Long Island Power Authority

Energy Audit Report

for

Deer Park Schools
John Quincy Adams School

February 27, 2008

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Section Page

1 Executive Summary

This report presents the findings of an energy survey conducted on February 1, 2008 by Bill Conn for:

Deer Park Schools John Quincy Adams School
172 Old Country Road
Deer Park, NY 11729
631-274-4080

Facility contact person: Kirk Gostkowski
LIPA account number(s): 724-43-1425--17
Gas 724-43-1428--06 Gas 724-98-1429-17

Long Island Power Authority (LIPA) conducts energy surveys at no charge to its customers. The surveys promote LIPA's message of safeguarding the environment, reducing dependence on foreign oil and delaying the need to build costly new power plants. This can be achieved through the wiser and more efficient use of energy.

The annual energy costs at this facility are as follows:

Electricity	$55,379
Natural Gas	$34,011
Total	$89,390

The potential annual energy cost savings are shown below in Table 1-1.

Table 1-1
Energy Cost Reduction Opportunities (ECRO's)

Description	Potential Rebate*	Cost After Rebate	Annual Savings	Payback with Rebate	% of Annual Energy Cost
Upgrade the Lighting	$420	$4,035	$1,406	2.9 years	1.6%
Install Lighting Controls	$980	$7,420	$3,103	2.4 years	3.5%
Improve Temperature Control			$9,732	Immediately.	10.9%
Upgrade the HVAC		$8,190	$1,260	6.5 years	1.4%
Totals	**$1,400**	**$19,645**	**$15,501**	**1.3 years**	**17.3%**

* **NOTE**: Rebates are subject to caps, changes and eligibility requirements. In addition, there may be other rebates that apply. Prior to purchasing any equipment you must contact your LIPA

representative or the audit program administrator, John Pratnicki, at (631) 755-5390 for assistance in the pre-approval process and in determining your potential rebate amount.
The estimated demand and energy savings are shown below in Table 1-3. The information in this table corresponds to the recommendations in Table 1-1.

Table 1-3
Estimated Energy Savings

Recommendation	Total kW Reduction	Total Annual kWh Reduction	Total Annual Therms Reduced
Upgrade the Lighting	2.8	7,265	
Install Lighting Controls		20,612	
Improve Temperature Control			8,070
Upgrade the HVAC		8,190	
Totals	**2.8**	**36,066**	**8,070**

The remainder of the report is organized as follows: Section 2 explains the details of the Energy Cost Reduction Opportunities, Section 3 shows the historical energy usage and costs for this facility. Section 4 gives an equipment inventory and discusses the building characteristics (architectural, mechanical, electrical, etc.), and Section 5 is the methodology used to survey and analyze your facility.

1 Executive Summary

Auditor's Comments

In most school buildings the most cost effective measure will be temperature control during unoccupied periods. The temperature is currently being setback at night but there may be opportunities to optimize these savings. Each school should have a temperature control schedule and the heat set back 15 minutes before the end on occupancy. Some investment may be needed to assure all pneumatic controls are working properly. Any reported overheating in any areas should be addressed promptly.

The boilers are new and controlled by an Andover control system. The boilers do not maintain boiler temperature when not required which is a desirable strategy. The circulators shut off when none of the five sensors in the building are calling for heat. Time clocks should be considered to shut off the Univent heating fans when the school is unoccupied. The heating system design appears to be very efficient however the temperature could be set back more at night. There could be three set points. The highest setpoint should be when the school is occupied. The temperature should be set back when only cleaning and maintenance is taking place. When the school is unoccupied, temperatures should be set to 55 F.

1 Executive Summary

Energy Star Rating

The Environmental Protection Agency's Energy Star Portfolio Manager program rates buildings by their energy efficiency. This rating is adjusted for building use and location. This is a voluntary program established to help facility managers establish baselines for energy consumption and measure progress.

How the Rating System Works

The national energy performance rating is a type of external benchmark that helps energy managers assess how efficiently their buildings use energy, relative to similar buildings nationwide. The rating system's 1–100 scale allows everyone to quickly understand how a building is performing — a rating of 50 indicates average energy performance, while a rating of 75 or better indicates top performance.

EPA, in conjunction with stakeholders, developed the energy rating as a screening tool; it does not by itself explain why a building performs a certain way, or how to change the building's performance. It does, however, help organizations assess performance and identify those buildings that offer the best opportunities for improvement and recognition.

