9 East 71st Street:
Comprehensive Energy Assessment

9 E 71st St.
New York, NY 10021

Report submitted by:

SourceOne

SourceOne, Inc. I 7 Penn Plaza I New York, NY 10001 I P [redacted] F [redacted]

BOSTON I NEW YORK

SourceOne

January 24, 2011

Richard J. Barnett
Property Manager
9 E 71st St.
New York, NY 10021

Re: 9 East 71st Street Comprehensive Energy Assessment Executive Summary
SourceOne Project Number 11-005

Dear Mr. Barnett:

On December 23rd, 2010 SourceOne performed a walkthrough audit of the private residence located at 9 E 71st St. in Manhattan, NY.

Representatives of SourceOne have:

- Conducted a facility walkthrough.
- Conducted interviews and met with representatives of the facility.
- Identified Energy Conservation Measures (ECMs) that will conserve energy.
- Identified potential ECMs that cannot be financial justified.

Executive Summary:

SourceOne recommends the implementation of the following ECMs:

1. S1-ECM-1: Motor Upgrades
   ⇒ Annual Energy Savings: 24,399 kWh ($4,626)
   ⇒ Simple Payback: 1.18 years
2. S1-ECM-2: Backroom Lighting Upgrades
   ⇒ Annual Energy Savings: 13,419 kWh ($2,544)
   ⇒ Simple Payback: 3.34 years
3. S1-ECM-3: Installation of VFDs on Air Handler Unit Fan Motors
   ⇒ Annual Energy Savings: 21,276 kWh ($4,034)
   ⇒ Simple Payback: 9.74 years
4. S1-ECM-4: Installation of a Condensate/Hot Water Heat Exchanger
   ⇒ Annual Energy Savings: 17 Mlbs of steam ($602)
   ⇒ Simple Payback: 6.39 years
5. S1-ECM-5: Installation of a Free-Cooling Heat Exchanger
   ⇒ Annual Energy Savings: 52,252 kWh ($9,906)
   ⇒ Simple Payback: 3.09 years
6. S1-ECM-6: Installation of an Additional Multistack Chiller
   ⇒ Annual Energy Savings: 38,650 kWh ($7,328)
   ⇒ Simple Payback: 11.98 years

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Relative to the annual electric consumption of 853,740 kWh for 9 E 71st St., these ECMs represent a 21% energy savings and have a collective payback of 6.06 years.

In addition to these six (6) ECMs, SourceOne has identified a potential energy conservation initiative whose enactment may benefit 9 E 71st St. but which cannot be easily justified financially. It is as follows:

1. S1-ECM-7: Elevator Motor SCR Conversion
   ⇒ Annual Energy Savings: 21,724 kWh of electricity ($4,119)
   ⇒ Simple Payback: 30.36 years

As will be described in detail in this report, each one of these initiatives could bring about substantial energy savings individually and as a collective whole.

Facility Overview:

The facility in question, 9 E 71st St., is a private residence located between 5th Ave. and Madison Ave. on 71st St. in the upper east side of Manhattan. It has six (6) floors with approximately 30,000 ft^2 of space.

Although the building is a private residence, there is a year round staff charged with cooking, cleaning and providing security. Members of the staff also maintain the heating and cooling systems in the building.

Energy Usage:

The facility's current annual energy usage and costs include:

- Electric
  - Usage - 814,110kWh
  - Cost - $154,307
  - Rate - $0.190/kWh

- Steam
  - Usage - 2,875 Mlbs
  - Cost - $99,069
  - Rate - $34.24/Mlbs

- Natural Gas
  - Usage - 51 MMBTU
  - Cost - $1,067
  - Rate - $20.99/MMBTU

- Energy Utilization Index (EUI): 204 kBTU/ft^2

Electricity, gas and steam are all purchased from Consolidated Edison.

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HVAC System:

The heating, cooling and ventilation of the building at 9 E 71st St. is carried out by three main air handler units (AHUs). Two of them are located in the basement and the third is in the penthouse. Each AHU has a single speed supply fan that is powered by a 7.5 HP electric motor and contains heating and cooling coils.

Heating:

The facility accepts high pressure steam from Consolidated Edison and steps it down to low pressure steam before circulating it through steam/hot water heat exchangers. The water that is heated by these heat exchangers is pumped through the heating coils of the AHUs by two (2) hot water pumps located in the basement. In the AHUs, ambient air is blown across the heating coil which transfers heat from the heated water to the ambient air. The air is circulated through the conditioned space to provide heating.

Cooling:

A 30-ton, water cooled Multistack scroll type chiller and a much older 40-ton Carrier chiller, both located in the basement, are used to accomplish cooling. These are shown in the photos below.

Photo 1: Multistack Chiller

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Photo 2: Carrier Chiller

Figure 1 below depicts the common components comprising a water cooled chiller system.

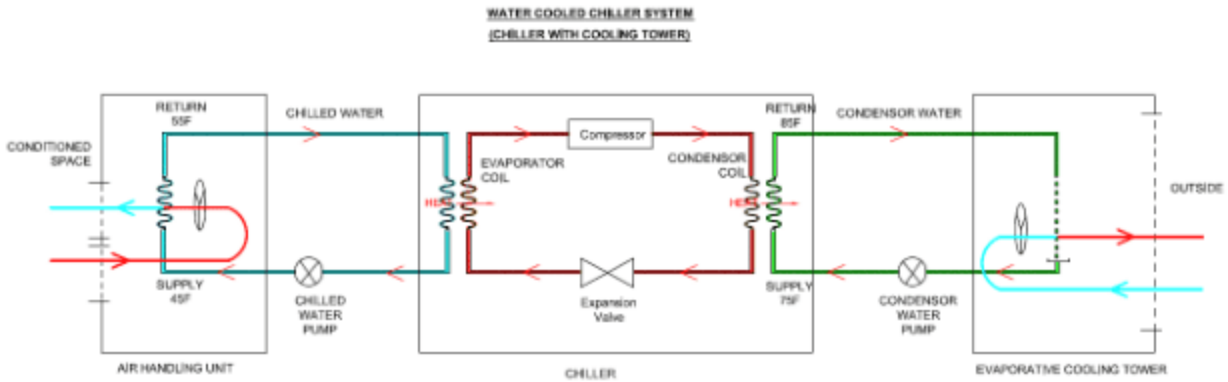

Figure 1: Water Cooled Chiller System

As can be seen from the illustration, there are three main components to the water cooled chiller system. These are the AHU, the chiller and the cooling tower. The chiller itself contains the compressor, the condenser, the expansion valve, and the evaporator. In the first stage of the refrigeration cycle, refrigerant enters the compressor as a low pressure gas and is pressurized by the compressor into a hot, high pressure gas. The high pressure gas leaves the compressor and is circulated to the condenser. In the condenser, the high pressure gas is cooled via a heat exchanger with the condenser water, which causes it to condense into a hot liquid. The hot liquid refrigerant then proceeds through an expansion valve, which decreases the pressure of the refrigerant, causing it to cool. The cool refrigerant is then circulated to an evaporator. In the evaporator, the refrigerant accepts heat from the chilled water, causing it to vaporize into a low pressure gaseous state. The AHU contains coils through which chilled water is circulated. These coils absorb heat from ambient air (chilling it) which is circulated through the conditioned space to accomplish cooling. The cooling tower (located on the roof) cools the condenser water through evaporative cooling. The condenser and chilled water pumps are all located in the basement. The HVAC system runs 24 hours a day 365 days a year to keep the building owner and staff at a comfortable temperature.

