Long Island Power Authority

Energy Audit Report

for

Deer Park Schools
May Moore School

January 14, 2008

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Section Page

1 Executive Summary

This report presents the findings of an energy survey conducted on October 3, 2007 by Bill Conn for:

Deer Park Schools May Moore School
239 Central Ave
Deer Park, NY 11729
631-274-4080

Facility contact person: Kirk Gostkowski
LIPA account number(s): 724-60-5700-04
Gas 724-60-5702-02 Gas 724-60-5704-14

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:

Fuel Oil	$2,213
Electricity	$46,627
Natural Gas	$34,385
Total	$83,225

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	$3,780	$1,389	2.7 years	1.7%
Install Lighting Controls			$111	Immediately.	0.1%
Improve Temperature Control			$2,831	Immediately.	3.4%
Totals	**$420**	**$3,780**	**$4,331**	**0.9 years**	**5.2%**

* **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, Stacey Wagner, at (631) 755-5358 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	2.2	7,575	
Install Lighting Controls		736	
Improve Temperature Control			2,380
Totals	**2.2**	**8,312**	**2,380**

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.

Auditor's Comments
The lighting systems were recently upgraded. The most interesting opportunity to consider is replacing the Metal Halide lighting in the gym with T5 High Output fluorescent lighting fixtures. High Output T5 fixtures will be more efficient. In addition, their instant on capability will allow the school to reduce the runtime of the lights.

The cost of a lighting upgrade should be weighed against the expected maintenance expenses on the existing system (relamping, cleaning, repairs) The school should continue to aggressively set back temperatures during unoccupied periods. Maintenance expenses related to keeping heating controls in good working condition are investments in efficiency.

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	**60**	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	**64**	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)	**368**	* 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 Stacey Wagner at (631) 755-5358 or your LIPA representative.

2 Energy Cost Reduction Opportunities

Upgrade the Lighting

Upgrade the Fluorescent Lighting

New fluorescent lamps and ballasts are available as direct replacements for your existing lamps and ballasts. A simple change from the old to the new can provide substantial savings. A typical drop-ceiling layin fixture with four, 4-foot lamps (34 Watt lamps) has a total wattage of about 164 Watts. By using the new lamps and ballasts the total wattage would be about 110 Watts, the light levels would increase by about 15%, and the light quality would increase by 35%.

The new lamps are called T8 lamps and they can fit right into the existing fixtures without any fixture modifications. The lamps are 1" in diameter instead of the 1.5" diameter of the existing T12 lamps. (The number after the "T" indicates the diameter in 8ths of an inch. Hence, T8=8/8 or 1", while T12=12/8 or 1.5".) The reduced surface area allows the use of more costly inside coatings (phosphors). The improved phosphors provide a greatly improved color rendering index (CRI). A T12 typically has a CRI of about 55. A typical T8 has a CRI of about 75.

The new ballasts are called "electronic ballasts" and they, too, can fit right into the existing fixtures without any fixture modifications. The existing ballasts add wattage to the lighting system due to its operating characteristics. An electronic ballast subtracts wattage from the lighting system due to its operating characteristics. In addition, a single electronic ballast can operate one, two, three, or four lamps in a fixture. The existing ballasts can only operate up to two lamps. The electronic ballasts could reduce the amount of ballasts in your facility by half. This can be taken advantage of with "tandem wiring" of ballasts. Instead of using one electronic ballast for every one fixture it is sometimes feasible to use one ballast for every two or more fixtures. The electrician wires a single ballast to operate the lamps in adjacent light fixtures which further reduces the amount of ballasts needed.

Although the T8 lamps and the electronic ballasts can fit into your existing fixtures, it is sometimes recommended to replace the fixtures. The reflective surfaces degrade over time and as they reach the end of their useful life it becomes more practical to install new fixtures, especially since modern fixture designs are much more efficient - meaning they are more effective at getting the light "out" of the fixture.

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.

2 Energy Cost Reduction Opportunities

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.

Upgrade the Lighting - Details

Line # - Area	Action	Cost and Savings
1 - 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: $1,389 Payback: 2.7 years.

Total Fixtures	
Unaffected Qty:	615
Affected Qty:	12
Total Existing Qty:	627

Totals	
Potential Rebate:	$420
Cost After Rebate:	$3,780
Annual Savings:	$1,389
Payback:	2.7 years

3 Historical Energy Usage and Costs

Table 3-2 and Figure 3-1 represents the electrical energy usage for the surveyed building from Jan-07 to Jan-08. 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 Jan-07 to Jan-08. Gas is supplied by Keyspan. The annual usage and cost are 28,912 CCF and $34,385, respectively. This yields an average cost $1.18930 / CCF.