Your building's actual source energy data is weather normalized; this enables EPA to assess your building's performance relative to the typical weather for your region, without bias for the specific weather patterns in the rating year.

Excerpted from Energy Star.gov

Based upon your current building use and energy consumption the Environmental Protection Agency your facility rating is as follows:

Baseline Score	**58**	Your current rating. This score represents your buildings relative energy efficiency on a 1-100 scale compared to similar buildings in your climate. This number can serve as a baseline to gauge improvements in energy efficiency.
Target	**78**	The target score is a customer-selected number. In this case the Target score was based on the energy reduction recommendations in this energy audit. In other words, this is where your score should be after implementation of the efficiency measures.
Energy Star Designation	**75**	Facilities with a Rating of 75 or above can receive an Energy Star designation by the EPA
CO_2 Emmisions (tons/year)	**342**	* Total Carbon Dioxide emissions attributed to your energy use as calculated by the EPA

Energy Star Portfolio Manager http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

1 Executive Summary

Audit Disclaimer

This audit has been conducted and prepared by LIPA for the sole purpose of presenting energy cost reduction opportunities for you. This report is not intended for any other purpose. The data used in this audit was provided by your organization and was not independently verified by us.

While the recommendations in this report have been reviewed for technical accuracy, LIPA is not liable if projected savings are not actually achieved. The recommendations are based on an analysis of conditions observed at the time of the audit and information provided by your organization. Estimated savings are computed on the basis of research by government agencies and engineering groups. Actual savings will depend on many factors including conservation measures implemented, seasonal variations in fuel price and weather, and specific energy use practices of the building occupants.

Costs are based on average local costs for materials and labor. It is strongly suggested that you contact a qualified contractor prior to implementing any of the recommendations outlined in this report. Many items are not included in our costs, such as removal and disposal of the existing equipment, bringing the new equipment installation up to code, asbestos abatement, lighting ballast PCB and lamp mercury handling, etc.

We hope that this report is helpful and that you will implement the energy savings measures that we recommended. If you have any questions, please contact John Pratnicki at (631) 755-5390 or your LIPA representative.

2 Energy Cost Reduction Opportunities

Upgrade the Lighting

Install Compact Fluorescent Lighting

Compact fluorescent lamps (CFL's) were created to be replacements for the standard incandescent lamps that are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to look like the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light. In some instances, this is still not the desired ambiance, but in most cases the significant energy savings and the "near incandescent" effect is welcomed.

The CFL buyer should spend some time shopping around, since the CFL is available in a myriad of shapes and sizes depending on the specific application. But for almost any application, there is a lamp that fits the need. Typical replacements are: a 13-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 25-Watt CFL for a 100-Watt incandescent lamp.

The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. Then there is a 3000K, a 3500K, and a 4100K. The 4100K would be the "brightest" or "coolest" output. It would be wise to see an example of each before making a purchase, and even to see a sample of the lamp you are buying since Kelvin ratings vary between manufacturers.

A CFL can be chosen to screw right into your existing fixtures, or to be hardwired into your existing fixtures, or a new CFL fixture could be purchased.

NOTE: fluorescent ballasts that are to be used in cold locations need to be specified as such. These "cold temperature" ballasts can be rated as low as zero degrees Fahrenheit.

The following table lists the details of the lighting upgrade. Applicable areas and the recommended action are shown. The first column identifies the line number that corresponds to the detailed lighting inventory at the end of this report.

It is strongly suggested that you contact a qualified contractor prior to implementing any of the recommendations outlined in this report. Many items are not included in our costs, such as removal and disposal of the existing equipment, bringing the new equipment installation up to code, asbestos abatement, lighting ballast PCB and lamp mercury handling, etc. In addition, the costs shown in this section are the basic costs you would incur if you were to install the project on your own. If you decide to use a contractor, then you most likely will see costs about 20-30% higher, plus the miscellaneous costs mentioned previously.