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Electric Utility:

Consolidated Edison supplies electricity via a three phase, 208 volt bolted pressure switch that has 1000A fuses. There is no submetering as the entire building's electric usage is billed through one account. The sole Consolidated Edison meter is located in the basement.

Photo 3: Consolidated Edison Meter

In NYC electricity is supplied by third party Energy Service Companies. These companies charge for the electric supply, and Consolidated Edison charges fees for the delivery of that electricity.

Consolidated Edison charges 9 E 71st St. for electrical delivery according to their EL9 rate. This rate is assigned to customers who are expected to have a monthly demand greater than 10 kW. The demand at 9 E 71st St. is well over 10 kW. Rate EL1 is the only other electric rate for which 9 E 71st St. could qualify. EL1 is described as being used for customers who use electricity for general uses in an apartment or home. The EL9 rate has a higher monthly delivery charge than EL1 and charges per kW (which EL1 does not) but has a much lower kWh charge than EL1 does. Because of these differences in charges and the high demand and energy usage of 9 E 71st St., the delivery charges using EL1 would be higher than that of EL9. A comparison of the delivery charges between the two rates (not including taxes and other surcharges) using average monthly energy usage and demand is included on the following page.

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Monthly Average	
kW	132.7304
kWh	67,607

Comparison of EL1 and EL9 Delivery Rates				
EL1			**EL9**	
Monthly	$15.76		Monthly	$81.71
kWh under 250	$0.07		kW over 5 under 100	$19.97
kWh over 250	$0.08		kW over 100	$19.15
meter charges	$21.42		kWh	$0.02
			meter charges	$8.16
monthly total	$5,678.84		**monthly total**	$4,006.51

Table 1: Comparison of EL1 and EL9 Delivery Rates

Lighting:

The living spaces of the building are lit with a wide variety of lamps, chandeliers, candelabras and wall/ceiling mounted fixtures. Most of them bear decorative or aesthetic appeal and will not be changed for the sake of efficiency. The basement and backroom areas, however, are lit mostly by fluorescent light fixtures as well as some floodlights and incandescent fixtures. The fluorescent light fixtures are a combination of 4 ft, 2-lamp, linear T12 light fixtures and 2 ft, 2-lamp, U-tube T12 light fixtures.

Vertical Transportation:

There is one passenger elevator in the building that is used by the building owner as well as guests and staff. It is a cable-driven elevator operated by a DC motor that is powered by a motor generator set. There is also one hydraulic freight elevator.

SourceOne Recommended Energy Efficiency Measures:

SourceOne has identified six (6) major energy efficiency measures that can be enacted at 9 East 71st St. They are as follows:

1. S1-ECM-1: Motor Upgrades
2. S1-ECM-2: Backroom Lighting Upgrades
3. S1-ECM-3: Installation of VFDs on Air Handler Unit Fan Motors
4. S1-ECM-4: Installation of a Condensate/Hot Water Heat Exchanger
5. S1-ECM-5: Installation of a Free-Cooling Heat Exchanger
6. S1-ECM-6: Installation of an Additional Multistack Chiller

The appendix of this report contains the spreadsheet analysis evaluating each of these ECMs. The annual savings, material cost, labor cost, and simple payback is calculated for each ECM individually as well as for the collective whole.

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S1-ECM-1: Motor Upgrades

Electric motors manufactured after the Energy Policy Act of 1995 are required to have high efficiency performance. During the walkthrough audit, SourceOne identified six (6) motors produced before 1995 that can be replaced with high efficiency equivalent units. These motors were each 7.5 horsepower and include the three AHU fan motors and the three condenser water pump motors in the building. The existing motors have an efficiency rating of 85.2%, where the new equivalent motors have an efficiency rating of 91.7%. This difference can be seen in Figure 2 below.

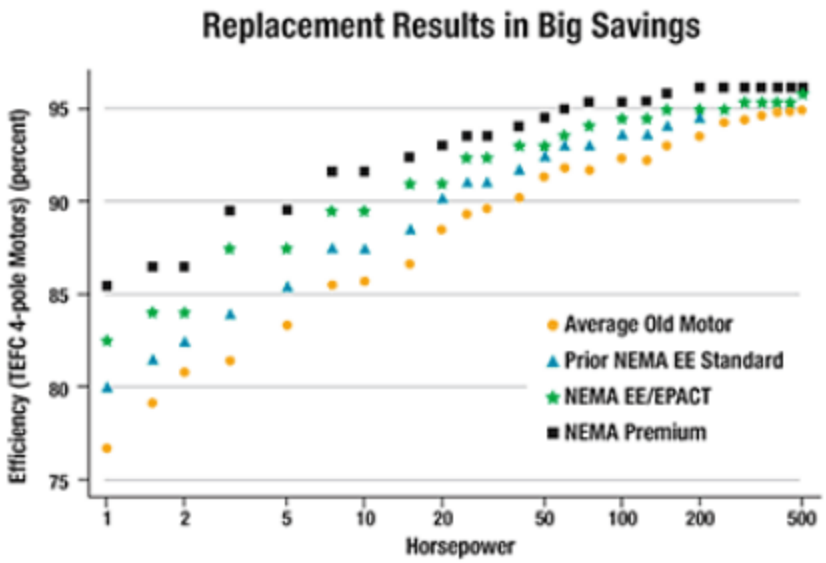

Figure 2: Motor Efficiency

The motor upgrade analysis is shown in the ECM analysis in the appendix. As can be seen, the energy savings has been calculated to be 24,398 kWh annually. The corresponding cost savings is $4,625 annually. With a total material and labor cost of $5,459 the simple payback would be 1.18 years.

S1-ECM-2: Backroom Lighting Upgrades

During the walkthrough audit, SourceOne identified several backroom areas with lighting fixtures that could be retrofitted or replaced with more energy efficient options. For retrofits, the fluorescent tubes and ballasts would be removed and replaced leaving the existing light fixture. Replacements require the removal of the existing light fixture and installation of an entire new one. These changes can be broken up into these four specific categories.

- Retrofit 4ft, 2-lamp, linear fluorescent T12 fixtures with corresponding 4ft, linear fluorescent T8 lamps and electronic ballasts.
  - These retrofits will save about 31W per fixture
- Replace 2ft, 2-lamp, T12 U-tube fluorescent fixtures with 2ft, 2-lamp, linear fluorescent T8 fixtures with electronic ballasts.

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  - These replacements will save about 56W per fixture
- Replace flood light bulbs with compact fluorescent lamps (CFLs) of equivalent luminosity
  - These replacements will save about 45W per bulb
- Replace incandescent bulbs with CFLs of equivalent luminosity
  - These replacements will save about 40W per bulb

The lighting upgrade analysis is shown in the ECM analysis in the appendix. As can be seen, the energy savings has been calculated to be 13,419 kWh annually. The corresponding cost savings is $2,544 annually. With a total material and labor cost of $8,507 the simple payback would be 3.34 years.

