Since it appears that there is a small office in the basement, SWA recommends that once walls are sealed more wall insulation be provided to the area.
- Maintain foundation walls - In areas where the brick foundation walls show excessive deterioration, CMU blocks should be used for replacement
- Water Efficient Fixtures & Controls - Adding controlled on / off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and / or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures / appliances will save both energy and money through reduced energy consumption for water heating, while also decreasing water / sewer bills.
- Energy Star labeled appliances such as refrigerators should replace older energy inefficient equipment.
- Create an educational program that teaches staff how to minimize their energy use in the building. 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 |
|---|---|
| **1** | **Upgrade lighting: incandescent to CFLs, occupancy sensors for some areas, Exit fluorescents to LED and T12 magnetic fixtures to T8 electronic fixtures** |
| **2** | **Replace refrigerator with Energy Star model** |

## ECM#1: *Upgrade existing lighting*

**Description:**

On the day of the site visit, SWA completed a lighting inventory of the Monroe Hall building (see Appendix A). The existing lighting consists of many T12 fluorescent fixtures with magnetic ballasts, and some 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 EXIT fluorescent signs to LED. The labor in all these installations was evaluated using prevailing electrical contractor wages. The Township of Hanover 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 gain savings. SWA recommends at a minimum that the incandescent bulbs be replaced with CFLs. See Appendix A for recommendations.

**Installation cost:**

Estimated installed cost: $520
Source of cost estimate: RS *Means; Published and established costs*

**Economics (Some of the options considered with incentives):**

| ECM description | Installed Cost | | 1st year energy savings | | | | | SPP | LoM | Lifetime | ROI % | Annual Carbon Reduced (lbs of CO2) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Estimate $ | Source | Use | Unit | Demand / mo | Unit | Savings / year $ | | | Cost Savings $ | | |
| replace 8 incandescent lamps to CFL | $160 | RS Means, Lit Search | 318 | kWh | 1.0 | kW | 100 | 1.6 | 7 | 616 | 40.7 | 436 |
| install 2 EXIT LED signs with INCENTIVES | $360 | RS Means, Lit Search, NJ Clean Energy Program | 175 | kWh | 0.0 | kW | 36 | 10.1 | 20 | 519 | 2.2 | 240 |
| Total Proposed | $520 | | 493 | kWh | 1.0 | kW | 135 | 3.8 | 16 | 1,671 | 13.8 | 675 |

**Economics (Option with incentives considered that does 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) | $1,850 | RS Means, Lit Search, NJ Clean Energy Program | 329 | kWh | 0.1 | kW | 55 | 33.5 | 20 | 806 | -2.8 | 451 |

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

**Rebates/financial incentives:**

*NJ Clean Energy - EXIT LED ($20 per sign)*
*Maximum incentive amount is $40.*

*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 $300.*

**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: *Replace Refrigerator with Energy Star model*

**Description:**

On the day of the site visit, SWA observed that there is a refrigerator in the kitchen manufactured by Admiral in 1997 which is not Energy Star rated (using approximately 773 kWh/yr). Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. SWA recommends the replacement of the existing refrigerator with a Kenmore 18.2 cu. ft. top freezer refrigerator ENERGY STAR®, Mfr. model #6897, 407 kWh / yr, or equivalent. Besides saving energy, the replacement will also keep the kitchen area cooler. When compared to the average electrical consumption of older equipment, Energy Star equipment results in large savings. Look for the Energy Star label when replacing appliances and equipment, including: window air conditioners, 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.

**Installation cost:**

Estimated installed cost: $500
Source of cost estimate: *Manufacturer and Store 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 kitchen refrigerator with Energy Star model | $500 | Manufacturer and Store Info | 366 | kWh | 0.1 | kW | 74 | 6.7 | 20 | 1,085 | 5.9 | 501 |

**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 - There aren't any incentives at this time offered by the state of NJ for this energy conservation measure.*

**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.

### 5.2. Wind

**Description:**

*Wind power production would not be applicable for the Monroe Hall location, because of the building low electric use and relatively high investment cost even when accounting for loans and incentives.*

### 5.3. Solar Photovoltaic

**Description:**

*A Solar Photovoltaic power production system would not be applicable for the for the Monroe Hall location, because of the building low electric use and relatively high investment cost even when accounting for loans and incentives.*

### 5.4. Solar Thermal Collectors

*Solar thermal collectors are not cost effective for this building and would not be recommended due to the insufficient 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 the building low electric and natural gas use, infrequent and changing use schedules and relatively high investment cost even when accounting for loans and incentives.*