2 Energy Cost Reduction Opportunities

Upgrade the Lighting - Details

Line # - Area	Action	Cost and Savings
6 - Gym	For the existing 12 high bay fixtures, each using 400-Watt metal halide lamps, install new open high-bay fixtures with 4 T5 fluorescent lamps (54 Watt) and electronic ballasts. (New qty: 12)	Cost After Rebates: $3,780 Annual Savings: $1,126 Payback: 3.4 years.
10 - Restrooms	For the existing 9 round fixtures, each using 75-Watt, incandescent lamps, retrofit with 18-Watt compact fluorescent screw-in lamps. (New qty: 9)	Cost After Rebates: $207 Annual Savings: $232 Payback: 0.9 years.
11 - Media Center	For the existing 6 hi-hat fixtures, each using 65-Watt, incandescent "flood" lamps, retrofit with PAR-Capsylite lamps, 45-Watt. (New qty: 6)	Cost After Rebates: $48 Annual Savings: $48 Payback: 1.0 years.

Total Fixtures	
Unaffected Qty:	598
Affected Qty:	27
Total Existing Qty:	625

Totals	
Potential Rebate:	$420
Cost After Rebate:	$4,035
Annual Savings:	$1,406
Payback:	2.9 years

3 Historical Energy Usage and Costs

Table 3-2 and Figure 3-1 represents the electrical energy usage for the surveyed building from Jun-06 to May-07. LIPA provides electricity to the facility under Rate 281. This electric rate has a component for consumption that is measured in kilowatt-hours (kWh). It is measured by multiplying the wattage of the equipment times the hours that it operates. For example, a 1,000-Watt lamp operating for 5 hours would measure 5,000 Watt-hours. Since one kilowatt is equal to 1,000 Watts, the measured consumption would be 5 kWh. This rate has another component for Peak Demand that is measured in kilowatts (kW). Following the example above, if your facility had nothing else in it except for the 1,000-Watt lamp, then your monthly Peak Demand would be 1.0 kW. Your meter averages your demand constantly over 15 or 30-minute intervals (depending upon the utility and the specific rate). At the end of the month you are charged for the highest "average" and this is called your Peak Demand. Based on these definitions of consumption and Peak Demand it can be shown that keeping equipment off whenever it is not in use will reduce your consumption, while not operating equipment simultaneously will reduce your Peak Demand.

Rates used in this report reflect the most current rate structure available. Table 3-1 shows the annualized rate structure:

Table 3-1
Rate Structure for Rate 281

Description	Summer	Winter	Average
Demand Charge	$9.99/kW	$8.88/kW	$9.25/kW
Energy Charge	$0.1605/kWh	$0.1456/kWh	$0.1506/kWh

Figure 3-2 is a pie chart reflecting the electrical end-uses and their contribution to the total electricity usage. Table 3-3 is the electrical end-use in data format.

Table 3-4 and Figure 3-3 on the following pages show the natural gas energy usage for the surveyed building from Jul-06 to Jun-07. Gas is supplied by Keyspan. The annual usage and cost are 28,201 CCF and $34,011, respectively. This yields an average cost $1.20600 / CCF.

Figure 3-4 is a pie chart reflecting the gas end-uses and their contribution to the total gas usage. Table 3-5 is the gas end-use in data format.