S1-ECM-3: Installation of VFDs on air handler units fan motors

During the walkthrough audit, SourceOne identified several electric motors that could be made to run more efficiently through the installation and use of variable frequency drives (VFDs). These motors include the three (3) 7.5 horsepower units powering the fans in the main AHUs.

For AHU fans, the HP requirement varies as the cube of the speed, so the slower the fan speed - the less energy required. A fan running at 80% speed will consume only 50% of the power of a fan running at full speed. At 50% fan speed, power consumption is only 16%. This is illustrated in Figure 3.

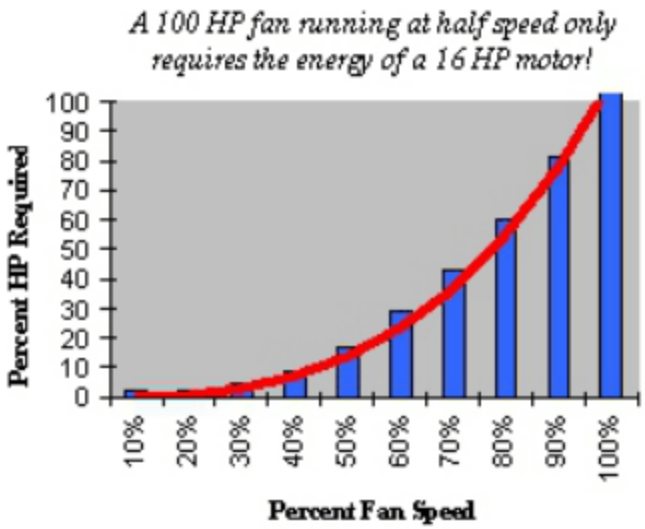

Figure 3: Relationship between Fan Speed and Motor HP Requirement

Given the relationship shown in Figure 3, the installation of a VFD will help reduce the electric usage of the AHU fans. The AHU fan motors can be run at 80% speed when the building owner is present to maintain the low temperature he prefers. When the building owner is not present, the AHU fan motors can be run at 50% speed to reduce the power consumption and save energy.

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The installation of VFDs on AHU fan motors analysis is shown in the ECM analysis in the appendix. As can be seen, the energy savings has been calculated to be 21,276 kWh annually. The corresponding cost savings is $4,034 annually. With a total material and labor cost of $39,285 the simple payback would be 9.74 years.

S1-ECM-4: Installation of a Condensate/Hot Water Heat Exchanger

During the walkthrough audit, SourceOne noticed that the hot condensate, produced from using the Consolidated Edison supplied steam for heating, is being cooled to acceptable disposal temperatures by quenching it with cold tap water before allowing it to drain into the sewer system. It is necessary to cool the condensate because the city requires that water temperature be below 120°F before allowing it to drain into the sewers. The condensate however is at a temperature of about 180°F after it exits the heat exchangers. The 60°F difference represents a significant amount of energy being wasted when the condensate is quenched and disposed. A method to use the energy in the still hot condensate rather than dispose of it would be to install a plate and frame heat exchanger between the condensate and unheated water to pre-heat it before sending it to the two domestic water heaters. This would conserve energy in the form of steam used in the domestic the water heaters, as well as save water that would be used to quench the condensate to an acceptable temperature.

The condensate/hot water heat exchanger analysis is shown in the ECM analysis in the appendix. As can be seen, the energy savings has been calculated to be 17.59 Mlbs of steam as well as 67,000 ft^3 of water annually. The corresponding cost savings is $800.85 annually. With a total material and labor cost of $5,514 the simple payback would be 6.89 years.

S1-ECM-5: Installation of a free-cooling heat exchanger

During the walkthrough audit, SourceOne was informed that the chiller is used all year round. When temperatures are below 48°F however, the chiller could be effectively bypassed by installing a heat exchanger between the condenser water from the cooling tower and the chilled water that is circulated through the AHUs. This is effective because the chiller normally outputs chilled water at 47-48°F and if the outdoor air temperature is below the chilled water temperature a chiller is not needed to cool the chilled water. Heat will naturally flow from the warmer returning chilled water to the condenser water through the heat exchanger and then from the condenser water to the outside air in the cooling tower. Under these circumstances, the heat exchanger would harness free-cooling and a large amount of energy would be saved by shutting down the chiller unit when the temperature drops below 48°F. In addition to the heat exchanger itself, valves would need to be installed to switch between the chiller and heat exchanger and these would need to be tied into the existing central control system.

The free-cooling heat exchanger analysis is shown in the ECM analysis in the appendix. As can be seen, the energy savings has been calculated to be 52,252 kWh annually. The corresponding cost savings is $9,906 annually. With a total material and labor cost of $30,644 the simple payback would be 3.09 years.

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S1-ECM-6: Installation of an additional Multistack chiller

During the walkthrough audit, SourceOne noticed that two chillers are being used in the facility. One of them is a 30-ton scroll type Multistack chiller. This was installed in the last few years to replace one of two older Carrier chillers. The other Carrier chiller is still in operation along with the new Multistack. Multistack chillers are modular units that are designed to easily be combined to create a chiller sized to match any demand. Therefore it is relatively inexpensive to add on to the Multistack modules already installed in the facility. SourceOne recommends installing another two (2) 15-ton modules to cover the load currently being handled by the older and less efficient Carrier chiller which can then be shut down permanently. With the more efficient chiller installed, we can expect an energy savings of about 0.22 kW/ton of cooling.

The additional Multistack chiller analysis is shown in the ECM analysis in the appendix. As can be seen, the energy savings has been calculated to be 38,649 kWh annually. The corresponding cost savings is $7,327 annually. With a total material and labor cost of $87,750 the simple payback would be 11.98 years.

Examined Energy Efficiency Measure That Cannot Be Financially Justified:

SourceOne identified a potential energy conservation measure but, due to its large initial cost and long payback period, its feasibility will need to be further examined. The ECM is as follows:

S1-ECM-7: Elevator Motor SCR Conversion

During the walkthrough audit, SourceOne notice that the building's elevator motor currently runs on an outdated Motor Generator set. This could be replaced with a more modern and efficient SCR static drive.

An MG set is used to convert the AC current from the utility line to DC current which is used by the main elevator motor. A DC motor was chosen for almost all elevators (until very recently) because it provides a much smoother operating elevator. Because utility supplied power is AC the MG set, which is an AC motor running a DC generator, was developed. This has been an effective solution in the past, however it poses several problems. To provide immediate power for the elevator motor, the MG set spends much of it's time in idle. When idling, the MG set can use up to 40% of its full load current. In addition, it is inefficient when in operation by today's standards and requires regular maintenance because it has high speed moving parts. The more recently developed SCR static drive is a solid state device that converts the AC current to DC. It does this more efficiently and immediately without running in any idle state. The elevator conversion is quite expensive, however, and will take an extended period to pay for itself.

The elevator motor SCR conversion analysis is shown in the ECM analysis in the appendix. As can be seen, the energy savings has been calculated to be 21,723 kWh annually. The corresponding cost savings is $4,118 annually. With a total material and labor cost of $125,053 the simple payback would be 30.36 years.