### 5.6. Geothermal

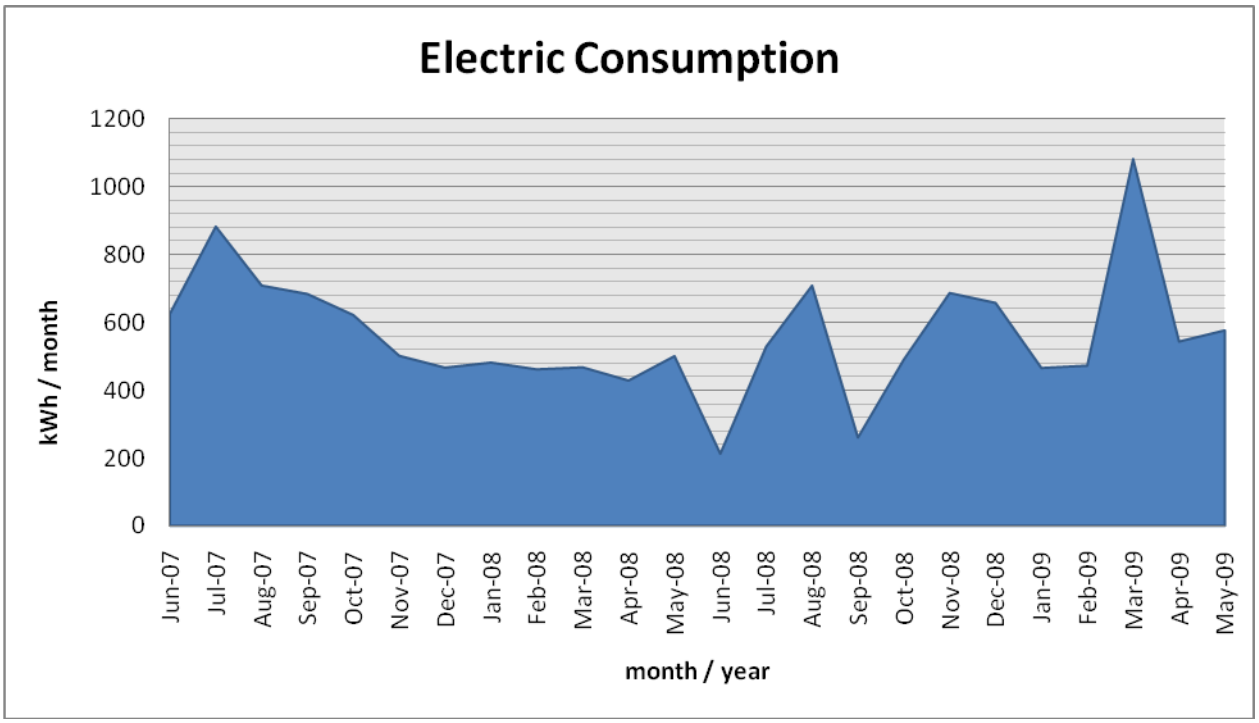
**Description:**

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

## 6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

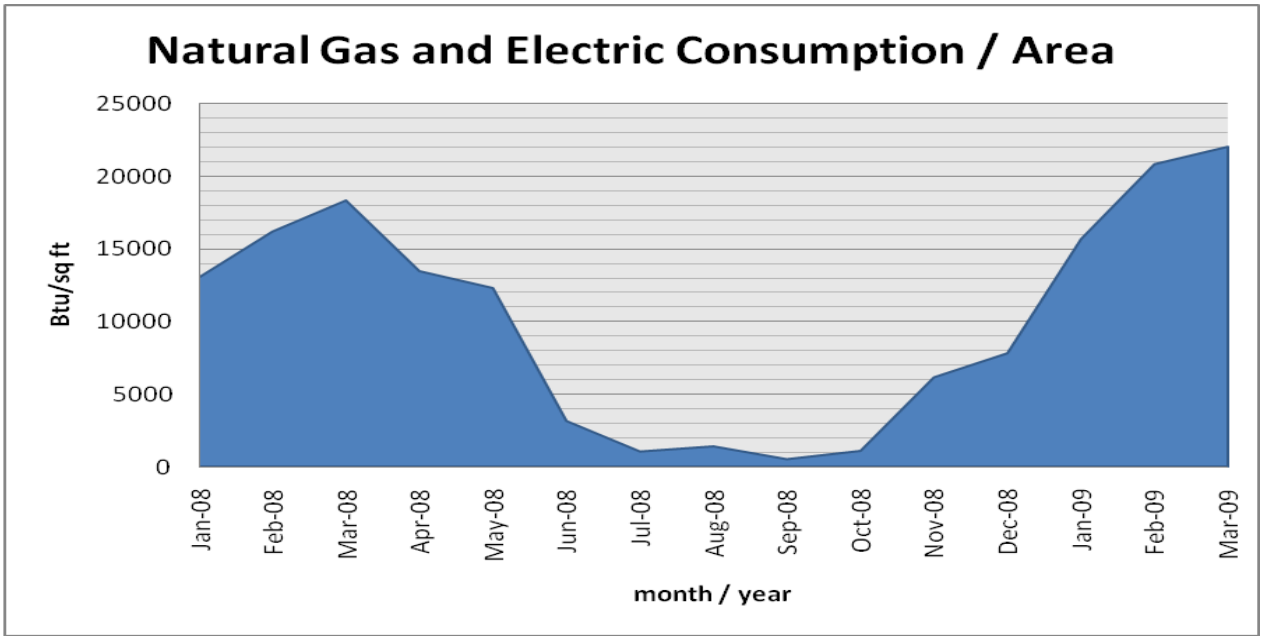
### 6.1. Load profiles

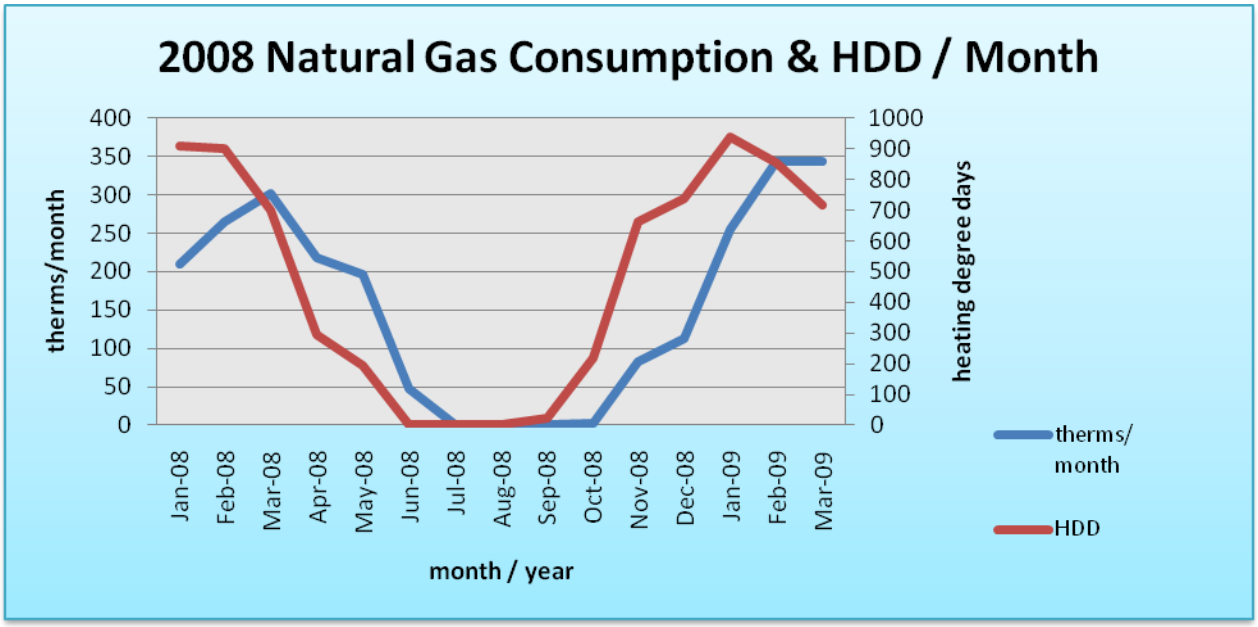
The following are charts that show the annual electric and natural gas load profiles for the Monroe Hall building.




The unusual electric fluctuations shown in Jul 08, Sept 08 and Mar 09 may be due to adjustments between estimated and actual meter readings.

