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

***Franklin Lakes Recreation Center
1 Vichiconti Way, Franklin Lakes, NJ***

Project Number: LGEA46



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INTRODUCTION

On December 16, 2009 and January 13, 2010 Steven Winter Associates, Inc. (SWA) performed an energy audit and assessment for the Borough of Franklin Lakes municipal buildings. The audit included a review of the:

- Franklin Lakes Municipal Building
- Franklin Lakes Police Station
- Franklin Lakes Recreational Center
- Franklin Lakes Firehouse (Main)
- Franklin Lakes Firehouse (Southside)
- Franklin Lakes DPW
- Franklin Lakes Ambulance Corps

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

This report addresses the Franklin Lakes Recreation Center located at 1 Vichiconti Way, Franklin Lakes, NJ. The current conditions and energy-related information were collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

The two-story Franklin Lakes Recreation Center building was built in 1965, with a major addition in 2005. The building houses a gymnasium, kitchen areas, meeting rooms, exercise rooms and bathrooms. The building consists of 8,511 square feet of conditioned space. The Franklin Lakes Recreation Center is occupied weekdays from approximately 8am to 8pm, 7am to 4pm Friday and three hours on Saturdays. The building has two employees present during operating hours, and between 20 to 30 visitors daily.

The goal of this Local Government Energy Audit (LGEA) is to provide sufficient information to the Borough of Franklin Lakes to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Franklin Lakes Recreation Center.

Launched in 2008, the LGEA Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. For projects awarded on or prior to December 31, 2009 the program will subsidize 75% of the cost of the audit. If the net cost of the installed measures recommended by the audit, after applying eligible NJ SmartStart Buildings incentives, exceeds the remaining cost of the audit, then that additional 25% will also be paid by the program. The Board of Public Utilities (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Franklin Lakes Recreation Center building located at 1 Vichiconti Way, Franklin Lakes, NJ. The Franklin Lakes Recreation Center building is a two-story building with a floor area of 8,511 square feet. The original structure was built in 1965, with additions in 2005.

Based on the field visits performed by the SWA staff on December 16, 2009 and January 13, 2010 and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling and electric usage.

From March 2008 to February 2009 the Franklin Lakes Recreation Center building consumed 78,106 kWh or \$19,233 worth of electricity at an approximate rate of \$0.246/kWh, and 3,399 therms or \$4,715 worth of natural gas at an approximate rate of \$1.387/therm. The joint energy consumption for the building, including both electricity and natural gas, was 606 MMBtu of energy that cost a total of \$23,948.

SWA has entered energy information about the Franklin Lakes Recreation Center building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* energy benchmarking system. A benchmark score could not be calculated for the Recreation facility since it is categorized as a non-eligible ("Recreation") space type for which there isn't any rating system available at this time. SWA encourages the Borough of Franklin Lakes to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather-normalized source energy use over time. EPA is continually working to expand the available space types.

The Site Energy Use Intensity is 73.0 kBtu/ft²yr compared to the national average of "Recreation" space type of 65.0 kBtu/ft²yr. Implementing this report's recommendations will reduce use by approximately 8.2 kBtu/ft²yr, which when implemented would bring the building's energy consumption to 64.8 kBtu/ft²yr, below the national average. There may be energy procurement opportunities for the Franklin Lakes Recreation Center building to reduce annual electric costs, which are \$7,517 higher, when compared to the average estimated NJ commercial utility rates.

Based on the assessment of the Franklin Lakes Recreation Center, SWA has separated the recommendations into three categories (see Section 4 for more details). These are summarized as follows:

Category I Recommendations: Capital Improvement Measures

- Install NEMA premium motors when motor replacements for furnace and condenser fans are required due to equipment damage or age

Category II Recommendations: Operations and Maintenance

- Set up thermostat evening setback schedule
- Maintain the integrity of the exterior wall and roof insulation
- Install a removable, insulated cover (or gravity louver) for the exhaust fan

- Inspect all roof vents to ensure proper airflow in attic and verify water is draining correctly
- Maintain downspouts - repair/install missing downspouts as needed
- Replace worn weather-stripping where located, especially on exterior doors
- Replace main office back door with thermally insulated fiberglass door
- Use Energy Star labeled appliances
- Use smart power electric strips
- Create an energy educational program

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

At this time, SWA highly recommends a total of **two** Energy Conservation Measures (ECMs) for the Franklin Lakes Recreation Center building, as summarized in the following Table 1. The total investment cost for these ECMs with incentives is **\$4,633**. SWA estimates a first-year savings of **\$2,325** with a simple payback of **2.0 years**. SWA estimates that implementing the highly recommended ECMs will reduce the carbon footprint of the Franklin Lakes Recreation Center building by **9,886 lbs of CO₂**. SWA also recommends **three** ECMs with a total first-year savings of **\$9,968**, as summarized in Table 2.

There are various incentive programs that the Borough of Franklin Lakes could apply for that could also help lower the cost of installing the ECMs, such as the NJ SmartStart program through the New Jersey Office of Clean Energy. This incentive program can help provide technical assistance for the building in the implementation phase of any energy conservation project. A new NJ Clean Power program, Direct Install, could also assist to cover up to 80% of the capital investment and is highly recommended.

Renewable ECMs require application approval and negotiations with the utility and proof of performance. There is also a utility-sponsored program that would allow the building to pay for the installation of the PV system through a loan issued by Orange Rockland Electric.

The following two tables summarize the proposed Energy Conservation Measures (ECMs) and their economic relevance. 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 summarized ECMs (i.e. lighting change influence on heating/cooling).

Table 1 - Highly Recommended 0-5 Year Payback ECMs

ECM #	ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	est. energy & operating 1st year cost 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, \$	CO2 reduced, lbs/yr
1a	22 New CFL fixtures to be installed with incentives	RS Means, lit search	1,112	none at this time	1,112	4,668	1.0	0	1.9	121	1,269	5	6,346	0.9	471%	94%	111	4,667	6,395
1b	19 New T8 fixtures to be installed with incentives	RS Means, lit search	4,091	570	3,521	2,548	0.5	0	1.0	429	1,056	15	15,837	3.3	350%	23%	29	8,903	3,491
TOTALS			5,203		4,633	7,216	1.5	0	2.9	550	2,325		22,183	2.0	-	-	-	-	9,886

Table 2 - Recommended 5-10 Year Payback ECMs

ECM #	ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	est. energy & operating 1st year cost 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, \$	CO2 reduced, lbs/yr
1c	9 New occupancy sensors to be installed with incentives	RS Means, lit search	1,980	180	1,800	1,136	0.2	0	0.5	0	279	15	4,192	6.4	133	9	13	1,489	1,556
2	Install 10 kW Solar Photovoltaic system	Similar Projects	70,000	10,000	60,000	11,800	10.0	87	4.7	0	9,503	25	171,570	6.3	186.0	7.4	14.15	187,101	21,128
3	Replace two old refrigerators in attic with Energy Star Refrigerators	Energy Star purchasing and procurement site, similar projects	1,760	None at this time	1,760	350	0.0	0	0.1	100	186	15	2,792	9.5	59	4	5	121	480
TOTALS			73,740		63,560	13,286	10.3	87	5.3	100	9,968		178,554	6.4	-	-	-	-	23,164

1. HISTORIC ENERGY CONSUMPTION

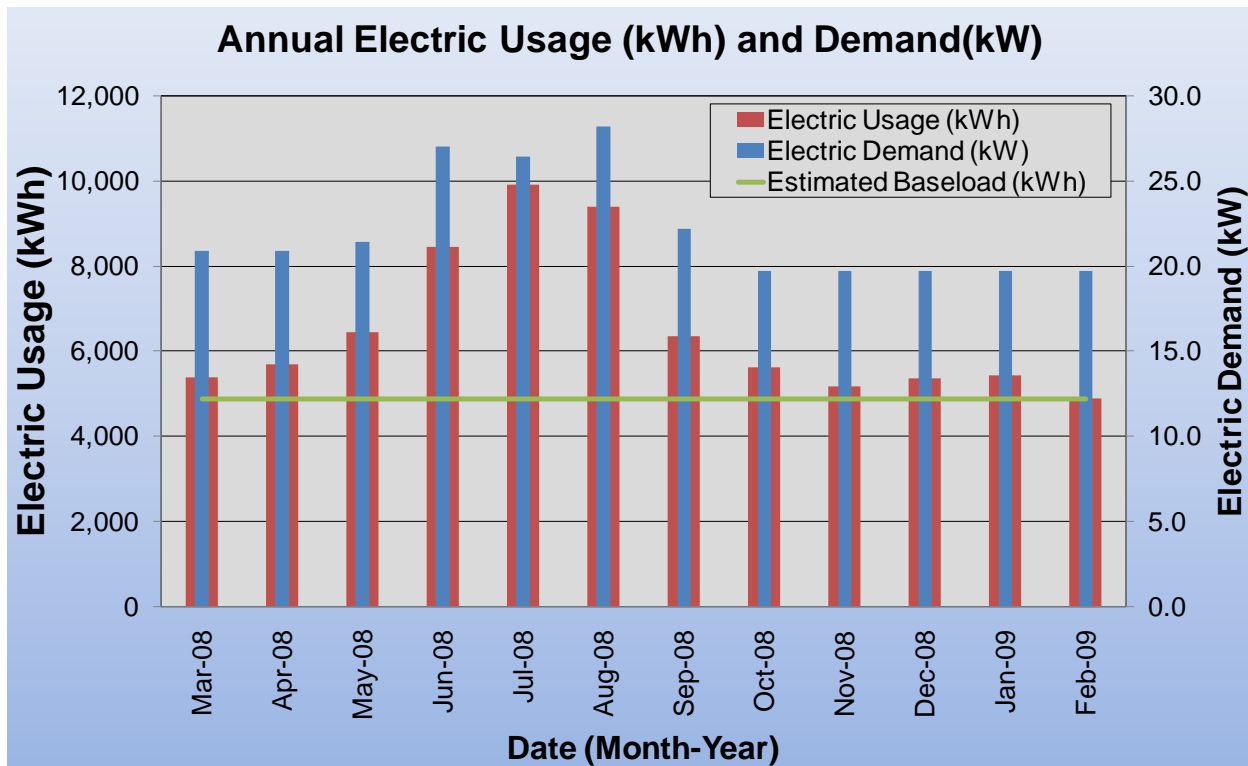
1.1 Energy usage and cost analysis

SWA analyzed utility bills from March 2008 to February 2009 that were received from the utility companies supplying the Franklin Lakes Recreation Center with electric and natural gas.

