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January 19th, 2010

Local Government Energy Program
Energy Audit Report

For

Secaucus Housing Authority

Kroll Heights
700 County Ave
Secaucus, NJ 07094

Project Number: LGEA20

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INTRODUCTION

As an approved energy consulting firm under the Local Government Energy Audit Program (LGEA), Steven Winter Associates, Inc. (SWA) was selected to perform an energy audit and assessment for the Secaucus Housing Authority buildings. For this audit, the PMK Group, an approved subcontractor under the LGEA, performed the assessment of the large mechanical and electrical systems including HVAC equipment. The audit included a review of The Elms, Kroll Heights and R. Impreveduto Towers. The buildings are located in Secaucus, NJ. A separate energy audit report is issued for each of the referenced buildings.

This report addresses the Kroll Heights building located at 700 County Ave., Secaucus, NJ. The current conditions and energy-related information were collected in order to analyze and suggest the implementation of building improvements and energy conservation measures.

Kroll Heights was built in 1993 and consists of five stories and a total floor area of 61,000 square feet including 75 apartment units. The building is operated 24 hours per day since it is a residential building.

The goal of this Local Government Energy Audit (LGEA) is to provide sufficient information to Secaucus Housing Authority to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the building.

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

- Section 1 and section 2 of the report cover a description and analysis of the building existing conditions.
- Section 3 provides a detail inventory of major electrical and mechanical systems in the building.
- Sections 4 through 7 provide a description of our recommendations.
- Appendices include further details and information supporting our recommendations.

EXECUTIVE SUMMARY

The energy audit performed by Steven Winter Associates (SWA) encompasses the Kroll Heights building located at 700 County Ave., Secaucus, NJ. The building is a five-story residential building with a total floor area of 61,000 square feet. The building was built in 1993 and contains 75 apartment units for senior housing. The original structure has not undergone any major renovations or additions.

Based on the field visits performed by the SWA staff on September 9th and 10th, 2009 and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling, and electric usage.

Existing conditions

From March 2008 through March 2009, the period of analysis for this audit, the building consumed 428,550 kWh or $70,385 worth of electricity at an approximate rate of $0.164/kWh and 29,327 therms or $38,364 worth of natural gas at an approximate rate of $1.31/therm. The joint energy consumption for the building, including both electricity and fossil fuel, was 4,395 MMBtus of energy that cost a total of $108,749.

SWA has entered energy information about the Kroll Heights building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was benchmarked as a Multifamily Housing building. The building was not able to receive an Energy Star performance rating since the building is classified as a Multifamily Housing building, which is currently ineligible for a performance score through the Benchmarking tool. SWA encourages the Secaucus Housing Authority to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time. The current Site Energy Use Intensity is 67.1 kBtu/ft^{2}yr.

Recommendations

Implementing this report's recommendations will reduce use by approximately 22.1 kBtu/ft^{2}yr, which would decrease the building's energy use intensity to 45.0 kBtu/ft^{2}yr.

SWA recommends a package of measures that address both common areas and tenant spaces. Kroll Heights, built in 1993, has been maintained well and much of the original structure is in good shape and much of the mechanical equipment is still operating as expected. In an effort to reduce electricity usage as well as carbon emissions, SWA recommends a 53.4 kW PV solar array to offset a portion of the building's electric use.

Based on the assessment of the building, 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

- Upgrade windows
- Install Energy Star roof with increased rigid insulation

Category II Recommendations: Operations and Maintenance

- Maintain roofs
- Provide weather stripping / air sealing
- Provide water efficient fixtures and controls

- Use Energy Star labeled appliances

Category III Recommendations: Energy Conservation Measures

At this time, SWA highly recommends a total of **3** Energy Conservation Measures (ECMs) for the Kroll Heights building that is summarized in the following Table 1. The total investment cost for these ECMs with incentives is **$36,277**. SWA estimates a first year savings of **$13,921** with a simple payback of **2.6 years**. SWA also recommends **3** ECMs with a 5-10 year payback that is summarized in Table 2 and **5** End of Life Cycle ECMs.

The implementation of all the recommended ECMs would reduce the building electric usage by 219,006 kWh annually, or 51% of the building's current electric consumption. The recommended ECMs would also reduce the building natural gas usage by 5,997 therms or 20% of the building's current electric consumption. SWA estimates that implementing these ECMs will reduce the carbon footprint of the Kroll Heights building by **458,235 lbs of CO_2**, which is equivalent to removing approximately 34 cars from the roads each year or avoiding the need of 1,103 trees to absorb the annual CO_2 produced. SWA also recommends that Secaucus Housing Authority contacts third party energy suppliers in order to negotiate a lower electricity rate. Comparing the current electric rate to average utility rates of similar type buildings in New Jersey, it may be possible to save up to $0.014/kWh, which would have equated to $6,000 for the past 12 months.

There are various incentives that Secaucus Housing Authority could apply for that could also help lower the cost of installing the ECMs. SWA recommends Secaucus Housing Authority to apply for the Pay-for-Performance (P4P) program through the New Jersey Office of Clean Energy. The P4P program is aimed at buildings that show potential for saving 15% or greater of annual energy consumption. This comprehensive energy efficiency program provides incentives towards whole-building energy improvements, including incentives for an Energy Reduction Plan, installation of energy saving measures and Post-Construction benchmarking. The program was originally intended for buildings with an average annual peak demand of over 200kW; however the program currently allows local government buildings not receiving Energy Efficiency and Conservation Block Grants to participate. The 2009 deadline for local governments to enter into the program is 12/31/2009. More P4P program opportunities may be available in 2010; however funding has not yet been approved.

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

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

Table 1 - Highly Recommended 0-5 Year Payback ECMs																		
ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
1	Install 2 new occupancy sensors	RS Means, lit search	440	40	400	1,647	0.3	0	0.1	0	270	15	3,178	1.5	694.6	46.3	67.5	2,825	2,949
2	Install 272 New CFL fixtures	RS Means, lit search	35,510	0	35,510	59,988	12.5	0	3.4	3,723	13,561	5	61,752	2.6	73.9	14.8	26.3	26,596	107,409
3	Install 2 new LED exit signs	RS Means, lit search	407	40	367	193	0.0	0	0.0	58	90	15	1,055	4.1	187.4	12.5	23.4	703	346
	TOTALS	**-**	**36,357**	**80**	**36,277**	**61,828**	**12.8**	**0**	**3.5**	**3,781**	**13,921**	**-**	**65,986**	**2.6**	**-**	**-**	**-**	**30,123**	**110,703**

Assumptions: Discount Rate: 3.2% per DOE FEMP; Energy Price Escalation Rate: 0% per DOE FEMP Guidelines
Note: A 0.0 electrical demand reduction / month indicates that it is very low / negligible

Table 2 - Recommended 5-10 Year Payback ECMs																			
ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
4	Install 199 new T8 fixtures	RS Means, lit search	42,249	5,970	36,279	15,473	3.2	0	0.9	2,490	5,028	15	59,160	7.2	63.1	4.2	10.9	23,740	27,704
5	Install 13 new Pulse Start Metal Halide fixtures	RS Means, lit search	6,256	325	5,931	3,132	0.7	0	0.2	286	800	15	9,410	7.4	58.6	3.9	10.4	3,102	5,608
6	Install 53.4 kW PV system	Similar Projects	347,100	0	347,100	53,732	53.0	0	3.0	0	40,612	15	477,884	7.2	62.7	4.2	10.9	191,124	96,207
	TOTALS	-	**395,605**	**6,295**	**389,310**	**72,337**	**56.9**	**0**	**4.1**	**2,776**	**46,439**	-	**760,248**	**8.4**	-	-	-	**213,327**	**129,519**

Table 3 - Recommended End of Life Cycle ECMs																		
ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
7	Install new Energy Star through-wall air conditioners	RS Means, lit search	91,784	0	91,784	49,941	10.4	0	2.8	0	8,190	15	96,376	11.2	5.0	0.3	3.9	5,992	89,419
8	Replace two 3-ton condensers and AHUs	RS Means, lit search	13,200	552	12,648	5,350	1.1	0	0.3	0	877	15	10,324	14.4	-18.4	-1.2	0.5	-2,174	9,579
9	Install 131 programmable thermostats	RS Means, lit search	25,545	0	25,545	0	0.0	1,245	2.0	0	1,631	15	19,191	15.7	-24.9	-1.7	-0.5	-6,075	13,724
10	Install 75 Energy Star refrigerators	RS Means, lit search	88,500	0	88,500	29,550	6.0	0	1.7	0	4,846	15	57,026	18.3	-35.6	-2.4	-2.4	-30,646	52,909
11	Install two boilers and a hot water skid	Contractor	240,000	2,100	237,900	0	0.0	4,752	7.8	0	6,225	15	73,251	38.2	-69.2	-4.6	-9.9	-163,585	52,381
	TOTALS	**-**	**459,029**	**2,652**	**456,377**	**84,841**	**17.5**	**5,997**	**14.6**	**0**	**21,770**	**-**	**256,169**	**21.0**	**-**	**-**	**-**	**-196,488**	**218,013**

Note: For more details on End of Life Cycle ECMs and associated incremental cost for high efficiency equipment and performance see Section 4.