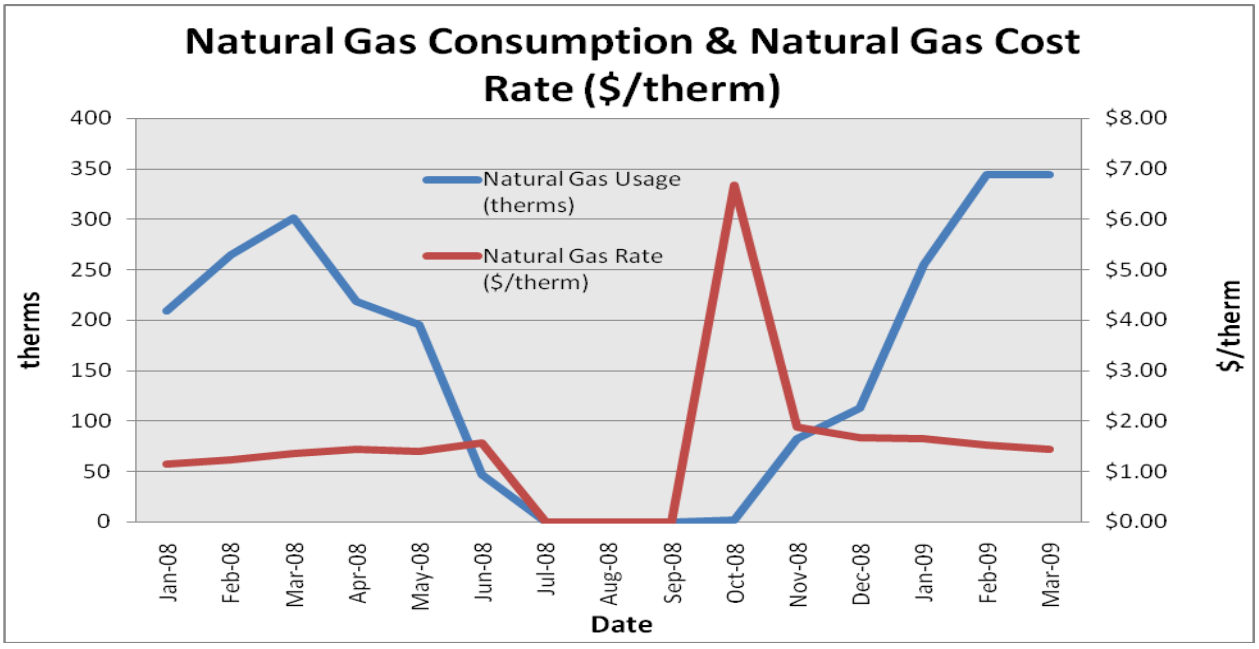
The following are charts of the natural gas and electric consumption per sq ft and natural gas annual load profile for the building, peaking in the coldest months of the year and a chart showing gas consumption mimicking the "heating degree days" curve.






## 6.2. Tariff analysis

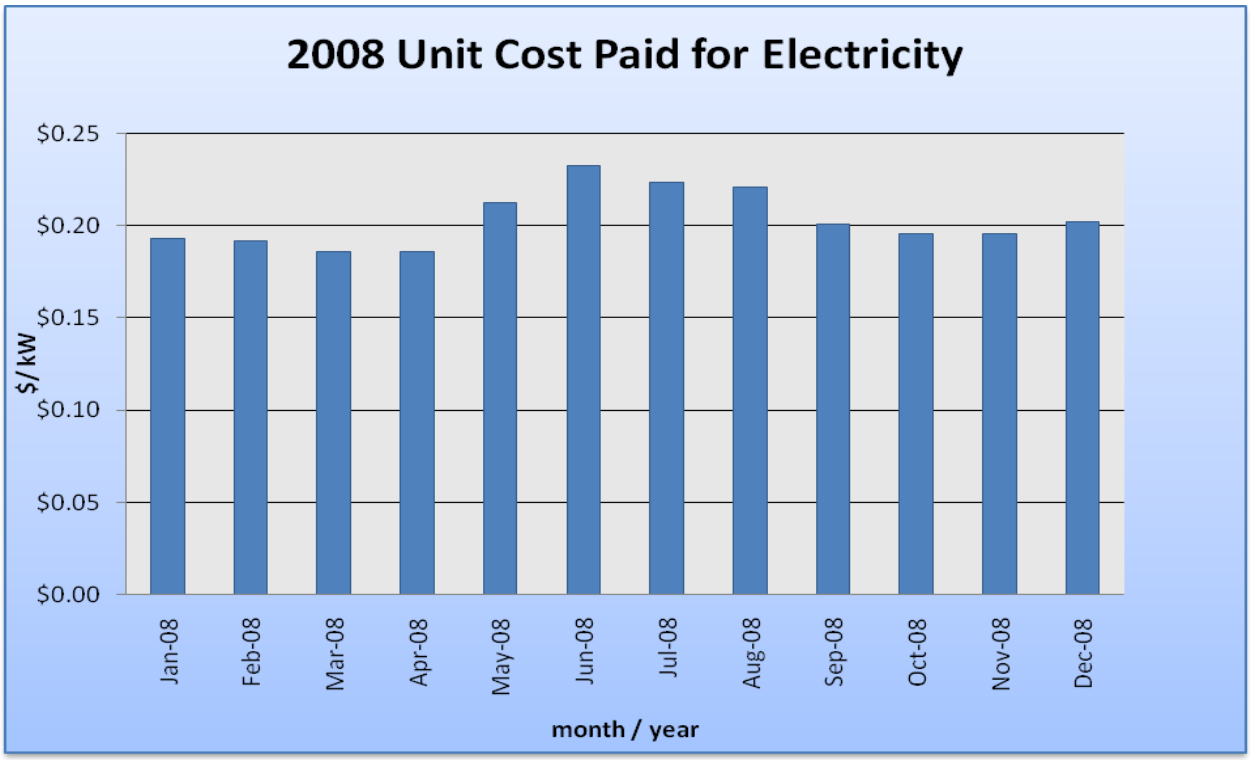
Currently, natural gas is provided to the Monroe Hall building via one gas meter with PSE&G acting as the supply and transport company. Gas supply is provided by PSE&G at a general service rate. The suppliers' general service rate for natural gas charges a market-rate price based on use and the Monroe Hall 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 air furnace unit. The high gas price per therm fluctuations shown on the following chart may be due to high energy costs that occurred in 2008 and low use caps for the non-heating months. Thus the building pays for fixed costs such as meter reading charges during the summer months.