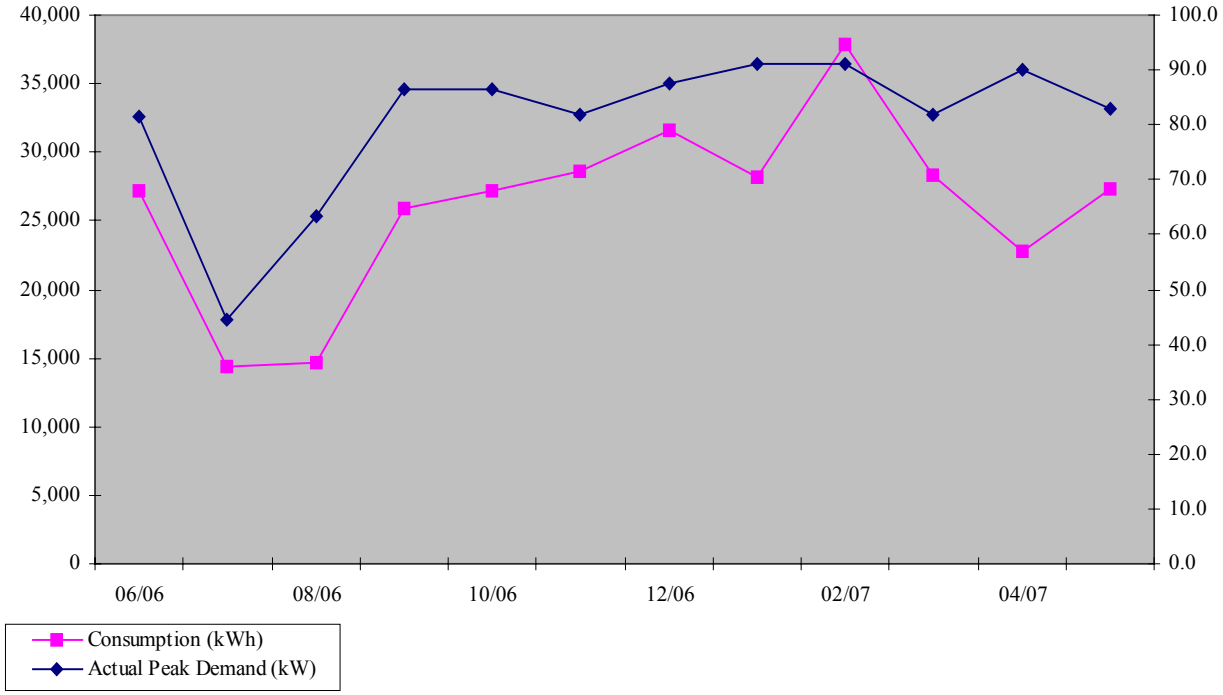
Table 3-2

3 Historical Energy Usage and Costs

Electricity Billing Data

Month of Use	Days in Month	Consumption kWh	Peak Demand		Total Bill
			Actual	Billed	
06/06	35	27,240	81.5	81.5	$5,457
07/06	30	14,400	44.5	69.5	$3,091
08/06	32	14,640	63.5	69.5	$3,179
09/06	30	25,920	86.5	86.5	$5,067
10/06	29	27,240	86.5	86.5	$4,676
11/06	30	28,560	82.0	82.0	$4,770
12/06	33	31,560	87.5	87.5	$5,323
01/07	26	28,200	91.0	91.0	$4,690
02/07	36	37,800	91.0	91.0	$6,171
03/07	30	28,320	82.0	82.0	$4,627
04/07	24	22,800	90.0	90.0	$3,780
05/07	31	27,360	83.0	83.0	$4,548
Totals	***366***	***314,040***			***$55,379***