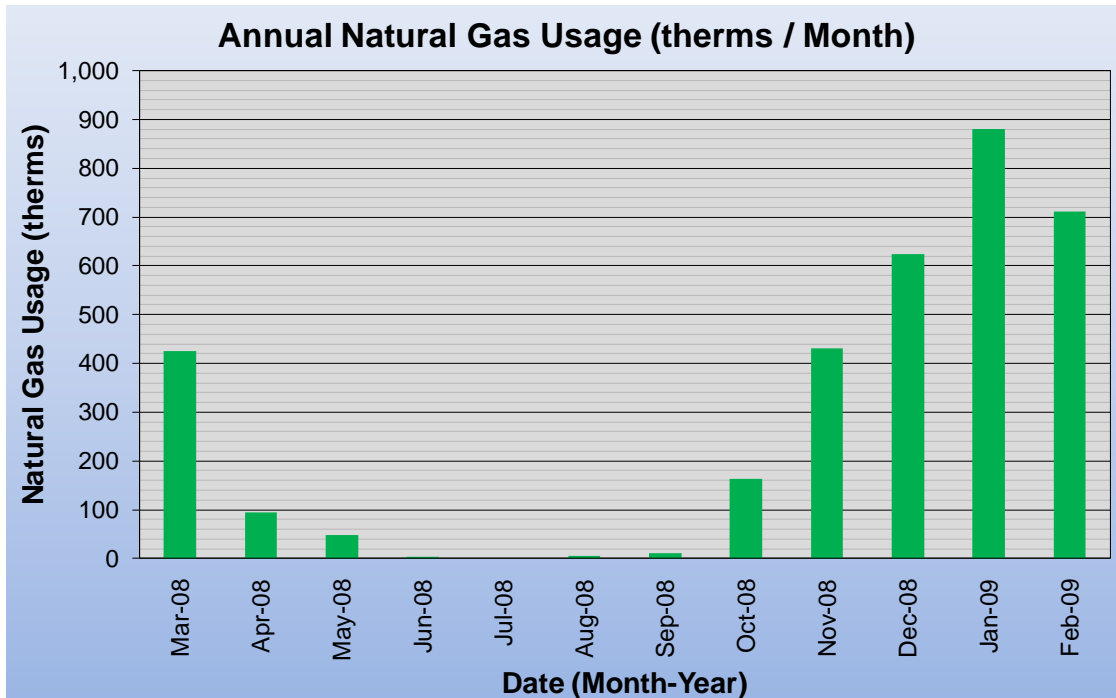
Electricity - The Franklin Lakes Recreation Center is currently served by one electric meter. The Franklin Lakes Recreation Center building currently buys electricity from Orange Rockland Electric at an average rate of **\$0.246/kWh** based on 12 months of utility bills from March 2008 to February 2009. The Franklin Lakes Recreation Center building purchased **approximately 78,106 kWh or \$19,233 worth of electricity** in the previous year. The average monthly demand was 22 kW.

Natural gas - The Franklin Lakes Recreation Center is currently served by one meter for natural gas. The Franklin Lakes Recreation Center buys natural gas from PSE&G at an average aggregated rate of **\$1.387/therm** based on 12 months of utility bills for March 2008 to February 2009. The Franklin Lakes Recreation Center purchased **approximately 3,399 therms or \$4,715 worth of natural gas** in the previous year.

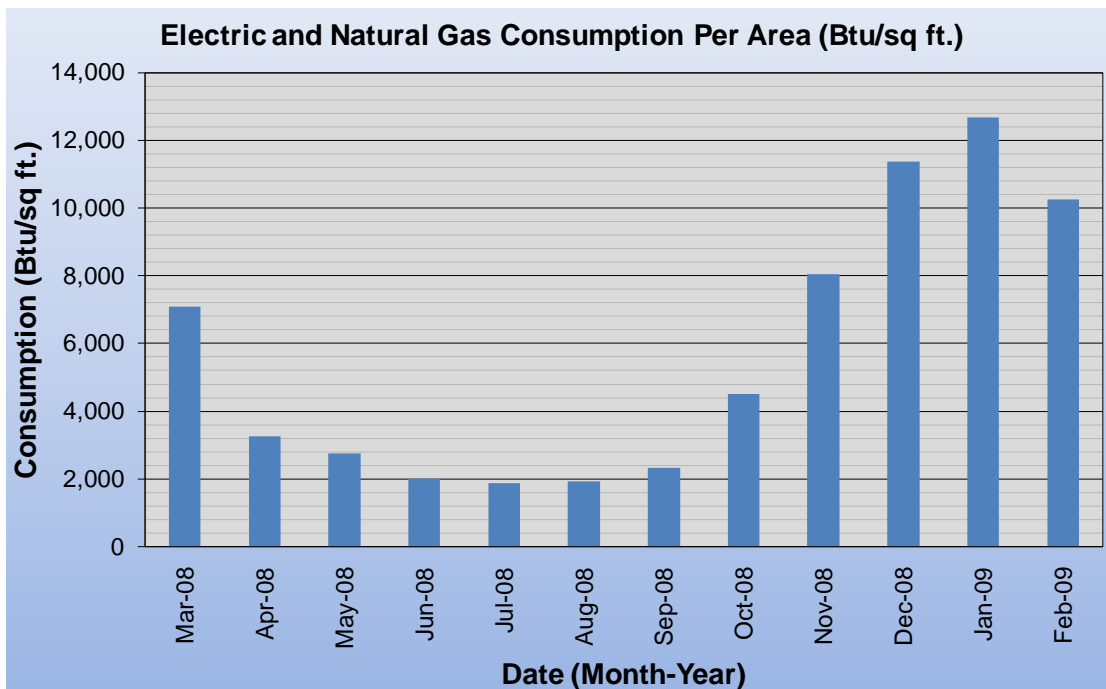
The following chart shows electricity use for the Franklin Lakes Recreation Center building based on utility bills for the 12 month period of March 2008 to February 2009.



The following chart shows the natural gas consumption for the Franklin Lakes Recreation Center building based on natural gas bills for the 12 month period of March 2008 to February 2009.

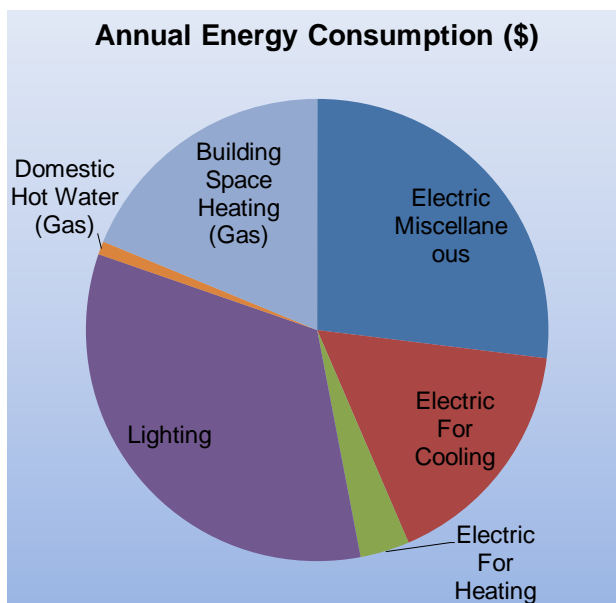
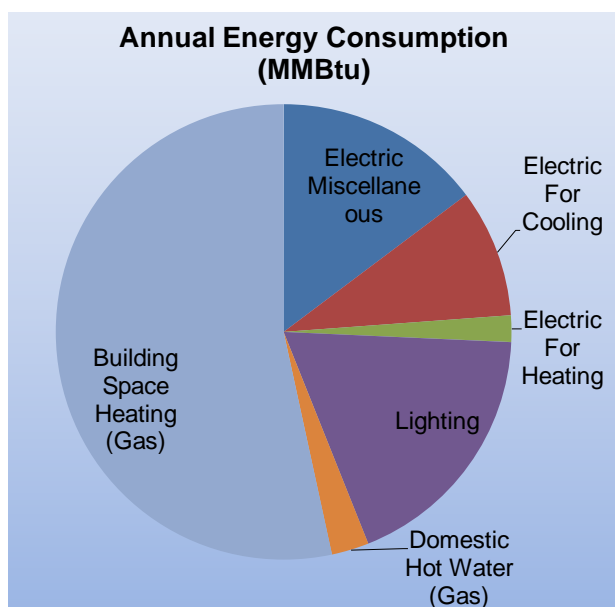


The following chart shows combined natural gas and electric consumption in Btu/sq ft for the Franklin Lakes Recreation Center building based on utility bills for the 12 month period of March 2008 to February 2009.



The following table and pie charts show energy use for the Franklin Lakes Recreation Center building based on utility bills for the 12 month period of March 2008 to February 2009. Note: electrical cost at \$72/MMBtu of energy is more than five times as expensive as natural gas at \$14/MMBtu.

2008 Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	\$	% \$	\$/MMBtu
Electric Miscellaneous	89	15%	\$6,457	27%	72
Electric For Cooling	55	9%	\$3,968	17%	72
Electric For Heating	12	2%	\$831	3%	72
Lighting	111	18%	\$7,978	33%	72
Domestic Hot Water (Gas)	16	3%	\$222	1%	14
Building Space Heating (Gas)	324	53%	\$4,493	19%	14
Total Electric Usage	267	44%	\$19,233	80%	72
Total Gas Usage	340	56%	\$4,715	20%	14
Totals	606	100%	\$23,948	100%	-



1.2 Utility rate

The Franklin Lakes Recreation Center building currently purchases electricity from Orange Rockland Electric at a general service market rate for electricity use (kWh) with a separate (kW) demand charge. The Franklin Lakes Recreation Center building currently pays an average rate of approximately \$0.246/kWh based on the 12 months of utility bills of March 2008 to February 2009.

The Franklin Lakes Recreation Center building currently purchases natural gas supply from the PSE&G at a general service market rate for natural gas (therms). PSE&G also acts as the transport company. There is one gas meter that provides natural gas service to the Franklin Lakes Recreation Center building currently. The average aggregated rate (supply and transport) for the meter is approximately \$1.387/therm based on 12 months of utility bills for March 2008 to February 2009.

1.3 Energy benchmarking

SWA has entered energy information about the Franklin Lakes Recreation Center building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* energy benchmarking system. This building type or "Recreation" best represents the use of the Recreation Center, however, it is not eligible to receive a national energy performance rating at this time.

The Site Energy Use Intensity is 73.0 kBtu/ft²/yr compared to the national average of a Recreation building using 65.0 kBtu/ft²/yr. Implementing this report's highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 2.9 kBtu/sqft yr, with an additional 5.3 kBtu/ft²/yr from the recommended ECMs. These recommendations therefore reduce the site energy use intensity to 64.8 kBtu/ft²/yr, which is below the national average.

Per the LGEA program requirements, SWA has assisted the Borough of Franklin Lakes to create an *Energy Star Portfolio Manager* account and share the Franklin Lakes Recreation Center facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager information with the Borough of Franklin Lakes (user name of "FranklinLakesBoro" with a password of "FRANKLINLAKES") and TRC Energy Services (user name of TRC-LGEA).