1. HISTORIC ENERGY CONSUMPTION

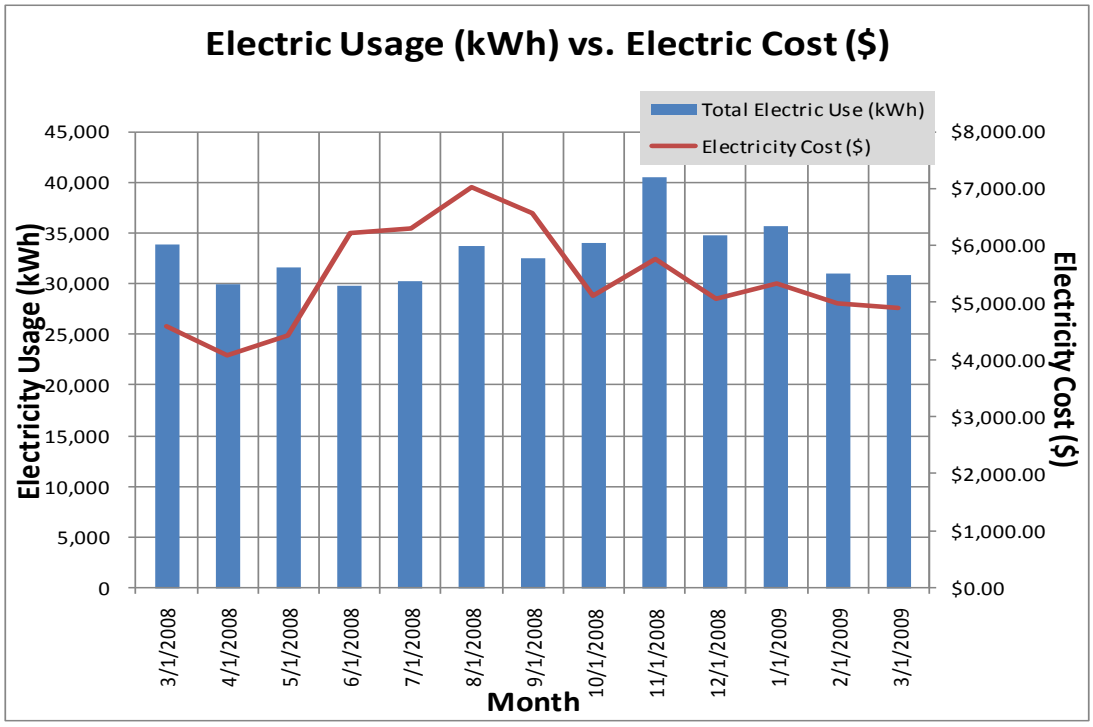
1.1. Energy usage, load profiles and cost analysis

SWA analyzed utility bills from **March 2008 through March 2009** (period of analysis) that were received from the utility companies supplying the Kroll Heights building with electricity and natural gas. Kroll Heights is currently master-metered for gas since the building has a central heating system. The common areas as well as each apartment are all metered separately for electricity. SWA based billing analysis on common area meters as well as extrapolating data for each apartment based on 10% of each apartment type.

Electricity – Kroll Heights currently buys electricity from PSE&G at **an average rate of $0.164/kWh** based on 12 months of utility bills from March 2008 to March 2009. Kroll Heights purchased **approximately 428,550 kWh or $70,385 worth of electricity** in the previous year. Kroll Height's common area and tenant meters are each charged separately for demand (kW) which has been factored into each monthly bill. Based on the same time period, the common area meters also has **an average monthly demand of 35.0 kW and a monthly peak demand of 45.0 kW.**

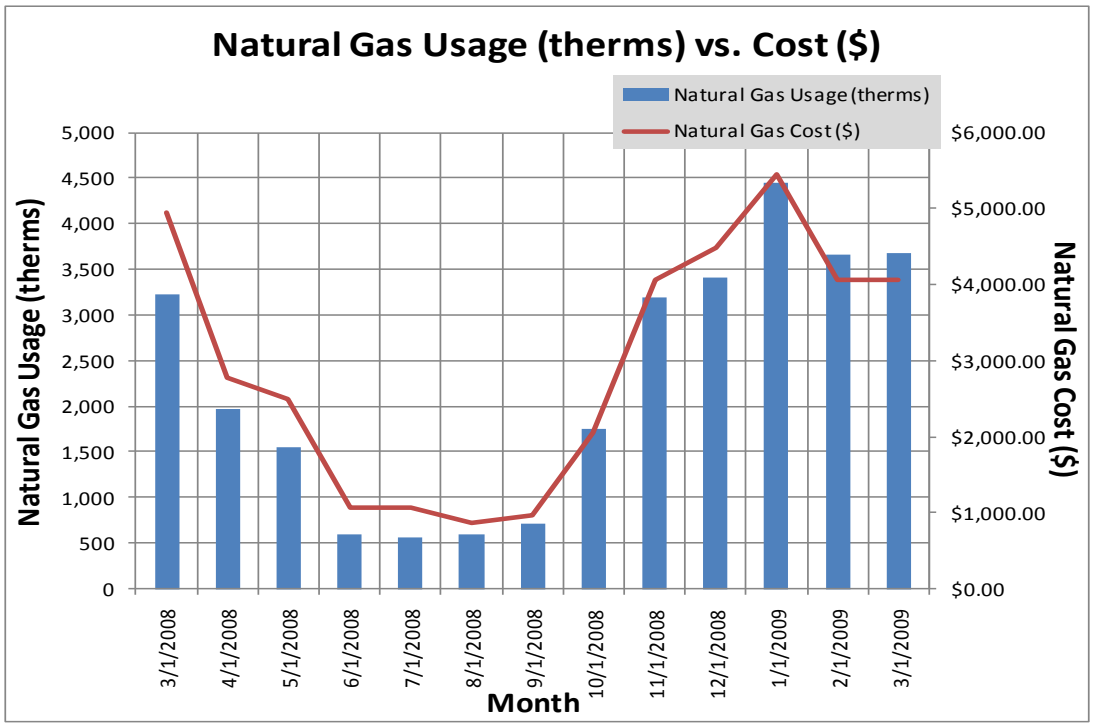
Natural gas – Kroll Heights is currently served by one meter for natural gas. Kroll Heights currently buys natural gas from PSE&G at **an average rate of $1.32/therm** based on 12 months of utility bills from March 2008 to March 2009. The building purchased **approximately 29,327 therms or $38,364 worth of natural gas** in the previous year.

The following chart shows electricity use versus cost for Kroll Heights based on utility bills for the 12 month period of March 2008 to March 2009.

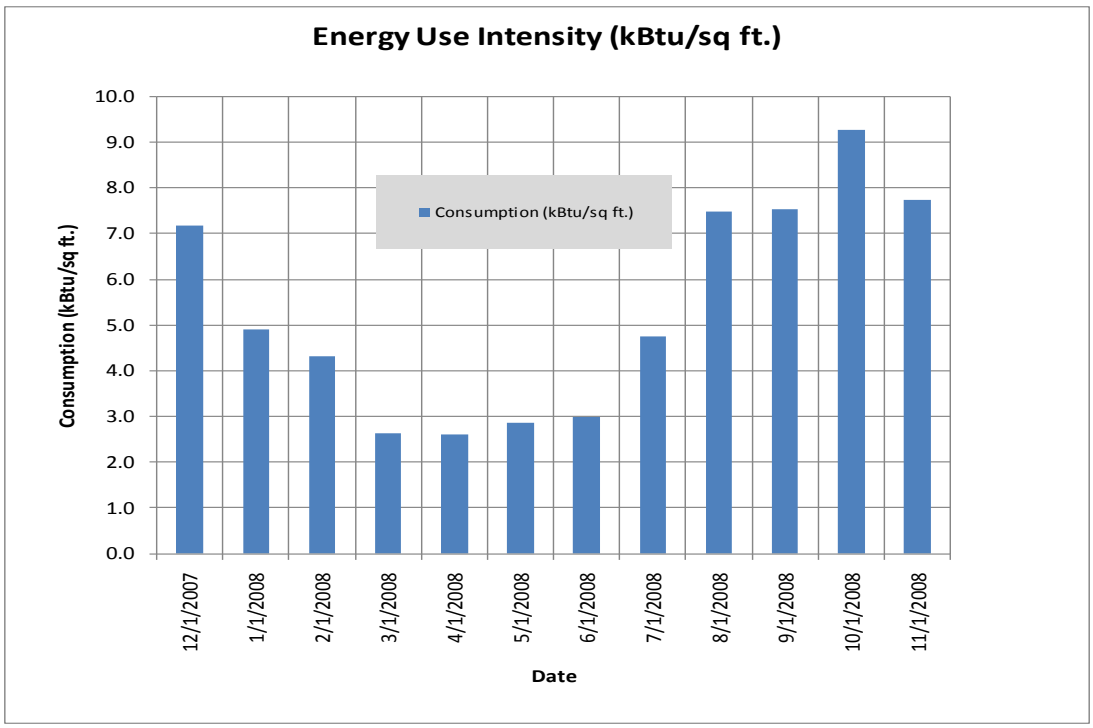


During the period from 6/2008 through 9/2008, the electricity cost appears to rise in comparison to electricity usage. This appears to be a result of estimated meter readings by the utility company. When a monthly bill is based on an estimated meter reading, future bills are adjusted to reconcile any differences; however this may cause confusion and misunderstanding when a client looks at their utility bills. SWA recommends that Secaucus Housing Authority monitor how many electric bills are estimated and contact the utility company as soon as they receive an estimated bill. Each monthly utility bill will have notation that states whether the meter was "actual" or "estimated". If the utility company estimates a bill, the utility company will adjust a future bill to make up the difference once the meter has been read again. Making sure the utility bills are always read avoids having to adjust future bills, which can cause billing confusion.