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SourceOne Recommended ECM Summary:

SourceOne recommends the implementation of the following ECMs:

1. S1-ECM-1: Motor Upgrades
   - ⇒ Annual Energy Savings: 24,399 kWh ($4,626)
   - ⇒ Simple Payback: 1.18 years
2. S1-ECM-2: Backroom Lighting Upgrades
   - ⇒ Annual Energy Savings: 13,419 kWh ($2,544)
   - ⇒ Simple Payback: 3.34 years
3. S1-ECM-3: Installation of VFDs on Air Handler Unit Fan Motors
   - ⇒ Annual Energy Savings: 21,276 kWh ($4,034)
   - ⇒ Simple Payback: 9.74 years
4. S1-ECM-4: Installation of a Condensate/Hot Water Heat Exchanger
   - ⇒ Annual Energy Savings: 17 Mlbs of steam ($602)
   - ⇒ Simple Payback: 6.39 years
5. S1-ECM-5: Installation of a Free-Cooling Heat Exchanger
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6. S1-ECM-6: Installation of an Additional Multistack Chiller
   - ⇒ Annual Energy Savings: 38,650 kWh ($7,328)
   - ⇒ Simple Payback: 11.98 years

Relative to the annual electric consumption of 853,740 kWh for 9 E 71st St., these ECMs represent a 21% energy savings and have a collective payback of 6.06 years.

In addition to these six (6) ECMs, SourceOne has identified a potential energy conservation initiative whose enactment may benefit 9 E 71st St. but which cannot be easily justified financially. It is as follows:

1. S1-ECM-7: Elevator Motor SCR Conversion
   - ⇒ Annual Energy Savings: 21,724 kWh of electricity ($4,119)
   - ⇒ Simple Payback: 30.36 years

Each one of these initiatives could bring about substantial energy savings individually and as a collective whole. If you have any questions, please do not hesitate to contact us. Thank you for this opportunity to be of service.

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Sincerely,

Timothy Sande
Associate Project Engineer
SourceOne Inc.
[redacted]

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Appendix:

Section 1: Utility Billing Data

SourceOne

Spreadsheet Instructions:

All fields in light yellow are input fields. This data needs to be gathered from DCAS	
or the Facility Staff.	
All fields in light green are output fields. This information will be used to analyze the	
feasibility of various Energy Conservation Measures (ECM)	
Values in bright yellow are assumed fields. Utility data not provided or not available	

Facility Name:

9 East 71st Street

Facility Address:

9 East 71st Street
New York, NY 10021

Facility Logistical Information:

Facility Square Footage for steam:	30,000	Hours of Operation:	24-7	Total Weekly Operating Hours:	168	
Facility Square Footage for electric:	30,000					
Facility Use/ Function:	Private Residence					
Last Major Renovation:						

Electric Utility Consumption Information:

ENTIRE BLDG CE BILL	Year	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
	2009	KWH	62,880	68,880	65,040	62,760	62,760	61,200	63,120	63,120	63,120	63,120	70,560	67,920	774,480
	2010	KWH	74,160	62,400	63,720	63,720	65,760	80,280	80,280	73,440	72,000	72,360	72,360	73,260	853,740
	2009	KW	132	122	120	120	120	120	125	125	125	125	127	137	137
	2010	KW	127	122	149	149	120	161	161	130	134	151	151	139	161
	2009	$$$	$ 10,944.94	$ 12,635.47	$ 10,736.05	$ 11,385.46	$ 11,385.46	$ 12,565.79	$ 12,036.50	$ 12,036.50	$ 12,036.50	$ 12,036.50	$ 11,341.73	$ 11,793.59	$140,934
	2010	$$$	$ 13,584.62	$ 11,364.09	$ 13,984.35	$ 13,984.35	$ 13,354.50	$ 16,652.24	$ 16,652.24	$ 13,255.74	$ 13,140.22	$ 13,965.58	$ 13,965.58	$ 13,775.10	$167,679
	Unit Cost Average	$/kwh	$0.179	$0.183	$0.192	$0.201	$0.192	$0.207	$0.200	$0.185	$0.186	$0.192	$0.177	$0.181	$0.190

Two Year Average		
Electrical Consumption:	814,110	kWh
Electrical Demand:	149	kW
Electric Load Factor	62%	
Electric Cost:	$ 154,307	

SourceOne

Spreadsheet Instructions:

All fields in light yellow are input fields. This data needs to be gathered from DCAS or the Facility Staff.
All fields in light green are output fields. This information will be used to analyze the feasibility of various Energy Conservation Measures (ECM)
Values in bright yellow are assumed fields. Utility data not provided or not available

Steam Utility Consumption Information: (ConEd Firm Steam Uninterruptible)

Account Name/Info	Year	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
	2009	MLBS	312	264	290	258	248	263	232	217	217	271	259	323	3,153
	2010	MLBS	274	263	214	221	204	198	172	172	183	205	239	251	2,597
	2009	$$$	$ 12,112	$ 9,997	$ 9,938	$ 9,294	$ 8,429	$ 7,710	$ 6,765	$ 6,025	$ 6,352	$ 7,305	$ 8,370	$ 10,471	$ 102,768
	2010	$$$	$ 10,345	$ 9,962	$ 8,736	$ 8,508	$ 6,634	$ 6,710	$ 6,355	$ 6,402	$ 6,713	$ 7,009	$ 8,677	$ 9,320	$ 95,370
	Unit Cost Average	$/MLB	$ 38.35	$ 37.92	$ 37.01	$ 37.17	$ 33.35	$ 31.30	$ 32.49	$ 31.96	$ 32.63	$ 30.08	$ 34.24	$ 34.45	$ 34.24

Two Year Annual Average *		
Steam Consumption:	2,875	Mlbs
Steam Cost:	$ 99,069	

Gas Utility Consumption Information:

Account Name/Info	Year	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
	2009	MBTU	4.2	3.5	3.4	3.3	3.3	4.0	3.4	3.7	3.8	2.4	4.8	3.5	43
	2010	MBTU	4.1	3.1	3.4	5.7	4.7	4.7	4.7	5.0	6.0	3.5	8.5	6.3	60
	2009	$$$	$ 97	$ 87	$ 78	$ 68	$ 68	$ 80	$ 70	$ 76	$ 76	$ 56	$ 99	$ 80	$ 935
	2010	$$$	$ 93	$ 70	$ 72	$ 106	$ 94	$ 94	$ 94	$ 103	$ 119	$ 77	$ 153	$ 123	$ 1,199
	Unit Cost Average	$/MBTU	$ 22.89	$ 23.82	$ 22.14	$ 19.52	$ 20.52	$ 20.07	$ 20.36	$ 20.48	$ 19.84	$ 22.61	$ 18.99	$ 20.68	$ 20.99