STATEMENT OF ENERGY PERFORMANCE Borough of Franklin Lakes - Recreation Center

Building ID: 1977084
For 12-month Period Ending: January 31, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: February 05, 2010

Facility Borough of Franklin Lakes - Recreation Center 1 Vichiconti Way Franklin Lakes, NJ 07417	Facility Owner N/A	Primary Contact for this Facility N/A
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Year Built: 1965
Gross Floor Area (ft²): 8,511

Energy Performance Rating² (1-100) N/A

Site Energy Use Summary³

Electricity - Grid Purchase(kBtu)	289,229
Natural Gas (kBtu) ⁴	351,071
Total Energy (kBtu)	620,300

Energy Intensity⁵

Site (kBtu/ft ² /yr)	73
Source (kBtu/ft ² /yr)	149

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	45
---	----

Electric Distribution Utility

Rockland Electric Co

National Average Comparison

National Average Site EUI	65
National Average Source EUI	136
% Difference from National Average Source EUI	9%
Building Type	Recreation

Stamp of Certifying Professional

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

Meets Industry Standards⁶ for Indoor Environmental Conditions:

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

Certifying Professional

N/A

Notes:

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

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, PE facility inspection, and notarizing the SEP) and welcomes suggestions for reducing this level of effort. Send comments (referencing OMB control number) to the Director, Collection Strategies Division, U.S., EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Recreation Center was constructed in 1965 with a major addition of 6,322 sq ft in 2005. This two-story structure houses a gymnasium, kitchen/snack bar, meeting rooms, exercise rooms, locker rooms, bathrooms, storage spaces for sports equipment, a mechanical room, a lobby and staff offices for the Franklin Lakes Parks and Recreational Department. The facility is open to all Franklin Lakes residents and business owners. The Recreation Center building consists of 8,511 square feet of conditioned space.

2.2. Building occupancy profiles

The occupancy for the Recreation Center is 2 employees sharing 2 shifts, with 20-30 visitors per weekday (and can accommodate approximately up to 100 people at special events). Recent schedules are Mon and Wed - 7:00 am to 6:00 pm, Tues and Thu - 8:30 am to 8:00 pm, Fri - 7:00 am to 4:00 pm and Sat - 9:00 am to 12:00 pm. The building is open some evenings and weekends for various sporting events and offers space for large gatherings.

2.3. Building envelope

2.3.1. Exterior Walls

There are four typical exterior envelopes. The first consists of rough-hewn and stacked earth-colored stone façade around the main entrance (see front cover of this report). The second is a typical 8" cinder block wall reinforced by tie beams. A third façade consists of 8" split-face concrete blocks or concrete masonry units (CMUs), which are a special class of decorative or architectural block that has a rough, stone-like texture created by splitting a block during production.

This look is reminiscent of the rock-faced masonry in Richardsonian Romanesque houses popular in the mid-1880s, the continued use of fieldstone for exterior foundations, and the brief revival of medieval stone houses after the First World War. Like other architectural CMUs, split-faced block does not require any further application of a decorative finish on the exterior surface, such as paint or stucco. However, the current use of split-face block is almost entirely confined to commercial and institutional buildings.

The fourth exterior façade style (mainly around the second floor) is made up of Exterior Insulation and Finish Systems (EIFS). The first half of the acronym, "Exterior Insulation" is derived from the fact that the first component installed is a foam insulation board. The foam board is mechanically and/or adhesively attached to the exterior sheathing of the building. In this respect the foam board serves as an exterior insulating layer. Over this foam board is applied a synthetic base-coat material embedded by a fiberglass reinforcing mesh. This is typically referred to as the "base-coat". On top of the base coat is applied one or more "finish coats". This is the exterior layer that gives the product its stucco-like appearance, hence the second part of the acronym "Finish Systems".

EIFS provides many advantages that other exterior finishes and sidings do not. Chief among these are superior energy efficiency and great design flexibility. Studies have shown that EIFS can reduce the air infiltration in a wall by as much as 55%, when compared to standard brick or wood construction. One should bear in mind that an EIFS system is a non-structural component of the wall.

The interior consists of rigid insulation board with vapor barrier on the interior face. Cosmetically, the facade is in age-appropriate condition. Exterior and interior finishes of the envelope wall were found to be age-appropriate and in good condition.



Façade: split face concrete blocks, EIFS (second floor), and cinder blocks (below)



2.3.2. Roof

The sloped roof sections are covered with common asphalt shingles over wood rafters with in-between R-19 fiberglass batt cavity insulation. SWA suggests inspection of all roof vents to ensure proper air flow in the attic. Where insulation is placed directly on the underside of the sheathing, and without vent baffles, as per asphalt shingle manufacturer, warranty is voided due to faulty installation. This 2005 roof looked age-appropriate, with gutters in visually good condition.

2.3.3. Base

The building's base is a 4" concrete slab-on grade with a perimeter footing. There weren't any reported problems with water seepage through the slab or other issues related to thermal performance or moisture. There are 2" of rigid board insulation at the interior of the foundation walls and extending 2 feet from the foundation walls under the slab. This is standard for this type of structure. SWA does not recommend any additional insulation as it would not be cost-effective. The slab edge or perimeter insulation could not be verified.

2.3.4. Windows

The building contains vinyl and aluminum framed double-glazed windows, most with low-e rating. Some of the windows are non-operable. The operable casement and double-hung windows were observed to be in good working condition and seal tightly. According to specifications, all of the windows are installed with thermal breaks. There weren't any comfort-related complaints or signs of condensation found. There wasn't any visible damage to the window frames or to the caulking.



First floor windows

2.3.5. Exterior doors

There are two primary types of exterior doors installed at the Recreation Center, aluminum frame with glass panels, and hollow metal. The exterior doors were observed to be in good condition, except for some missing or worn weather-stripping. SWA was informed that the office back door becomes extremely hot in the summer when the sun beats down on the building. SWA recommends that the door be replaced with a proper thermally-insulated fiberglass door. 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 the doors will help ensure that the building is kept continuously tight and insulated.



Front entrance doors in need of weather stripping

2.3.6. Building air tightness

Based on a visual inspection, the building was observed to be relatively well-sealed. There weren't any observed deficiencies of air tightness within the building other than some of the exterior doors.

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

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

2.4 HVAC Systems

The Franklin Lakes Recreation Center gymnasium, exercise rooms, kitchen areas and bathrooms are cooled and heated by a series of direct vented furnaces with outside condensers which heat or cool the air, depending on the season and temperature set points. The temperature of the air is regulated by programmable thermostats throughout the space. The thermostats are typically set at a consistent temperature set point between 67°F and 72°F throughout the day, without evening setbacks. SWA recommends implementing an evening setback schedule so that the thermostat set point would adjust during unoccupied hours to 62°F in the winter and 80°F in the summer. The attic should be kept at unoccupied temperatures for all hours since it is an unoccupied space.



Attic programmable thermostat, set at 67°F at all times

2.4.1 Heating

There are five Trane direct-vented natural gas furnaces. The furnaces serve five different areas of the building based on separate programmable thermostats. The flue pipe for the furnaces is piped to the roof as exhaust. The heat of combustion of natural gas is used to heat a mixture of outside air and return air, which is then supplied to the constant volume distribution system via supply fans to the occupied spaces. The furnaces were installed in 2005 and have 70% remaining useful life.

2.4.2 Cooling

The Franklin Lakes Recreation Center occupied spaces and bathrooms are cooled by an electric DX split system, with the evaporator section contained within the furnaces. There are a total of five R-22 based condensers located outside with a total cooling capacity of approximately fifteen tons. The units were installed in 2005 and have 70% remaining useful life.

2.4.3 Ventilation

There are several rooftop exhaust fans which serve bathrooms, kitchen hood and general exhaust from the air distribution system. The roof fans were not visible during the field audit however the bathroom exhaust fans turned on with the switch for the bathroom lights and the

kitchen hood has a switch as well. The fans are mostly likely installed in the attic or on the sloped roof.

2.4.4 Domestic Hot Water

The domestic hot water (DHW) is provided by a Rheem natural gas-fired heater with 50 gal storage and 40,000 Btu/hr capacity. The heater serves bathrooms, showers and kitchen hot water. The heater appears in good operating condition and has 70% remaining useful life.

2.5 Electrical systems

2.5.1 Lighting

Interior Lighting - The majority of the Recreation Center lighting is provided by T8 fixtures, with sporadic use of T12 fixtures with magnetic ballasts and incandescent lights. The lights are all controlled by switch. Based on measurements of lighting levels for each space, there are not any vastly over-illuminated areas. SWA recommends replacing T12 fixtures using magnetic ballasts with T8 fixtures using electronic ballasts, for a reduction in lamp wattage, ballast wattage, and an increase in lamp lifespan. SWA also recommends replacing the incandescent lights with CFLs and installing occupancy sensor lighting controls to minimize the use of lights in kitchen areas, offices areas and bathrooms. See attached lighting schedule in Appendix A for a complete inventory of lighting throughout the building, and estimated power consumption.

Exit Lights - Exit signs were found to be LED type. SWA does not have recommendations for upgrades at this time.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be two incandescent fixtures. The field exterior lighting is on a separate meter and was not included in this analysis. SWA recommends replacing the incandescent lamps with CFL's. SWA does not recommend any changes to the timer control at this time.

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. Energy Star refrigerators use as little as 315 kWh/yr. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large savings. Building management should select Energy Star label appliances and equipment when replacing: refrigerators, printers, computers, copy machines, etc. More information can be found in the *Products* section of the Energy Star website at: <http://www.energystar.gov>. Also, energy vending miser devices are now available for conserving energy usage by drink and snack vending machines. When equipped with the vending miser devices, vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR qualified machines. See section 4, Energy Conservation Measures for details on replacing refrigerators and installing energy vending miser devices.

Computers left on in the building consume a lot of energy. A typical desk top computer uses 65 to 250 watts and uses the same amount of energy when the screen saver is left on. Televisions, DVDs, stereos, computers, and kitchen appliances often have internal memories or clocks which consume approximately 3-5 watts of electricity when turned off. SWA recommends all computers and all appliances, (other than refrigerators and freezers), be plugged into power

strips and turned off each evening just as the lights are turned off. The Franklin Lakes Recreation Center computers are generally NOT programmed for the power save mode, to shut down after a period of time that they have not been used.

2.5.3 Elevators

The Franklin Lakes Recreation Center is a two-story building with an Arrow elevator using a 20HP motor. The elevator components were installed in 2005 and have 80% remaining useful life.

2.5.4 Other electrical systems

There are not currently any other significant energy impacting electrical systems installed at the Franklin Lakes Recreation Center building, other than a 112.5 kVA transformer with 80% remaining useful life and an Onan 43.8 kVa natural gas emergency generator.