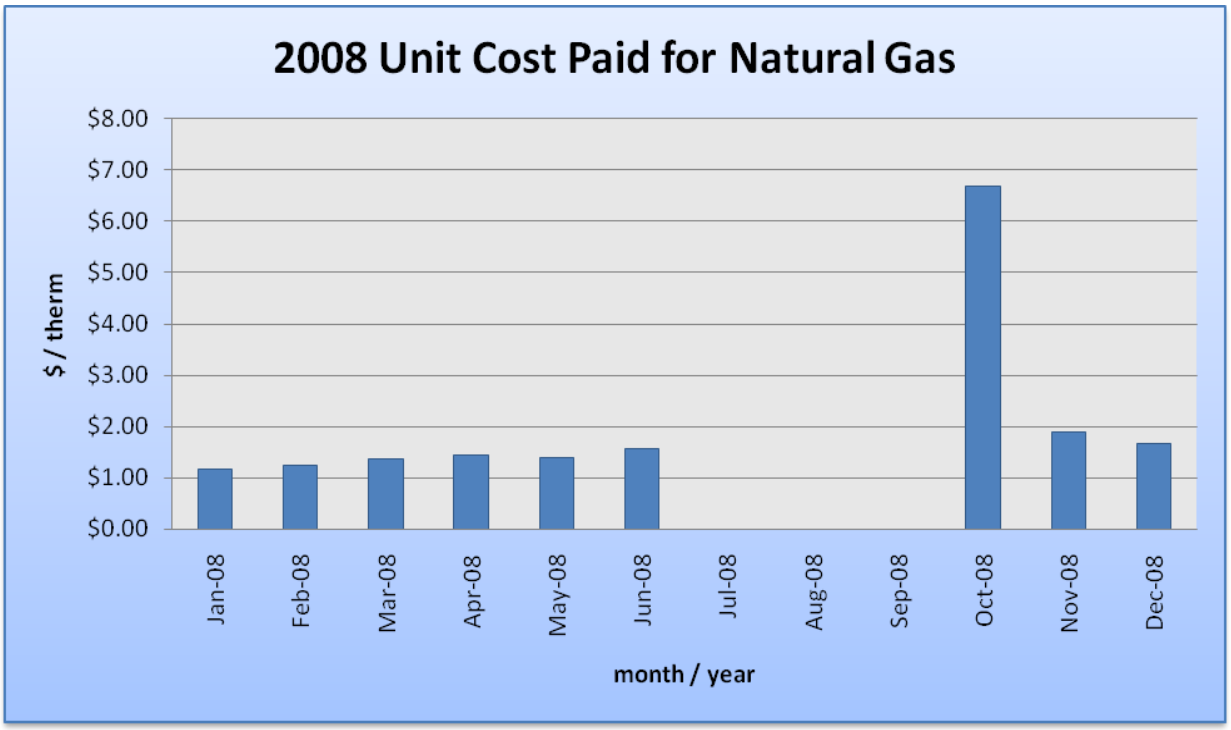


The Monroe Hall building is direct-metered (via one main meter) and currently purchases electricity from JCP&L at a general service rate. The general service rate for electric charges are market-rate based on use and the Monroe Hall billing and does show a breakdown of demand costs. Demand prices are 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 back of building condensing unit and basement air blower.