The following chart shows natural gas use versus cost for Kroll Heights based on utility bills for the 12 month period of March 2008 to March 2009.

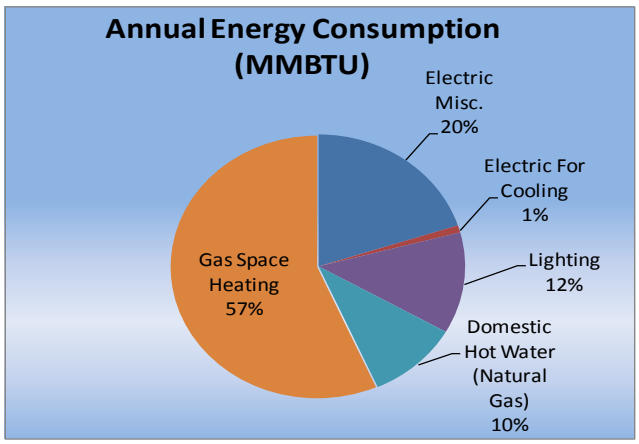


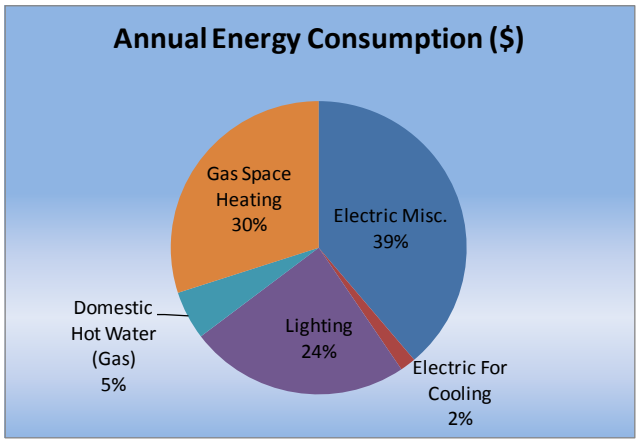
The following chart shows combined natural gas and electric consumption in Btu/sq ft for the Kroll Heights building based on utility bills for the 12 month period of March 2008 to March 2009.



The following table and chart pies show energy use for the Kroll Heights building based on utility bills for the 12 month period of March 2008 to March 2009. Note electrical cost at $48.0/MMBtu of energy is more than 3.5 the cost of natural gas at $13.1/MMBtu.

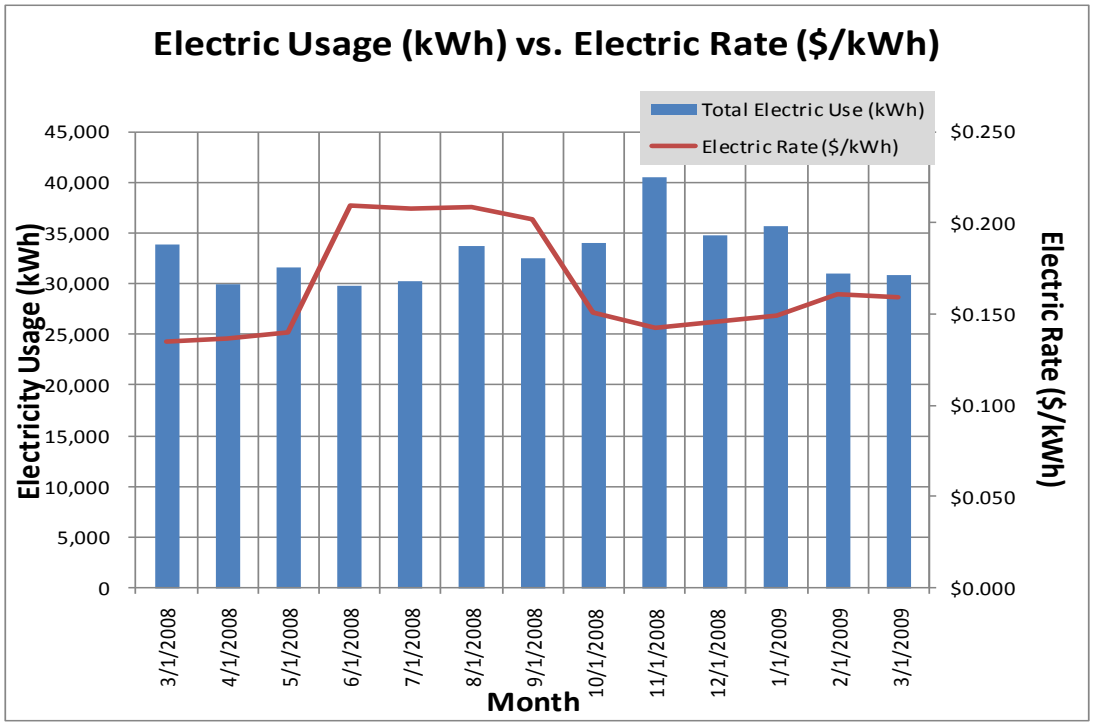
2008 Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	$	% $	$/MMBtu
Electric Miscellaneous	878	20%	$42,232	39%	48.1
Electric For Cooling	39	1%	$1,876	2%	48.1
Electric For Heating	0	0%	$0	0%	48.1
Lighting	545	12%	$26,215	24%	48.1
Domestic Hot Water (Gas)	445	10%	$5,830	5%	13.1
Gas Space Heating	2488	57%	$32,593	30%	13.1
Totals	4,878	100%	$108,745	100%	-
Total Electric Usage	1,462	100%	$70,385	64.7%	48.1
Total Gas Usage	2,933	100%	$38,364	35.3%	13.1
Totals	4,395	100%	$108,749	100%	-





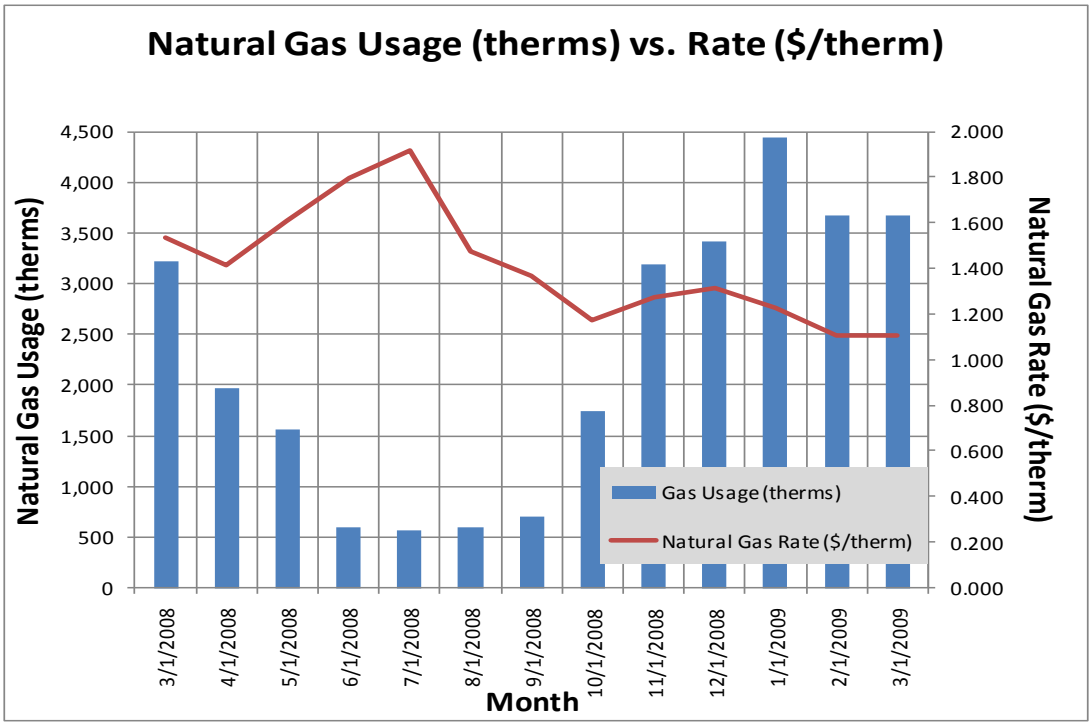
1.2. Utility rate analysis

The Kroll Heights building currently purchases electricity from PSE&G at a general service market rate for electricity use (kWh) including a separate (kW) demand charge that is factored into each monthly bill. Kroll Heights currently pays an average rate of approximately $0.164/kWh based on the 12 months of utility bills of March 2008 to March 2009. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year. The electric rate does not show large fluctuations throughout the year and therefore appears to be the appropriate rate for the building.



The electricity rate fluctuates inversely proportional to usage, as expected. Typically, the more units of electricity that are used by the building, the cheaper electricity becomes per unit.

The Kroll Heights building currently purchases natural gas from PSE&G at a general service market rate for natural gas use (therms). Kroll Heights currently pays an average rate of approximately $1.31/therm based on the 12 months of utility bills of March 2008 to March 2009. The natural gas rate does not show large fluctuations throughout the year and therefore appears to be the appropriate rate for the building.