3. EQUIPMENT LIST

Inventory

Building System	Description	Location	Model #	Serial #	Fuel	Space Served	Year Installed	Estimated Remaining Useful Life %
Domestic Hot water	Domestic hot water heater, 40,000 Btu/hr, 50 Gal., 0.64 EF	EQUIP ROOM	Rheem 41VRP50N	RHLN09U5-DC9866	Natural Gas	All Areas	2005	70%
Cooling	CU1, Condenser, 3Tons, 16 RLA, 12 SEER	BACK BLDG	TRANE 2TTB2036A1000AA	52321SX3F	Electric	OFFICES	2005	70%
Cooling	COIL1, Refrigerant R-22 cooling coil for FURN1	EQUIP ROOM	TRANE TXC037S3HPD	531547K5G	Electric	OFFICES	2005	70%
Cooling	CU2, Condenser, 3 Tons, 12 SEER	BACK BLDG	TRANE 2TTB203A1000AA	30935SJ4F	Electric	FITNESS ROOM	2005	70%
Cooling	COIL2, Refrigerant R-22 cooling coil for FURN2	EQUIP ROOM	TRANE TXC037S3HPD0	5341TAW5G	R-22	FITNESS ROOM	2005	70%
Cooling	CU3, Condenser, 3 Tons, 12 SEER, 13.5 RLA	BACK BLDG	TRANE 2TTB2030A1000AA	506343E4F	Electric	2ND FLOOR	2005	70%
Cooling	COIL3, Refrigerant R-22 cooling coil for FURN3	2ND FL	TRANE TXC037S3HPD0	5333E4Y5G	R-22	2ND FLOOR	2005	70%
Cooling	CU4, Condenser, 3 Tons, 12 SEER, 13.5 RLA,	BACK BLDG	TRANE 2TTB2030A1000AA	50635LW4F	Electric	1ST FL LARGE RM	2005	70%
Cooling	COIL4, Refrigerant R-22 cooling coil for FURN4	2ND FL	TRANE TXC037S3HPD0	5334H2Y5G	R-22	1ST FL LARGE RM	2005	70%
Cooling	CU5, Condenser, 3 Tons, 12 SEER	BACK BLDG	TRANE 2TTB2030A1000AA	5053TYB4F	Electric	1ST FL LARGE RM	2005	70%
Cooling	COIL5, Refrigerant R-22 cooling coil for FURN5	2ND FL	TRANE TUC037S3HPD0	523YUG5G	R-22	1ST FL LARGE RM	2005	70%

Building System	Description	Location	Model #	Serial #	Fuel	Space Served	Equip Age	Estimated Remaining Useful Life %
Heating / Cooling	FURN1, direct vented 100,00 Btu/hr In, 90,000 Btu/hr Out, 90% Eff.	EQUIP ROOM	TRANE TUX100C948D3	53650GTTG	Natural Gas / Electric	OFFICES	2005	80%
Heating / Cooling	FURN2 direct vented & Cooling Unit, 100,00 Btu/hr In, 90,000 Btu/hr Out, 90% Eff.	EQUIP ROOM	TRANE TUX100C948D3	53650GETG	Natural Gas / Electric	FITNESS ROOM	2005	80%
Heating / Cooling	FURN3 direct vented & Cooling Unit, 100,00 Btu/hr In, 90,000 Btu/hr Out, 90% Eff.	2ND FL	TRANE TUX100C948D3	53025Y17G	Natural Gas / Electric	2ND FLOOR	2005	80%
Heating / Cooling	FURN4 direct vented & Cooling Unit, 100,00 Btu/hr In, 90,000 Btu/hr Out, 90% Eff.	2ND FL	TRANE TUX100C948D3	52011197G	Natural Gas / Electric	1ST FL LARGE RM	2005	80%
Heating / Cooling	FURN5 direct vented & Cooling Unit, 100,00 Btu/hr In, 90,000 Btu/hr Out, 90% Eff.	2ND FL	TRANE TUX100C948D3	5291MK77G	Natural Gas / Electric	1ST FL LARGE RM	2005	80%
Generator	Natural Gas Generator, Onan, 35 kW, 43.8 kVA	Outside	Onan 3566FB	F980753529	Natural Gas	Emergency	2005	80%
Ventilation	Exhaust fan, inaccessible during audit	Roof	NA	NA	Electric	Kitchen	2005	80%
Elevators	Imperial, 20 HP, 3395 RPM	Arrow Elevator	Cat # 217EA5020C001	339	Electric	Recreation Center	2005	80%
Transformer	Electric Transformer, 112.5 kVA	EQUIP ROOM	Jefferson Electric Cat# 423-3254	55	Electric		2005	80%
Lighting	See details - Appendix A	-	-		Electric	All Areas	-	-

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 Franklin Lakes Recreation Center, SWA has separated the investment opportunities into three recommended categories:

Capital Improvements - Upgrades not directly associated with energy savings

Operations and Maintenance - Low Cost/No Cost Measures

Energy Conservation Measures - Higher cost upgrades with associated energy savings

Category I Recommendations: Capital Improvements

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

Category II Recommendations: Operations and Maintenance

- Set up thermostat evening setback schedule

The thermostats were found to be set at a constant temperature of 67°F at all times and can be programmed to automatically reduce the temperature set point during unoccupied hours. The building is open 12 hours during most weekdays, and 3 hours on Saturdays. Therefore at all other times the temperature set points can be lowered/raised so that the equipment can reduce load when the space is not being used. The temperatures can be adjusted if a longer start-up time is required. By following the setback schedule below, Franklin Lakes can generate an estimated annual energy savings of up to \$10,000. Set up the programmable thermostats schedule as follows:

- Occupied Spaces Cooling Season: 80°F Unoccupied hours
 - Occupied Spaces Heating Season: 60°F Unoccupied hours
 - Attic Cooling Season: 80°F All hours
 - Attic Heating Season: 60°F All hours
- Replace main office back door, which becomes incredibly hot during summer months, with thermally-insulated fiberglass door
 - Thoroughly and evenly insulate space (with batt insulation) and plug all penetrations to the outside. SWA recommends properly maintaining exterior wall and roof insulation to minimize energy loss.
 - Also, install a removable, seasonal, insulated cover (or gravity louvers) for the exhaust fan.
 - Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.
 - Maintain downspouts - Repair/install missing downspouts as needed to prevent water/moisture infiltration and insulation damage.

- Provide weather-stripping/air-sealing - 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 proper flashing and seal wall penetrations wherever necessary in order to keep insulation dry and effective.
- Repair/seal space between drop ceiling and attic – SWA recommends providing additional air-sealing between the drop ceiling and attic space.
- Provide water-efficient fixtures and controls - Adding controlled on/off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Building staff can also easily install faucet aerators and/or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures/appliances will save energy through reduced energy consumption for water heating, while also decreasing water/sewer bills.
- Use Energy Star labeled appliances - such as Energy Star refrigerators that should replace older, energy-inefficient equipment.
- Use smart power electric strips - in conjunction with occupancy sensors, to power down computer equipment when left unattended for extended periods of time.
- Create an energy educational program - 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/>.

Category III Recommendations: Energy Conservation Measures - Summary table

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1a	Building Lighting Upgrades – Replace Inc with CFL
1b	Building Lighting Upgrades – Replace T12 with T8
	Description of Recommended 5-10 Year Payback ECMs
1c	Building Lighting Upgrades – Install Occupancy Sensors
2	Install 10 kW Solar PV System
3	Replace two refrigerators with Energy Star Type

ECM# 1a, 1b, 1c: *Building Lighting Upgrades*

Description:

On the days of the site visits, SWA completed a lighting inventory of the Franklin Lakes Recreation Center building (see Appendix A). SWA recommends replacing both interior and exterior incandescent lights with compact fluorescent lights. CFLs typically operate at a third of the wattage for the same lumen output and longer life. In addition, SWA recommends adding wall-mounted occupancy sensors to bathrooms, office areas, and kitchen areas which have intermittent occupancy throughout the day. Typically, using occupancy sensors reduces the hours of operation of lights by a third. There is sporadic use of T12 lamps with magnetic ballasts. SWA recommends replacing all T12 magnetic fixtures with T8 electronic fixtures, which will decrease wattage and increase lamp life for the same lumen output. Labor in all these installations was evaluated using prevailing electrical contractor wages. The Borough of Franklin Lakes may decide to perform this work with in-house resources from the Maintenance Department.

Installation cost:

Estimated installed cost: \$6,433 (includes approx. \$2,000 labor)

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

Economics (Some of the options considered with incentives):

ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	est. 1st year cost 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, \$	CO2 reduced, lbs/yr
22 New CFL fixtures to be installed with incentives	RS Means, lit search	1,112	none at this time	1,112	4,668	1.0	0	1.9	121	1,269	5	6,346	0.9	471	94	111	4,667	6,395
19 New T8 fixtures to be installed with incentives	RS Means, lit search	4,091	570	3,521	2,471	0.5	0	1.0	752	1,359	15	20,391	2.6	479	32	38	12,475	3,385
9 New occupancy sensors to be installed with incentives	RS Means, lit search	1,980	180	1,800	1,136	0.2	0	0.5	0	279	15	4,192	6.4	133	9	13	1,489	1,556
TOTALS		7,183	750	6,433	8,275	2	0.0	3.4	872	2,908		30,929	2.2				18,631	11,337

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 – Occupancy Sensor Wall Mounted - \$20 per fixture, Total \$180; T12 to T8 - \$30/fixture - Total \$570

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

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

ECM#2: *Install 10 kW PV system*

Description:

Currently, the Franklin Lakes Recreation Center building does not use any renewable energy systems. Renewable energy systems such as photovoltaic panels can be mounted on the building roof facing south, and can offset a portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, when electric demand at a power station is high due to the amount of air conditioners, lights, equipment, etc being used within the region, demand charges go up to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems not only offset the amount of electricity use by a building, but also reduce the building's electrical demand, resulting in a higher cost savings as well. SWA presents below the economics, and recommends at this time that Borough of Franklin Lakes further review installing a 10 kW PV system to offset electrical demand and reduce the annual net electric consumption for the building, and review guaranteed incentives from NJ rebates to justify the investment. The Borough of Franklin Lakes may consider applying for a grant and/or engage a PV generator/leaser who would install the PV system and then sell the power at a reduced rate. Orange Rockland Electric provides the ability to buy SRECs at \$600/MWh or best market offer.

The size of the system was determined using the amount of roof surface area as a limiting factor, as well as the facilities annual base load. A PV system could be installed on a portion of the sloped roof that faces South or West. A commercial multi-crystalline 123 watt panel (17.2 volts, 7.16 amps) has 10.7 square feet of surface area (11.51 watts per square foot). A 10 kW system needs approximately 80 panels, which would take up 870 square feet. Below is the ideal location to install the panels; it is a south/southeast exposure and very little shade.