### 6.3. Energy Procurement strategies

The Monroe Hall receives natural gas via one incoming meter. One company, PSE&G, supplies the gas, and transports it. There isn't and ESCO engaged in the process. An Energy Services Company (ESCO) is a consultancy group that engages in a performance based contract with a client firm to implement measures which reduce energy consumption and costs in a technically and financially viable manner. Electricity is also purchased directly for the Monroe Hall 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 21% over the 2008 - 12 month period. Natural gas bill analysis shows fluctuations in excess of 40% over the 2008 - 12 month period. Some of these fluctuations may have been caused by adjustments between estimated and actual meter readings, others may be due to unusual high and escalating energy costs in 2008. The average estimated NJ commercial utility rates for electric and gas are $0.150/kWh and $1.550/therm respectively. This building's annual utility costs are $311 higher for electric and $189 higher for natural gas for a total of $500 higher, when compared to the average estimated NJ commercial utility rates. SWA recommends that the Township of Hanover 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 Monroe Hall. Appendix B contains a complete list of third party energy suppliers for the Township of Hanover service area. The Township of Hanover may want to consider partnering with other 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. The following charts show the Monroe Hall monthly $ / unit of energy spending for 2008.


2008 Unit Cost Paid for Electricity
$0.25
$0.20
$0.15
$0.10
$0.05
$0.00
$/kW
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
month / year


2008 Unit Cost Paid for Natural Gas
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
$ / therm
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Jun-08
Jul-08
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
month / year

## 7. METHOD OF ANALYSIS

### 7.1. Assumptions and tools

| | |
|---|---|
| Energy modeling tool: | established / standard industry assumptions |
| Cost estimates: | RS Means 2009 (Facilities Maintenance & Repair Cost Data)<br>RS Means 2009 (Building Construction Cost Data)<br>RS Means 2009 (Mechanical Cost Data)<br>Published and established specialized equipment material and labor costs<br>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

| Monroe Hall Existing Lighting Conditions | | | | | | | | | | | | | | | Proposed Lighting | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | Bldg | Flr | 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) | Con-trols | Day-lighting possible? | Fixture Type | Ballast Type | No. of Fixtures | No. of Lamps | Type of Lamp | Watts/ Lamp | Hrs/ Day | Energy Use (Watt hours/ day) | Con-trols | Total Power (Watts) | further W-hr/day reduction with occupancy sensors |
| 1 | MoH | 1 | Bathroom Men | - | incand | N/A | 1 | 1 | I | 75 | 2 | 150 | S | n | **CFL** | **-** | **1** | **1** | **CFL** | **15** | **2** | **30** | **S** | **15** | |
| 2 | MoH | 1 | Bathroom Women | - | incand | N/A | 1 | 1 | I | 75 | 2 | 150 | S | n | **CFL** | **-** | **1** | **1** | **CFL** | **15** | **2** | **30** | **S** | **15** | |
| 3 | MoH | 1 | Auditorium | 110 | T12 4' | M | 8 | 4 | F | 34 | 3 | 3264 | S | Yes | **T8 4'** | **E** | **8** | **4** | **F** | **32** | **3** | **2448** | **S** | **1024** | |
| 4 | MoH | 1 | Auditorium | - | Exit | N/A | 1 | 1 | F | 11 | 24 | 264 | N/A | n | **Exit LED** | **-** | **1** | **1** | **LED** | **1** | **24** | **24** | **N/A** | **1** | |
| 5 | MoH | 1 | Kitchen | 15 | T12 4' | M | 1 | 4 | F | 34 | 2 | 272 | S | n | **T8 4'** | **E** | **1** | **4** | **F** | **32** | **2** | **204** | **S** | **128** | |
| 6 | MoH | 1 | Kitchen | - | incand | N/A | 1 | 1 | I | 100 | 2 | 200 | S | n | **CFL** | **-** | **1** | **1** | **CFL** | **30** | **2** | **60** | **S** | **30** | |
| 7 | MoH | 1 | Basement | 5 | T12 4' | M | 1 | 2 | F | 34 | 1 | 68 | S | n | **T8 4'** | **E** | **1** | **2** | **F** | **32** | **1** | **51** | **S** | **64** | |
| 8 | MoH | 1 | Basement | 5 | incand | N/A | 4 | 1 | I | 100 | 1 | 400 | S | n | **CFL** | **-** | **4** | **1** | **CFL** | **30** | **1** | **120** | **S** | **120** | |
| 9 | MoH | 1 | Hallway | - | incand | N/A | 1 | 1 | I | 100 | 3 | 300 | S | n | **CFL** | **-** | **1** | **1** | **CFL** | **30** | **3** | **90** | **S** | **30** | |
| 10 | MoH | 1 | Hallway | - | Exit | N/A | 1 | 1 | F | 11 | 24 | 264 | N/A | n | **Exit LED** | **-** | **1** | **1** | **LED** | **1** | **24** | **24** | **N/A** | **1** | |
| 11 | MoH | 1 | Outside perimeter | ext | Halogen flood | N/A | 4 | 1 | HPS | 75 | 12 | 3600 | S | photo-cells | Halogen flood | - | 4 | 1 | 75 | 12 | 12 | 3600 | S | 48 | |
| 12 | MoH | 1 | Outside parking | ext | Lantern - HPS | N/A | 1 | 2 | HPS | 75 | 12 | 1800 | S | photo-cells | Lantern - HPS | - | 1 | 2 | 75 | 12 | 12 | 1800 | S | 24 | |
| | | | | TOTALS exterior | | | | | | | | 5,400 | | | | | | | | | | 5,400 | | | |
| | | | | TOTALS interior | | | | | | | | 5,332 | | | | | | | | | | 3,081 | | 1,500 | 0 |
| annual consumption (kWh) | | | | | | | | | | | | 3,917 | | | | | | | | | | 3,096 | includes occupancy sensors | | |
| estimated cost ($/year) | | | | | | | | | | | | $808 | | | | | | | | | | $638 | | | |
| Monroe Hall total light power (Watt) | | | | | | | | | | | | 2,514 | | | | | | | | | | 1,500 | | | |
| Monroe Hall light power density (Watt/sq ft) | | | | | | | | | | | | 1.46 | | | | | | | | | | 0.87 | | | |
| Proposed Annual Savings (kWh) | | | | | | | | | | | | 822 | | | | | | | | | | | | | |
| Proposed Annual Cost Savings ($) | | | | | | | | | | | | $169 | | | | | | | | | | | | | |
| Proposed Investment ($) | | | | | | | | | | | | $2,370 | | | | | | | | | | | | | |
| surface area (sq ft) | | | | | | | | | | | | 1,727 | | | | | | | | | | 1,727 | | | |
| Legend: MoH - Monroe Hall; 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**