The natural gas rate fluctuates inversely proportional to usage, as expected. Typically, the more units of natural gas that are used by the building, the cheaper natural gas becomes per unit. In summer periods, when a minimal amount of gas is used, the natural gas rate ($/therm) increases sharply. Each month, the utility customer pays service and delivery charges to the utility company regardless of use. When minimal amounts of gas are used, the rate appears to sky rocket since service and delivery charges are the same amount as during high use months but represent a larger percentage of the total bill.

Some of the minor unusual utility fluctuations that showed up for a couple of months on the utility bills may be due to adjustments between estimated and actual meter readings.

1.3. Energy benchmarking

SWA has entered energy information about Kroll Heights in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was benchmarked as Multifamily Housing building. The building was not able to receive an Energy Star performance rating since the building is classified as a Multifamily Housing building, which is currently ineligible for a performance score through the Benchmarking tool. SWA encourages Secaucus Housing Authority to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time. The current Site Energy Use Intensity is 67.1 kBtu/ft^{2}yr.

Implementing this report's highly recommended Energy Conservations Measures (ECMs) will reduce use by approximately 3.5 kBtu/sqft yr, with an additional 4.0 kBtu/sq ft yr from the recommended ECMs and 14.6 kBtu/sq ft yr from the recommended End of Life Cycle ECMs.

Per the LGEA program requirements, SWA has assisted Secaucus Housing Authority to create an *Energy Star Portfolio Manager* account and has shared Kroll Heights building facility information to allow future

data to be added and tracked using the benchmarking tool. SWA is sharing this Portfolio Manager Site information with TRC Energy Services. As per requirements, the account information is provided below:

Username: SecaucusHousing
Password: SECAUCUS

Also, below is a performance rating that is generated based on historical energy consumption from the Portfolio Manager Benchmarking tool.

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
SHA - Kroll Heights

Building ID: 1926337
For 12-month Period Ending: February 28, 2009[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: December 09, 2009

Facility
SHA - Kroll Heights
700 County Avenue
Secaucus, NJ 07094

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1993
Gross Floor Area (ft²): 61,000

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	1,403,003
Natural Gas (kBtu)[4]	2,692,231
Total Energy (kBtu)	4,095,234

Energy Intensity[5]	
Site (kBtu/ft²/yr)	67
Source (kBtu/ft²/yr)	123

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	357

Electric Distribution Utility
Public Service Elec & Gas Co

National Average Comparison	
National Average Site EUI	
National Average Source EUI	
% Difference from National Average Source EUI	
Building Type	Multifamily Housing

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

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

Kroll Heights was built in 1993 and contains 75 apartment units (all one bedroom), administrative offices, a community room, and common spaces. The building consists of a total area of 61,000 square feet.

2.2. Building occupancy profiles

The building is operated 24 hours per day, 7 days per week. The peak occupancy for the building is approximately 125 tenants and 15 staff and maintenance personnel.

2.3. Building envelope

2.3.1.Exterior Walls

The exterior walls consist of 8" concrete block with a brick façade. The interior surface of the walls consist of gypsum board set on steel studs spaced 16" on center. According to building drawings, the interior side of the exterior walls consists of a 3 1/2" layer of fiberglass batt insulation. Due to warm temperature conditions at the time of the field visits, insulation levels could not be verified with the help of infrared technology.

Overall, exterior and interior wall finishes of the envelope were found to be in age-appropriate, good condition with the exception of some minor damage to brick veneer resulting from condensate dripping from AC wall units. Other than minor condensate-related damage, no major signs of unusual water, air leakage or other energy compromising damage. SWA recommends that building staff ensure that each thru-wall AC unit is properly leveled so that excess amounts of condensate are not allowed to leak out of the unit drain pan and down the façade of the building.

Damage to brick veneer from AC wall unit condensate

2.3.2.Roof

The roof areas of the building are flat and constructed of dark-colored EPDM finish without a gravel layer. The roof membrane appeared to be in good condition with sufficiently sealed seams and proper flashing. At the time of the field audit, SWA was told a sub-contractor performs regular maintenance

on the roof. No current leaks were mentioned to the auditors at the time of the field visit and no signs of water leakage were detected.

Roof surface including mechanical penetrations

View of typical roof seams including corner

In an effort to get the maximum life expectancy out of the roofing material installed, SWA recommends following the installer's or manufacturer's recommended maintenance and inspection schedule.

2.3.3. Base

The building's base is 4-6" concrete slab-on-grade with a perimeter footing and specified slab edge insulation. There were not any reported problems with water penetration or moisture. The slab edge or perimeter insulation could not be verified. There were no reported problems with water penetration or moisture.

2.3.4. Windows

Due to the age of the building, the windows have not yet reached the end of their useful lifetime. These windows are aluminum-framed, double-paned windows with no low-e coating. Many of the windows were not able to close fully or allowed cold air to infiltrate apartments around the frame. SWA observed that some windows contained deteriorating weather-stripping, which does not allow the window to close properly. SWA recommends that maintenance staff conduct a survey of each apartment to identify specific windows that have improper seals. Perform routine inspections every 6

months to ensure that window seals have not been compromised. Building maintenance staff should replace weather-stripping and repair any broken seals that currently exist.

Towel used to block cold air at tenant window

As a best practice, SWA recommends that all windows be inspected at least once a year. Any gaps, cracks, or damage to weather-stripping or caulking should be repaired or replaced, as needed, to minimize energy loss around those openings. Building staff should also verify that windows open and close properly and repair, as needed.

2.3.5.Exterior doors

The exterior doors are a mix of un-insulated metal doors and glass doors. The un-insulated metal exterior doors were observed to be in good condition except for missing or worn weather-stripping. SWA recommends that the exterior doors of the building are weather-stripped in order to decrease the amount of conditioned air that is lost to the outside. As a best practice, SWA recommends checking the weather-stripping of each door on a regular basis and replacing any broken seals immediately. This will help optimize comfort and energy performance.

Worn weather-stripping at side door

2.3.6. Building air tightness

Based on a visual inspection, there are various tenant and common spaces that could benefit from additional maintenance (caulking and air-sealing) in order to improve the building envelope. Windows should be routinely maintained to ensure tight seals. As a best practice, weather-stripping on doors and windows should be checked every 6 months for deficiencies and replaced as they fail.

2.4. HVAC Systems

Kroll Heights contains a central heating plant to provide hot water heating for all common areas as well as tenant spaces. The building does not contain a central cooling plant, instead is uses sleeved thru-wall units in each apartment. Hot water heating and refrigerant cooling are provided to first floor common areas via a Lennox air handling unit. .

2.4.1. Heating

The central heating plant is made up of (7) unitary Slant Fin Galaxy boilers (Model #GG375-300,00 Btu output) that are sequenced via a standalone unit controller based on return water temperature and outdoor ambient reset. Based on field observations, the boilers supply 140ºF hot water to baseboard at perimeter of all resident rooms and corridors via a 2HP main circulation and back-up pump arrangement. The central heating plant also provides hot water via a coil in the air-handler that serves common areas on the first floor. Individual zone control is provided by wall mounted line voltage dial stats controlling 2-way valves. Our survey was conducted on September 9th, when there was no building demand. Boiler #7 was operating solely for domestic hot water purposes. On October 30, 2009 auditors returned to the site and conducted a Steady State Efficiency test on four (4) of the seven (7) boilers. The Steady State Efficiency tests indicate that the boilers were operating at an average of 75.8% efficiency but appeared to be well maintained.

Individual room heating is provided via wall baseboard with line voltage dial thermostats that control a 2-way valve for each room baseboard.

The Community Room located on the first floor is heated and cooled by McQuay #LSL106CV air handler located in a mechanical closet just off the space. The air handler is equipped with heating provided by the house hot water loop. Air flow readings for this area were taken and the total supply to the space was recorded at 2,260 CFM with a return volume of 1,785 CFM. According to Archive information, this unit is capable of producing close to 3,000 CFM, however no design criteria was obtainable at the time of this audit. At the time of the audit, there were no specific complaints by tenants regarding apartment heating.

2.4.2. Cooling

Cooling is provided to tenant spaces via sleeved through the wall GE units; Model AJA12DFV1-11,500 Btuh for living room areas and GE AJZ08AFV1-8,200 Btuh for bedroom areas. In the rooms surveyed, the majority of units were in fair condition but are not Energy Star labeled.

The Community Room located on the first floor is cooled by Lennox #HS17-1353-5Y DX split system with a McQuay #LSL106CV air handler located in a mechanical closet just off the space. The air handler is also equipped with heating provided by the house hot water loop. Air flow readings were taken for this unit and noted above in Section 2.4.1 Heating.

The Director's offices are cooled by two additional split systems; (1) Carrier 38CKC036-3ton condenser with a Snyder General #SCB121B air handler and (1) Inter City #AD036HD-3 ton condenser with a Snyder General #SCB121B air handler as well. Both of these units are located in the Laundry room ceiling. Both units were manufactured in 1984 but appear to be well maintained. Flow readings were taken for both office units and based on archive data these units should be producing close to 1000 CFM of cooling. The data retrieved at the time of this audit revealed a number of zero to low flow registers that contributed to the 500 CFM total flow readings for both units.