Figure 3-1
Electricity Usage Profile

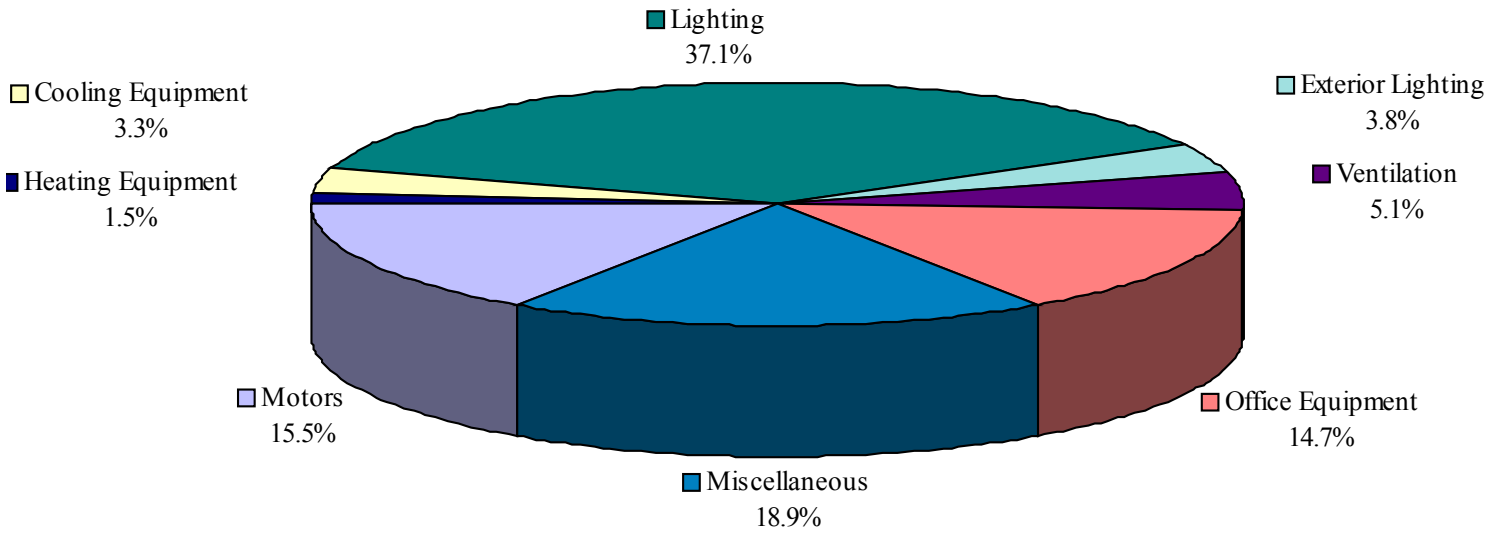


3 Historical Energy Usage and Costs

Table 3-3
Electricity End Use

End Use	Percent of Total
Heating Equipment	1.5%
Cooling Equipment	3.4%
Lighting	37.2%
Exterior Lighting	3.8%
Ventilation	5.1%
Office Equipment	14.7%
Miscellaneous	18.9%
Motors	15.5%
TOTAL	100.0%

Figure 3-2
Electricity End Use

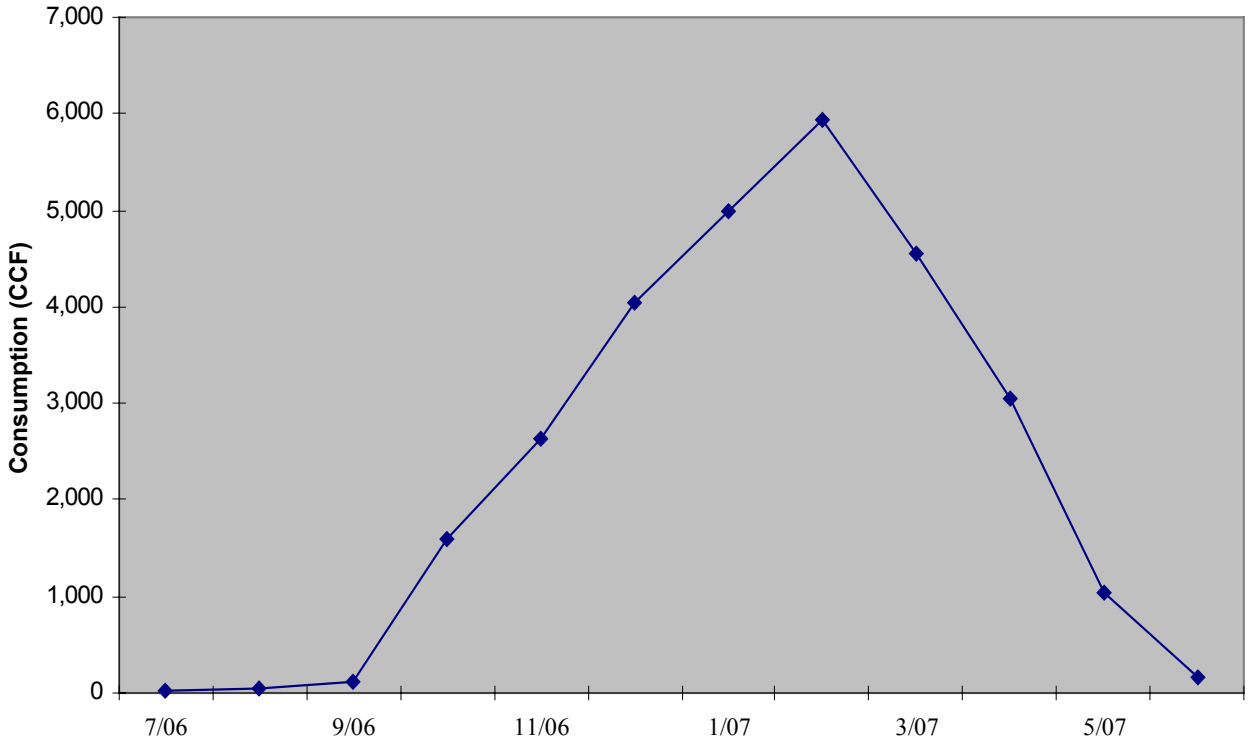


3 Historical Energy Usage and Costs

Table 3-4
Natural Gas Billing Data

Date	Days per Month	Consumption (CCF)	Total Bill
7/06	31	28	$46
8/06	31	48	$77
9/06	30	125	$168
10/06	31	1,599	$1,217
11/06	30	2,636	$3,341
12/06	31	4,039	$5,065
1/07	31	4,997	$5,829
2/07	28	5,927	$7,148
3/07	31	4,546	$5,803
4/07	30	3,059	$3,822
5/07	31	1,035	$1,259
6/07	30	162	$236
Totals	***365***	***28,201***	***$34,011***