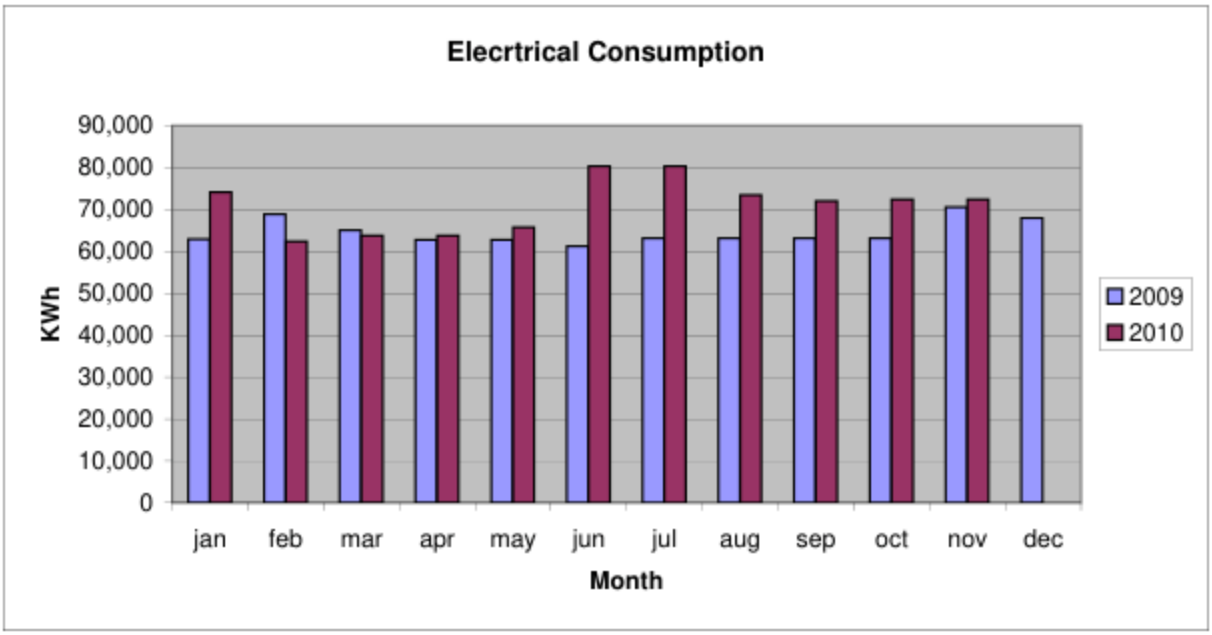
Two Year Annual Average *		
Gas Consumption:	51	MBTU
Gas Cost:	$ 1,067	

Thermal and Electric Load Calculations:

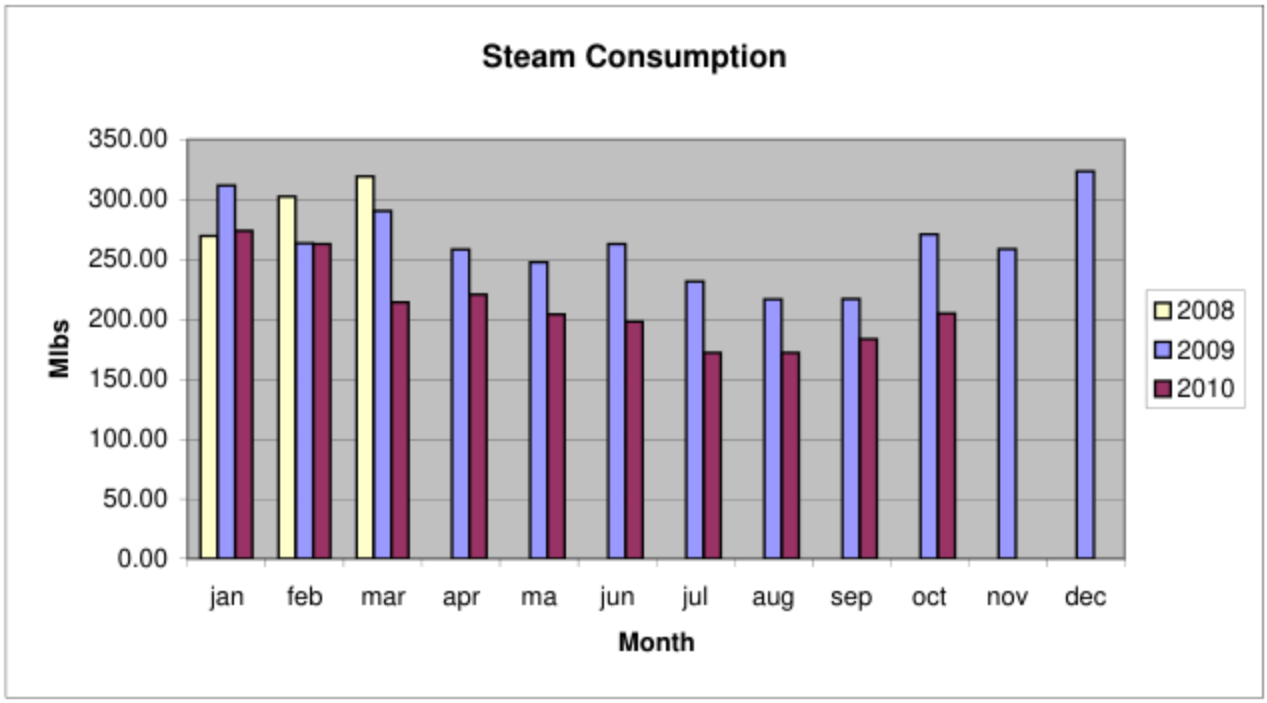
Building Energy Use Profile:		
	27.14	kWh/ft^2
Annual Electric Consumption	**92.6**	**kBtu/ft^2**
	0.096	Mlbs/ft^2
Annual Steam Consumption	**111.2**	**kBtu/ft^2**
Total Annual Energy	**204**	**kBtu/ft^2**
Consumption	**2.04**	**therms/ft^2**

From Date	To Date	Elec Use (Kwh)	Elec Demand (Kw)	Electric Bill Amt
10/13/2010	12/14/2010	144,720	151.2	$27,931.16
11/10/2010	12/14/2010	--	--	--
10/13/2010	11/10/2010	--	--	--
9/13/2010	10/13/2010	72,000	134.4	$13,140.22
8/12/2010	9/13/2010	73,440	129.6	$13,255.74
5/13/2010	8/12/2010	--	--	--
6/14/2010	8/12/2010	160,560	160.8	$33,304.47
5/13/2010	6/14/2010	65,760	120	$13,354.50
3/17/2010	5/13/2010	127,440	148.8	$27,968.69
4/15/2010	5/13/2010	--	--	--
3/17/2010	4/15/2010	--	--	--
2/16/2010	3/17/2010	62,400	122.4	$11,364.09
1/14/2010	2/16/2010	74,160	127.2	$13,584.62
12/15/2009	1/14/2010	67,920	136.8	$11,793.59
11/12/2009	12/15/2009	70,560	127.2	$11,341.73
7/15/2009	11/12/2009	252,480	124.8	$48,146.01
10/14/2009	11/12/2009	--	--	--
9/14/2009	10/14/2009	--	--	--
8/13/2009	9/14/2009	--	--	--
7/15/2009	8/13/2009	--	--	--
6/15/2009	7/15/2009	--	--	--
6/15/2009	7/15/2009	61,200	120	$12,565.79
4/15/2009	6/15/2009	125,520	120	$22,770.91
3/17/2009	4/15/2009	65,040	120	$10,736.05
2/13/2009	3/17/2009	68,880	122.4	$12,635.47
1/14/2009	2/13/2009	62,880	132	$10,944.94
12/12/2008	1/14/2009	78,960	132	$14,874.61

