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December 29, 2010

Local Government Energy Program
Energy Audit Final Report

Glen Ridge Public Schools

District Office
12 High Street
Glen Ridge, NJ 07028

Project Number: LGEA78

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EXECUTIVE SUMMARY

The Glen Ridge Public Schools District Office is a three-story building with basement comprising a total conditioned floor area of 3,510 square feet. The original structure was built in 1905, with renovations in 1922 and in 1997 when the original residential building was repurposed as an office building. The following chart provides an overview of current energy usage in the building based on the analysis period of July 2009 through June 2010:

Table 1: State of Building—Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Other fuel usage, gal/yr	Current Annual Cost of Energy, $	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption , MMBtu/yr
Current	19,652	1,263	N/A	$5,392	55.1	193
Proposed	16,810	1,169	N/A	$4,643	49.7	174
Savings	2,842	94	N/A	$749*	5.4	19
% Savings	14%	7%	N/A	14%	10%	10%

There may be energy procurement opportunities for the Glen Ridge Public Schools District Office to reduce annual utility costs, which are $629 higher, when compared to the average estimated NJ commercial utility rates. Glen Ridge Board of Education should explore the option to participate in the NJSBA ACES program to cooperatively buy both electric and gas, like many other schools throughout New Jersey.

SWA has also entered energy information about the District Office in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This building is comprised of "Office" space in the Benchmark tool; however, a performance score could not be generated because the building is less than 5,000 square feet. The Portfolio Manager software was able to calculate metrics such as source and site energy use intensity. The calculated site energy use intensity is 55.1 kBtu/sqft-yr, which is better than the average comparable building of 77.0 kBtu/sqft-yr by 21.0%.

Based on the current state of the building and its energy use, SWA recommends implementing various energy conservation measures from the savings detailed in Table 1. The measures are categorized by payback period in Table 2 below:

Table 2: Energy Conservation Measure Recommendations

ECMs	First Year Savings ($)	Simple Payback Period (years)	Initial Investment, $	CO2 Savings, lbs/yr
0-5 Year	$310	0.7	$203	2,678
5-10 Year	$439	8.9	$3,911	3,081
>10 year	N/A	N/A	N/A	N/A
Total	$749	5.5	$4,114	5,759

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 1 car from the roads each year or avoiding the need of 14 trees to absorb the annual CO_2 generated.

Other recommendations to increase building efficiency pertaining to operations and maintenance and capital improvements are listed below:

Further Recommendations:

SWA recommends that the district office further explore the following:

- Capital Improvements
  - Install premium motors when replacements are required
  - Repair and or Replace all damaged exterior surfaces
- Operations and Maintenance
  - Maintain programmable thermostat setpoints
  - Maintain downspouts and cap flashing
  - Provide weather-stripping/air-sealing
  - Install hot water pipe insulation
  - Repair/seal wall cracks and penetrations
  - Openings around window air-conditioning units need airtight gaskets/sealants for optimal all year performance.
  - Provide water-efficient fixtures and controls
  - Use smart power electric strips

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Glen Ridge Public Schools. Based on the requirements of the LGEA program, Glen Ridge Public Schools must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is $272.38.

Financial Incentives and Other Program Opportunities

The table below summarizes the recommended next steps that Glen Ridge Public Schools can take to achieve greater energy efficiency and reduce operating expenses. It includes the amount in dollars that Glen Ridge Public Schools is required to spend per building according to the LGEA program guidelines. It is important to note that the required 25% expenditure is per building and after the other implementation incentive amounts.

Table 3: Next Steps for the Glen Ridge District Office

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Install eight (8) new CFL lamps	**Direct Install**
Install one (1) new LED exit signs	**Smart Start, Direct Install**
Install TRVs on five (5) hot water radiators	None Available
Replace one (1) large refrigerator with an 17 cu. ft. ENERGY STAR® model	None Available
Replace one (1) compact refrigerator with an 2.7 cu. ft. ENERGY STAR® model	None Available
Install nine (9) new T8 fluorescent fixtures	**Smart Start, Direct Install**

There are various incentive programs that the Glen Ridge Public Schools could apply for that could help lower the cost of installing the ECMs. For the District Office, and contingent upon available funding, SWA recommends the following incentive programs:

Smart Start: Majority of energy saving equipment and design measures have moderate incentives under this program.

Direct Install 2010 Program: Commercial buildings with peak electric demand below 200kW can receive up to 60% of installed cost of energy saving upgrades. Glen Ridge Board of Education is exempt from this demand requirement if they apply for the EECBG grant before December 31, 2010.

Renewable Energy Incentive Program: Receive up to $0.75/Watt toward installation cost for PV panels upon available funding.
For each 1,000 kWh generated by renewable energy, receive a credit between $475 and $600.

Utility Sponsored Programs: See available programs with PSE&G. http://www.pseg.com/

Energy Efficiency and Conservation Block Grant Rebate Program: Provides up to $20,000 per local government toward energy saving measures.

Please refer to Appendix F for further details.

INTRODUCTION

Launched in 2008, the Local Government Energy Audit (LGEA) Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. The Program will subsidize up to 100% of the cost of the audit. The Board of Public Utilities (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

Steven Winter Associates, Inc. (SWA) is a 38-year-old architectural/engineering research and consulting firm, with specialized expertise in green technologies and procedures that improve the safety, performance, and cost effectiveness of buildings. SWA has a long-standing commitment to creating energy-efficient, cost-saving and resource-conserving buildings. As consultants on the built environment, SWA works closely with architects, developers, builders, and local, state, and federal agencies to develop and apply sustainable, 'whole building' strategies in a wide variety of building types: commercial, residential, educational and institutional.

SWA performed an energy audit and assessment for the District Office at 12 High Street. The process of the audit included facility visits on August 5th, 2010, benchmarking and energy bills analysis, assessment of existing conditions, energy modeling, energy conservation measures and other recommendations for improvements. The scope of work includes providing a summary of current building conditions, current operating costs, potential savings, and investment costs to achieve these savings. The facility description includes energy usage, occupancy profiles and current building systems along with a detailed inventory of building energy systems, recommendations for improvement and recommendations for energy purchasing and procurement strategies.

The goal of this Local Government Energy Audit is to provide sufficient information to the Glen Ridge Public Schools to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the District Office.

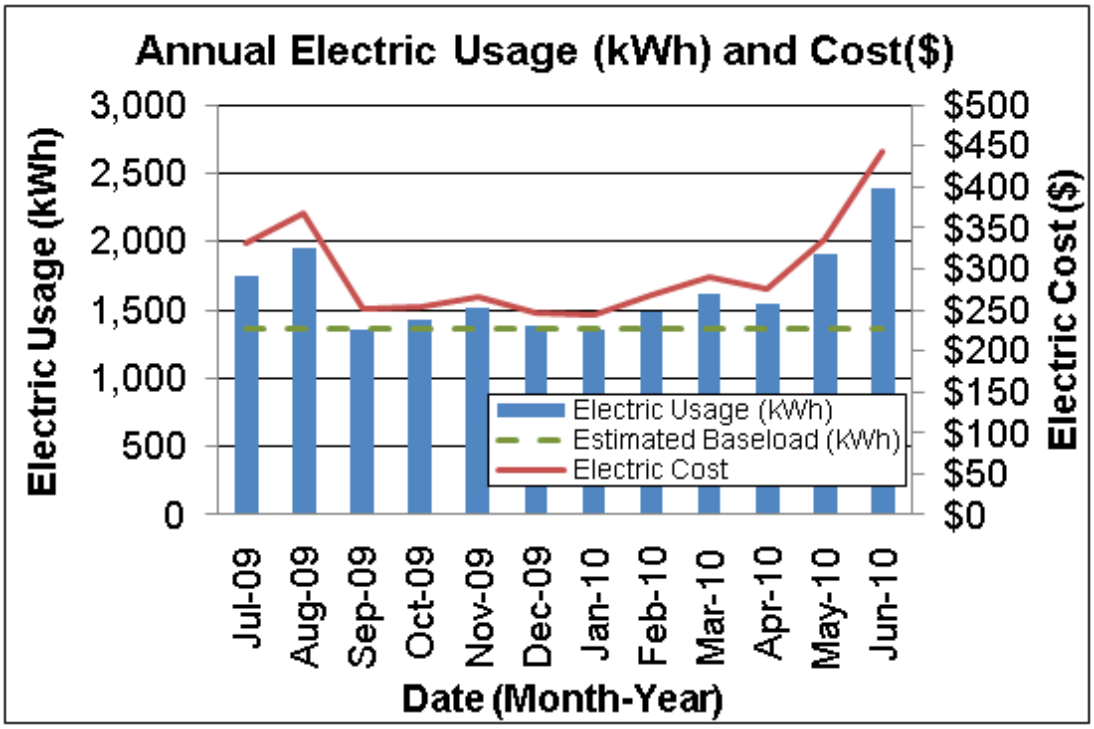
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

SWA reviewed utility bills from July 2008 through June 2010 that were received from the utility companies supplying the District Office with electric and natural gas. A 12 month period of analysis from July 2009 through June 2010 was used for all calculations and for purposes of benchmarking the building.