Figure 3-3 Natural Gas Usage Profile

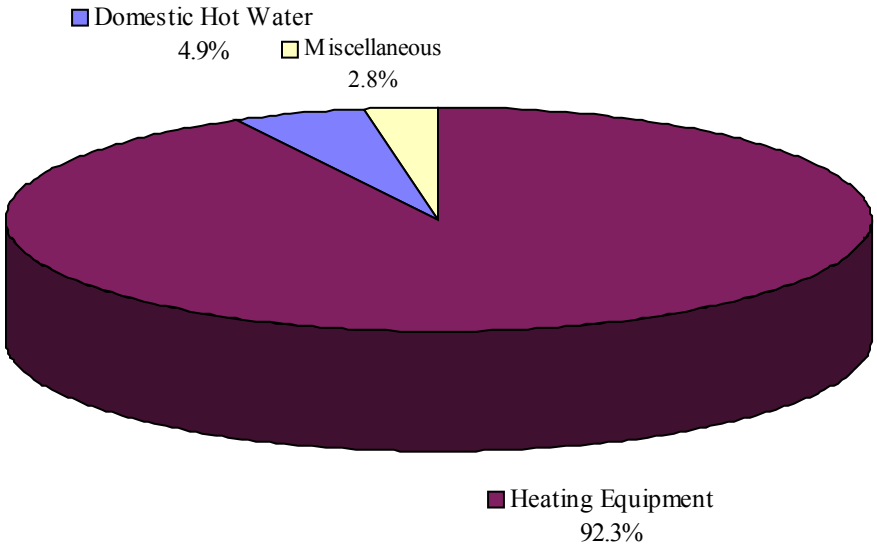


3 Historical Energy Usage and Costs

Table 3-5
Natural Gas End Use

End Use	Percent of Total
Heating Equipment	92.3%
Domestic Hot Water	4.9%
Miscellaneous	2.8%
TOTAL	100%

Figure 3-4
Natural Gas End Use



4 Equipment Inventory

Building Characteristics

Facility Name:	Deer Park Schools John Quincy Adams School
Total Square Footage:	59,508
Building Type:	Elementary School (K-2)

Building Construction						
Description	**Age (yrs)**	**Wall Type**	**Wall Insulation**	**Roof Type**	**Roof Insulation**	**Window Type**
Two Story Elementary School	45	Brick	Minimum	Flat	Minimum	Double Pane

Equipment Inventory

Equipment denoted by an asterisk indicates an estimate of the equipment ratings due to equipment inaccessibility, worn nameplates, or a lack of nameplates. The Miscellaneous Equipment table ends with a column that shows that line's contribution to the total respective fuel bill (electricity, gas, oil, etc.)

Heating Equipment				
Description	**Qty**	**Capacity**	**Fuel**	**Age (yrs)**
Crown Boilers (Hot Water)	5	629 MBH	gas	7

Cooling Equipment			
Description	**Qty**	**Capacity**	**Age (years)**
Office Area	1	2 Tons	10
Office Area	1	1 Tons	10
Office Area	2	1.5 Tons	10
School Year AC units	2	1 Tons	10

4 Equipment Inventory

Ventilation Equipment				
Description	**Qty**	**Capacity**	**Hrs/Wk Winter**	**Hrs/Wk Summer**
Univent Heaters (32 units)	32	0.1 HP	168	168
Kitchen Exhaust	1	0.33 HP	30	30
Rest Rooms	10	0.25 HP	100	100

Domestic Hot Water Systems			
Description	**Qty**	**Capacity**	**Fuel**
90 Gallon	1	300 MBH	gas