3 Historical Energy Usage and Costs

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.

Annual oil usage is 1,000 gallons at an annual cost of $2,213. Average cost per gallon is $2.21.

Table 3-2
Electricity Billing Data

Month of Use	Days in Month	Consumption kWh	Peak Demand		Total Bill
			Actual	Billed	
01/07	31	23,040	75.0	75.0	$3,999
02/07	28	24,360	77.0	77.0	$4,045
03/07	31	22,320	78.0	78.0	$3,749
04/07	30	23,400	73.0	73.0	$3,967
05/07	31	22,800	77.0	77.0	$3,806
06/07	30	21,960	90.0	90.0	$3,978
07/07	31	19,920	92.5	92.5	$4,184
08/07	31	12,720	65.0	78.5	$2,645
09/07	30	17,640	98.5	98.5	$3,706
10/07	31	22,200	97.0	97.0	$4,117
11/07	30	32,280	89.0	89.0	$5,509
12/07	31	17,640	75.0	79.0	$2,922
Totals	***365***	***260,280***			***$46,627***

Figure 3-1

3 Historical Energy Usage and Costs

Electricity Usage Profile

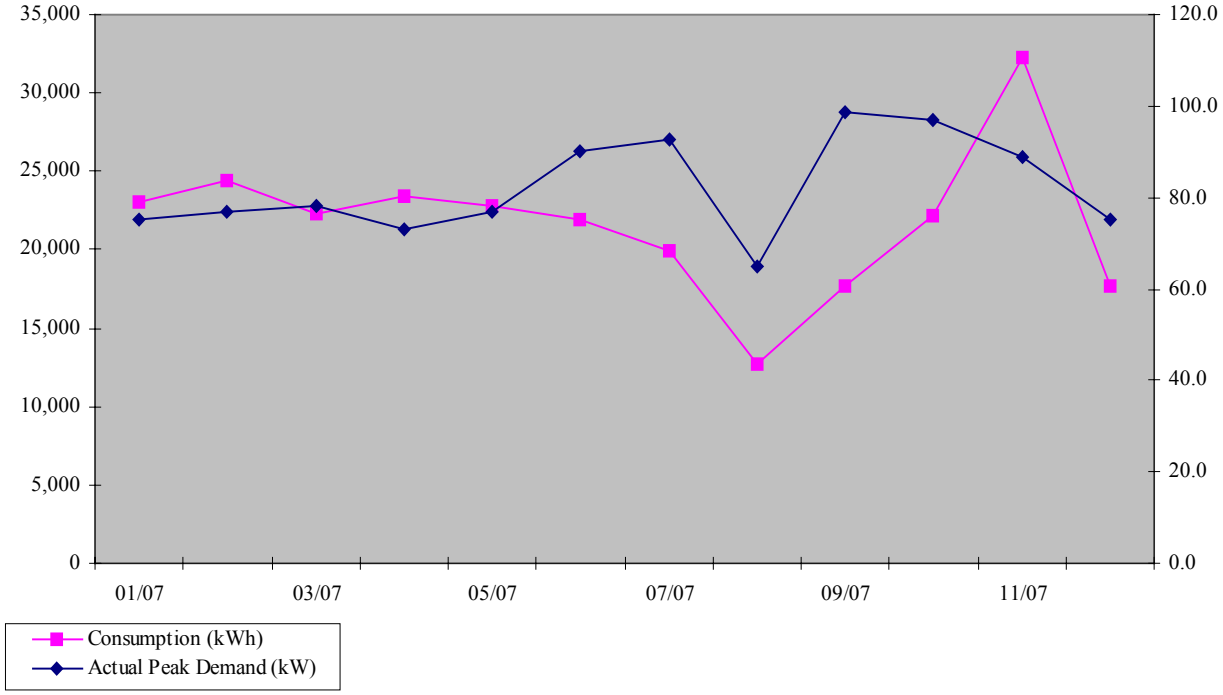
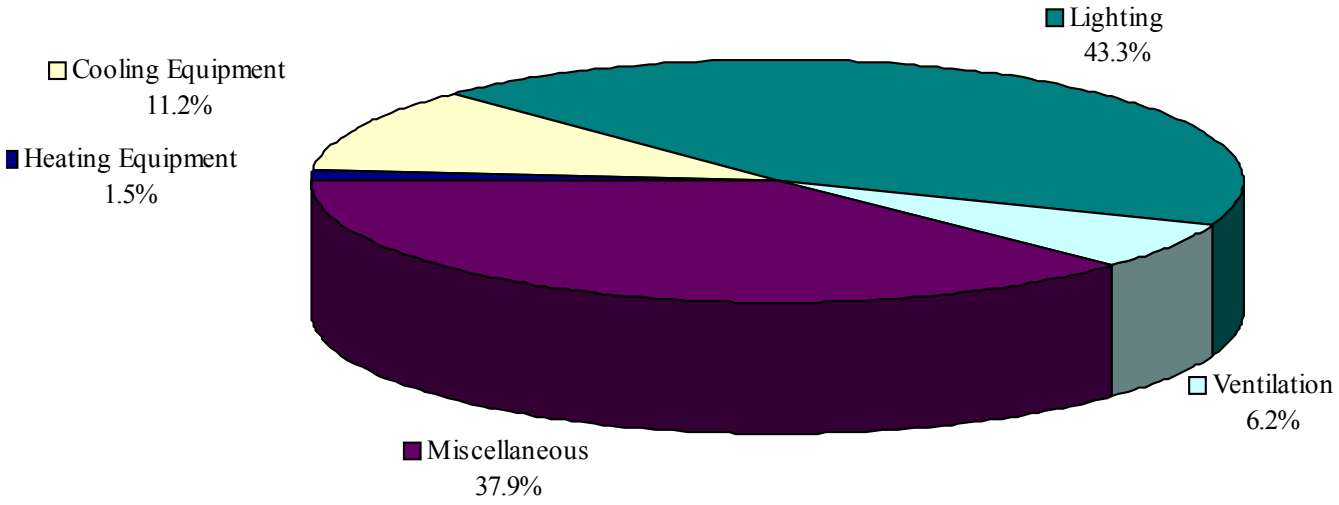