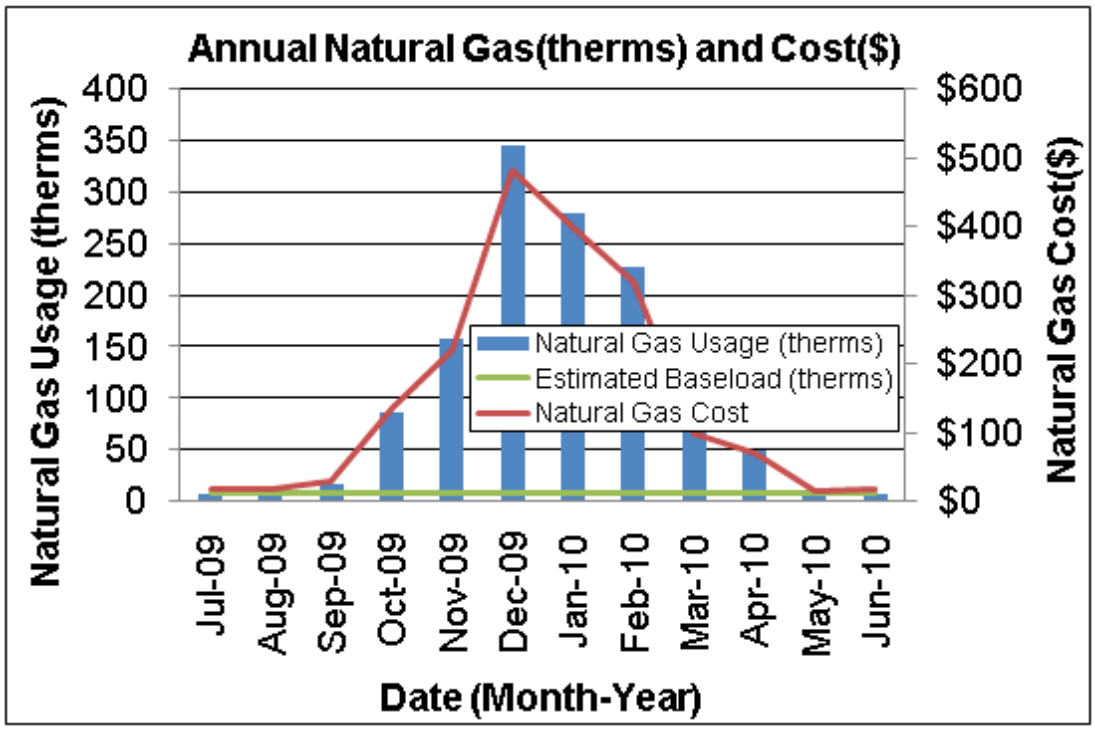
Electricity - The District Office is currently served by one electric meter. The District Office currently buys electricity from PSE&G at **an average aggregated rate of $0.182/kWh**. The District Office purchased **approximately 19,652 kWh, or $3,572 worth of electricity,** in the previous year.

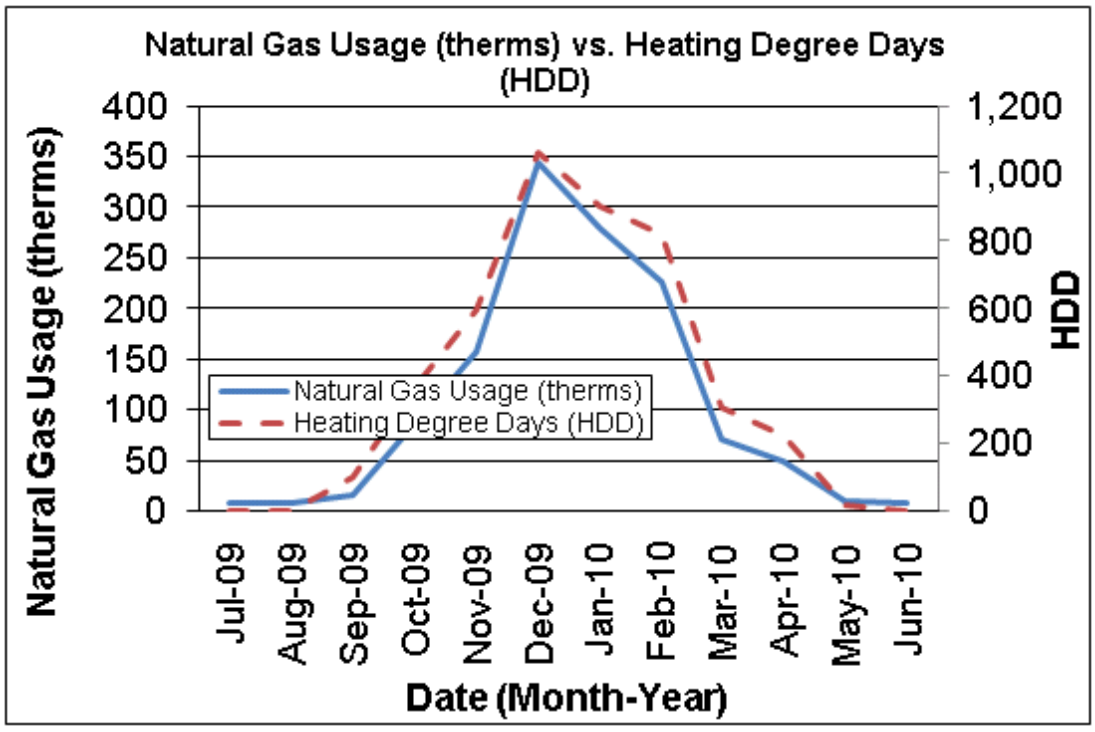
The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate baseload or minimum electric usage required to operate the District Office.



Natural gas - The District Office is currently served by one meter for natural gas. The District Office currently buys natural gas from PSE&G through HESS who acts as a third party supplier at **an average aggregated rate of $1.441/therm**. The District Office purchased **approximately 1,263 therms, or $1,820 worth of natural gas,** in the previous year.

The chart below shows the monthly natural gas usage and costs. The green line represents the approximate baseload or minimum natural gas usage required to operate the District Office.

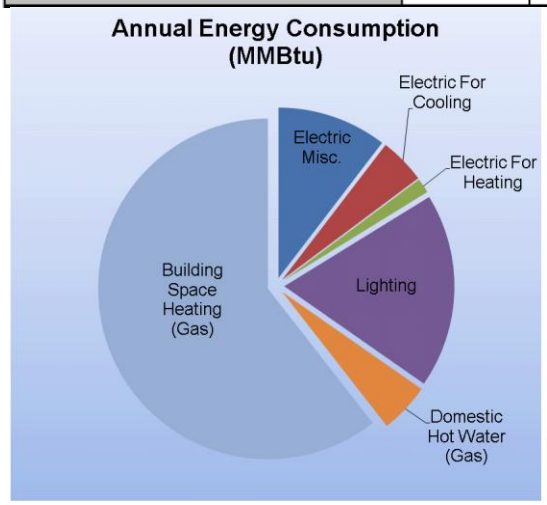


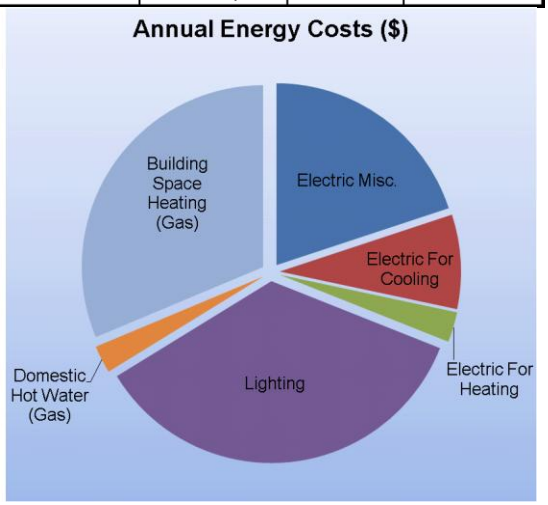


The chart above shows the monthly natural gas usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base temperature. SWA's analysis used a base temperature of 65 degrees Fahrenheit.

The following graphs, pie charts, and table show energy use for the District Office based on utility bills for the 12 month period. Note: electrical cost at $53/MMBtu of energy is greater than three times as expensive as natural gas at $14/MMBtu

Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	20	10%	$1,075	20%	53
Electric For Cooling	8	4%	$452	8%	53
Electric For Heating	3	1%	$145	3%	53
Lighting	36	18%	$1,900	35%	53
Domestic Hot Water (Gas)	9	5%	$132	2%	14
Building Space Heating (Gas)	117	61%	$1,687	31%	14
Totals	193	100%	$5,392	100%	
Total Electric Usage	67	35%	$3,572	66%	53
Total Gas Usage	126	65%	$1,820	34%	14
Totals	193	100%	$5,392	100%	



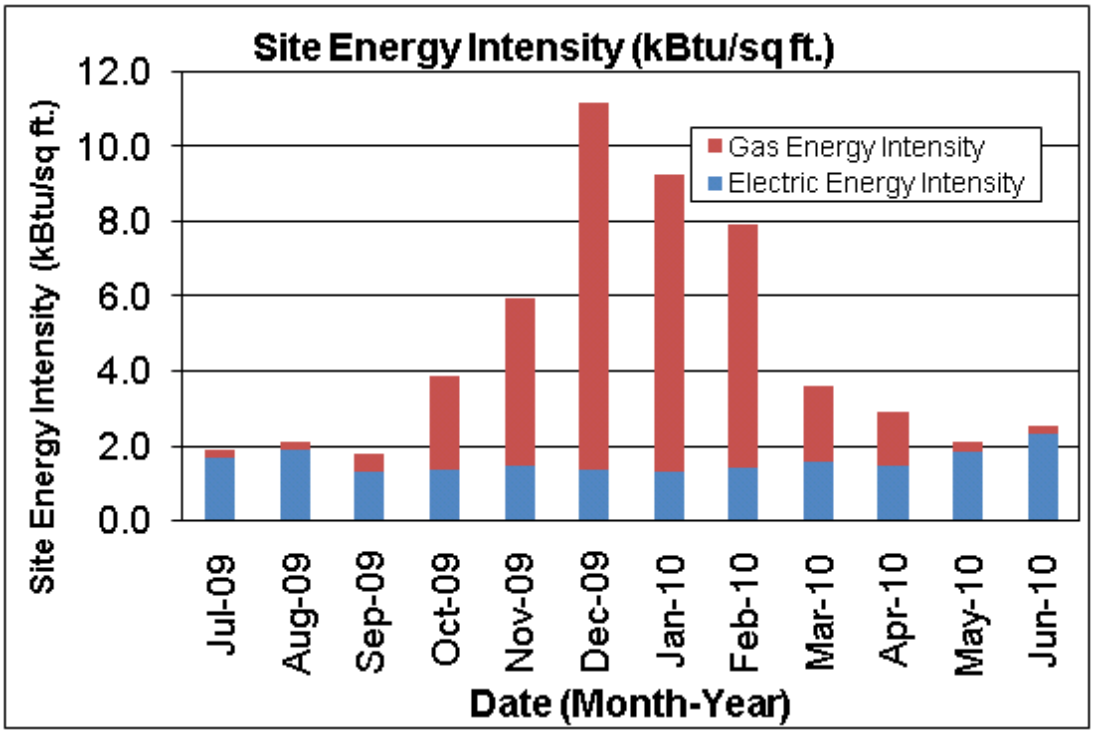


As noted in the above charts, Electric Miscellaneous represents electric loads that are not associated with heating or cooling loads. These miscellaneous loads are mostly associated with various plug-loads such as computers and other electronics. At this building, these loads are typically not monitored and computers are left on with only screensavers to conserve power.

Energy benchmarking

SWA has entered energy information about the District Office in the U.S. Environmental Protection Agency's (EPA) *ENERGY STAR® Portfolio Manager* energy benchmarking system. This office facility is categorized as a non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the District Office is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 55.1 kBtu/ft^2-yr compared to the national average of an office building consuming 77.0 kBtu/ft^2-yr. See ECM section for guidance on how to improve the building's rating.