2.4.3. Ventilation

Individual bathrooms have timer activated exhaust fans that are ducted to open vertical shafts that run vertically to a back draft damper and roof mounted hood. Flow readings were taken on six of the eight rooms visited and the flow readings ranged from the code-required 30 CFM to 50 CFM. Kitchen exhaust consists of individual Broan 210 Watt; 160 CFM fans operated by switch that feed into vertical exhaust shafts that are terminated at roof level with curb mounted exhaust fans. Flow readings were taken on seven of the eight rooms visited and the flows ranged from 90 to 130 CFM, within the code requirements. Unit 517 was found to be an exception with a reading of 40 CFM. These exhaust fans help induce fresh air into the apartments, by exhausting stale air and creating a slightly negative pressure on the inside of each apartment.

2.4.4. Domestic Hot Water

A secondary loop off the boiler manifold contains a ¾ HP primary and backup circulating pump that feeds a heat exchanger for providing the domestic hot water loop throughout the entire building. The DHW system was observed to be in good operating condition and there were no tenant complaints.

2.5. Electrical systems

2.5.1. Lighting

Interior Lighting – The Kroll Heights building contains mostly of inefficient T12 fluorescent fixtures with magnetic ballasts for general areas and common spaces such as hallways, stairwells and first floor common areas. There are approximately 124 inefficient fluorescent fixtures that should be upgraded to T8 fluorescent fixtures with electronic ballasts. Tenant spaces consist of a mix of screw-in CFLs, pin-type CFLs and incandescent bulbs. Out of 19 studio apartments and 56 one bedroom apartments, SWA sampled 4 studio apartments and 8 one bedroom apartments. Apartment lighting was found to be consistent for each type of apartment and therefore data was extrapolated from a sample of over 10% of each apartment type to expand to all 75 apartments. There were approximately 75 T12 fluorescent fixtures as well as 262 incandescent bulbs that could benefit from upgrading to more efficient CFLs. Within the building, SWA also observed two areas that could benefit from installing occupancy sensors; the laundry room and community room.

Exit Lights – A majority of the exit signs were found to be efficient LED exit signs. There was however 2 fluorescent exit signs that were observed to contain 15W bulbs in comparison to an LED exit sign that only uses 5W. LED exit signs are always a cost-effective option since they use such little power and operate 24 hours a day, 365 days a year. See attached existing and proposed lighting schedule in Appendix A.

Exterior Lighting - The exterior lighting surveyed revealed that there were 13 exterior fixtures that contained probe-start metal halide fixtures. SWA recommends upgrading these probe-start metal halide fixtures with new pulse-start metal halide fixtures.

2.5.2. Appliances

SWA performed a basic survey of appliances installed at the Kroll Heights building. Appliances, such as refrigerators, that are over 10 years of age should be replaced with newer efficient models with the Energy Star label. For example, Energy Star refrigerators of similar size to the existing units, use as little as 315 kWh/year. Refrigerators surveyed during the field audit used as much as 709 kWh/year. SWA recommends upgrading each tenant refrigerator to a new Energy Star rated refrigerator. When compared to the average electrical consumption of older equipment, Energy Star equipment results in a large energy as well as cost 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

2.5.3. Elevators

The Kroll Heights building contains one elevator.

2.5.4. Process and others electrical systems

There are no other electrical systems present within the building.

3. EQUIPMENT LIST

Inventory

Building System	Description	Physical Location	Make/model	Fuel	Space served	Estimated Remaining useful life %
Heating	7 unitary Slant Fin Galaxy Boilers (300,000 BTU output), sequenced based on return water temp and outside temp reset	Boiler Room	Slant Fin Galaxy Boilers/ GG375	Natural Gas	Entire building (via baseboards) and DHW	40%
Cooling	36,000 Btu R22 condenser. 208/230 Volts, 3 phases, 60 Hz	On grade rear of building	Carrier #38CKC036550	Electric	1st Floor Offices	50%
	air handler	Laundry room ceiling	SnyderGeneral/ SCB121B	Electric	Offices	50%
Cooling/ Heating	Dx split system, 1 compressor, HCFC-22 refrigerant, 3 phase, 208/230 V, 60 Hz	On grade rear of building	Lennox/HS17-1353-5Y	Electric	Community Room	50%
	2260 cfm air handler with hot water and Dx coil.	closet off of community room	Mcquay SnyderGeneral #LSL106CV	Electric	Community Room	50%
Cooling	Single unit, with R22 refrigerant, 208/230 Volts, 3 phases, 60 Hz	On grade rear of building	Inter-City Products/AD03 6HD	Electric	Offices	50%
	air handler	Laundry room ceiling	SnyderGeneral/ SCB121B	Electric	Offices	50%
Cooling	through the wall A/C units, 11,500 BTU's, 8.5 EER	Unit Living Rooms and Studio Units	GE/AJA12DFV1	Electric	Unit's Living Rooms/ Entire Studio	25%
Cooling	Through the wall A/C units, 8,200 BTU's, 8.7 EER	Unit Bedrooms	GE/AJZ08AFV1	Electric	Unit's Bedrooms	25%
Exhaust	160 cfm Kitchen Exhaust Fans	Kitchen Ceilings	Broan #503-B Dayton Motor # 3M660D	Electric	Unit Kitchens	10%
Exhaust	Toilet Exhaust Fans	Bathroom Ceilings	DaytonMotor/ 3M660D	Electric	Unit Bathrooms	50%
Ventilation	(10) Roof Top Exhaust Fans	Building Roof	Dayton Motor/4K259G	Electric	Exhaust Risers	50%
Circulation	3/4 Hp Pump-Primary DHW Loop to Heat Exchanger	Boiler Room	Marathon Electric/8VJ56B 17D2011D P	Electric	DHW	50%

Circulation	Secondary Hot Water Loop Pump	Boiler Room	Unknown/ YVC56T17D5640 B L	Electric	DHW	50%
Circulation /Heating	(1) -2hp 50' H -Hot Water to Building Baseboard & Misc. units	Boiler Room	U.S. Electric Motors/G154	Electric	Baseboard	25%
	(1) -2hp 50' H -Hot Water to Building Baseboard & Misc. units	Boiler Room	Armstrong	Electric	Baseboard	75%
Heating	42 Mbh Unit Htr. # 1	Compactor rm	Mc Quay	Electric/ Hw	Compactor rm	50%
Heating	42 Mbh Unit Htr. # 2	Electrical rm	Mc Quay	Electric/ Hw	Electrical rm	50%
Heating	42 Mbh Unit Htr.# 3	Boiler Room	Mc Quay	Electric/ Hw	Boiler Room	50%

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 Kroll Heights building, SWA has separated the investment opportunities into three recommended categories:

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

Category I Recommendations: Capital Improvements

- Upgrade windows – Replace current windows with new double-paned, argon-filled windows with a low-e coating and thermal break. This is not cost-effective at this time but is strongly recommended provided the current windows conditions.

- Install Energy Star roof with increased rigid insulation – SWA recommends to increase the amount of rigid insulation on the roof to 6 inches if any major roof renovations are undertaken. In addition, the building could benefit from installing a light-colored, reflective roof surface to prevent solar radiation from penetrating the building and increasing the load on air-conditioners during winter.

Category II Recommendations: Operations and Maintenance

- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly.

- Provide weather stripping / air sealing – SWA observed that all windows and doors had proper weather-stripping and air sealing due to their age. As a best practice, SWA recommends that each window and door is inspected twice per year for deficiencies. Any time that a seal has been compromised, building maintenance staff should repair and replace the seal immediately to ensure that thermal barriers are not breached.

- 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 (0.5 gpm on bathroom sinks) and low-flow shower heads (1.2 gpm) to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures / appliances will save both energy and money through reduced energy consumption for water heating, while also decreasing water / sewer bills.

- Use Energy Star labeled appliances - such as Energy Star refrigerators that should replace older energy inefficient equipment.

Category III Recommendations: Energy Conservation Measures

Summary table

ECM#	Description of Highly Recommended 0-5 Year Payback ECMs
1	Install 2 new occupancy sensors
2	Install 272 new CFL fixtures
3	Install 2 new LED exit signs
	Description of Recommended 5-10 Year Payback ECMs
4	Install 199 new T8 fixtures
5	Install 13 new Pulse Start Metal Halide fixtures
6	Install 53.4 kW PV system
	Description of Recommended End of Life Cycle ECMs
7	Install new Energy Star through-wall air conditioners
8	Replace two 3-ton condensers and AHUs
9	Install 131 programmable thermostats
10	Install 75 Energy Star refrigerators
11	Install two boilers and a hot water skid

ECM#1: *Install 2 new occupancy sensors*

Description:

Based on field observations, there are 2 areas within the Kroll Heights building that would benefit from the installation of occupancy sensors. SWA recommends that these 2 areas are upgraded to occupancy sensors in order to reduce the amount of runtime based on occupancy schedules. See Appendix A for complete lighting schedule and analysis.

Installation cost:

Estimated installed cost: $400
Source of cost estimate: RS *Means; Published and established costs*

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
1	Install 2 new occupancy sensors	RS Means	440	40	400	1,647	0.3	0	0.1	0	270	15	3,178	1.5	694.6	46.3	67.5	2,825	2,949

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes amount of reduced hours based on field observations.

Rebates / financial incentives:
NJ Clean Energy Prescriptive Lighting Controls – Wall-mounted occupancy sensors ($20 per control)
Maximum incentive amount is $40.