	month	kwh	kw	electric bill
2009	jan	62,880	132	$10,944.94
2009	feb	68,880	122.4	$12,635.47
2009	mar	65,040	120	$10,736.05
2009	apr	62760	120	$11,385.46
2009	may	62760	120	$11,385.46
2009	jun	61,200	120	$12,565.79
2009	jul	63120	124.8	$12,036.50
2009	aug	63120	124.8	$12,036.50
2009	sep	63120	124.8	$12,036.50
2009	oct	63120	124.8	$12,036.50
2009	nov	70,560	127.2	$11,341.73
2009	dec	67,920	136.8	$11,793.59
2010	jan	74,160	127.2	$13,584.62
2010	feb	62,400	122.4	$11,364.09
2010	mar	63720	148.8	$13,984.35
2010	apr	63720	148.8	$13,984.35
2010	may	65,760	120	$13,354.50
2010	jun	80280	160.8	$16,652.24
2010	jul	80280	160.8	$16,652.24
2010	aug	73,440	129.6	$13,255.74
2010	sep	72,000	134.4	$13,140.22
2010	oct	72360	151.2	$13,965.58
2010	nov	72360	151.2	$13,965.58
2010	dec			

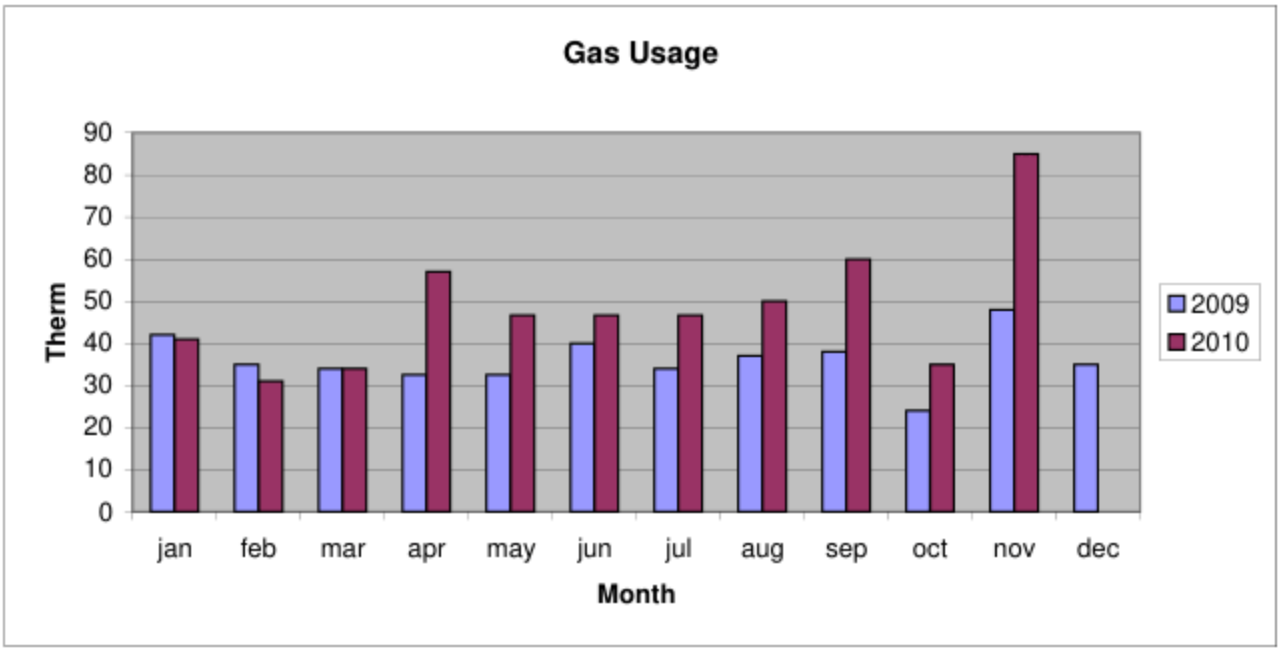


year	month	Mlbs	bill amount	Payments	
2008	oct	269.50	$8,682.83	7323.1	$32.22
2008	nov	302.56	$10,277.13	$8,682.83	$33.97
2008	dec	319.33	$11,477.13	$10,277.13	$35.94
2009	jan	311.81	$12,112.07	$11,477.13	$38.84
2009	feb	263.56	$9,997.06	$12,112.07	$37.93
2009	mar	290.40	$9,938.08	$9,997.06	$34.22
2009	apr	258.30	$9,293.57	$9,938.08	$35.98
2009	may	247.64	$8,428.57	$9,293.57	$34.04
2009	jun	262.77	$7,709.52	$8,428.57	$29.34
2009	jul	231.60	$6,765.16	$7,709.52	$29.21
2009	aug	216.80	$6,025.48	$6,765.16	$27.79
2009	sep	216.96	$6,351.95	$6,025.48	$29.28
2009	oct	270.88	$7,304.81	$6,351.95	$26.97
2009	nov	258.53	$8,370.31	$10,084.29	$32.38
2009	dec	323.42	$10,471.23	$0.00	$32.38
2010	jan	273.78	$10,345.10	$0.00	$37.79
2010	feb	262.79	$9,962.25	$8,757.86	$37.91
2010	mar	214.19	$8,736.05	$9,962.25	$40.79
2010	apr	220.65	$8,508.15	$8,736.05	$38.56
2010	may	204.06	$6,633.56	$8,508.15	$32.51
2010	jun	197.96	$6,709.73	$6,633.56	$33.89
2010	jul	172.17	$6,354.52	$6,709.73	$36.91
2010	aug	172.00	$6,401.62	$6,354.52	$37.22
2010	sep	183.43	$6,712.59	$6,401.62	$36.59
2010	oct	205.05	$7,009.44	$6,712.59	$34.18
2010	nov				
2010	dec				



From Date	To Date	Gas Use (Therm)	Gas Bill Amt
10/13/2010	12/14/2010	--	--
11/10/2010	12/14/2010	85	$153.13
10/13/2010	11/10/2010	35	$77.11
9/13/2010	10/13/2010	60	$118.76
8/12/2010	9/13/2010	50	$102.66
5/13/2010	8/12/2010	140	$282.26
6/14/2010	8/12/2010	--	--
5/13/2010	6/14/2010	--	--
3/17/2010	5/13/2010	--	--
4/15/2010	5/13/2010	57	$106.34
3/17/2010	4/15/2010	34	$72.40
2/16/2010	3/17/2010	31	$70.45
1/14/2010	2/16/2010	41	$93.12
12/15/2009	1/14/2010	35	$79.50
11/12/2009	12/15/2009	48	$99.42
7/15/2009	11/12/2009	--	--
10/14/2009	11/12/2009	24	$56.28
9/14/2009	10/14/2009	38	$75.68
8/13/2009	9/14/2009	37	$75.50
7/15/2009	8/13/2009	34	$70.13
6/15/2009	7/15/2009	40	$79.84
6/15/2009	7/15/2009	--	--
4/15/2009	6/15/2009	65	$136.66
3/17/2009	4/15/2009	34	$78.16
2/13/2009	3/17/2009	35	$86.78
1/14/2009	2/13/2009	42	$96.84
12/12/2008	1/14/2009	39	$98.34