Due to the nature of its calculation based upon a survey of existing buildings of varying usage, the national average for “Other” space types is very subjective, and is not an absolute bellwether for gauging performance. Additionally, should the Glen Ridge Public Schools desire to reach this average there are other large scale and financially less advantageous improvements that can be made, such as envelope window, door and insulation upgrades that would help the building reach this goal.



Per the LGEA program requirements, SWA has assisted the Glen Ridge Public Schools to create an *ENERGY STAR® Portfolio Manager* account and share the District Office facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager account information with the Glen Ridge Public Schools (user name of “glrenridge” with a password of *“glenridge”)* and TRC Energy Services (user name of “TRC-LGEA”).

Tariff analysis

As part of the utility bill analysis, SWA evaluated the current utility rates and tariffs. Tariffs are typically assigned to buildings based on size and building type.

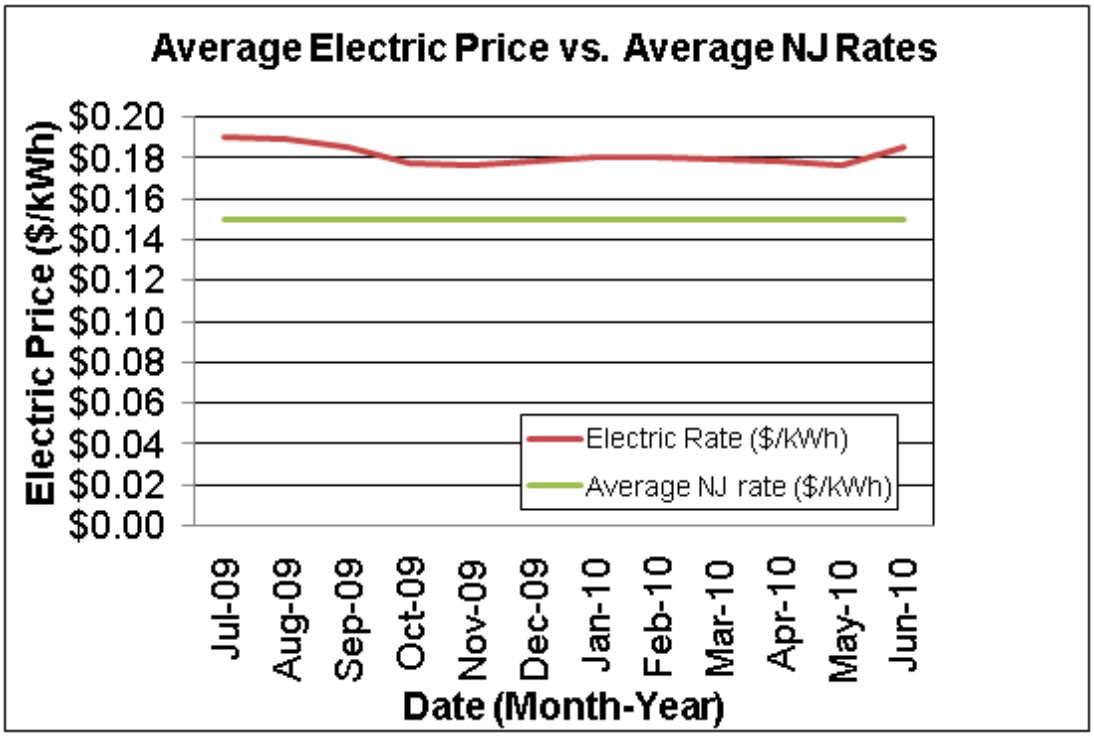
Tariff analysis is performed to determine if the rate that a municipality is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric and gas provision. Typically, the natural gas prices increase during the heating months when natural gas is used by the hot water boiler units. Some high gas price per therm fluctuations in the summer may be due to high energy costs that recently occurred and low use caps for the non-heating months. Typically, electricity prices also increase during the cooling months when electricity is used by the air conditioning units.

The supplier charges a market-rate price based on use, and the billing does not break down demand costs for all periods because usage and demand are included in the rate. Currently, the Glen Ridge Public Schools is paying a general service rate for natural gas. Demand is not broken out in the bill. Thus the building pays for fixed costs such as meter reading charges during the summer months. The building is direct metered and currently purchases electricity at a general service rate for usage with an additional charge for electrical demand factored into each monthly bill. The general service rate for electric charges is market-rate based on usage and demand. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year.

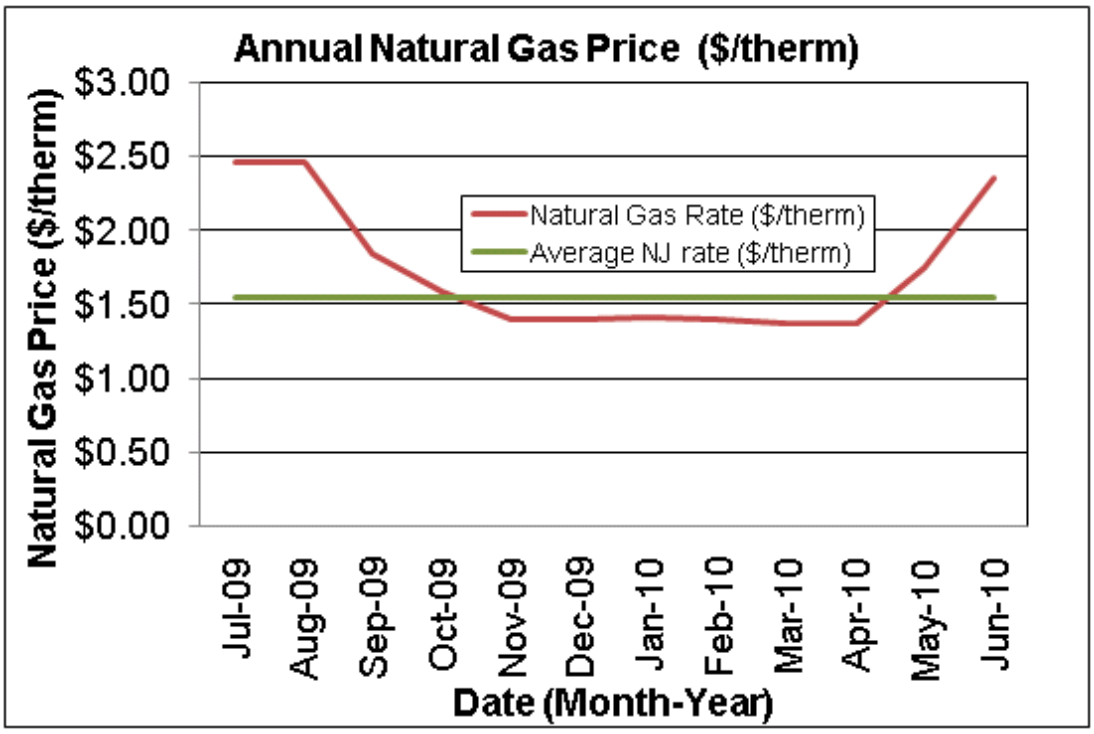
Energy Procurement strategies

Billing analysis is conducted using an average aggregated rate that is estimated based on the total cost divided by the total energy usage per utility per 12 month period. Average aggregated rates do not separate demand charges from usage, and instead provide a metric of inclusive cost per unit of energy. Average aggregated rates are used in order to equitably compare building utility rates to average utility rates throughout the state of New Jersey.

The average estimated NJ commercial utility rates for electric are $0.150/kWh, while District Office pays a rate of $0.182/kWh. The District Office annual electric utility costs are $629 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 7% over the most recent 12 month period.



The average estimated NJ commercial utility rates for gas are $1.550/therm, while District Office pays a rate of $1.441/therm. Natural gas bill analysis shows fluctuations up to 44% over the most recent 12 month period.



Utility rate fluctuations may have been caused by adjustments between estimated and actual meter readings; others may be due to unusual high and recent escalating energy costs.

SWA recommends that the District Office further explore opportunities of purchasing both natural gas and electricity from third-party suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the District Office. Appendix C contains a complete list of third-party energy suppliers for the Glen Ridge Public Schools service area.

EXISTING FACILITY AND SYSTEMS DESCRIPTION

This section gives an overview of the current state of the facility and systems. Please refer to the Proposed Further Recommendations section for recommendations for improvement.

Based on visits from SWA on Thursday, August 05, 2010, the following data was collected and analyzed.

Building Characteristics

The three-story, including a full basement, 3,510 square feet district office was originally constructed in 1905 with alterations completed in 1922 and a full renovation and repurposing in 1997. It houses administration and municipal offices, as well as a conference room, storage rooms, and kitchen.

East Façade

West Façade

South Façade

Partial North Façade

Building Occupancy Profiles

Its occupancy is approximately nine employees daily from 8:00 AM to 4:00 PM Monday through Friday.

Building Envelope

Exterior Walls

The exterior wall envelope is mostly constructed of vinyl clapboard siding accents, over 3-1/2" wood stud framing with 3-1/2 inches of fiberglass batt cavity insulation. Other areas are constructed of stucco over concrete block with 1-1/2 inches of foam board insulation. The interior is mostly painted gypsum wallboard.

Note: Wall insulation levels could not be verified in the field or on construction plans, and are based upon similar wall types and time of construction.

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall good condition with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues detected on all facades.

The following specific exterior wall problem spots and areas were identified:

Typical exterior wall systems with missing siding and damaged exterior wall finishes; as well as damage around an improperly sealed and insulated exterior wall penetration.

Roof

The building's roof is predominantly a medium-pitch shed type over a wood structure, with an asphalt shingle surface. It was recently installed in 1997. Six inches of batt insulation for a total insulation value of R-19 has been assumed.

Note: Roof insulation levels could not be verified in the field or on construction plans, and are based upon similar wall types and time of construction.

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall good condition, with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues detected on all roof areas.

The following specific roof problem spots were identified:

Typical roof systems with some instances of missing or ineffective flashing

Base

The building's base is composed of a below grade basement with 4" slab floor with a perimeter footing with concrete block foundation walls and no detectable slab edge/perimeter insulation.

Slab/perimeter insulation levels could not be verified in the field or on construction plans, and are based upon similar wall types and time of construction.

The building's base and its perimeter were inspected for signs of uncontrolled moisture or water presence and other energy-compromising issues. Overall the base was reported to be in good condition with no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues neither visible on the interior nor exterior.