Options for funding ECM:
This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#2: *Install 272 new CFL lamps*

Description:

The Kroll Heights building contains 75 apartments; 19 studios and 56 one bedrooms. Each studio apartment contains one fixture in the bathroom that contains 3 incandescent bulbs and one fixture in the entranceway that contains 1 incandescent bulb. Each one bedroom apartment contains one fixture in the bedroom that contains 3 incandescent bulbs, one fixture in the bathroom that contains 4 incandescent bulbs, one fixture in the entranceway that contains 1 incandescent bulb and one fixture in the living room that contains 1 incandescent bulb. In addition to apartments, there are also 10 incandescent fixtures in common areas that should be upgraded to CFLs. SWA recommends replacing each incandescent bulb with an equivalent CFL.

Installation cost:

Estimated installed cost: $35,510
Source of cost estimate: RS *Means; Published and established costs*

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
2	Install 120 new CFL lamps	RSMeans	35,510	0	35,510	59,988	12.5	0	3.4	3,723	13,561	5	61,752	2.6	73.9	14.8	26.3	26,596	107,409

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes operation cost savings based on avoided bulb replacement when upgrading to lighting that consists of longer rated burn hours.

Rebates / financial incentives:
There are currently no incentives for this measure at this time.

Options for funding ECM:
This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#3: *Install 2 new LED exit signs*

Description:

Kroll Heights consists of mostly efficient LED exit signs. There are 2 remaining fluorescent exit signs that should be upgraded to LED technology. Exit signs show a good opportunity for energy savings since they are operated 24 hours per day, 365 days per year.

Installation cost:

Estimated installed cost: $367
Source of cost estimate: RS *Means; Published and established costs*

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
3	Install 2 new LED exit signs	RSMeans	407	40	367	193	0.0	0	0.0	58	90	15	1,055	4.1	187.4	12.5	23.4	703	346

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes operation cost savings based on avoided bulb replacement when upgrading to lighting that consists of longer rated burn hours.

Rebates / financial incentives:
NJ Clean Energy Prescriptive – LED Exit signs ($10/$20 per control)
Maximum incentive amount is $40.

Options for funding ECM:
This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#4: *Install 199 new T8 fluorescent fixtures*

Description:

The Kroll Heights building currently contains 199 inefficient T12 fluorescent fixtures with magnetic ballasts. Each apartment unit in the building contains one T12 fluorescent fixture with magnetic ballast in the kitchen area. Also, some T12 lighting still exists throughout the common areas. SWA recommends replacing each one of these T12 fixtures with equivalent T8 fluorescent fixtures with electronic ballasts. Typically, T8 fluorescent fixtures with electronic ballasts use 30% less energy than equivalent T12 fixtures with magnetic ballasts. In addition, there will be operating cost savings associated with each bulb since CFLs have a longer rated lifetime than incandescent bulbs. See Appendix A for complete lighting schedule and analysis.

Installation cost:

Estimated installed cost: $36,279
Source of cost estimate: RS *Means; Published and established costs*

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
4	Install 199 new T8 fluorescent fixtures	RSMeans	42,249	5,970	36,279	15,473	3.2	0	0.9	2,490	5,028	15	59,160	7.2	63.1	4.2	10.9	23,740	27,704

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes operation cost savings based on avoided bulb replacement when upgrading to lighting that consists of longer rated burn hours.

Rebates / financial incentives:
NJ Clean Energy Prescriptive Lighting – T-5 and T8 lamps with electronic ballast in existing facilities ($10-30 per fixture, depending on quantity of lamps)
Maximum incentive amount is $5,970.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#5: *Install 13 new Pulse Start Metal Halide fixtures*

Description:

The Kroll Heights building currently contains 13 exterior probe start metal halide fixtures that are older and consume an unnecessary amount of power. SWA recommends upgrading each probe-start metal halide to pulse-start metal halides. A complete lighting schedule has been attached in Appendix A of this report.

Installation cost:

Estimated installed cost: $5,931
Source of cost estimate: RS *Means; Published and established costs*

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
5	Install 13 new pulse start metal halide fixtures	RSMeans	6,256	325	5,931	3,132	0.7	0	0.2	286	800	15	9,410	7.4	58.6	3.9	10.4	3,102	5,608

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. SWA assumes operation cost savings based on avoided bulb replacement when upgrading to lighting that consists of longer rated burn hours.

Rebates / financial incentives:
NJ Clean Energy Prescriptive Lighting – Metal halide w/pulse start ($25 per fixture)
Maximum incentive amount is $325.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#6: *Install 53.4 kW PV system*

Description:

Currently, the Kroll Heights building does not use any renewable energy systems. Renewable energy systems such as photovoltaic panels, can be mounted on the building roofs, and can offset a portion of the purchased electricity for the building. Based on a preliminary Photovoltaic study, there are two areas identified to install a Photovoltaic array; on the roof and mounted on canopies over the parking lot. 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 Secaucus Housing Authority further review installing a 53.4 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 Kroll Heights building is not eligible for a 30% federal tax credit. Instead, Secaucus Housing Authority 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. PSE&G provides the ability to buy SRECs at $600 / MWh or best market offer.

There are a few locations for a 53.4 kW PV installation on the building roofs and away from shade. 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 53.4 kW system needs approximately 434 panels which would take up 4,639 square feet. The installation of a renewable Solar Photovoltaic power generating system could serve as a good educational tool and exhibit for the community.

Installation cost:

Estimated installed cost: $293,700
Source of cost estimate: Similar projects

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
6	Install 53.4 kW PV System	Similar Projects	347,100	0	347,100	53,732	53.0	0	3.0	0	40,612	25	691,679	8.5	99.3	4.0	8.8	185,972	96,207

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 - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. $31,800 has been incorporated in the above costs; however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#7: *Install new Energy Star through-wall air conditioners*

Description:

Individual rooms are cooled by through-wall air conditioners; 75 of which are 11,500 BTU units and 56 of which are 8,200 BTU units. These units are old and have surpassed their useful lives. Newer through-wall units that meet Energy Star specifications are available that are more energy efficient than older units.

Installation cost:

Estimated installed cost: $91,784 ($737/$652 per unit, based on size)
Source of cost estimate: RS *Means; Published and established costs*

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
7	Install new Energy Star through-wall air conditioners	RSMeans	91,784	0	91,784	49,941	10.4	0	2.8	0	8,190	15	96,376	11.2	5.0	0.3	3.9	5,992	89,419

Assumptions: Using the facility's electric billing and usage data, the cost of electricity was determined to be $0.164 per kWh. Due to the units' age and condition, the current SEERs 7.2 for the larger units and 7.4 for the smaller ones, were estimated to be 85% of the original SEERs, which were about 8.5 and 8.7, respectively. The number of annual degree-days and the 0.4% cooling dry-bulb temperature, provided by ASHRAE, were 864 degree days and 91ºF, respectively.

Rebates / financial incentives:
There are currently no incentives for this measure at this time.

Options for funding ECM:
This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#8: *Replace two 3-ton condensers and AHUs*

Description:

Two 3-ton Carrier condensers are nearing their useful lives and are in poor condition. It is recommended that they be replaced with more efficient units. As of the beginning of 2010, air-conditioning units that use R-22 refrigerant, like the two current models, will no longer be sold, as they are being replaced with units that use Puron refrigerant. These units have higher Seasonal Energy Efficiency Ratios (SEERs), but new air-handlers must also be purchased to accommodate the new refrigerant. Carrier manufactures such condensers with SEERs of 21.

Installation cost:

Estimated installed cost: $12,648
Source of cost estimate: RS *Means; Published and established costs*

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
8	Replace two 3-ton condenser and AHUs	RSMeans	13,200	552	12,648	5,350	1.1	0	0.3	0	877	15	10,324	14.4	-18.4	-1.2	0.5	-2,174	9,579

Assumptions: Using the facility's electric billing and usage data, the cost of electricity was determined to be $0.164 per kWh. Due to the unit's age and condition, the current SEER, 9, was estimated to be 75% of the original SEER, which were about 12. The number of annual degree-days and the 0.4% cooling dry-bulb temperature, provided by ASHRAE, were 864 degree-days and 91ºF, respectively.

Rebates / financial incentives:
NJ Clean Energy – Unitary AC and split systems ($73-$92 per ton)
Maximum incentive amount is $552.

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#9: Install 131 *Programmable Thermostats*

Description:

Currently, the heating is controlled by non-setback thermostats. It would be beneficial to install 131 7-day programmable set back thermostats to replace these. These thermostats would automatically turn down the heating and cooling at times when the areas are unoccupied, saving energy costs.

Installation cost:

Estimated installed cost: $25,545 ($195 for each thermostat)
Source of cost estimate: RS *Means; Published and established costs*

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
9	Install 131 programmable thermostats	RS Means	25,545	0	25,545	0	0.0	1,245	2.0	0	1,631	15	19,191	15.7	-24.9	-1.7	-0.5	-6,075	13,724

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Calculations were performed automatically by Honeywell's Programmable Thermostat calculator. It was assumed that the heating would be turned down 5ºF at night, but cooling would not.

Rebates / financial incentives:
There are currently no incentives for this measure at this time.

Options for funding ECM:
This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#10: Install 75 Energy Star refrigerators

Description:

SWA performed a basic survey of appliances installed at the Kroll Heights building. Apartments were observed to contain refrigerators that used as much as 709 kWh/year. New Energy Start units of similar size and capacity use as little as 315 kWh per year. SWA uses calculations based on the Energy Star refrigerator calculator located at http://www.energystar.gov.