Table 3-3
Electricity End Use

End Use	Percent of Total
Heating Equipment	1.5%
Cooling Equipment	11.2%
Lighting	43.3%
Ventilation	6.2%
Miscellaneous	37.9%
TOTAL	100.0%

Figure 3-2
Electricity End Use

3 Historical Energy Usage and Costs

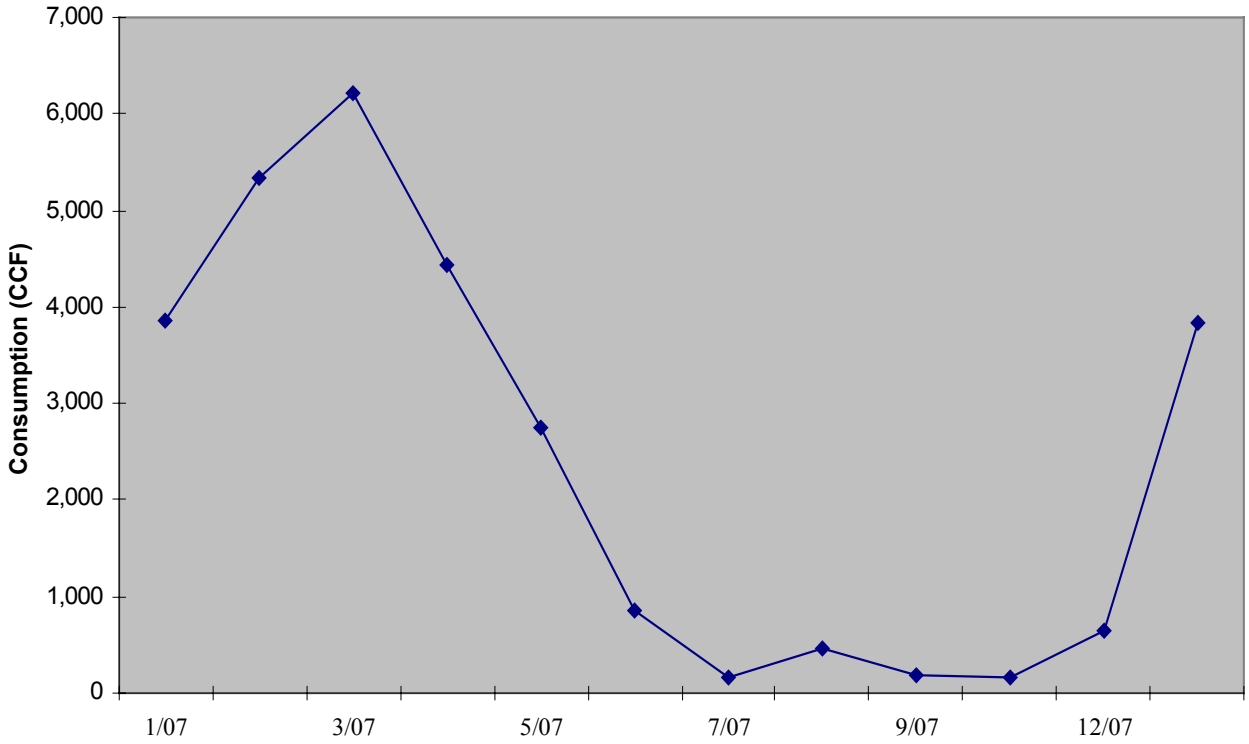


3 Historical Energy Usage and Costs

Table 3-4
Natural Gas Billing Data

Date	Month	Consumption (CCF)	Total Bill
1/07	31	3,864	$4,868
2/07	28	5,331	$6,244
3/07	31	6,220	$7,514
4/07	30	4,438	$5,673
5/07	31	2,747	$3,357
6/07	30	866	$1,099
7/07	31	170	$248
8/07	31	455	$204
9/07	30	189	$91
10/07	31	151	$74
12/07	30	640	$566
1/08	31	3,841	$4,447
Totals	***365***	***28,912***	***$34,385***

Figure 3-3
Natural Gas Usage Profile

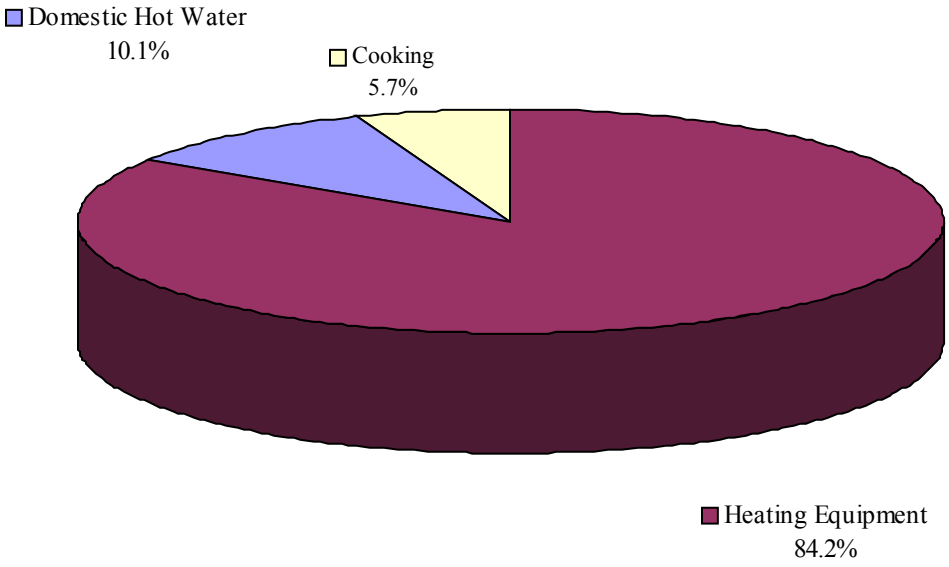


3 Historical Energy Usage and Costs

Table 3-5
Natural Gas End Use

End Use	Percent of Total
Heating Equipment	84.2%
Domestic Hot Water	10.1%
Cooking	5.7%
TOTAL	100%

Figure 3-4
Natural Gas End Use



4 Equipment Inventory

Building Characteristics

Facility Name:	Deer Park Schools May Moore School
Total Square Footage:	55,514
Building Type:	Elementary School

Building Construction						
Description	**Age (yrs)**	**Wall Type**	**Wall Insulation**	**Roof Type**	**Roof Insulation**	**Window Type**
Two Story School	50	Block	Minimal	Flat	Adequate	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)**
Boilers with Power Burners	3	3,270 MBH	gas	20

Cooling Equipment			
Description	**Qty**	**Capacity**	**Age (years)**
Office AC Units	2	1.5 Tons	5
Classroom AC Units	12	2 Tons	5
Library	1	3 Tons	5
Computer Room	1	3 Tons	5