Windows

The building contains basically three different types of windows:

1. Double-hung type windows with an insulated aluminum frame, clear double glazing and interior mini blinds. The windows are located throughout the building and were installed in 1997.

2. Double-hung type windows with an insulated aluminum frame, frosted double glazing and interior mini blinds. The windows are located in the bathrooms only and were installed in 1997.

3. Slider type windows with an insulated aluminum frame, clear double glazing and no interior or exterior shading devices. The windows are located in the basement only and were installed in 1997.

Windows, shading devices, sills, related flashing and caulking were inspected as far as accessibility allowed for signs of moisture, air-leakage and other energy compromising issues. Overall, the windows were found to be in good condition with only a few signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific window problem spots were identified:

Typical window units with air-leakage at sleeved window conditioning units

Exterior doors

The building contains only one type of exterior door:

1. Solid metal type exterior doors. They are located on the east west and south facades and were installed in 1997.

All exterior doors, thresholds, related flashing, caulking and weather-stripping were inspected for signs of moisture, air-leakage and other energy-compromising issues. Overall, the doors were found to be in good condition with no signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific door problem spots were identified:

Typical exterior doors with no visible energy compromising issues.

Building air-tightness

Overall, the field auditors found the building to be reasonably air-tight, considering the building's use and occupancy, as described in more detail earlier in this chapter.

The air tightness of buildings helps maximize all other implemented energy measures and investments, and minimizes potentially costly long-term maintenance, repair and replacement expenses.

Mechanical Systems

Heating Ventilation Air Conditioning

The office is heated and cooled by separate systems. It is cooled by through the window and wall air conditioners and a central air split system, heated by hot water radiators. The building is naturally ventilated using operable windows; however, window air conditioners aid in pulling fresh outside air into the building. Bathroom exhaust fans rid the building of stale air, which puts a negative pressure on the building which induces fresh air into the building via infiltration. No comfort issues were reported by the building staff.

Equipment

The district office is cooled by seven through the window and wall air conditioners and a central air split system. Of the seven air conditioners only one is ENERGY STAR® qualified. They vary in capacity from 6,000 – 25,200 BTU, are all operating with R-22 refrigerant and

have efficiency ratings that range from EER's of 9.4 – 10.8. The split system is a Fujitsu Halcyon unit, with an exterior condenser and wall mounted evaporator. It has a rated capacity of 24,200 BTU, an estimated SEER of 18 and operates with R-410A. A comprehensive equipment list can be found in Appendix A.

Heat for the building is provided by cast iron hot water radiators supplied by a natural gas fired hot water boiler. The boiler is a sealed-combustion, cast iron boiler manufactured by Peerless, model number G-761. The unit was installed in 1997 and is in good operating condition with approximately 35% of its estimated useful life cycle remaining.

Existing Peerless boiler and nameplate

There are four exhaust fans located on the roof level, which serve the bathrooms. They are combination exhaust fan and lighting units and are manufactured by Broan. Not all fans were accessible during the field visit due to the lack of a visible nameplate. In general, the building exhaust fans have an estimated 36% useful operating life left.


Typical combination exhaust fans and bathroom light units.

Distribution Systems

Heat for the building is distributed by hot water cast iron radiators with manually operated control valves. They are located in every room of the building and are all in good operating condition. A majority of the units are covered or housed in an enclosure.

Typical cast iron radiator

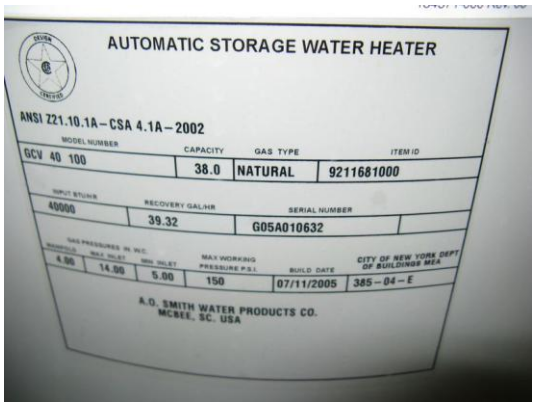
Controls

Several of the individual air conditioners are equipped with their own individual thermostats and remote controls. Heating in the form of boiler operation, is controlled by a digital programmable thermostat and it's located in the office area on the ground floor.

Existing thermostat on the ground floor

Domestic Hot Water

The domestic hot water (DHW) for the District Office is provided by a natural gas fired, atmospheric A.O. Smith Pro Max storage water heater with 38 gallons of storage and 40,000 BTU/Hr. capacity.



This heater has 67% estimated useful operating life remaining and appears in good condition.

Electrical systems

Lighting

See attached lighting schedule in Appendix B for a complete inventory of lighting throughout the building including estimated power consumption and proposed lighting recommendations.

As of **July 1, 2010** magnetic ballasts most commonly used for the operation of T12 lamps will no longer be produced for commercial and industrial applications. Also, many T12 lamps will be phased out of production starting July 2012.

Interior Lighting - The office currently contains fixtures with mostly efficient electronically ballasted T8 lamps; however, there are some inefficient magnetically ballasted T12 lamps. There are also some self ballasted incandescent lamp and CFL fixtures as well as some halogen lamp track fixtures. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas.

Exit Lights - Exit signs were found to be a mixture of fluorescent and LED type.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of Metal Halide lamp, incandescent, and CFL fixtures. Exterior lighting is controlled by photocells and switches.

Appliances and process

SWA has conducted a general survey of larger, installed equipment. Appliances and other miscellaneous equipment account for a significant portion of electrical usage within the building. Typically, appliances are referred to as “plug-load” equipment, since they are not inherent to the building’s systems, but rather plug into an electrical outlet. Equipment such as process motors, computers, computer servers, radio and dispatch equipment, refrigerators, vending machines, printers, etc. all create an electrical load on the building that is hard to separate out from the rest of the building’s energy usage based on utility analysis.

There are a total of three refrigerators installed at the office. Of the three units, one is a newer energy efficient model and the other two are older inefficient models. The newer unit and one of the smaller units are small compact refrigerators. The other older model is a large residential sized unit.

Elevators

The District Office does not have an installed elevator.

Other electrical systems

There are not currently any other significant energy-impacting electrical systems installed at the district office.

RENEWABLE AND DISTRIBUTED ENERGY MEASURES

Renewable energy is defined as any power source generated from sources which are naturally replenished, such as sunlight, wind and geothermal. Technology for renewable energy is improving, and the cost of installation is decreasing, due to both demand and the availability of state and federal government-sponsored funding. Renewable energy reduces the need for using either electricity or fossil fuel, therefore lowering costs by reducing the amount of energy purchased from the utility company. Technology such as photovoltaic panels or wind turbines, use natural resources to generate electricity on the site. Geothermal systems offset the thermal loads in a building by using water stored in the ground as either a heat sink or heat source. Solar thermal collectors heat a specified volume of water, reducing the amount of energy required to heat water using building equipment. Cogeneration or CHP allows you to generate electricity locally, while also taking advantage of heat wasted during the generation process.

Existing systems

Currently there are no renewable energy systems installed in the building.

Evaluated Systems

Solar Photovoltaic

Photovoltaic panels convert light energy received from the sun into a usable form of electricity. Panels can be connected into arrays and mounted directly onto building roofs, as well as installed onto built canopies over areas such as parking lots, building roofs or other open areas. Electricity generated from photovoltaic panels is generally sold back to the utility company through a net meter. Net-metering allows the utility to record the amount of electricity generated in order to pay credits to the consumer that can offset usage and demand costs on the electric bill. In addition to generation credits, there are incentives available called Solar Renewable Energy Credits (SRECs) that are subsidized by the state government. Specifically, the New Jersey State government pays a market-rate SREC to facilities that generate electricity in an effort to meet state-wide renewable energy requirements.

Based on utility analysis and a study of roof conditions, the District Office is not a good candidate for a Solar Panel installation. There is insufficient roof space for panels to reasonably supplement the power consumption of the building and insufficient solar exposure to justify the installation of solar arrays.

Solar Thermal Collectors

Solar thermal collectors are not cost-effective for this building and would not be recommended due to the insufficient and intermittent use of domestic hot water throughout the building to justify the expenditure.

Wind

The District Office is not a good candidate for wind power generation due to insufficient wind conditions in this area of New Jersey.

Geothermal

The District Office is not a good candidate for geothermal installation since it would require replacement of the entire existing HVAC system, of which major components still have between 25% and 95% remaining useful life.

Combined Heat and Power

The District Office is not a good candidate for CHP installation and would not be cost-effective due to the size and operations of the building. Typically, CHP is best suited for buildings with a high electrical baseload to accommodate the electricity generated, as well as a means for using waste heat generated. Typical applications include buildings with an absorption chiller, where waste heat would be used efficiently.

PROPOSED ENERGY CONSERVATION MEASURES

Energy Conservation Measures (ECMs) are recommendations determined for the building based on improvements over current building conditions. ECMs have been determined for the building based on installed cost, as well as energy and cost-savings opportunities.

Recommendations: Energy Conservation Measures

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Install eight (8) new CFL bulbs
2	Install one (1) new LED exit signs
	Description of Recommended 5-10 Year Payback ECMs
3	Install TRVs on (5) hot water radiators
4	Replace one (1) large refrigerator with an 17 cu. ft. ENERGY STAR® model
5	Replace one (1) compact refrigerator with an 2.7 cu. ft. ENERGY STAR® model
6	Install nine (9) new T8 fluorescent fixtures
7	Replace one (1) window air conditioning unit with ENERGY STAR® efficient type

In order to clearly present the overall energy opportunities for the building and ease the decision of which ECM to implement, SWA calculated each ECM independently and did not incorporate slight/potential overlaps between some of the listed ECMs (i.e. lighting change influence on heating/cooling.

ECM#1: Install eight (8) new CFL lamps

On the day of the site visit, SWA completed a lighting inventory of the Glen Ridge District Office (see Appendix B). The existing lighting inventory contained a total of eight inefficient incandescent and halogen lamps. SWA recommends that each of these lamps is replaced with a more efficient, Compact Fluorescent Lamp (CFL). CFLs are capable of providing equivalent or better light output while using less power.

Installation cost:

Estimated installed cost: $72 (includes $40 of labor)
Source of cost estimate: RS Means; Published and established costs, NJ Clean Energy Program

Economics:

Est. installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
72	0	72	1,268	0.3	0	1.2	33	264	5	1,321	0.3	1,735	347	367	1,131	2,270

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

Rebates/financial incentives:

- NJ Clean Energy – Direct Install program (Up to 60% of the installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#2: Install one (1) new LED exit sign

On the days of the site visits, SWA completed a lighting inventory of the Glen Ridge District Office (see Appendix B). The District Office currently contains one fluorescent exit sign. SWA recommends replacing this exit sign with a newer, more efficient LED model. Exit signs present a good opportunity for savings since they are operated 24 hours per day.