| JCP&L ELECTRICAL SERVICE TERRITORY<br>Last Updated: 06/15/09 | | |
|---|---|---|
| **Hess Corporation**<br>1 Hess Plaza<br>Woodbridge, NJ 07095<br>(800) 437-7872<br>www.hess.com | **BOC Energy Services, Inc.**<br>575 Mountain Avenue<br>Murray Hill, NJ 07974<br>(800) 247-2644<br>www.boc.com | **Commerce Energy, Inc.**<br>4400 Route 9 South,<br>Suite 100<br>Freehold, NJ 07728<br>(800) 556-8457<br>www.commerceenergy.com |
| **Constellation NewEnergy, Inc.**<br>900A Lake Street,<br>Suite 2<br>Ramsey, NJ 07446<br>(888) 635-0827<br>www.newenergy.com | **Direct Energy Services, LLC**<br>120 Wood Avenue<br>Suite 611<br>Iselin, NJ 08830<br>(866) 547-2722<br>www.directenergy.com | **FirstEnergy Solutions Corp.**<br>300 Madison Avenue<br>Morristown, NJ 07962<br>(800) 977-0500<br>www.fes.com |
| **Glacial Energy of New Jersey, Inc.**<br>207 LaRoche Avenue<br>Harrington Park, NJ 07640<br>(877) 569-2841<br>www.glacialenergy.com | **Integrys Energy Services, Inc.**<br>99 Wood Ave, South,<br>Suite 802<br>Iselin, NJ 08830<br>(877) 763-9977<br>www.integrysenergy.com | **Liberty Power Delaware, LLC**<br>Park 80 West<br>Plaza II, Suite 200<br>Saddle Brook, NJ 07663<br>(866) 769-3799<br>www.libertypowercorp.com |
| **Liberty Power Holdings, LLC**<br>Park 80 West<br>Plaza II, Suite 200<br>Saddle Brook, NJ 07663<br>(866) 769-3799<br>www.libertypowercorp.com | **Pepco Energy Services, Inc.**<br>112 Main St.<br>Lebanon, NJ 08833<br>(800) ENERGY-9 (363-7499)<br>www.pepco-services.com | **PPL EnergyPlus, LLC**<br>811 Church Road<br>Cherry Hill, NJ 08002<br>(800) 281-2000<br>www.pplenergyplus.com |
| **Sempra Energy Solutions**<br>The Mac-Cali Building<br>581 Main Street, 8th Floor<br>Woodbridge, NJ 07095<br>(877) 273-6772<br>www.semprasolutions.com | **South Jersey Energy Company**<br>One South Jersey Plaza<br>Route 54<br>Folsom, NJ 08037<br>(800) 800-756-3749<br>www.south jerseyenergy.com | **Suez Energy Resources NA, Inc.**<br>333 Thornall Street<br>6th Floor<br>Edison, NJ 08837<br>(888) 644-1014<br>www.suezenergyresources.com |
| **UGI Energy Services, Inc.**<br>704 East Main Street<br>Suite 1<br>Moorestown, NJ 08057<br>(856) 273-9995<br>www.ugienergyservices.com | | |