Ventilation Equipment				
Description	**Qty**	**Capacity**	**Hrs/Wk Winter**	**Hrs/Wk Summer**
Kitchen Exhaust	1	0.3 HP	35	20
Rest Room Exhausts	4	0.25 HP	45	35
Gym Air Handler	2	1 HP	45	35

4 Equipment Inventory

Ventilation Equipment				
Description	**Qty**	**Capacity**	**Hrs/Wk Winter**	**Hrs/Wk Summer**
Small Air Handlers	5	0.5 HP	45	35
Perimeter AC Units	35	0.1 HP	65	40

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

Motor Inventory							
Equipment	**Qty**	**HP**	**ODP/ TEFC**	**RPM**	**Usage hrs/day**	**Usage days/wk**	**Estimated Load Factor**
Circulators	1	1.5			12	7	0.8
Circulators	4	0.25			12	7	0.8
Oil Pumps	2	0.25			2	7	0.8
Compressor	2	1			4	7	0.8
Sump Pump	1	1				7	0.8

Miscellaneous Equipment						
Description	**Qty**	**Capacity**	**Fuel**	**Hrs/Wk Usage**	**% Fuel Usage**	**End-Use**
Miscellaneous Load	1	4 kW	elec	50	4.0%	Miscellaneous
Computers	71	0.15 kW	elec	60	12.8%	Miscellaneous
Copier	1	0.3 kW	elec	20	0.1%	Miscellaneous
Printer	1	0.2 kW	elec	25	0.1%	Miscellaneous
Water Cooler	1	0.2 kW	elec	30	0.1%	Miscellaneous
TV Large	15	0.1 kW	elec	15	0.5%	Miscellaneous
Laminating Machine	1	1.8 kW	elec	1	0.0%	Miscellaneous
Elevator	1	15 hp	elec	15	3.4%	Miscellaneous
Bread Warmer	1	1.2 kW	elec	25	0.6%	Miscellaneous
2 Door Commercial Freezer	2	3 kW	elec	45	5.4%	Miscellaneous
2 Door Commercial Refrigerator	2	3 kW	elec	40	4.8%	Miscellaneous
3 Door Commercial Refrigerator	1	4.5 kW	elec	40	3.6%	Miscellaneous

4 Equipment Inventory

Miscellaneous Equipment						
Description	**Qty**	**Capacity**	**Fuel**	**Hrs/Wk Usage**	**% Fuel Usage**	**End-Use**
Gas Range	1	120 MBH	gas	8	1.7%	Cooking
Gas Kettle	1	40 MBH	gas	7	0.5%	Cooking
Gas Ovens	2	100 MBH	gas	8	2.9%	Cooking
Gas Steamer	1	50 MBH	gas	7	0.6%	Cooking
Miscelaneous Kitchen Loads	1	3 kW	elec	40	2.4%	Miscellaneous

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	Gym	12 high bay fixtures, each using 400-Watt metal halide lamps.	70
2	Gym	4 recessed lensed 2X4 fixtures, each using 3, 4' energy-efficient lamps and ballasts.	65
3	Exits	17 exit sign fixtures, each using LED technology.	168
4	Boiler Room	4 surface-mounted open industrial 1X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	30
5	Boiler Room	2 surface-mounted open industrial 1X4 fixtures, each using 1,4' T8 lamp and electronic ballast's.	30
6	Kitchen	12 surface-mounted wrap 1X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	55
7	Cafeteria	19 surface-mounted wrap 1X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	45
8	Offices	10 recessed paracube 2X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	50
9	Library	24 surface-mounted wrap 1X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	45
10	Library	6 hi-hat fixtures, each using 23-Watt, compact fluorescent, screw-in lamps .	45

4 Equipment Inventory

Lighting Equipment			
Line #	**Area**	**Description**	**Hrs/Wk Usage**
11	Classroom Areas	500 surface-mounted wrap 1X4 fixtures, each using 2, 4' T8 lamps and electronic ballasts.	50
23	Exterior Lights	1 hi-hat fixture using 70-Watt high pressure sodium lamps.	85
24	Exterior Lights	16 wall-mounted fixtures, each using 70-Watt high pressure sodium lamps.	85

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
1 - 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	$1,389	3.0 years	$35	$420	$3,780	2.7 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, Stacey Wagner, at 631-755-5358 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 May Moore School

Printed: 1/14/08

Audit Date: 10/3/2007

Site:
Deer Park Schools May Moore School
239 Central Ave
Deer Park, NY 11729

LIPA main account number:
724-60-5700-04

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

Annual Energy Costs:

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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.