Installation cost:

Estimated installed cost: $131 (includes $75 of labor)
Source of cost estimate: RS *Means; Published and established costs, NJ Clean Energy Program*

Economics:

Est. installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
151	20	131	228	0.0	0	0.2	5	46	15	692	2.8	430	29	35	413	408

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

Rebates/financial incentives:

- NJ Clean Energy – SmartStart – LED Exit Signs ($20 per fixture)
    - Maximum Incentive Amount: $20
- NJ Clean Energy – Direct Install program (Up to 60% of the installed cost)

Please see Appendix F for more information on Incentive Programs

ECM#3: Install TRVs on five (5) hot water radiators

The District Office has steam radiators installed throughout the building. Most of the radiators have only simple on and off controllability. Thermostatic radiators valves, TRV's, are a simple, low cost, and effective method of controlling hot water radiator heating. TRV's regulate the amount of hot water through the radiator by controlling the venting of air. The valve is self-regulating, and consists of a valve and a sensor. As the space conditions change, the valve will respond to maintain the temperature set point. This avoids having to open windows to compensate for over-heating the space. The TRVs can be manually adjusted at the valve itself, or by a remote thermostat.

Given that the radiators are installed throughout the building, it is not practical to install remote thermostats for each one, and the temperature set point should be relatively consistent during each season. Typically the valves have a set point range of 41˚F to 78.8˚C, but can be limited to a smaller range through a minor adjustment. Therefore, SWA recommends installing manual TRV valves on the hot water supply for 5 separate radiators.

Installation cost:

Estimated installed cost: $1,000 (includes $500 of labor)
Source of cost estimate: RS Means; Published and established costs

Est. Installed Cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	Therms of Natural gas, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
1,000	0	1,000	0	0.0	94	0.1	0	133	15	1,990	7.5	99	7	10	561	1,036

Assumptions: SWA calculated the savings for this measure assuming that all existing radiators will be retrofitted with TRV's. It is also assumed that 0.75% of the total heating cost can be saved by installing TRVs.

Rebates/financial incentives:

- None at this time

Please see Appendix F for more information on Incentive Programs.

ECM#4: Replace one (1) large refrigerator with an 17 cu. ft. ENERGY STAR® model

On the day of the site visit, SWA observed that there was an older refrigerator, 17 cu. ft. model in the building which was not Energy Star rated (using approximately 773 kWh/year). Appliances, such as refrigerators, that are over 10 years of age should be replaced with a newer efficient model with the Energy Star label. SWA recommends the replacement of the existing refrigerator with a 17 cu. ft. top freezer ENERGY STAR® refrigerator. Besides saving energy, the replacement will also keep their surroundings 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: $600 (Includes $50 in labor cost)
Source of cost estimate: Manufacturer and Store established costs

Economics:

Est. Installed cost, $	Est. incentives, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
600	0	600	375	0.1	0	0.4	0	68	12	819	8.8	37	3	8	203	671

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

Rebates/financial incentives:

- There is no incentive available for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

ECM#5: Replace one (1) compact refrigerator with an 2.7 cu. ft. ENERGY STAR® model

On the day of the site visit, SWA observed that there were eight older 2.7 cu. ft. model refrigerators that are not ENERGY STAR® rated (using approximately 254 kWh/year). 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 older model compact refrigerators with a 2.7 cf. ft. ENERGY STAR® model or equivalent. Besides saving energy, the replacement will also keep their surroundings 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: $119 (Includes $20 in labor cost)
Source of cost estimate: Manufacturer and Store established costs

Economics:

Est. installed cost, $	Est. incentive, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
119	0	119	70	0.0	0	0.1	0	13	12	153	9.3	28	2	7	31	125

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

Rebates/financial incentives:

- There is no incentive available for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

ECM#6: Install nine (9) new T8 fluorescent fixtures

On the day of the site visit, SWA completed a lighting inventory of the Glen Ridge District Office (see Appendix B). The existing lighting inventory contained nine inefficient T12 fluorescent fixtures with magnetic ballasts. SWA recommends replacing each existing fixture with more efficient T8 fluorescent fixtures with electronic ballasts. T8 fixtures with electronic ballasts provide equivalent or better light output while reducing energy consumption by 30% when compared to a T12 fixture with magnetic ballast.

Installation cost:

Estimated installed cost: $1,567 (includes $855 of labor)
Source of cost estimate: RS Means; Published and established costs, NJ Clean Energy Program

Economics:

Est. installed cost, $	Est. incentive, $	Net est. cost with incentives, $	kWh, 1st year savings	kW, demand reduction	therms, 1st year savings	kBtu/sq ft, 1st year savings	Est. operating cost, 1st year savings, $	Total 1st year savings, $	Life of measure, years	Est. lifetime energy cost savings, $	Simple payback, years	Lifetime return-on-investment, %	Annual return-on-investment, %	Internal rate of return, %	Net present value, $	CO_2 reduced, lbs/year
1,702	135	1,567	551	0.1	0	0.5	61	161	15	2,420	9.7	54	4	6	332	987

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

Rebates/financial incentives:

- NJ Clean Energy - Smart Start - T8 fixtures with electronic ballasts ($15 per fixture)
    - Maximum Incentive Amount: $135
- NJ Clean Energy – Direct Install program (Up to 60% of the installed cost)

Please see Appendix F for more information on Incentive Programs.

ECM#7: Replace two (2) window air conditioning units with ENERGY STAR® efficient type units

There were 8 window air conditioners installed at the building of various ages and efficiencies. There were two GE Quiet-Aire units (Models AGN12ABG1: Serial numbers ZV012459 and DZ018058) that were observed to be in slightly worse condition than the other units in the building. These two units had efficiency values of 9.8 EER and have operating useful lifetimes of less than 50%. SWA suggests that these are the most cost-effective units to replace at this time.

Window air conditioners cool rooms rather than the entire building. If they provide cooling only where they're needed, room air conditioners are less expensive to operate than central units, even though their efficiency is generally lower than that of central air conditioners. A room air conditioner features a condenser on the end that faces the outside and a condenser fan behind it that blows air through it, helping to remove the heat from the condenser. On the end facing the room is the evaporator, with an evaporator fan behind that to push the cool air into the room. The filter is mounted in the front grill. When buying a new room air conditioner, look for units with an EER of 10.0 or above. Check the Energy Guide label for the unit, and also look for room air conditioners with the ENERGY STAR® label. The labor for the recommended installation is evaluated using prevailing mechanical/electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: $625 (includes $50 of labor)
Source of cost estimate: RS Means, Published and established costs, NJ Clean Energy Program

Economics (with incentives):

Est. installed cost, $	Est. incentive, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
625	0	625	350	0.1	0	0.3	0	64	15	956	9.8	53	4	6	125	627

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA also used Energy Star site: http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing, Excel spreadsheet for Room Air Conditioners Savings Calculator.

Rebates/financial incentives:

- There are currently no incentives for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

PROPOSED FURTHER RECOMMENDATIONS

Capital Improvements

Capital Improvements are recommendations for the building that may not be cost-effective at the current time, but that could yield a significant long-term payback. These recommendations should typically be considered as part of a long-term capital improvement plan. Capital improvements should be considered if additional funds are made available, or if the installed costs can be shared with other improvements, such as major building renovations. SWA recommends the following capital improvements for the District Office:

- Upgrade windows - SWA recommends that Glen Ridge Board of Education upgrade all windows to double-pane, argon-filled windows with a low-e coating, frame insulation and a thermal break. At this time, this measure would not be cost-effective but should be considered as a capital improvement or if there is an opportunity for additional funding through energy conservation block grants.

- Upgrade building insulation – SWA recommends that Glen Ridge Board of Education upgrade all insulation at the roof level to a minimum of R-30 and wall insulation is increased to recent energy code minimums. At this time, this measure would not be cost-effective but should be considered as a capital improvement or if there is an opportunity for additional funding through energy conservation block grants.

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

- Repair and or Replace all damaged exterior surfaces – repair and replace all damaged and missing sections of the existing clapboard siding.

Operations and Maintenance

Operations and Maintenance measures consist of low/no cost measures that are within the capability of the current building staff to handle. These measures typically require little investment, and they yield a short payback period. These measures may address equipment settings or staff operations that, when addressed will reduce energy consumption or costs.

- Install occupancy-based power strips or power management software for computers – The District Office contains computers and other electronic devices that consume a significant amount of power. Typically, computers are left on for extended periods of time such as during nights, weekends and holiday breaks with only screensavers to power down the screens. SWA recommends that the school deploy either a power management software that can be programmed to automatically shutdown computers or install occupancy based power strips. New SmartStrips are power strips that contain an occupancy sensor to automatically shutdown computers if no motion is detected within a set period of time.

- Maintain programmable thermostat set points – There was one programmable thermostat that is used to control the heating setpoint for the entire steam system. SWA recommends that this programmable thermostat is adjusted in conjunction with the proposed thermostatic radiator valves (TRVs). The programmable thermostat should be responsible for acting as the primary equipment to determine whether the building calls for heat or not, while the individual TRVs

account for separate control of each radiator. The programmable thermostat should be set up in order to reduce temperatures in the entire building at night and on weekends, outside of operating hours, when only minimal heating is needed.

- Maintain downspouts and cap flashing - Repair/install missing downspouts and cap flashing as needed to prevent water/moisture infiltration and insulation damage. SWA recommends round downspout elbows to minimize clogging.

- Install hot water pipe insulation – Insulate all sections of hot water piping to reduce heat loss.

- Provide weather-stripping/air-sealing - SWA observed that exterior door weather-stripping was beginning to deteriorate in places. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. The perimeter of all window frames should also be regularly inspected, and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frames. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.

- Repair/seal wall cracks and penetrations - SWA recommends as part of the maintenance program installing weep holes, installing proper flashing and correct masonry efflorescence, and sealing wall cracks and penetrations wherever necessary in order to keep insulation dry and effective.

- Openings around window air-conditioning units need airtight gaskets/sealants for optimal all year performance. Insulated hoods should be installed during winter months if removing the units is not an option.

- Provide water-efficient fixtures and controls - Adding controlled on/off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and/or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures/appliances will reduce energy consumption for water heating, while also decreasing water/sewer bills.