Installation cost:

Estimated installed cost: $88,500
Source of cost estimate: RS *Means; Published and established costs*

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
10	Install 75 Energy Star refrigerators	RSMeans	88,500	0	88,500	29,550	6.0	0	1.7	0	4,846	15	57,026	18.3	-35.6	-2.4	-2.4	-30,646	52,909

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Existing refrigerators were assumed to use 709 kWh/year, while new Energy Star refrigerators of equivalent size are estimated to use 315 kWh/year.

Rebates / financial incentives:
There are currently no incentives for this measure at this time.

Options for funding ECM:
This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM#11: Install two boilers and a hot water skid

Description:

Heating is currently provided by 7 gas-fired, hot water unity boilers, rated at 300 MBH each, one of which is used for hot water. Condensing hot water boilers that are 95% efficient have been manufactured since this boiler was installed, and it is recommended that these seven boilers be replaced with two larger boilers with a reduction in capacity equivalent to the domestic hot water demand. It is also recommended that a separate 95% efficient hot water boiler and holding tank skid be installed as part of this ECM.

Installation cost:

Estimated installed cost: $237,900
Source of cost estimate: Contractor (Struble Mechanical Services, Fairfield, NJ)

Economics:

ECM #	ECM description	Source	est. installed cost, $	est. incentives, $	net est. ECM cost with incentives, $	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, $	total 1st yr savings, $	life of measure, yrs	est. lifetime energy cost savings, $	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, $	CO_2 reduced, lbs/yr
11	Install two boilers and a hot water skid	Contractor	240,000	2,100	237,900	0	0.0	4,752	7.8	0	6,225	15	73,251	38.2	-69.2	-4.6	-9.9	-163,585	52,381

Assumptions: SWA calculated the savings for this measure using measurements taken the days of the field visits and using the billing analysis. Using the building's utility bills, it was determined that the building consumes 24,880 therms of gas per year, at a rate of $1.31/therm. A steady-state efficiency test done on the current boilers determined that the average efficiency of the current boilers is 75.8%. The calculated annual savings for the project was calculated to be 4,752 therms per year.

Rebates / financial incentives:
NJ Clean Energy – Gas-fired boilers between 1,500 MBH and 4,000 MBH ($1.00 per MBH)
Maximum incentive amount is $2,100.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There are not currently any existing renewable energy systems.

5.2. Wind

A Wind system is not applicable for this building because the area does not have winds of sufficient velocity to justify installing a wind turbine system.

5.3. Solar Photovoltaic

Pleases see the above recommended ECM #4.

5.4. Solar Thermal Collectors

Solar thermal collectors are not recommended for this project because they would require modification to the existing domestic hot water system and/or heat distribution system, which would not be cost-effective.

5.5. Combined Heat and Power

CHP is not applicable for this building because of electric metering configuration.

5.6. Geothermal

Geothermal is not applicable for this building because it would require significant modifications to the existing HVAC system, which would not be cost effective. Additionally, the land area available is not suitable for vertical closed loop or large enough to install the necessary underground infrastructure for a geothermal system.

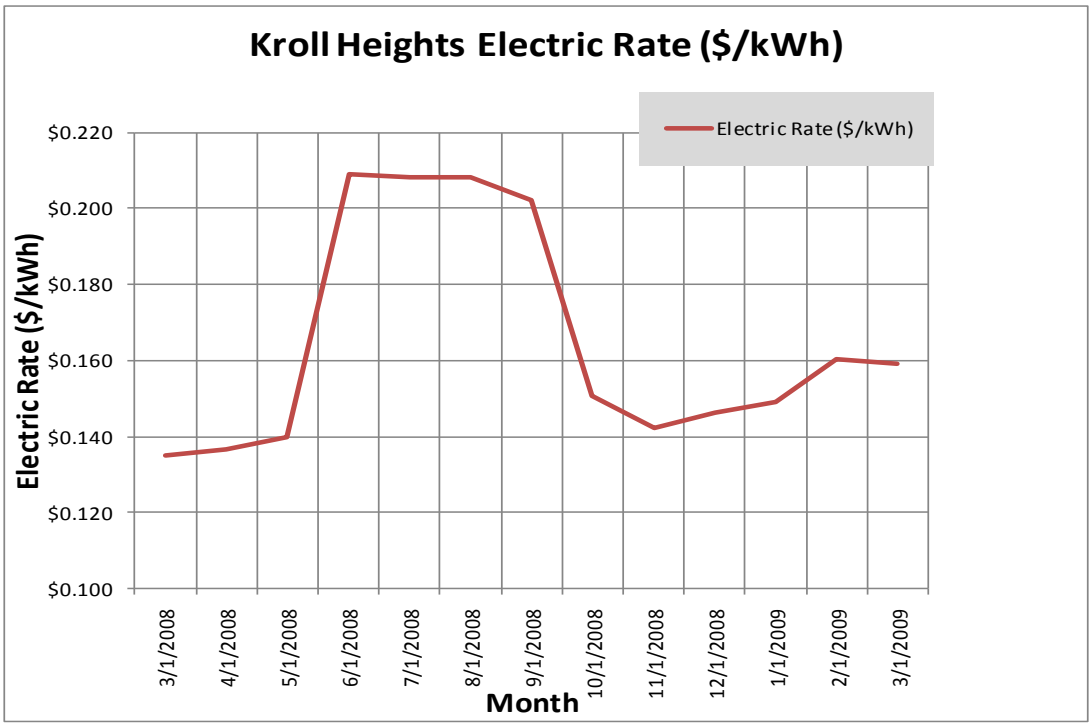
6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

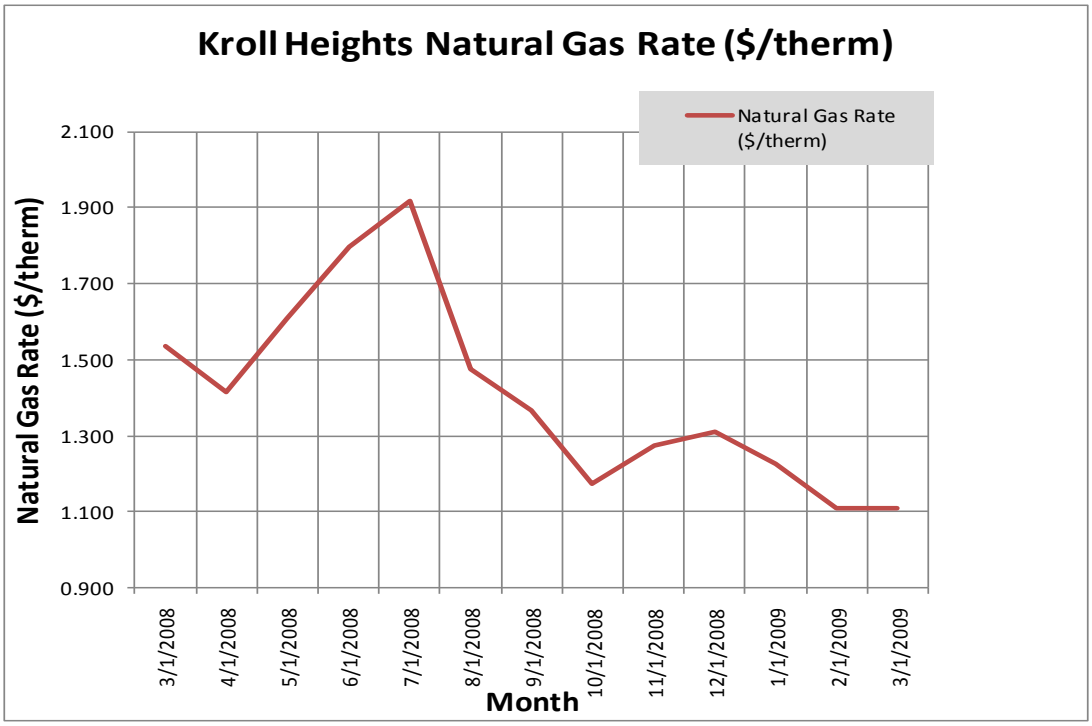
6.1. Energy Purchasing

The Kroll Heights building receives natural gas via one incoming meter. PSE&G supplies gas to the building. There is not an ESCO engaged in the process. An Energy Services Company (ESCO) is a consultancy group that engages in a performance based contract with a client firm to implement measures which reduce energy consumption and costs in a technically and financially viable manner. Electricity is also purchased via one incoming meter directly for the common areas and individual meters for each tenant space from PSE&G without an ESCO. SWA analyzed the utility rate for natural gas and electricity supply over an extended period. Electric bill analysis shows fluctuations of 35% over the most recent 12 month period. Natural gas bill analysis shows fluctuations up to 42% over the most recent 12 month period. Some of these fluctuations may have been caused by adjustments between estimated and actual meter readings, others may be due to unusual high and escalating energy costs in 2008.

Currently, New Jersey commercial buildings of similar type pay $0.150/kWh for electricity and $1.55/therm for natural gas. Currently, the electricity rate for Kroll Heights is $.164/kWh, which means

there is a potential cost savings of $6,000 per year. The current natural gas rate for the Kroll Heights building is $1.31/therm which is better than the average natural gas cost. A large cost savings potential for electricity exists, however this involves contacting third party suppliers and negotiating utility rates. SWA recommends that Secaucus Housing Authority further explore opportunities of purchasing electricity from third party energy suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Kroll Heights building. Appendix B contains a complete list of third party energy suppliers for the Secaucus Housing Authority service area. Secaucus Housing Authority may want to consider partnering with other school districts, municipalities, townships and communities to aggregate a substantial electric and natural gas use for better leveraging in negotiations with ESCOs and of improving the pricing structures. This sort of activity is happening in many parts of the country and in New Jersey.