	month	gas (therm)	gas (MBTU)	gas bill
2009	jan	42	4.2	$96.84
2009	feb	35	3.5	$86.78
2009	mar	34	3.4	$78.16
2009	apr	32.5	3.25	$68.33
2009	may	32.5	3.25	$68.33
2009	jun	40	4	$79.84
2009	jul	34	3.4	$70.13
2009	aug	37	3.7	$75.50
2009	sep	38	3.8	$75.68
2009	oct	24	2.4	$56.28
2009	nov	48	4.8	$99.42
2009	dec	35	3.5	$79.50
2010	jan	41	4.1	$93.12
2010	feb	31	3.1	$70.45
2010	mar	34	3.4	$72.40
2010	apr	57	5.7	$106.34
2010	may	46.66666667	4.666666667	$94.09
2010	jun	46.66666667	4.666666667	$94.09
2010	jul	46.66666667	4.666666667	$94.09
2010	aug	50	5	$102.66
2010	sep	60	6	$118.76
2010	oct	35	3.5	$77.11
2010	nov	85	8.5	$153.13
2010	dec			



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Appendix:

Section 2: Energy Conservation Measures Summary Sheets

S1-ECM-1 Motor Upgrades

Standard Efficiency Table		
HP	OLD EFF	NEW EFF
5.00	83.7%	89.5%
7.50	85.2%	91.7%
10.00	85.7%	91.7%
15.00	86.8%	93.0%
20.00	87.7%	93.0%
25.00	89.5%	93.6%
30.00	89.7%	94.1%
40.00	90.1%	94.5%
50.00	90.6%	95.0%
60.00	91.7%	95.4%
75.00	91.9%	95.4%
100.00	92.4%	95.4%
125.00	92.2%	95.4%
150.00	92.4%	95.8%

Misc. Assumptions & Results

- *Motor replacement based on motors >5HP*
- *New motor efficiency based on NETA Standards*
- *Complete motor assessment req'd to verify existing motor efficiency*

Item	Cost
6- New 7.5 HP High Efficiency Motor	$2,766.00
Estimated motor installation labor	$1,278.00

Estimated Material Cost	$2,766.00	
Estimated labor Cost	$1,278.00	
Projected Electrical Savings	24,398.80	kWh

PROPOSED CAPITAL COST (MATERIAL AND LABOR)	$ 4,044.00	
TOTAL ENERGY SAVINGS kWh	24,398.80	kWh
TOTAL ANNUAL SAVINGS ($)	$ 4,625.81	
SIMPLE PAYBACK (EXCL FEES & CONTINGENCY)	0.87	Years

Proposed Capital Cost		$	4,044.00
Contingency	20.0%	$	808.80
Engineering	15.0%	$	606.60
	TOTAL	$	5,459.40
Effective Payback (fees included)			**1.18**

EFTA00287185

S1-ECM-2 Lighting Upgrades

Fixture Type	# of fixtures	watts/fixture (existing)	total watts	Fixture Replacement	watts/fixture	total watts	cost/fixture + bulbs	Labor/fixture	disposal cost/fixture	total cost
4' 2 bulb straight T12 fixtures	43	86	3698	4' 2 bulb straight T8 w/ electronic balast	55	2365	$11.82	$30.00	($4.00)	$1,626.26
2' 2 bulb T12 U-tube	44	86	3784	2' 2 bulb straight T8 w/ electronic balast	30	1302	$42.08	$60.00	($4.00)	$4,315.52
Flood lights	12	65	780	CFL floods	20	240	$6.00	$15.00		$252.00
Incandecents	6	60	360	CFLs	20	120	$3.00	$15.00		$108.00
	105		8622			4027				$6,301.78

Avg Existing Energy Consumption	25,176	kWh
New Energy Consumption	11,757	kWh
Annual Energy Savings	13,419	kWh

Current Electric Consumption	25,176	kWh
Estimated Current Electric Charges	$ 4,773.21	
Projected Electrical Consumption	11,757	kWh
Projected Electric Charges	$ 2,229.11	
Projected Electrical Savings	13,419	kWh
Projected Annual Payback	$ 2,544.09	

PROPOSED CAPITAL COST*	$6,301.78	
TOTAL ENERGY SAVINGS kWh	13,419	kWh
TOTAL ANNUAL SAVINGS ($)	$ 2,544.09	
SIMPLE PAYBACK (EXCL FEES & CONTINGENCY)	2.48	Years

* includes one-time disposal fee

Proposed Capital Cost		$	6,301.78
Contingency	20.0%	$	1,260.36
Engineering	15.0%	$	945.27
TOTAL CAPITAL COST		**$**	**8,507.40**
Effective Payback (fees included)			**3.34**

EFTA00287186

S1-ECM-3 Installation of Variable Frequency Drives on Air Handlers

Hourly BIN Energy Calculation

Temperature BIN Data Mid-pts	Range	Annual Hrs	Occ Hrs	UnOcc Hrs	Occ % Load	UnOcc % Load	Existing kWh	Proposed Occ kWh	Proposed UnOcc kWh	Proposed Total kWh
97.5	95 to 100	19	13	6	110%	0%	183	122	15	137
92.5	90 to 95	77	51	26	90%	0%	744	496	61	556
87.5	85 to 90	196	131	65	70%	0%	1893	1262	154	1416
82.5	80 to 85	378	252	126	50%	0%	3650	2433	297	2730
77.5	75 to 80	608	405	203	30%	0%	5871	3914	478	4392
72.5	70 to 75	812	541	271	10%	0%	7841	5227	638	5865
67.5	65 to 70	809	539	270	0%	0%	7812	5208	636	5844
62.5	60 to 65	759	506	253	12%	0%	7329	4886	596	5482
57.5	55 to 60	705	470	235	19%	0%	6808	4538	554	5092
52.5	50 to 55	689	459	230	27%	0%	6653	4435	541	4977
47.5	45 to 50	687	458	229	35%	0%	6634	4422	540	4962
42.5	40 to 45	766	511	255	42%	0%	7397	4931	602	5533
37.5	35 to 40	838	559	279	50%	0%	8092	5395	659	6053
32.5	30 to 35	628	419	209	58%	0%	6064	4043	493	4536
27.5	25 to 30	365	243	122	65%	0%	3524	2350	287	2636
22.5	20 to 25	222	148	74	73%	0%	2144	1429	174	1604
17.5	15 to 20	117	78	39	81%	0%	1130	753	92	845
12.5	10 to 15	51	34	17	88%	0%	492	328	40	368
7.5	5 to 10	17	11	6	96%	0%	164	109	13	123
2.5	0 to 5	2	1	1	104%	0%	19	13	2	14
		8745	5830.0	2915.0	56%	0	84443	56295	6872	63167

Motor List

Unit	Supply Fan HP	Return Fan HP	Existing VFD
AC-1	7.5		NO
AC-2	7.5		NO
AC-3	7.5		NO
Total	22.5	0	

Estimate

Item	Cost
Commissioning / Test	$ 4,500.00
VFDs for AC-1 through AC-3 (7.5HP)	$ 24,600.00
Subtotal	**$ 29,100.00**

Misc. Assumptions

Occ. Space Temp (F)	70	F
Heat setback (F)	60	F
Cooling setback (F)	85	F
Peak kW Demand	160.8	kW
Annual kWH saved	21,276	kWh
kWH unit cost	$ 0.19	$ / kWh

Motor Data

Combined Fan HP	22.5	HP
Conversion Constant	0.746	
Minimum allowable speed	50%	
Maximum allowable speed	80%	
Est. Motor Load	90%	
Est. Motor Eff.	89%	

Historic weather data used to analyze cooling / heating needs by means of BIN analysis.