Motor Inventory							
Equipment	**Qty**	**HP**	**ODP/ TEFC**	**RPM**	**Usage hrs/day**	**Usage days/wk**	**Estimated Load Factor**
Boiler Water	2	2			8	7	0.8
Circulators	2	5			14	7	0.8
Sump Pump	1	1			1	1	0.8
Air Compressors	2	1.5			12	7	0.8
Burner Motors	5	0.3			3	7	0.8

Miscellaneous Equipment						
Description	**Qty**	**Capacity**	**Fuel**	**Hrs/Wk Usage**	**% Fuel Usage**	**End-Use**
Miscellaneous Load	1	6 kW	elec	60	6.0%	Miscellaneous
Commercial Gas Oven	1	75 MBH	gas	6	0.8%	Miscellaneous
Commercial Gas Range	1	100 MBH	gas	6	1.1%	Miscellaneous
Gas Kettle/Steamer	1	75 MBH	gas	6	0.8%	Miscellaneous
Commercial Freezer	1	3 kW	elec	65	3.2%	Miscellaneous
2 Door Com Refrigerator	1	3 kW	elec	65	3.2%	Miscellaneous
3 Door Commercial Refrigerator	1	4.5 kW	elec	65	4.8%	Miscellaneous
Clothes Dryer	1	6 kW	elec	6	0.6%	Miscellaneous
Clothes Washer	1	0.5 kW	elec	6	0.1%	Miscellaneous
Computers	91	0.15 kW	elec	60	13.6%	Office Equipment
Printers	3	0.2 kW	elec	25	0.3%	Office Equipment

4 Equipment Inventory

Miscellaneous Equipment						
Description	**Qty**	**Capacity**	**Fuel**	**Hrs/Wk Usage**	**% Fuel Usage**	**End-Use**
Copiers	1	0.4 kW	elec	25	0.2%	Office Equipment

The second to the last column of the Miscellaneous Equipment Table shows the percentage of the total fuel usage (electricity, natural gas, or fuel oil) which corresponds with the pie charts on the previous pages. The "Hrs/Wk Usage" column values include the equipment load factor and duty cycling (i.e. an air compressor running at 80% capacity and cycling on 30% of the time during a 60 hour week would have an "Hrs/Wk Usage" value of 60*0.08*0.30 = 14 Hrs/Wk).

Lighting Equipment			
Line #	**Area**	**Description**	**Hrs/Wk Usage**
1	Exits	18 exit sign fixtures, each using LED technology.	168
2	Boiler Room	7 pendant-mounted fixtures, each using 23-Watt, compact fluorescent, screw-in lamps .	30
3	Cafeteria	48 surface-mounted wrap 1X4 fixtures, each using 3,4' T8 lamps and electronic ballasts.	55
4	Kitchen	15 surface-mounted wrap 1X4 fixtures, each using 3,4' T8 lamps and electronic ballasts.	60
5	Stage	8 stage lights fixtures, each using 150-Watt, incandescent "flood" lamps.	4
6	Gym	12 high bay fixtures, each using 400-Watt metal halide lamps.	50
7	Halls	75 recessed lensed 2X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	80
8	Classrooms	336 surface-mounted wrap 1X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	50
9	Restrooms	24 surface-mounted wrap 1X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	50
10	Restrooms	9 round fixtures, each using 75-Watt, incandescent lamps.	50
11	Media Center	6 hi-hat fixtures, each using 65-Watt, incandescent "flood" lamps.	40
12	Media Center	3 hi-hat fixtures, each using 50-Watt, MR-16 low-voltage quartz halogen lamps.	40

4 Equipment Inventory

Lighting Equipment			
Line #	**Area**	**Description**	**Hrs/Wk Usage**
13	Library	20 surface-mounted wrap 1X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	50
14	Exterior Soffit	4 recessed fixtures, each using 100-Watt, incandescent lamps.	
15	Exterior	17 wall-mounted fixtures, each using 100-Watt high pressure sodium lamps.	84
16	Parking	3 pole-mounted fixtures, each using 70-Watt metal halide lamps.	85
17	Parking	2 cobra head fixtures, each using 100-Watt high pressure sodium lamps.	85
18	Principal's Office	6 recessed paracube 2X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	60
19	Offices	6 recessed paracube 2X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	65
20	Copy Room	6 recessed paracube 2X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	50

5 Methodology

The first step in the energy analysis is the site survey. The auditor walks your entire site to inventory the building envelope (roof, windows, etc.), the heating, ventilation, and air conditioning equipment (HVAC), the lighting equipment, other facility-specific equipment, and to gain an understanding of how each facility is used.