- SWA recommends that the building considers purchasing the most energy-efficient equipment, including ENERGY STAR® labeled appliances, when equipment is installed or replaced. More information can be found in the “Products” section of the ENERGY STAR® website at: http://www.energystar.gov.

- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.

- Create an energy educational program - that teaches how to minimize energy use. The U.S. 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/.

Note: The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Glen Ridge Public Schools. Based on the requirements of the LGEA program, Glen Ridge Public Schools must commit to implementing

some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is $272.38.

APPENDIX A: EQUIPMENT LIST

Inventory

Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Controls	Digital Programmable Themostat - Heating Only	Pro Model	Electric	Ground Floor Office Area	All Areas	2005	67%
Cooling	Window AC Unit; 6,000 BTU, 9.8 EER built-in thermostat	GE	Electric	3rd Floor Office	3rd Floor Office	2004	70%
Cooling	Dx Split System, Wall Mounted Evaporator	Fujitsu Halcyon: M# ASU24CL, S#DDA001839	Electric	3rd Floor Office	3rd Floor Office	2005	75%
Cooling	Window AC Unit; 6,000 BTU, 10.7 EER, R-22, 560 Watts, ENERGY STAR® Qualified, built-in thermostat and remote control	AirTemp M# B7X06F2A-A; S# CS201972073Y	Electric	2nd Floor Office	2nd Floor Office	2007	85%
Cooling	Window AC Unit ; 12,000 BTU, 9.8 EER, R-22, 1,220 Watts, manual controls	GE Quiet-Aire: M# AGN12ABG1, S# ZV012459	Electric	2nd Floor Office	2nd Floor Office	1999	45%
Cooling	Window AC Unit ; 12,000 BTU, 10.7 EER, R-22, built-in thermostat and remote control	Panasonic	Electric	1st Floor Office Area	1st Floor Office Area	2007	85%
Cooling	Window AC Unit ; 25,200 BTU, 9.4 EER, R-22, 2,690 Watts built-in thermostat and remote control	Freidrich: M# CP24E30 S# LJCR 02644	Electric	1st Floor Office Area By Copiers	1st Floor Office Area	2009	95%
Cooling	Window AC Unit ; 10,000 BTU, 10.8 EER, R-22, 926 Watts, built-in thermostat and remote control	Whirlpool: M# ACQ108XP0, S# QR1001167	Electric	1st Floor Office	1st Floor Office	2006	80%
Cooling	Window AC Unit ; 10,000 BTU, 9.8 EER, R-22, 1,020 Watts, manual controls	GE Quiet-Aire: M# AGN10ABG1, S# DZ018058	Electric	1st Floor Meeting Room	1st Floor Meeting Room	2000	50%
Cooling	Dx Split System, Condenser; 24,200 BTU, 18 SEER, R410A	Fujitsu Halcyon: M# AOU24CL, S# DDN006598	Electric	Exterior floor mounted by northern side yard	3rd Floor Office	2004	70%

Building System	Description	Model #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating Distribution	Cast Iron Hot Water Radiators	---	Hot Water	Throughout Building	Entire Building	1995	25%
Heating	Cast Iron Hot Water Boiler - 76.1 MBH in, 62.4 MBH out , 82% thermal Eff. 50 PSI Water Max. W.P.	Peerless M# G-761	Natural Gas	Boiler Rm	All areas	1997	35%
Domestic Hot Water	Gas Fired Storage Water Heater - 40000 BTU/Hr in, 38 Gal Capacity, 39.32 Gal/Hr recovery rate, Energy Guide Estimated Annual Usage 250 Therms / Yr.	A.O. Smith Pro Max M# GCV 40 100 S#G05A010632	Natural Gas	Boiler Rm	All areas	2005	67%
Lighting	See details - Appendix B	-	Electric	See details - Appendix B	Library	2002	53%

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.

Appendix B: Lighting Study

Location			Existing Fixture Information											Retrofit Information												Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
1	3	Storage Room	Ceiling Mounted	M	4'T12	1	2	40	Sw	4	261	12	92	96	T8	Ceiling Mounted	4'T8	E	Sw	1	2	32	4	261	5	69	72	24	0	24
2	3	Bathroom	Wall Mounted	S	CFL	1	1	13	Sw	4	261	0	13	14	N/A	Wall Mounted	CFL	S	Sw	1	1	13	4	261	0	13	14	0	0	0
3	3	Office	Recessed	S	CFL	4	1	23	Sw	8	261	0	92	192	N/A	Recessed	CFL	S	Sw	4	1	23	8	261	0	92	192	0	0	0
4	3	Office	Recessed	S	CFL	4	1	23	Sw	8	261	0	92	192	N/A	Recessed	CFL	S	Sw	4	1	23	8	261	0	92	192	0	0	0
5	3	Office	Recessed	S	Inc	4	1	120	Sw	8	261	0	480	1,002	CFL	Recessed	CFL	S	Sw	4	1	40	8	261	0	160	334	668	0	668
6	3	Staircase	Recessed	E	4'T8	1	3	32	Sw	8	261	5	101	211	N/A	Recessed	4'T8	E	Sw	1	3	32	8	261	5	101	211	0	0	0
7	2	Storage Room	Ceiling Mounted	E	4'T8	1	4	32	Sw	8	261	5	133	278	N/A	Ceiling Mounted	4'T8	E	Sw	1	4	32	8	261	5	133	278	0	0	0
8	2	Bathroom	Recessed	S	CFL	1	1	23	Sw	4	261	0	23	24	N/A	Recessed	CFL	S	Sw	1	1	23	4	261	0	23	24	0	0	0
9	2	Office	Recessed	E	4'T8 U-Shaped	4	2	32	Sw	8	261	5	276	576	N/A	Recessed	4'T8 U-Shaped	E	Sw	4	2	32	8	261	5	276	576	0	0	0
10	2	Office	Track	E	Hal	1	3	20	Sw	8	261	4	64	134	CFL	Track	CFL	E	Sw	1	3	5	8	261	0	15	31	103	0	103
11	2	Office	Recessed	E	4'T8	4	3	32	Sw	8	261	5	404	844	N/A	Recessed	4'T8	E	Sw	4	3	32	8	261	5	404	844	0	0	0
12	2	Staircase	Recessed	E	4'T8	1	3	32	Sw	8	261	5	101	211	N/A	Recessed	4'T8	E	Sw	1	3	32	8	261	5	101	211	0	0	0
13	1	Vestibule	Recessed	M	4'T12 U-Shaped	1	2	40	Sw	8	261	12	92	192	T8	Recessed	4'T8 U-Shaped	E	Sw	1	2	32	8	261	5	69	144	48	0	48
14	1	Office Area	Recessed	E	4'T8	6	3	32	Sw	8	261	5	606	1,265	N/A	Recessed	4'T8	E	Sw	6	3	32	8	261	5	606	1265	0	0	0
15	1	Office	Ceiling Mounted	E	4'T8	3	4	32	Sw	8	261	5	399	833	N/A	Ceiling Mounted	4'T8	E	Sw	3	4	32	8	261	5	399	833	0	0	0
16	1	Meeting Room Closet	Wall Mounted	S	Inc	1	1	75	Sw	8	261	0	75	157	CFL	Wall Mounted	CFL	S	Sw	1	1	25	8	261	0	25	52	104	0	104
17	1	Meeting Room	Ceiling Mounted	E	4'T8	2	2	32	Sw	8	261	5	138	288	N/A	Ceiling Mounted	4'T8	E	Sw	2	2	32	8	261	5	138	288	0	0	0
18	1	Meeting Room	Exit Sign	E	Fl.	1	2	15	N	24	365	2	32	276	LEDex	Exit Sign	LED	E	N	1	1	5	24	365	1	6	48	228	0	228
19	1	Office Area	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0
20	1	Kitchen	Ceiling Mounted	E	4'T8	1	4	32	Sw	8	261	5	133	278	N/A	Ceiling Mounted	4'T8	E	Sw	1	4	32	8	261	5	133	278	0	0	0
21	1	Bathroom	Recessed	S	CFL	1	1	23	Sw	4	261	0	23	24	N/A	Recessed	CFL	S	Sw	1	1	23	4	261	0	23	24	0	0	0
22	Bsmt	Storage Room	Recessed	M	4'T12	4	4	40	Sw	8	261	12	688	1,437	T8	Recessed	4'T8	E	Sw	4	4	32	8	261	5	532	1111	326	0	326
23	Bsmt	Storage Room	Recessed	M	4'T12 U-Shaped	2	2	40	Sw	8	261	12	184	384	T8	Recessed	4'T8 U-Shaped	E	Sw	2	2	32	8	261	5	138	288	96	0	96
24	Bsmt	Storage Room	Ceiling Mounted	S	Inc	1	1	60	Sw	4	261	0	60	63	CFL	Ceiling Mounted	CFL	S	Sw	1	1	20	4	261	0	20	21	42	0	42
25	Bsmt	Storage Room	Ceiling Mounted	M	8'T12	1	2	80	Sw	4	261	20	180	188	T8	Ceiling Mounted	8'T8	E	Sw	1	2	59	4	261	7	125	131	57	0	57
26	Ext	Exterior	Flood	S	MH	1	1	75	PC	12	365	21	96	420	N/A	Flood	MH	S	PC	1	1	75	12	365	21	96	420	0	0	0
27	Ext	Exterior	Wall Mounted	S	CFL	3	1	23	Sw	12	365	0	69	302	N/A	Wall Mounted	CFL	S	Sw	3	1	23	12	365	0	69	302	0	0	0
28	Ext	Exterior	Ceiling Mounted	S	Inc	1	2	60	Sw	12	365	0	120	526	CFL	Ceiling Mounted	CFL	S	Sw	1	2	20	12	365	0	40	175	350	0	350
Totals:						57	58	1,086				140	4,771	10,455						57	57	798			94	3,903	8,408	2,047	0	2,047

Rows Highlighed Yellow Indicate an Energy Conservation Measure is recommended for that space

Proposed Lighting Summary Table			
Total Gross Floor Area (SF)	3,510		
Average Power Cost ($/kWh)	0.1820		
Exterior Lighting	**Existing**	**Proposed**	**Savings**
Exterior Annual Consumption (kWh)	1,248	898	**350**
Exterior Power (watts)	285	205	**80**
Total Interior Lighting	**Existing**	**Proposed**	**Savings**
Annual Consumption (kWh)	9,206	7,510	**1,696**
Lighting Power (watts)	4,486	3,698	**788**
Lighting Power Density (watts/SF)	1.28	1.05	**0.22**
Estimated Cost of Fixture Replacement ($)	1,769		
Estimated Cost of Controls Improvements ($)	0		
Total Consumption Cost Savings ($)	**472**		