Installation cost:

Estimated installed cost: \$60,000 (labor included at \$3/Watt, totaling \$30,000)
 Source of cost estimate: Similar projects

Economics (with incentives):

ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr cost savings, \$	life of measure, yrs	est. lifetime energy cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
Install 10 kW Solar Photovoltaic system	Similar Projects	70,000	10,000	60,000	11,800	10.0	0	4.7	0	9,503	25	171,570	6.3	186.0	7.4	14.15	187,101	21,128

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Polycrystalline Solar Panel (123 Watts, Model ND-123UJF). PV systems are sized based on Watts, and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on \$1.00/watt Solar PV application for systems 10 kW or less. Incentive amount for this application is \$10,000 for the Franklin Lakes Recreation Center.

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

NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1,000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. A total of \$6,600/year, based on \$600/SREC, has been incorporated in the above costs for the Recreation Center, however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

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

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

ECM #3: Replace Two Old Refrigerators with Energy Star Models

Description:

On the day of the site visit, SWA observed that there are two old refrigerators which appear at the end of their useful life. 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 refrigerators with two 18.2 cu. ft. top freezer refrigerators rated at 400 kWh / yr, or equivalent. Besides saving energy, the replacement will also keep the kitchen and other areas cooler. When compared to the average electrical consumption of older equipment, Energy Star equipment results in large savings.

Installation cost:

Estimated installed cost: \$1,760 (includes \$50/ unit labor, \$100 total)

Source of cost estimate: *Manufacturer and Store established costs*

Economics:

Refrigerator Replacement Cost Comparison																		
ECM description	source	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	est. energy & operating 1st year cost 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, \$	CO2 reduced, lbs/yr
Replace two old refrigerator with conventional		1,700	None at this time	1,700	50	0.0	0	0.0	100	112	12	1,348	15.1	50	4	-3	-582	69
Incremental cost to replace old refrigerators with Energy Star Refrigerators	Energy Star purchasing and procurement site, similar projects	60	None at this time	60	300	0.1	0	0.1	0	74	12	886	0.8	1376	115	123	675	411
Replace two old refrigerators in attic with Energy Star Refrigerators	Energy Star purchasing and procurement site, similar projects	1,760	None at this time	1,760	350	0.1	0	0.1	100	186	12	2,233	9.5	95	8	4	92	480

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 aren't currently any existing renewable energy systems.

5.2 Wind

Description:

There aren't any recommendations for this renewable energy source at this time, due to lack of necessary wind conditions in this region.

5.3 Solar Photovoltaic

Please see the above recommended ECM# 2.

5.4 Solar Thermal Collectors

Description:

Solar thermal collectors are not cost-effective for this building, and would not be recommended due to the insufficient and intermittent 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 HVAC system types (forced air) and intermittent domestic hot water use.

5.6 Geothermal

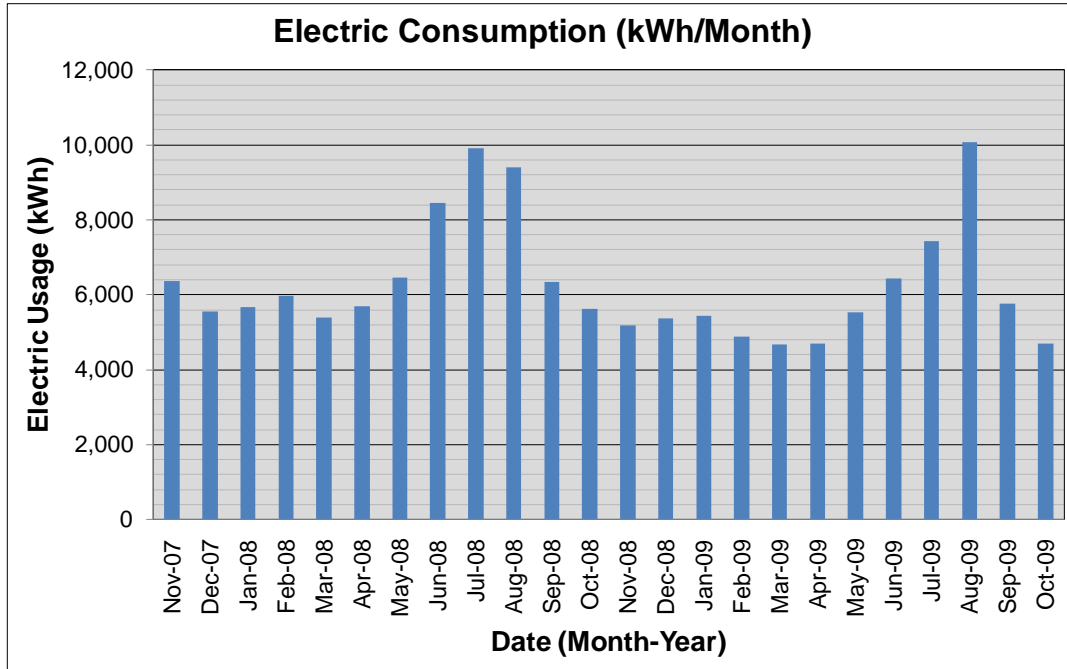
Description:

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

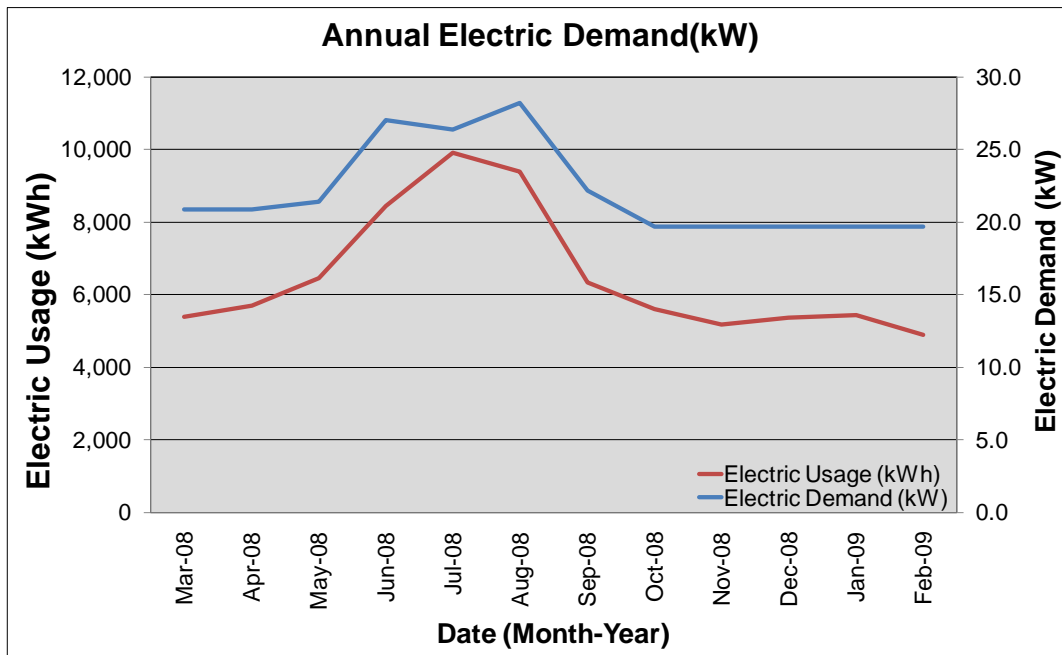
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1 Load profiles

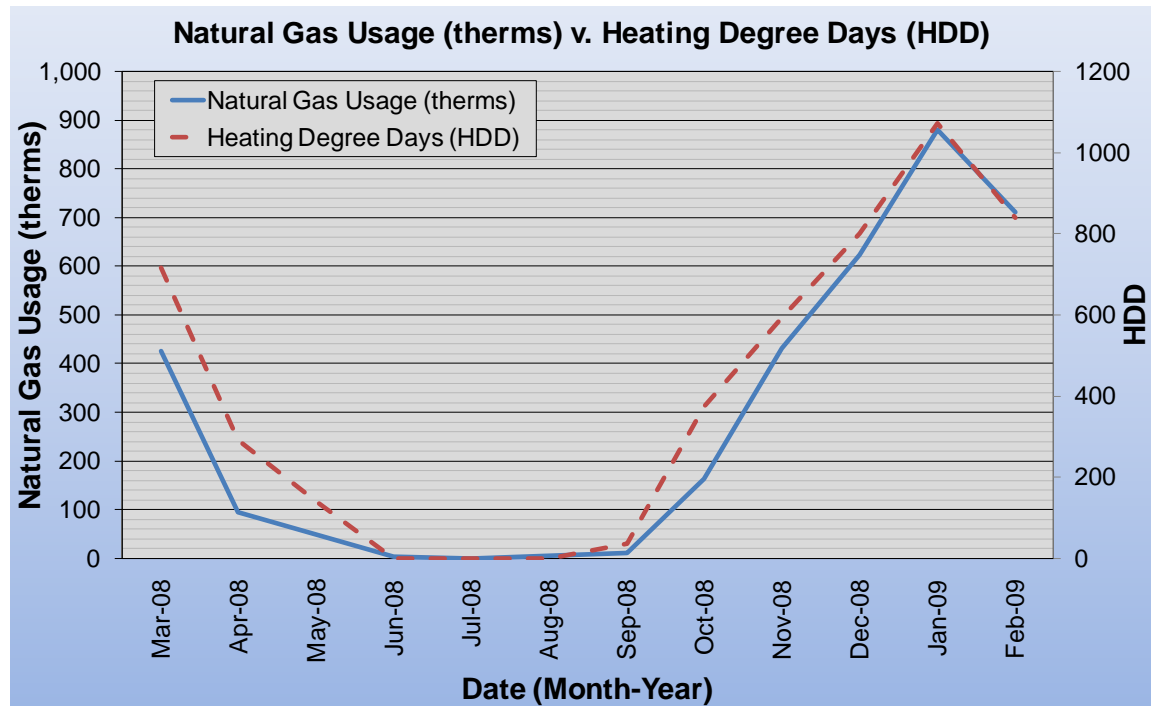
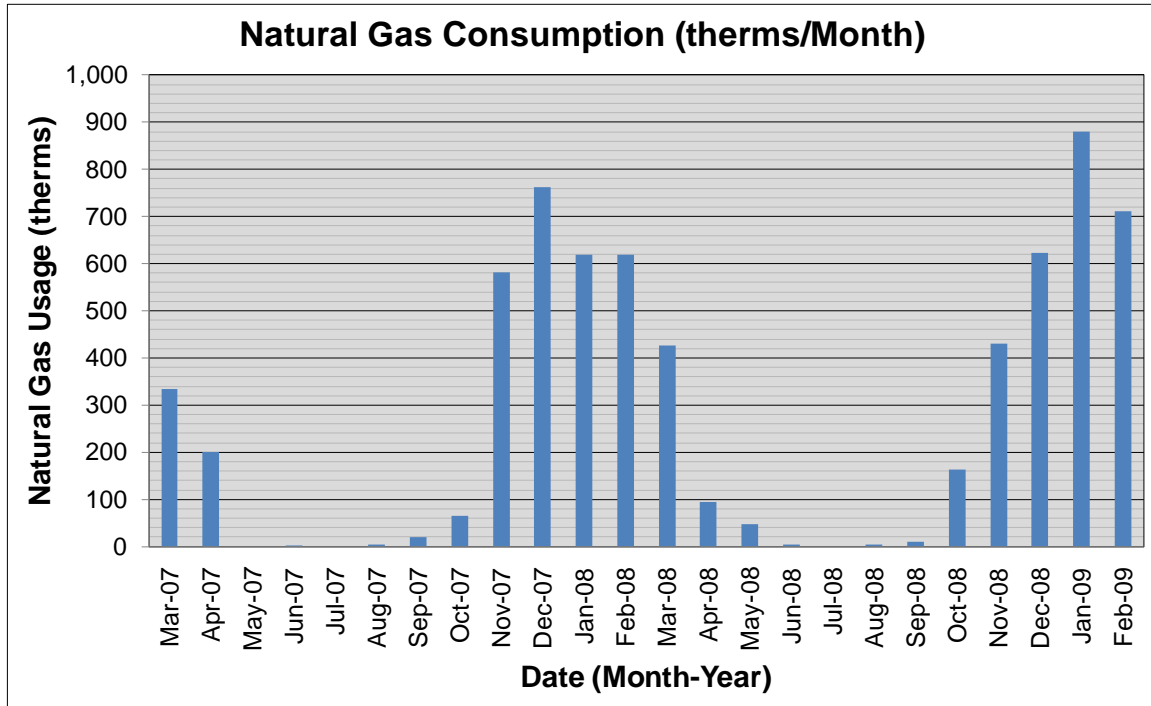
The following are charts that show the electric and natural gas load profiles for the Franklin Lakes Recreation Center.