6.2. Energy Procurement strategies

Also, the Kroll Heights building would not be eligible for enrollment in a Demand Response Program, because there isn't the capability at this time to shed a minimum of 150 kW electric demand when requested by the utility during peak demand periods, which is the typical threshold for considering this option.

7. METHOD OF ANALYSIS

7.1. Assumptions and tools

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

7.2. Disclaimer

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

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

Appendix A: Lighting Study

Location			Existing Fixture Information												Retrofit Information												Annual Savings		
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)
1	1	Office Area	2'U-Shape	M	2'T12	8	2	24	D	8.0	365	16	400	1,495	N/A	2'U-shape	2'T8	N	D	8	2	24	8.0	365	16	400	1495	0	0	0
2	Ext	Roof	Screw-in	N	Inc	1	1	40	S	2.0	365	0	40	29	CFL	Screw-in	CFL	N	S	1	1	15	2.0	365	0	15	11	18	0	18
3	1	Entrance	2'U-Shape	M	2'T12	8	2	24	S	24.0	365	16	400	4,485	N/A	2'U-shape	2'T8	N	S	8	2	24	24.0	365	16	400	4485	0	0	0
4	1	Mail room	Recessed	M	4'T12	1	1	40	S	24.0	365	12	52	456	T8	Recessed	4'T8	E	S	1	1	32	24.0	365	3	35	307	149	0	149
5	1	Electrical Equipment Rm	Recessed	M	4'T12	4	2	40	S	2.0	365	15	335	277	T8	Recessed	4'T8	E	S	4	2	32	2.0	365	6	262	204	73	0	73
6	1	Mechanical Rm	Recessed	M	4'T12	9	2	40	S	2.0	365	15	735	624	T8	Recessed	4'T8	E	S	9	2	32	2.0	365	6	582	460	164	0	164
7	1	Storage Rooms	Screw-in	N	Inc	6	1	75	S	2.0	365	0	450	329	CFL	Screw-in	CFL	N	S	6	1	25	2.0	365	0	150	110	219	0	219
8	5	Community Room	Recessed	M	4'T12	24	4	40	S	4.0	365	24	3,864	6,447	T8	Recessed	4'T8	E	OS	24	4	32	3.0	365	13	3085	3705	1507	1235	2742
9	5	Community Room	Exit Sign	N	LED	2	1	5	N	24.0	365	1	11	105	N/A	Exit Sign	LED	N	N	2	1	5	24.0	365	1	11	105	0	0	0
10	1	Office Area	Recessed	M	4'T12	2	2	40	S	8.0	365	15	175	555	T8	Recessed	4'T8	E	S	2	2	32	8.0	365	6	134	409	146	0	146
11	1	Office Area	Exit Sign	N	Fl.	2	1	15	N	24.0	365	2	32	298	LEDex	Exit Sign	LED	N	N	2	1	5	24.0	365	1	11	105	193	0	193
12	1	Office Area	Screw-in	N	Inc	3	1	40	D	8.0	365	0	120	350	CFL	Screw-in	CFL	N	D	3	1	15	8.0	365	0	45	131	219	0	219
13	1	Laundry room	Recessed	M	4'T12	4	4	40	S	8.0	365	24	664	2,149	T8	Recessed	4'T8	E	OS	4	4	32	6.0	365	13	525	1235	502	412	914
14	5	Stairwell	Recessed	M	4'T12	2	2	40	S	24.0	365	15	175	1,664	T8	Recessed	4'T8	E	S	2	2	32	24.0	365	6	134	1226	438	0	438
15	4	Stairwell	Recessed	M	4'T12	2	2	40	S	24.0	365	15	175	1,664	T8	Recessed	4'T8	E	S	2	2	32	24.0	365	6	134	1226	438	0	438
16	3	Stairwell	Recessed	M	4'T12	2	2	40	S	24.0	365	15	175	1,664	T8	Recessed	4'T8	E	S	2	2	32	24.0	365	6	134	1226	438	0	438
17	2	Stairwell	Recessed	M	4'T12	2	2	40	S	24.0	365	15	175	1,664	T8	Recessed	4'T8	E	S	2	2	32	24.0	365	6	134	1226	438	0	438
18	1	Stairwell	Recessed	M	4'T12	2	2	40	S	24.0	365	15	175	1,664	T8	Recessed	4'T8	E	S	2	2	32	24.0	365	6	134	1226	438	0	438
19	5	Hallway	Recessed	M	4'T12	11	1	40	S	24.0	365	12	452	5,011	T8	Recessed	4'T8	E	S	11	1	32	24.0	365	3	355	3373	1638	0	1638
20	4	Hallway	Recessed	M	4'T12	11	1	40	S	24.0	365	12	452	5,011	T8	Recessed	4'T8	E	S	11	1	32	24.0	365	3	355	3373	1638	0	1638
21	3	Hallway	Recessed	M	4'T12	11	1	40	S	24.0	365	12	452	5,011	T8	Recessed	4'T8	E	S	11	1	32	24.0	365	3	355	3373	1638	0	1638
22	2	Hallway	Recessed	M	4'T12	11	1	40	S	24.0	365	12	452	5,011	T8	Recessed	4'T8	E	S	11	1	32	24.0	365	3	355	3373	1638	0	1638
23	1	Hallway	Recessed	M	4'T12	11	1	40	S	24.0	365	12	452	5,011	T8	Recessed	4'T8	E	S	11	1	32	24.0	365	3	355	3373	1638	0	1638
24	5	Stairwell	Recessed	M	2'T12	3	1	20	S	24.0	365	8	68	736	T8	Recessed	2'T8	E	S	3	1	17	24.0	365	2	53	499	237	0	237
25	4	Stairwell	Recessed	M	2'T12	3	1	20	S	24.0	365	8	68	736	T8	Recessed	2'T8	E	S	3	1	17	24.0	365	2	53	499	237	0	237
26	3	Stairwell	Recessed	M	2'T12	3	1	20	S	24.0	365	8	68	736	T8	Recessed	2'T8	E	S	3	1	17	24.0	365	2	53	499	237	0	237
27	2	Stairwell	Recessed	M	2'T12	3	1	20	S	24.0	365	8	68	736	T8	Recessed	2'T8	E	S	3	1	17	24.0	365	2	53	499	237	0	237
28	1	Stairwell	Recessed	M	2'T12	3	1	20	S	24.0	365	8	68	736	T8	Recessed	2'T8	E	S	3	1	17	24.0	365	2	53	499	237	0	237
29	WB	Typical Studio Bedroom	Circiline	N	T8	19	1	22	S	10.0	365	2	420	1,664	N/A	Circiline	T8	N	S	19	1	22	10.0	365	2	420	1664	0	0	0
30	WB	Typical Studio Bathroom	Screw-in	N	Inc	19	4	60	S	3.0	365	0	4,560	4,993	CFL	Screw-in	CFL	N	S	19	4	20	3.0	365	0	1520	1664	3329	0	3329
31	WB	Typical Studio Entranceway	Screw-in	N	Inc	19	1	75	S	10.0	365	0	1,425	5,201	CFL	Screw-in	CFL	N	S	19	1	25	10.0	365	0	475	1734	3468	0	3468
32	WB	Typical Studio Kitchen	Parabolic	M	4'T12	19	2	40	S	2.0	365	15	1,535	1,318	T8	Parabolic	4'T8	E	S	19	2	32	2.0	365	6	1222	971	347	0	347
33	WB	Typical 1BR Bedroom	Screw-in	N	Inc	56	3	60	S	10.0	365	0	10,080	36,792	CFL	Screw-in	CFL	N	S	56	3	20	10.0	365	0	3360	12264	24528	0	24528
34	WB	Typical 1BR Bathroom	Screw-in	N	Inc	56	4	60	S	3.0	365	0	13,440	14,717	CFL	Screw-in	CFL	N	S	56	4	20	3.0	365	0	4480	4906	9811	0	9811
35	WB	Typical 1BR Entranceway	Screw-in	N	Inc	56	1	75	S	10.0	365	0	4,200	15,330	CFL	Screw-in	CFL	N	S	56	1	25	10.0	365	0	1400	5110	10220	0	10220
36	WB	Typical 1BR Kitchen	Parabolic	M	4'T12	56	2	40	S	2.0	365	15	4,495	3,884	T8	Parabolic	4'T8	E	S	56	2	32	2.0	365	6	3590	2862	1022	0	1022
37	WB	Typical 1BR Living Room	Screw-in	N	Inc	56	1	60	S	10.0	365	0	3,360	12,264	CFL	Screw-in	CFL	N	S	56	1	20	10.0	365	0	1120	4088	8176	0	8176
38	Ext	Exterior	Exterior	N	MH	13	1	150	T	10.0	365	38	1,988	8,921	PSMH	Exterior	PSMH	N	T	13	1	100	10.0	365	22	1322	5789	3132	0	3132
Totals:						**523**	**64**	**1,605**				**385**	**56,256**	**159,738**						**523**	**64**	**1,026**				**27,274**	**79,306**	**78,785**	**1,647**	**80,432**

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

Appendix B: Third Party Energy Suppliers (ESCOs)

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
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

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 Thomall 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