Legend							
Fixture Type		**Lamp Type**			**Control Type**	**Ballast Type**	**Retrofit Category**
Ceiling Suspended	Recessed	CFL	3'T12	8'T5	Autom. Timer (T)	S (Self)	N/A (None)
Exit Sign	Sconce	Inc	3'T12 U-Shaped	8'T5 U-Shaped	Bi-Level (BL)	E (Electronic)	T8 (Install new T8)
High Bay	Spotlight	LED	3'T5	8'T8	Contact (Ct)	M (Magnetic)	T5 (Install new T5)
Parabolic Ceiling Mounted	Track	HPS	3'T5 U-Shaped	8'T8 U-Shaped	Daylight & Motion (M)		CFL (Install new CFL)
Parabolic Ceiling Suspended	Vanity	MH	3'T8	Circline - T5	Daylight & Switch (DLSw)		LEDex (Install new LED Exit)
Pendant	Wall Mounted	MV	3'T8 U-Shaped	Circline - T8	Daylight Sensor (DL)		LED (Install new LED)
Recessed Parabolic	Wall Suspended	1'T12	4'T5	Circline - T12	Delay Switch (DSw)		D (Delamping)
Ceiling Mounted	Wallpack	1'T12 U-Shaped	4'T5 U-Shaped	FI.	Dimmer (D)		C (Controls Only)
Chandelier		1'T5	6'T12	Hal	Motion Sensor (MS)		PSMH (Install new Pulse-Start Metal Halide)
Equipment / Fume Hood		1'T5 U-Shaped	6'T12 U-Shaped	Induction	Motion& Switch (MSw)		
Flood		1'T8	6'T5	Infrared	None (N)		
Landscape		1'T8 U-Shaped	6'T5 U-Shaped	LPS	Occupancy Sensor (OS)		
Low Bay		2'T12 U-Shaped	6'T8	Mixed Vapor	Occupancy Sensor - CM (OSCM)		
Parabolic Wall Mounted		2'T5	6'T8 U-Shaped	Neon	Photocell (PC)		
Pole Mounted		2'T5 U-Shaped	8'T12	Quartz Halogen	Switch (Sw)		
Pole Mounted Off Building		2'T8 U-Shaped	8'T12 U-Shaped				

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS

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

Third Party Electric Suppliers for PSEG Service Territory	Telephone & Web Site
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009	(877) 977-2636 www.americanpowernet.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
ConEdison Solutions 535 State Highway 38 Cherry Hill, NJ 08002	(888) 665-0955 www.conedsolutions.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446	(888) 635-0827 www.newenergy.com
Credit Suisse, (USA) Inc. 700 College Road East Princeton, NJ 08450	(212) 538-3124 www.creditsuisse.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
FirstEnergy Solutions 300 Madison Avenue Morristown, NJ 07926	(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
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 www.metroenergy.com
Integrys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830	(877) 763-9977 www.integrysenergy.com
Liberty Power Delaware, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-3799 www.libertypowercorp.com
Liberty Power Holdings, LLC Park 80 West Plaza II, Suite 200 Saddle Brook, NJ 07663	(800) 363-7499 www.libertypowercorp.com

Third Party Electric Suppliers for PSEG Service Territory	Telephone & Web Site
Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833	(800) 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 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.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

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109	(800) 628-9427 www.cooperativenet.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
Dominion Retail, Inc. 395 Highway 170, Suite 125 Lakewood, NJ 08701	(866) 275-4240 www.retail.dom.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701	(800) 805-8586 www.gesc.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 Moorestown, NJ 08057	(856) 273-9995 www.ugienergyservices.com

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
Great Eastern Energy 116 Village Riva, Suite 200 Princeton, NJ 08540	(888) 651-4121 www.greateastern.com
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095	(800) 437-7872 www.hess.com
Hudson Energy Services, LLC 545 Route 17 South Ridgewood, NJ 07450	(877) 483-7669 www.hudsonenergyservices.com
Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024	(800) 724-1880 www.intelligentenergy.org
Keil & Sons 1 Bergen Blvd. Fairview, NJ 07002	(877) 797-8786 www.systrumenergy.com
Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601	(888) 536-3876 www.metroenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 08837	(800) 375-1277 www.mxenergy.com
NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050	(800) 840-4427 www.natgasco.com
Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833	(800) 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 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037	(800) 756-3749 www.southjerseyenergy.com
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928	(800) 225-1560 www.spragueenergy.com
Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631	(800) 646-6457 www.stuyfuel.com
Woodruff Energy 73 Water Street Bridgeton, NJ 08302	(800) 557-1121 www.woodruffenergy.com

APPENDIX D: GLOSSARY AND METHOD OF CALCULATIONS

Net ECM Cost: The net ECM cost is the cost experienced by the customer, which is typically the total cost (materials + labor) of installing the measure minus any available incentives. Both the total cost and the incentive amounts are expressed in the summary for each ECM.

Annual Energy Cost Savings (AECS): This value is determined by the audit firm based on the calculated energy savings (kWh or Therm) of each ECM and the calculated energy costs of the building.

Lifetime Energy Cost Savings (LECS): This measure estimates the energy cost savings over the lifetime of the ECM. It can be a simple estimation based on fixed energy costs. If desired, this value can factor in an annual increase in energy costs as long as the source is provided.

Simple Payback: This is a simple measure that displays how long the ECM will take to break-even based on the annual energy and maintenance savings of the measure.

ECM Lifetime: This is included with each ECM so that the owner can see how long the ECM will be in place and whether or not it will exceed the simple payback period. Additional guidance for calculating ECM lifetimes can be found below. This value can come from manufacturer's rated lifetime or warranty, the ASHRAE rated lifetime, or any other valid source.

Operating Cost Savings (OCS): This calculation is an annual operating savings for the ECM. It is the difference in the operating, maintenance, and / or equipment replacement costs of the existing case versus the ECM. In the case where an ECM lifetime will be longer than the existing measures (such as LED lighting versus fluorescent) the operating savings will factor in the cost of replacing the units to match the lifetime of the ECM. In this case or in one where one-time repairs are made, the total replacement / repair sum is averaged over the lifetime of the ECM.

Return on Investment (ROI): The ROI is expresses the percentage return of the investment based on the lifetime cost savings of the ECM. This value can be included as an annual or lifetime value, or both.

Net Present Value (NPV): The NPV calculates the present value of an investment's future cash flows based on the time value of money, which is accounted for by a discount rate (assumes bond rate of 3.2%).

Internal Rate of Return (IRR): The IRR expresses an annual rate that results in a break-even point for the investment. If the owner is currently experiencing a lower return on their capital than the IRR, the project is financially advantageous. This measure also allows the owner to compare ECMs against each other to determine the most appealing choices.

Gas Rate and Electric Rate ($/therm and $/kWh): The gas rate and electric rate used in the financial analysis is the total annual energy cost divided by the total annual energy usage for the 12 month billing period studied. The graphs of the monthly gas and electric rates reflect the total monthly energy costs divided by the monthly usage, and display how the average rate fluctuates throughout the year. The average annual rate is the only rate used in energy savings calculations.

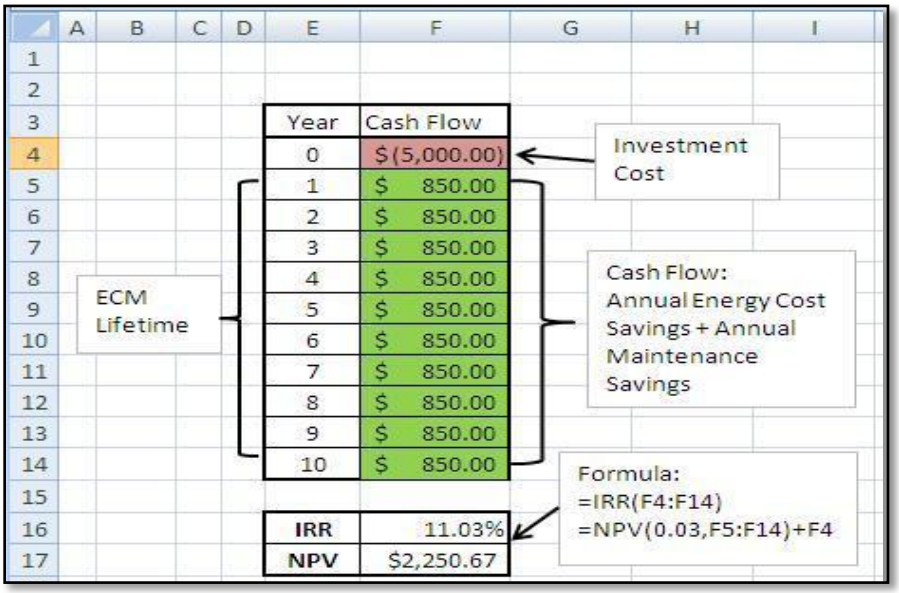
Calculation References

Term	Definition
ECM	Energy Conservation Measure
AOCS	Annual Operating Cost Savings
AECS	Annual Energy Cost Savings
LOCS*	Lifetime Operating Cost Savings
LECS	Lifetime Energy Cost Savings
LCS	Lifetime Cost Savings
NPV	Net Present Value
IRR	Internal Rate of Return
DR	Discount Rate
Net ECM Cost	Total ECM Cost – Incentive
LECS	AECS X ECM Lifetime
AOCS	LOCS / ECM Lifetime
LCS	LOCS+LECS
Simple Payback	Net ECM Cost / (AECS + AOCS)
Lifetime ROI	(LECS + LOCS – Net ECM Cost) / Net ECM Cost
Annual ROI	(Lifetime ROI / Lifetime) = [(AECS + OCS) / Net ECM Cost – (1 / Lifetime)]

* The lifetime operating cost savings are all avoided operating, maintenance, and/or component replacement costs over the lifetime of the ECM. This can be the sum of any annual operating savings, recurring or bulk (i.e. one-time repairs) maintenance savings, or the savings that comes from avoiding equipment replacement needed for the existing measure to meet the lifetime of the ECM (e.g. lighting change outs).