The collected data is then processed with a software package from The Daylight Savings Company in Goshen, NY (1-800-337-2192) that calculates the anticipated energy usage. The actual energy usage is entered directly from your utility bills. The anticipated energy usage is compared to the actual usage. If necessary, corrections are made to the site-collected data until the anticipated energy usage matches the actual usage. This process develops an end-use baseline for all of the fuels used at the facility. The baseline is used to calculate the energy savings for the measures that are recommended in this report.

The savings in this report are not duplicative. The savings for each recommendation may actually be higher if the individual recommendations were installed instead of the entire project. For example, the lighting module calculates the change in wattage and multiplies it by the new operating hours instead of the existing operating hours (if there was a change in the hours at all). The lighting controls module calculates the change in hours and multiplies it by the new system wattage instead of the existing wattage. Therefore, if you chose to install the recommended lighting system but not the lighting controls, the savings achieved with the new lighting system would actually be higher because there would have been no reduction in the hours of use.

The same principal follows for heating, cooling, and temperature recommendations - even with fuel switching. If there are recommendations to change the temperature settings to reduce fuel use, then the savings for the heating/cooling equipment recommendations are reduced, as well.

Our thermal module calculates the savings for temperature reductions using ASHRAE's modified bin method. The savings are calculated in "output" values –meaning energy, not fuel savings. To show fuel savings we multiply the energy values times the fuel conversion factor (these factors are different for electricity, natural gas, fuel oil, etc.) and also take into account the heating/cooling equipment efficiency. The temperature recommendation savings are lower when the heating/cooling equipment is more efficient or is using a cheaper fuel. Also, you may see natural gas savings in this report even if you do not currently have natural gas. This happens when fuel switching was recommended for your heating/cooling equipment and you have temperature reduction recommendations, as well.

Thermal recommendations (insulation, windows, pipe insulation etc.) are evaluated by taking the difference in the thermal load due to reduced heat transfer. Again, the "thermal load" is the thermal load after the other recommendations have been accounted for.
Lastly, installation costs are then applied to each recommendation and simple paybacks are calculated. Costs are derived from Means Cost Data, other industry publications, and local contractors and suppliers.

Line # - Area	Action	Material Cost	Labor Cost	Total Cost	Annual Savings	Payback	Rebate Each*	Total Rebate*	Cost After Rebate	Payback After Rebate
6 - Gym	For the existing 12 high bay fixtures, each using 400-Watt metal halide lamps, install new open high-bay fixtures with 4 T5 fluorescent lamps (54 Watt) and electronic ballasts. (New qty: 12)	$2,400	$1,800	$4,200	$1,126	3.7 years	$35	$420	$3,780	3.4 years
10 - Restrooms	For the existing 9 round fixtures, each using 75-Watt, incandescent lamps, retrofit with 18-Watt compact fluorescent screw-in lamps. (New qty: 9)	$162	$45	$207	$232	0.9 years			$207	0.9 years
11 - Media Center	For the existing 6 hi-hat fixtures, each using 65-Watt, incandescent "flood" lamps, retrofit with PAR-Capsylite lamps, 45-Watt. (New qty: 6)	$30	$18	$48	$48	1.0 years			$48	1.0 years

***Important Note**: Rebates are subject to caps, changes and eligibility requirements. In addition, there may be other rebates that apply. Prior to purchasing any equipment you must contact your LIPA representative or the audit program administrator, John Pratnicki, at 631-755-5390 for assistance in the pre-approval process and in determining your potential rebate amount.

Long Island Power Authority – Summary Energy Audit Report for:

Deer Park Schools John Quincy Adams School

Printed: 2/27/08

Audit Date: 2/1/2008

Site:
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172 Old Country Road
Deer Park, NY 11729

LIPA main account number:
724-43-1425--17

Facility contact person: Kirk Gostkowski
Facility contact phone #: 631-274-4080

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Recommendation Highlights:

- Install new lighting products to increase the efficiency of your lighting fixtures.
- Install lighting controls in certain areas of your facility to reduce lighting use during unoccupied periods.
- Modify your temperature setpoints to reduce the energy use associated with heating and/or cooling your facility.
- Install new heating, ventilation, or air conditioning products to reduce the amount of energy required to condition your indoor environment.