Also, note on the following chart how the electrical demand peaks follow the electrical consumption and are a steady draw.

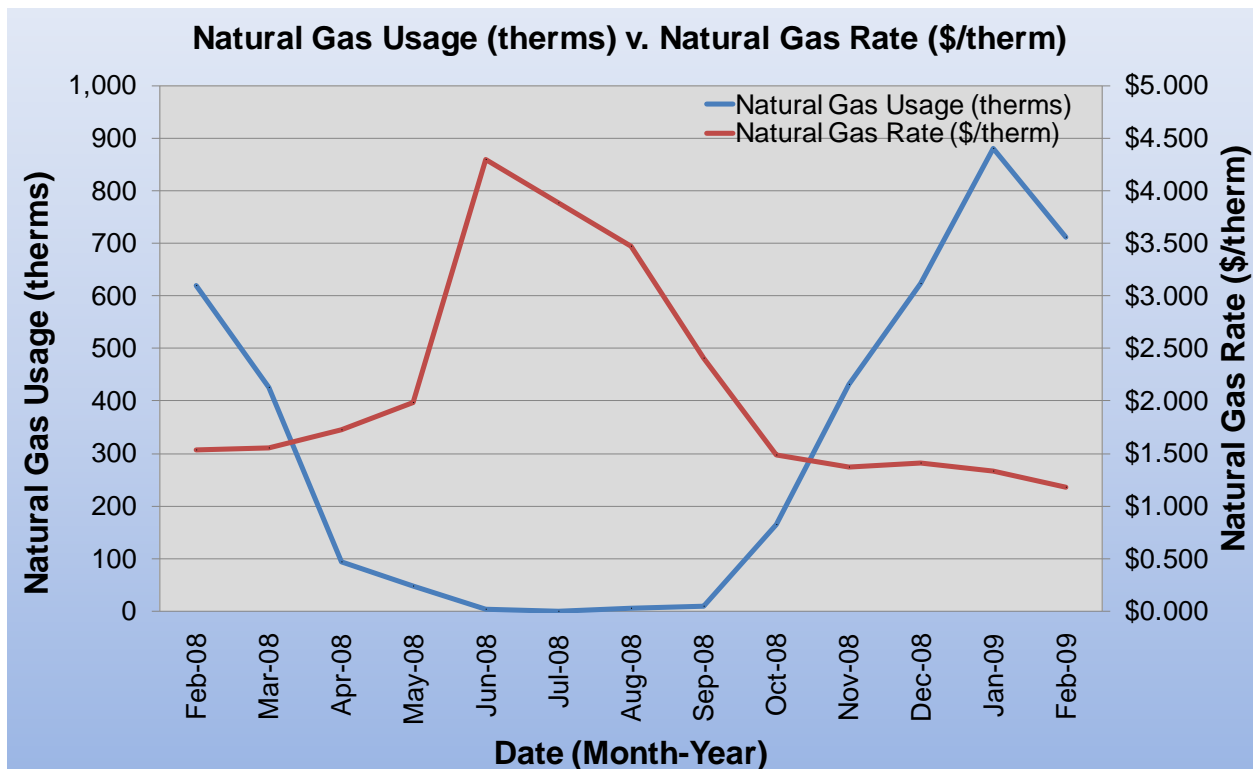


The following is a chart of the natural gas annual load profile for the building, peaking in the coldest months of the year as well as a chart showing natural gas consumption following the “heating degree days” curve.



6.2 Tariff analysis

Currently, natural gas is provided to the Franklin Lakes Recreation Center via one gas meter, with the PSE&G acting as the supply and also the transport company. Gas is provided by PSE&G at a general service rate. The suppliers' general service rate for natural gas is a market-rate price based on use, and the Franklin Lakes Recreation Center building billing does not break down 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. The high gas price per therm fluctuations in the summer may be due to low-use caps for the non-heating months as seen in May through September. Thus the building pays for fixed costs such as meter reading charges during the summer months.



The Franklin Lakes Recreation Center building is direct-metered and currently purchases electricity from Orange Rockland Electric at a general service rate. The general service rate for electric charges are market-rate based on use, and the Franklin Lakes Recreation Center building billing does show a breakdown of demand costs.

Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. Typically, the electricity rates decrease during the cooling months when more electricity is used by the condensers for cooling.

6.3 Energy Procurement strategies

The Franklin Lakes Recreation Center building receives natural gas via one incoming meter with PSE&G service for supply and transport. There is not an ESCO engaged in the process. An Energy Services Company (ESCO) is a consultancy group that engages in a performance-

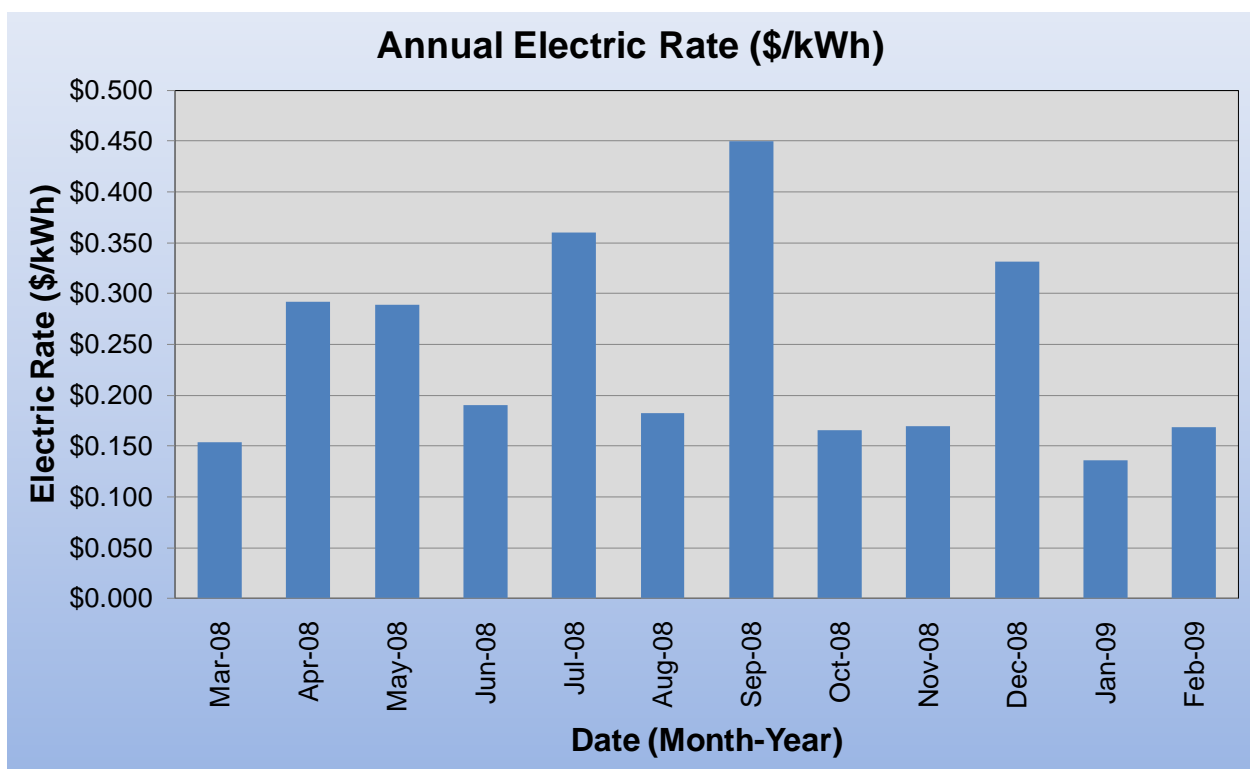
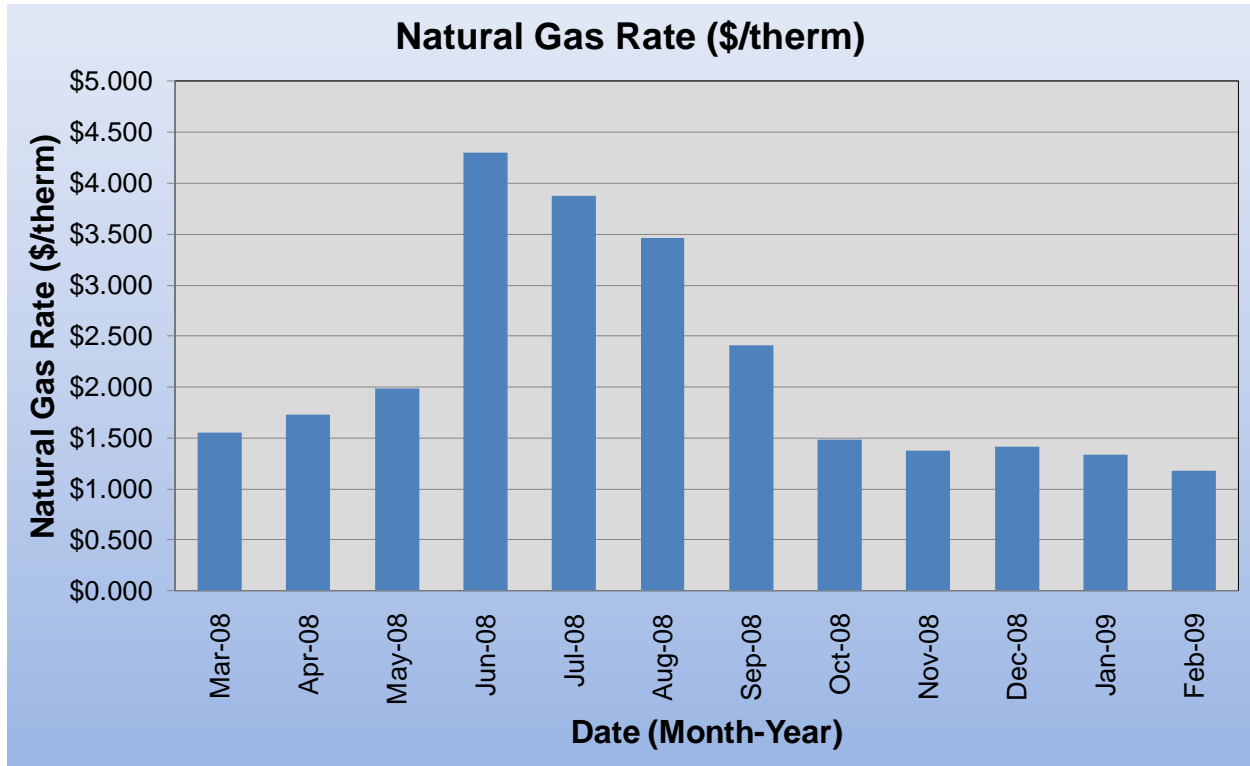
based contract with a client firm to implement measures to reduce energy consumption and costs in a technically and financially viable manner.