| PSE&G NATURAL GAS SERVICE TERRITORY<br>Last Updated: 06/15/09 | | |
|---|---|---|
| **Cooperative Industries**<br>412-420 Washington Avenue<br>Belleville, NJ 07109<br>800-6BUYGAS (6-289427)<br>www.cooperativenet.com | **Direct Energy Services, LLP**<br>120 Wood Avenue, Suite 611<br>Iselin, NJ 08830<br>866-547-2722<br>www.directenergy.com | **Dominion Retail, Inc.**<br>395 Highway 170 - Suite 125<br>Lakewood, NJ 08701<br>866-275-4240<br>http://retail.dom.com |
| **Gateway Energy Services Corp.**<br>44 Whispering Pines Lane<br>Lakewood, NJ 08701<br>800-805-8586<br>www.gesc.com | **UGI Energy Services, Inc. d/b/a GASMARK**<br>704 East Main Street, Suite 1<br>Moorestown, NJ 08057<br>856-273-9995<br>www.ugienergyservices.com | **Great Eastern Energy**<br>116 Village Riva, Suite 200<br>Princeton, NJ 08540<br>888-651-4121<br>www.greateastern.com |
| **Hess Energy, Inc.**<br>One Hess Plaza<br>Woodbridge, NJ 07095<br>800-437-7872<br>www.hess.com | **Hudson Energy Services, LLC**<br>545 Route 17 South<br>Ridgewood, NJ 07450<br>877- Hudson 9<br>www.hudsonenergyservices.com | **Intelligent Energy**<br>2050 Center Avenue, Suite 500<br>Fort Lee, NJ 07024<br>800-724-1880<br>www.intelligentenergy.org |
| **Keil & Sons**<br>1 Bergen Blvd.<br>Fairview, NJ 07002<br>1-877-Systrum<br>www.systrumenergy@aol.com | **Metromedia Energy, Inc.**<br>6 Industrial Way<br>Eatontown, NJ 07724<br>877-750-7046<br>www.metromediaenergy.com | **Metro Energy Group, LLC**<br>14 Washington Place<br>Hackensack, NJ 07601<br>888-53-Metro<br>www.metroenergy.com |
| **MxEnergy, Inc.**<br>510 Thornall Street, Suite 270<br>Edison, NJ 088327<br>800-375-1277<br>www.mxenergy.com | **NATGASCO (Mitchell Supreme)**<br>532 Freeman Street<br>Orange, NJ 07050<br>800-840-4GAS<br>www.natgasco.com | **Pepco Energy Services, Inc.**<br>112 Main Street<br>Lebanon, NJ 08833<br>800-363-7499<br>www.pepco-services.com |
| **PPL EnergyPlus, LLC**<br>811 Church Road - Office 105<br>Cherry Hill, NJ 08002<br>800-281-2000<br>www.pplenergyplus.com | **Sempra Energy Solutions**<br>The Mac-Cali Building<br>581 Main Street, 8th fl.<br>Woodbridge, NJ 07095<br>877-273-6772<br>800-2 SEMPRA<br>www.semprasolutions.com | **South Jersey Energy Company**<br>One South Jersey Plaza, Route 54<br>Folsom, NJ 08037<br>800-756-3749<br>www.sjindustries.com/sje.htm |
| **Sprague Energy Corp.**<br>12 Ridge Road<br>Chatham Township, NJ 07928<br>800-225-1560<br>www.spragueenergy.com | **Stuyvesant Energy LLC**<br>10 West Ivy Lane, Suite 4<br>Englewood, NJ 07631<br>800-646-6457<br>www.stuyfuel.com | **Woodruff Energy**<br>73 Water Street<br>Bridgeton, NJ 08302<br>800-557-1121<br>www.woodruffenergy.com |