Excel NPV and IRR Calculation

In Excel, function =IRR (values) and =NPV(rate, values) are used to quickly calculate the IRR and NPV of a series of annual cash flows. The investment cost will typically be a negative cash flow at year 0 (total cost - incentive) with years 1 through the lifetime receiving a positive cash flow from the annual energy cost savings and annual maintenance savings. The calculations in the example below are for an ECM that saves $850 annually in energy and maintenance costs (over a 10 year lifetime) and takes $5,000 to purchase and install after incentives:



Solar PV ECM Calculation

There are several components to the calculation:

Costs:	Material of PV system including panels, mounting and net-metering + Labor
Energy Savings:	Reduction of kWh electric cost for life of panel, 25 years
Incentive 1:	NJ Renewable Energy Incentive Program (REIP), for systems of size 30kW or less, $1/Watt incentive subtracted from installation cost
Incentive 2:	Solar Renewable Energy Credits (SRECs) – Market-rate incentive. Calculations assume $600/Megawatt hour consumed per year for a maximum of 15 years; added to annual energy cost savings for a period of 15 years. (Megawatt hour used is rounded to nearest 1,000 kWh)
Assumptions:	A Solar Pathfinder device is used to analyze site shading for the building and determine maximum amount of full load operation based on available sunlight. When the Solar Pathfinder device is not implemented, amount of full load operation based on available sunlight is assumed to be 1,180 hours in New Jersey.

Total lifetime PV energy cost savings =
kWh produced by panel * [$/kWh cost * 25 years + $600/Megawatt hour /1000 * 15 years]

ECM and Equipment Lifetimes

Determining a lifetime for equipment and ECM's can sometimes be difficult. The following table contains a list of lifetimes that the NJCEP uses in its commercial and industrial programs. Other valid sources are also used to determine lifetimes, such as the DOE, ASHRAE, or the manufacturer's warranty.

Lighting is typically the most difficult lifetime to calculate because the fixture, ballast, and bulb can all have different lifetimes. Essentially the ECM analysis will have different operating cost savings (avoided equipment replacement) depending on which lifetime is used.

When the bulb lifetime is used (rated burn hours / annual burn hours), the operating cost savings is just reflecting the theoretical cost of replacing the existing case bulb and ballast over the life of the recommended bulb. Dividing by the bulb lifetime will give an annual operating cost savings.

When a fixture lifetime is used (e.g. 15 years) the operating cost savings reflects the avoided bulb and ballast replacement cost of the existing case over 15 years minus the projected bulb and ballast replacement cost of the proposed case over 15 years. This will give the difference of the equipment replacement costs between the proposed and existing cases and when divided by 15 years will give the annual operating cost savings.

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

Measure	Life Span
Commercial Lighting — New	15
Commercial Lighting — Remodel/Replacement	15
Commercial Custom — New	18
Commercial Chiller Optimization	18
Commercial Unitary HVAC — New - Tier 1	15
Commercial Unitary HVAC — Replacement - Tier 1	15
Commercial Unitary HVAC — New - Tier 2	15
Commercial Unitary HVAC — Replacement Tier 2	15
Commercial Chillers — New	25
Commercial Chillers — Replacement	25
Commercial Small Motors (1-10 HP) — New or Replacement	20
Commercial Medium Motors (11-75 HP) — New or Replacement	20
Commercial Large Motors (76-200 HP) — New or Replacement	20
Commercial VSDs — New	15
Commercial VSDs — Retrofit	15
Commercial Comprehensive New Construction Design	18
Commercial Custom — Replacement	18
Industrial Lighting — New	15
Industrial Lighting — Remodel/Replacement	15
Industrial Unitary HVAC — New - Tier 1	15
Industrial Unitary HVAC — Replacement - Tier 1	15
Industrial Unitary HVAC — New - Tier 2	15
Industrial Unitary HVAC — Replacement Tier 2	15
Industrial Chillers — New	25
Industrial Chillers — Replacement	25
Industrial Small Motors (1-10 HP) — New or Replacement	20
Industrial Medium Motors (11-75 HP) — New or Replacement	20
Industrial Large Motors (76-200 HP) — New or Replacement	20
Industrial VSDs — New	15
Industrial VSDs — Retrofit	15
Industrial Custom — Non-Process	18
Industrial Custom — Process	10
Small Commercial Gas Furnace — New or Replacement	20
Small Commercial Gas Boiler — New or Replacement	20
Small Commercial Gas DHW — New or Replacement	10
C&I Gas Absorption Chiller — New or Replacement	25
C&I Gas Custom — New or Replacement (Engine Driven Chiller)	25
C&I Gas Custom — New or Replacement (Gas Efficiency Measures)	18
O&M savings	3
Compressed Air (GWh participant)	8

APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Glen Ridge BOE - District Office

Building ID: 2404040
For 12-month Period Ending: June 30, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 12, 2010

Facility	Facility Owner	Primary Contact for this Facility
Glen Ridge BOE - District Office 12 High Street Glen Ridge, NJ 07028	N/A	N/A

Year Built: 1905
Gross Floor Area (ft²): 3,510

Energy Performance Rating[2] (1-100) N/A

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	67,057
Natural Gas (kBtu)[4]	126,314
Total Energy (kBtu)	193,371
Energy Intensity[5]	
Site (kBtu/ft²/yr)	55
Source (kBtu/ft²/yr)	101
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	17
Electric Distribution Utility	
Public Service Elec & Gas Co	
National Average Comparison	
National Average Site EUI	77
National Average Source EUI	182
% Difference from National Average Source EUI	-44%
Building Type	Office

Stamp of Certifying Professional

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

Certifying Professional
N/A

Meets Industry Standards[6] **for Indoor Environmental Conditions:**	
Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

EPA Form 5900-16

APPENDIX F: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

The NJ Clean Energy Pay for Performance (P4P) Program relies on a network of Partners who provide technical services to clients. LGEA participating clients who are not receiving Direct Energy Efficiency and Conservation Block Grants are eligible for P4P. SWA is an eligible Partner and can develop an Energy Reduction Plan for each project with a whole-building traditional energy audit, a financial plan for funding the energy measures and an installation construction schedule.

The Energy Reduction Plan must define a comprehensive package of measures capable of reducing a building's energy consumption by 15+%. P4P incentives are awarded upon the satisfactory completion of three program milestones: submittal of an Energy Reduction Plan prepared by an approved Program Partner, installation of the recommended measures and completion of a Post-Construction Benchmarking Report. Theincentives for electricity and natural gas savings will be paid based on actual savings, provided that the minimum 15%performance threshold savings has been achieved.

For further information, please see: http://www.njcleanenergy.com/commercial-industrial/programs/pay-performance/existing-buildings .

Direct Install 2010 Program*

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC and other equipment with energy efficient alternatives. The program pays **up to 60%** of the retrofit costs, including equipment cost and installation costs.

Eligibility:

- Existing small and mid-sized commercial and industrial facilities with peak electrical demand **below 200 kW** within 12 months of applying
- Must be located in New Jersey
- Must be served by one of the state's public, regulated or natural gas companies
    - Electric: Atlantic City Electric, Jersey Central Power & Light, Orange Rockland Electric, PSE&G
    - Natural Gas: Elizabethtown Gas, New Jersey Natural Gas, PSE&G, South Jersey Gas

For the most up to date information on contractors in New Jersey who participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/direct-install

Smart Start

New Jersey's SmartStart Building Program is administered by New Jersey's Office of Clean Energy. The program also offers design support for larger projects and technical assistance for smaller projects. If your project specifications do not fit into anything defined by the program, there are even incentives available for custom projects.

There are a number of improvement options for commercial, industrial, institutional, government, and agricultural projects throughout New Jersey. Alternatives are designed to enhance quality while building in energy efficiency to save money. Project categories included in this program are New Construction and Additions, Renovations, Remodeling and Equipment Replacement.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings.

Renewable Energy Incentive Program*

The Renewable Energy Incentive Program (REIP) provides incentives that reduce the upfront cost of installing renewable energy systems, including solar, wind, and sustainable biomass. Incentives vary depending upon technology, system size, and building type. Current incentive levels, participation information, and application forms can be found at the website listed below.

Solar Renewable Energy Credits (SRECs) represent all the clean energy benefits of electricity generated from a solar energy system. SRECs can be sold or traded separately from the power, providing owners a source of revenue to help offset the cost of installation. All solar project owners in New Jersey with electric distribution grid-connected systems are eligible to generate SRECs. Each time a system generates 1,000 kWh of electricity an SREC is earned and placed in the customer's account on the web-based SREC tracking system.

For the most up to date information on how to participate in this program, go to: http://www.njcleanenergy.com/renewable-energy/home/home.

Utility Sponsored Programs

Check with your local utility companies for further opportunities that may be available.

Energy Efficiency and Conservation Block Grant Rebate Program

The Energy Efficiency and Conservation Block Grant (EECBG) Rebate Program provides supplemental funding up to $20,000 for eligible New Jersey local government entities to lower the cost of installing energy conservation measures. Funding for the EECBG Rebate Program is provided through the American Recovery and Reinvestment Act (ARRA).

For the most up to date information on how to participate in this program, go to: http://njcleanenergy.com/EECBG

Other Federal and State Sponsored Programs

Other federal and state sponsored funding opportunities may be available, including BLOCK and R&D grant funding. For more information, please check http://www.dsireusa.org/.

*Subject to availability. Incentive program timelines might not be sufficient to meet the 25% in 12 months spending requirement outlined in the LGEA program.

APPENDIX G: ENERGY CONSERVATION MEASURES

	ECM #	ECM description	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
0-5 Year	1	**Install eight (8) new CFL lamps**	0	72	1,268	0.3	0	1.2	33	264	5	1,321	0.3	1,735	347	367	1,131	2,270
	2	**Install one (1) new LED exit sign**	20	131	228	0.0	0	0.2	5	46	15	692	2.8	430	29	35	413	408
5-10 Year Payback	**3**	**Install TRVs on five (5) hot water radiators**	0	1,000	0	0.0	94	0.1	0	133	15	1,990	7.5	99	7	10	561	1,036
	4	**Replace one (1) large refrigerator with an 17 cu. ft. ENERGY STAR® model**	0	600	375	0.1	0	0.4	0	68	12	819	8.8	37	3	8	203	671
	5	**Replace one (1) compact refrigerator with an 2.7 cu. ft. ENERGY STAR® model**	0	119	70	0.0	0	0.1	0	13	12	153	9.3	28	2	7	31	125
	6	**Install nine (9) new T8 fluorescent fixtures**	135	1,567	551	0.1	0	0.5	61	161	15	2,420	9.7	54	4	6	332	987
	7	**Replace two (2) window air conditioning unit with ENERGY STAR® units**	0	625	350	0.1	0	0.3	0	64	15	956	9.8	53	4	6	125	627

APPENDIX H: METHOD OF ANALYSIS

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

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 District Office 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 District Office(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.