Electricity is purchased via one incoming meter directly for the main Franklin Lakes Recreation Center building from Orange Rockland Electric 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 64% over the most recent 12 month period. Natural gas bill analysis shows fluctuations up to 89% over the most recent 12 month period. Some of these fluctuations may be due to unusually high and recent escalating energy costs. The average estimated NJ commercial utility rates for electric and gas are \$0.150/kWh and \$1.550/therm respectively. The Franklin Lakes Recreation Center building annual electric costs are \$7,517 higher when compared to the average estimated NJ commercial utility rates.

SWA recommends that the Borough of Franklin Lakes further explore opportunities of purchasing electricity from ESCOs in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Franklin Lakes Recreation Center. Appendix B contains a complete list of third party energy suppliers for the Borough of Franklin Lakes service area. The Borough of Franklin Lakes may also want to consider partnering with other school districts, municipalities, townships and communities to aggregate 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 Franklin Lakes Recreation Center building would not be eligible for enrollment in a Demand Response Program because there isn't the capability at this time (without a large capital investment) to shed a minimum of 150 kW electric demand when requested by the utility during peak demand periods, which is the typical threshold for considering this option. Demand Response could be an option in the future when the Borough of Franklin Lakes may install a large enough back-up emergency generator.

The following charts show the Franklin Lakes Recreation Center building monthly spending per unit of energy from March 2008 to February 2009.



7. METHOD OF ANALYSIS

7.1 Assumptions and tools

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

7.2 Disclaimer

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

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

Appendix A: Lighting Study

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	Ext	exterior ()	Screw-in	N	inc	2	2	75	T	16	365	0	300	1,752	CFL	Screw-in	CFL	N	T	2	2	25	16	365	0	100	584	1168	0	1168
2	1	weight rm ()	Parabolic	E	4't12	12	4	40	S	10	350	24	2,208	7,728	T8	Parabolic	4'T8	E	S	12	4	32	10	350	13	1692	5922	1806	0	1806
3	1	weight rm ()	Exit Sign	N	LED	2	1	5	N	24	365	1	12	105	N/A	Exit Sign	LED	N	N	2	1	5	24	365	1	12	105	0	0	0
4	1	hallway ()	Parabolic	E	4'8	10	3	32	S	16	350	10	1,060	5,936	N/A	Parabolic	4'T8	E	S	10	3	32	16	350	10	1060	5936	0	0	0
5	1	mech rm ()	Parabolic	E	4'8	1	2	32	S	2	350	6	70	49	C	Parabolic	4'T8	E	OS	1	2	32	2	350	6	70	37	0	12	12
6	1	kitchen ()	Parabolic	E	4'8	1	3	32	S	10	350	10	106	371	C	Parabolic	4'T8	E	OS	1	3	32	8	350	10	106	278	0	93	93
7	1	kitchen ()	Parabolic	E	4't12	6	2	40	S	10	350	15	570	1,995	T8	Parabolic	4'T8	E	S	6	2	32	10	350	6	420	1470	525	0	525
8	1	kitchen ()	Parabolic	E	4'8	2	4	32	S	10	350	13	282	987	C	Parabolic	4'T8	E	OS	2	4	32	8	350	13	282	740	0	247	247
9	1	hallway ()	Exit Sign	N	LED	3	1	5	N	24	365	1	18	158	N/A	Exit Sign	LED	N	N	3	1	5	24	365	1	18	158	0	0	0
10	1	janitor closet ()	Parabolic	E	4'8	1	3	32	S	2	350	10	106	74	C	Parabolic	4'T8	E	OS	1	3	32	2	350	10	106	56	0	19	19
11	1	hallway 2 ()	Parabolic	E	4'8	1	3	32	S	16	350	10	106	594	N/A	Parabolic	4'T8	E	S	1	3	32	16	350	10	106	594	0	0	0
12	1	hallway 2 ()	4'U-Shape	E	4'8	1	2	32	S	16	350	6	70	392	N/A	4'U-Shape	4'T8	E	S	1	2	32	16	350	6	70	392	0	0	0
13	1	hallway 2 ()	Exit Sign	N	LED	1	1	5	N	24	365	1	6	53	N/A	Exit Sign	LED	N	N	1	1	5	24	365	1	6	53	0	0	0
14	1	br women ()	Parabolic	E	4'8	1	3	32	S	10	350	10	106	371	C	Parabolic	4'T8	E	OS	1	3	32	8	350	10	106	278	0	93	93
15	1	office area ()	Parabolic	E	4'8	6	3	32	S	10	350	10	636	2,226	N/A	Parabolic	4'T8	E	S	6	3	32	10	350	10	636	2226	0	0	0
16	1	office ()	Parabolic	E	4'8	2	3	32	S	10	350	10	212	742	N/A	Parabolic	4'T8	E	S	2	3	32	10	350	10	212	742	0	0	0
17	1	br men ()	Parabolic	E	4'8	1	3	32	S	10	350	10	106	371	C	Parabolic	4'T8	E	OS	1	3	32	8	350	10	106	278	0	93	93
18	1	br men2 ()	Parabolic	E	4'8	1	3	32	S	10	350	10	106	371	C	Parabolic	4'T8	E	OS	1	3	32	8	350	10	106	278	0	93	93
19	1	elevator ()	Parabolic	E	2'8	2	2	17	S	5	350	3	74	130	N/A	Parabolic	2'T8	E	S	2	2	17	5	350	3	74	130	0	0	0
20	1	br women2 ()	Parabolic	E	4'8	1	3	32	S	10	350	10	106	371	C	Parabolic	4'T8	E	OS	1	3	32	8	350	10	106	278	0	93	93
21	1	stair corr. ()	Parabolic	E	4't12	1	2	40	S	16	350	15	95	532	T8	Parabolic	4'T8	E	S	1	2	32	16	350	6	70	392	140	0	140
22	1	excercise rm ()	Screw-in	N	inc	20	1	75	S	10	350	0	1,500	5,250	CFL	Screw-in	CFL	N	S	20	1	25	10	350	0	500	1750	3500	0	3500
23	1	excercise rm ()	Exit Sign	N	LED	2	1	5	N	24	365	1	12	105	N/A	Exit Sign	LED	N	N	2	1	5	24	365	1	12	105	0	0	0
24	1	attic ()	Parabolic	E	4'8	16	4	32	S	2	350	13	2,256	1,579	C	Parabolic	4'T8	E	OS	16	4	32	2	350	13	2256	1184	0	395	395
25	1	attic ()	Exit Sign	N	LED	2	1	5	N	24	365	1	12	105	N/A	Exit Sign	LED	N	N	2	1	5	24	365	1	12	105	0	0	0
26	1	office area ()	Exit Sign	N	LED	1	1	5	N	24	365	1	6	53	N/A	Exit Sign	LED	N	N	1	1	5	24	365	1	6	53	0	0	0
Totals:						99	61	765				201	10,141	32,399						99	61	641			172	8,250	24,124	7,139	1,136	8,275

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

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

Proposed Lighting Summary Table			
Total Surface Area (SF)	8,511		
Average Power Cost (\$/kWh)	0.2460		
Exterior Lighting	Existing	Proposed	Savings
Exterior Annual Consumption (kWh)	1,752	584	1,168
Exterior Power (watts)	300	100	200
Total Lighting	Existing	Proposed	Savings
Annual Consumption (kWh)	30,647	23,540	8,275
Lighting Power (watts)	9,841	8,150	1,691
Lighting Power Density (watts/SF)	1.16	0.96	0.20
Estimated Cost of Fixture Replacement (\$)	5,203		
Estimated Cost of Controls Improvements (\$)	1,980		
Total Consumption Cost Savings (\$)	2,908		

Appendix B: Third Party Energy Suppliers (ESCOs)

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

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
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

Third Party Gas Suppliers for PSEG Service Territory	Telephone & Web Site
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

Third Party Electric Suppliers for Orange Rockland Service Territory	Telephone & Web Site
BOC Energy Services, Inc. 575 Mountain Avenue Murray Hill, NJ 07974	(800) 247-2644 www.boc.com
Direct Energy Services, LLC 120 Wood Avenue, Suite 611 Iselin, NJ 08830	(866) 547-2722 www.directenergy.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640	(877) 569-2841 www.glacialenergy.com
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07097	(800) 437-7872 www.hess.com
Liberty Power Holdings, LLC Park 80 West, Plaza II, Suite 200 Saddle Brook, NJ 07663	(866) 769-03799 www.libertypowercorp.com
Sempra Energy Solutions 581 Main Street, 8th Floor Woodbridge, NJ 07095	(877) 273-6772 www.semprasolutions.com
Strategic Energy, LLC 55 Madison Avenue, Suite 400 Morristown, NJ 07960	(888) 925-9115 www.sel.com
Suez Energy Resources NA, Inc. 333 Thornal Street, 6th Floor Edison, NJ 08837	(888) 999-8374 www.suezenergyresources.com

Appendix C: 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 measure (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 expressed as 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:

Year	Cash Flow
0	\$(5,000.00)
1	\$ 850.00
2	\$ 850.00
3	\$ 850.00
4	\$ 850.00
5	\$ 850.00
6	\$ 850.00
7	\$ 850.00
8	\$ 850.00
9	\$ 850.00
10	\$ 850.00

Investment Cost

ECM Lifetime

Cash Flow: Annual Energy Cost Savings + Annual Maintenance Savings

Formula:
=IRR(F4:F14)
=NPV(0.03,F5:F14)+F4

IRR	11.03%
NPV	\$2,250.67

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 50kW 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 D: 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. The incentives 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 80%** of the retrofit costs, including equipment cost and installation costs. See all applicable DI measures on the following pages.