% Load = (OAT-Setpoint)/(Design-Setpoint)
KW= (HP * .746) / Eff
D HP = (New Speed/Old Speed)^3

Current Electric Consumption	84,443	kWh
Projected Electrical Consumption	63,167	kWh
Projected Electrical Savings	21,276	kWh

PROPOSED CAPITAL COST*	$ 29,100	
TOTAL ENERGY SAVINGS kWh	**21,276**	kWh
TOTAL ANNUAL ENERGY SAVINGS ($)	**$ 4,034**	
SIMPLE PAYBACK (EXCL FEES & CONTINGENCY)	7.21	Yrs

Proposed Capital Cost		$	29,100
Contingency	20.0%	$	5,820
Engineering	15.0%	$	4,365
TOTAL CAPITAL COST		**$**	**39,285**
Effective Payback (fees included)			**9.74**

EFTA00287187

S1-ECM-4 Installation of Heat Exchanger on Condensate

Current water heater usage		
cold water temp	50 F	
hot water temp	140 F	
Temp difference	90 F	
Water heated annually	420000 lbs	
Mlbs	31.66 Mlbs	
Cost of heating	$	1,084.12

Heat Exchanger		
cold water temp	50 F	
condensate temp	180 F	
water after HX	100 F	
Temp difference	50 F	
Mlbs	17.59 Mlbs	
Cost saved	$	602.29

Cost saved from cold water	
volume used to cool condensate	356.6755 100 cu ft
cost of water	$2.95 per 100 cu ft
total cost of water used	$1,052.19
volume saved by hx	67.30769 100 cu ft
cold water savings	$198.56

Materials cost	$1,205.00
Labor cost	$2,880.00
Total cost	$4,085.00
Annual Cost saved	$800.85
Simple Payback	5.10

Proposed Capital Cost		$	4,085.00
Contingency	20.0%	$	817.00
Engineering	15.0%	$	612.75
	TOTAL	**$**	**5,514.75**
Effective Payback (fees included)			**6.89**

EFTA00287188

S1-ECM-5 Installation of Free-cooling Heat Exchanger

Temperature BIN Data

Mid-pts	Range	Annual Hrs
97.5	95 to 100	19
92.5	90 to 95	77
87.5	85 to 90	196
82.5	80 to 85	378
77.5	75 to 80	608
72.5	70 to 75	812
67.5	65 to 70	809
62.5	60 to 65	759
57.5	55 to 60	705
52.5	50 to 55	689
47.5	45 to 50	687
42.5	40 to 45	766
37.5	35 to 40	838
32.5	30 to 35	628
27.5	25 to 30	365
22.5	20 to 25	222
17.5	15 to 20	117
12.5	10 to 15	51
7.5	5 to 10	17
2.5	0 to 5	2
		8745

Annual hours below 48 3349.5

Chiller size	40	tons
Load factor	0.5	
Chiller demand	0.78	KW/ton
Winter hours	3349.5	hours
Chiller energy usage	52252.2	KWh
Energy cost	$9,906.58	
hourly chiller flow	9590.41	gal/hr
	159.8402	gal/min

Materials cost	$6,379.67
Labor cost	$16,320.00
Total cost	$22,699.67
Annual Cost saved	$9,906.58
Simple Payback	2.29

Proposed Capital Cost		$	22,699.67
Contingency	20.0%	$	4,539.93
Engineering	15.0%	$	3,404.95
	TOTAL	**$**	**30,644.55**
Effective Payback (fees included)			**3.09**

EFTA00287189

S1-ECM-6 Installation of Addidional Multistack Chillers

Chilling Load	
hours/year	4392
tons	40
KW/ton	0.78
KWh	137030.4
Cost per year	$25,979.83

Savings	0.22	KW/ton/hr
energy savings	38649.6	KWh
cost savings	$7,327.64	

Materials cost	$45,000.00
Labor cost	$20,000.00
Total cost	$65,000.00
Annual Cost saved	$7,327.64
Simple Payback	$8.87

Proposed Capital Cost		$	65,000.00
Contingency	20.0%	$	13,000.00
Engineering	15.0%	$	9,750.00
	TOTAL	**$**	**87,750.00**
Effective Payback (fees included)			**11.98**

EFTA00287190

Annual Hours	4368	
MG Set Motor HP	38	
MG Set Motor Efficiency	85.50%	
MG Set System Electric Consumption	144823.47	KWh
MG Set Motor Electric Costs	$27,457.33	
SCR System Electric Consumption	123099.95	KWh
SCR Motor Electric Costs	$23,338.73	
Yearly Savings	21,723.52	KWh
Yearly Savings	$4,118.60	

Materials cost	$37,053.04
Labor cost	$55,579.06
Total cost	$92,632.10
Annual Cost saved	$4,118.60
Simple Payback	22.49

Proposed Capital Cost		$	92,632.10
Contingency	20.0%	$	18,526.42
Engineering	15.0%	$	13,894.82
	TOTAL	**$**	**125,053.34**
Effective Payback (fees included)			**30.36**

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9 E 71st Street - Energy Efficiency Analysis Summary

9 E 71st Energy Assessment Results								
ECM ID	**Energy Conservation Measure (ECM)**	**Yearly Savings (kWh)**	**Yearly Savings (Mlbs)**	**Yearly Savings (BTU)**	**Yearly GHG Emissions Decrease (MTCO2e)**	**Capital Cost ($)**	**Yearly Savings ($)**	**Effective Payback (Years)**
S1-ECM-1	Motor Upgrades	24,399	-	83,248,691	11	$ 5,459	$4,626	1.18
S1-ECM-2	Lighting Upgrades	13,419	-	45,784,951	6	$ 8,507	$2,544	3.34
S1-ECM-3	VFD on Air Handlers	21,276	-	72,592,188	10	$ 39,285	$4,034	9.74
S1-ECM-4	Heat Exchangner on Condensate	0	17.59	18	1	$ 5,515	$801	6.89
S1-ECM-5	Heat Exchanger Parallel with Chiller	52,252		178,284,506	23	$ 30,645	$9,907	3.09
S1-ECM-6	Increase Multistacks	38,650	-	131,872,435	17	$ 87,750	$7,328	11.98
S1-ECM-7	Elevator SCR Conversion	21,724	-	74,120,650	10	$ 125,053	$4,119	30.36
	Total	**171,718**	**18**	**585,903,440**	**78**	**$ 302,214**	**$33,357**	**9.06**
	Total without Elevator SCR	149,995		511,782,789	6820%	$177,161	$29,239	6.06