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.

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/>.

LIGHTING	
Proposed Fixture	
2' T8 1-lamp with EB	
2' T8 2-lamp with EB	
2' T8 3-lamp with EB	
2' T8 4-lamp with EB	
4' T8 1-lamp with EB	
4' T8 2-lamp with EB	
4' T8 3-lamp with EB	
4' T8 4-lamp with EB	
2' T8 1-lamp with EB plus reflector	
4' T8 1-lamp with EB plus reflector	
4' T8 2-lamp with EB plus reflector	
4' T8 3-lamp with EB plus reflector	
8' T8 2-lamp with EB	
4' T8 4-lamp with EB plus reflector	
4' T8 6-lamp with EB plus reflector	
8' T8 2-lamp with EB plus reflector	
2' T8 U-Lamp with EB	
4' T8 2-lamp w/ HPEB	
4' T8 2-lamp w/ HPEB plus reflector	
4' T8 4-lamp w/ HPEB	
4' T8 4-lamp w/ HPEB plus reflector	
54T5HO 2-lamp and fixture	
54T5HO 3-lamp and fixture	
T8 3-lamp fixture with EB & reflector	
T8 4-lamp fixture with EB & reflector	
54T5HO 4-lamp and fixture	
5W CF Screw-in Quad Lamp	
5W CF Screw-in Torpedo or R20 Lamp	
CF 7-1L SCREW IN CFL	
CF 9-1L SCREW IN CFL	
CF 13-1L SCREW IN CFL	
CF 18-1L SCREW IN CFL	
CF 22-1L SCREW IN CFL	
CF 26-1L SCREW IN CFL	
CF 28-1L SCREW IN CFL	
CF 32-1L SCREW IN CFL	
CF 36-1L SCREW IN CFL	
CF 42-1L SCREW IN CFL	
CF 7-1L SCREW IN CFL DIMMABLE	
CF 18-1L SCREW IN CFL DIMMABLE	
CF 23-1L SCREW IN CFL DIMMABLE	
18W CIRCLINE w/ dome	
32W CIRCLINE w/ dome	
40W CIRCLINE w/ dome	
58W CIRCLINE w/ dome	
28W CF Exterior Floodlight w/PE	
1 LAMP T5 HIGH BAY HO FIXTURE	
2 LAMP T5 HIGH BAY HO FIXTURE	
3 LAMP T5 HIGH BAY HO FIXTURE	
4 LAMP T5 HIGH BAY HO FIXTURE	
5 LAMP T5 HIGH BAY HO FIXTURE	
6 LAMP T5 HIGH BAY HO FIXTURE	
MH PS (320 W) RETRO.	
MH PS (250W) RETRO.	
MH PS (200 W) RETRO.	
MH PS (175 W) RETRO.	
NEW MH PS (320 W) FIXTURE	
NEW MH PS (250 W) FIXTURE	
NEW MH PS (200 W) FIXTURE	
NEW MH PS (175 W) FIXTURE	
42W Halogen Lamp (12 V System)	
50W Halogen Lamp (12 V System)	
65W Halogen Lamp (12 V System)	
LED Exit Sign Retrofit Kit	
LED Universal Exit Sign	
LED EXIT Sign w/ Batt. Backup	

LIGHTING CONTROLS	
Proposed Sensor	
Occ. Sensor Ceiling Mount (line volt)	
Occ. Sensor Ceiling Mount (low volt)	
Dual Tech. Occ.Sens Ceiling (line v)	
Dual Tech. Occ.Sens Ceiling (low v)	
Occ. Sens. Wall/Corner Mount (line v)	
Occ. Sens. Wall/Corner Mount (low v)	
Dual Tech Occ.Sens Wall/Corner (line v)	
Dual Tech Occ.Sens Wall/Corner (low v)	
Occupancy Sensor Wall Switch	
Dual Tech Occ. Sensor Wall Switch	
Occ.Sensor for High Bay Fixtures	
Photocell Control w/ Dimmable Balast	
Programmable Time Clock	
Add'l Power Pack (a.k.a. Relay)	

VFDs	
Lookup	
VFD for 1 HP Motor	
VFD for 1.5 HP Motor	
VFD for 2 HP Motor	
VFD for 3 HP Motor	
VFD for 5 HP Motor	
VFD for 7.5 HP Motor	
VFD for 10 HP Motor	

GAS MEASURES	
Measure Description	
Low Intensity IR Heating Unit (Gas)	
Gas-Fired Furnace	
Gas-Fired Boiler	

HVAC & HW CONTROLS	
Equipment Type	
Outside Economizer	
Demand Control Ventilation	
Programmable Thermostats	

Pipe Wrap	
0.75	
1	
1.25	
1.5	
2	
2.5	
3	
4	
6	
8	

MOTORS	
Motor Description	
Open Drip Proof - 1200 RPM - 5 HP	
Open Drip Proof - 1200 RPM - 7.5 HP	
Open Drip Proof - 1200 RPM - 10 HP	
Open Drip Proof - 1800 RPM - 1.5 HP	
Open Drip Proof - 1800 RPM - 2 HP	
Open Drip Proof - 1800 RPM - 3 HP	
Open Drip Proof - 1800 RPM - 5 HP	
Open Drip Proof - 1800 RPM - 7.5 HP	
Open Drip Proof - 1800 RPM - 10 HP	
Open Drip Proof - 3600 RPM - 7.5 HP	
Open Drip Proof - 3600 RPM - 10 HP	
Enclosed, Fan-Cooled - 1200 RPM - 2 HP	
Enclosed, Fan-Cooled - 1200 RPM - 3 HP	
Enclosed, Fan-Cooled - 1200 RPM - 5 HP	
Enclosed, Fan-Cooled - 1200 RPM - 7.5 HP	
Enclosed, Fan-Cooled - 1200 RPM - 10 HP	
Enclosed, Fan-Cooled - 1800 RPM - 3 HP	
Enclosed, Fan-Cooled - 1800 RPM - 5 HP	
Enclosed, Fan-Cooled - 1800 RPM - 7.5 HP	
Enclosed, Fan-Cooled - 1800 RPM - 10 HP	
Enclosed, Fan-Cooled - 3600 RPM - 7.5 HP	
Enclosed, Fan-Cooled - 3600 RPM - 10 HP	

OIL/PROPANE MEASURES	
Measure /Capacity (Btus)	
Oil-Fired Furnace	
60,001 to 80,000	
80,001 to 100,000	
100,001 to 120,000	
120,001 to 140,000	
Propane-Fired Furnace	
25,000 to 40,000	
40,001 to 60,000	
60,001 to 80,000	
80,001 to 100,000	
100,001 to 120,000	
120,001 to 140,000	
Oil-Fired Boiler	
75,000 to 100,000	
100,001 to 150,000	
150,001 to 225,000	
225,001 to 300,000	
300,001 to 400,000	
400,001 to 500,000	
Propane-Fired Boiler	
75,000 to 100,000	
100,001 to 150,000	
150,001 to 225,000	
225,001 to 300,000	
300,001 to 400,000	
400,001 to 500,000	

HOT WATER MEASURES	
Low-flow Showerhead	
Low-flow faucet aerators	
Low-flow Kitchen Pre-Rinse Spray Valves	

Fuel Economizer Control

Models	For Use with	Fuel	For HVAC Sizes	
<i>IntelliCon-HW+</i>	Resid. Hot Water Sys	Oil/Gas	<300	kBTU/hr
<i>IntelliCon-LCH</i>	Lt. Comm. Hot Water Sys.	Oil/Gas	300-2500	kBTU/hr
<i>IntelliCon-CHW</i>	Comm. Hot Water Sys.	Oil/Gas	>2500	kBTU/hr
<i>IntelliCon-LCS</i>	Lt. Comm. Steam Boilers	Oil/Gas	<2500	kBTU/hr
<i>IntelliCon-CHS</i>	Comm. Steam Boiler Sys.	Oil/Gas	>2500	kBTU/hr
<i>IntelliCon-FA</i>	Res/Comm. Forced Air Heat Sys.	Oil/Gas	all sizes	
<i>IntelliCon-AC</i>	Resid. Central AC	Electric	0-5 tons	
<i>IntelliCon-CAC</i>	Comm. Central AC	Electric	>5 tons	
<i>IntelliCon-RU</i>	Refrigeration Units	Electric	all sizes	

REFRIGERATION

Measure Description
Evaporator/Compressor Controller for one Cooler
Incremental Cost for each additional Cooler
First Cooler/Freezer Door Heater Control
Incremental Cost for each additional Cooler/Freezer Heater Circuit

PACKAGED HVAC

Equipment Type
2.5-Ton Packaged Unitary A/C (Elec.)
3-Ton Packaged Unitary A/C (Elec.)
4-Ton Packaged Unitary A/C (Elec.)
5-Ton Packaged Unitary A/C (Elec.)
7.5-Ton Packaged Unitary A/C (Elec.)
10-Ton Packaged Unitary A/C (Elec.)
12-Ton Packaged Unitary A/C (Elec.)
15-Ton Packaged Unitary A/C (Elec.)
2.5-Ton Packaged Unit (Elec. AC/Gas Heat)
3-Ton Packaged Unit (Elec. AC/Gas Heat)
4-Ton Packaged Unit (Elec. AC/Gas Heat)
5-Ton Packaged Unit (Elec. AC/Gas Heat)
7.5-Ton Packaged Unit (Elec. AC/Gas Heat)
10-Ton Packaged Unit (Elec. AC/Gas Heat)
12-Ton Packaged Unit (Elec. AC/Gas Heat)
15-Ton Packaged Unit (Elec. AC/Gas Heat)
2-Ton Electric Split System A/C
2.5-Ton Electric Split System A/C
3-Ton Electric Split System A/C
4-Ton Electric Split System A/C
5-Ton Electric Split System A/C
7.5-Ton Electric Split System A/C
2-Ton Air Source Heat Pump
2.5-Ton Air Source Heat Pump
3-Ton Air Source Heat Pump
4-Ton Air Source Heat Pump
5-Ton Air Source Heat Pump
7.5-Ton Air Source Heat Pump
2.5-Ton Water Source Heat Pump
3-Ton Water Source Heat Pump
4-Ton Water Source Heat Pump
5-Ton Water Source Heat Pump
7.5-Ton Water Source Heat Pump