

TO: Board of Education, Mount Prospect School District 57

FROM: Seymour M. Schwartz, Director, School Facilities Group (SFG)

DATE: December 17, 2015

SUBJECT: Energy Audit Update

In the last four years District 57 has made significant progress in conserving energy, and improving efficiency, while maintaining a safe and environmentally friendly school environment. The strategy has been to identify operational inefficiencies and physical problems that can be remedied using available grants and high payback expenditures. Development and implementation of this strategy began with SFG's energy audit recommendation presented to the Board in February 2012.

EXECUTIVE SUMMARY:

The district's accomplishments are summarized below:

- Reduced electrical use by 20.1% or avoided \$58,600 in electricity costs
 - If these savings are maintained, based on 2010-11 rates, this represents \$586,000 in savings over the next 10 years.
 - Deferment of large capital expenditures. \$100,000 was budgeted in the capital plan, but not needed, for replacement of two of the four boilers at Lincoln by 2015-16.
 - During boiler tuning (which was funded by a State Grant), dangerous defects in the refractory of the boilers were discovered and repaired. As a result the boilers useful life was extended and efficiency improved.
- Obtained \$146,000 in energy grants
- Enhanced the district's environmentally sustainable operations
 - The district developed and bid a sustainable lawn care and grounds maintenance program which has been in effect for 2 years. It uses no artificial pesticides to control weeds.
 - Energy savings represent major improvements in the amount of greenhouse gases emitted by the district.
 - Improved waste removal contract. The district condensed the number of pick-ups to reduce the waste and recycling contract.
- Improving maintenance procedures
 - The HVAC maintenance contract is pending bid.
 - This will bring about a better scheduled maintenance program.

The next three sections detail the district's accomplishments. References to the 2012 Energy Audit Report are *italicized* and recent actions are **bolded**.

- A. Low Cost and No Cost Recommendations with Action Taken in the Last Four Years
- B. Grants Received
- C. Electricity Savings 2010-11 Versus 2014-15

A. Low Cost and No Cost Recommendations

1. Schedule Energy Use *Most HVAC equipment and lighting should operate only when needed. The HVAC system should automatically shut down or reset to a lower setting at the end of the school day, and at all unoccupied times, such as vacations and weekends. When needed for after school activities or special events, equipment can be scheduled "on", via the building automation system, for a limited and defined period of time. Scheduling should be done daily. SFG recommends assigning this task to an existing clerical person, so the head of maintenance can devote his/her time to other, more technical tasks. Finding and training a person who is committed to this goal would result in great benefit to the district. In SFG's opinion, improved HVAC scheduling, is the number one opportunity for energy savings.*

Action taken:

- **This task was assigned jointly to the Building Facility Supervisor at Lincoln and the District Maintenance Coordinator. Because of their direct involvement, they are able to custom schedule all parts of the buildings to turn cooling and ventilation equipment on and off for events such as afterhours Park District usage.**
 - **The operating times for HVAC equipment at all schools has been reduced by tighter scheduling during the normal school day.**
 - **Special events district wide, can be scheduled by the Building Facility Supervisor at Lincoln or the District Maintenance Coordinator to closely follow expected start and finish time.**
 - **The system is internet based; therefore, one can remotely change temperature set points, schedule equipment on and off, and receive alarms if temperatures are too warm or cold. Being able to monitor HVAC equipment run time, space, water and air temperatures, valve and damper positions, and other key data inputs, provides a huge money saving benefit to the district. Understanding data from the Building Automation System, allows one to make more quick and accurate diagnosis of problems which will benefit the district by reducing time and money spent on repairs. The closer the system is monitored, the more the district will reduce energy use and repair bills.**
 - **Most of the district energy savings, documented in this report are derived from the Building Automation System and the efforts of the maintenance/custodial staff.**
2. Adjust Waste Hauling Contract *The total cost of the contract, to remove recyclables, and non-recyclable refuse is more than \$17,700. SFG believes that the contract cost can be reduced to under \$10,000. Charges for waste removal are based on the number of pickups and the size of the container. Dumpster size and pickup frequency for non-recyclable refuse can be reduced, since recyclable waste, should exceed refuse, in schools. Still, according to the contract, (see Appendix 2), refuse dumpsters are larger and picked up more often than recyclables. The cost of*

refuse disposal by itself is more than \$13,700 per year. SFG looked in the dumpsters on many occasions to verify the quantity of refuse and recyclables. Additional savings can be achieved by having a separate summer time pick up schedule. Recycling should not jeopardize proper sanitation standards and pest control management.

Action taken:

- **Since 2012, waste pick-up costs were reduced. The savings were significant but not as great as anticipated due to limitations mandated by the contractor.**
 - **Currently, District 57 is bidding with District 214.**
3. Lighting Retrofits *Replace or retrofit existing incandescent and obsolete fluorescent light fixtures, at Westbrook and Lincoln. Install high efficiency fluorescent fixtures. SFG estimates that these changes would save 30 to 50% of the energy used for lighting in these spaces.*

Action taken:

- **Completed in 2013. Energy use was significantly reduced especially at Lincoln.**
 - **The district received grants in the amount of \$55,371 and \$8,637.**
4. Spot Market Or Fixed Energy Procurement *Well in advance of the automatic roll-over date, review existing gas and electricity contracts. Based upon market and budget considerations, evaluate whether a spot market, (price changes each month), or fixed cost, (price is the same each month); strategy is most advantageous to the district. Include the administration building and the maintenance building in the contract.*

Action taken:

- **The district continues to have a contract with the Illinois Energy Consortium for electricity and natural gas which strives to reduce the supply cost of energy.**
 - **District locked in natural gas prices at very low level for the next two and a half years.**
5. Maintain “Green” Habits *Encourage students and staff to continue support of energy conservation, and recycling. Promote good habits such as turning off lights and other devices at the end of the school day. Encourage custodians to conserve energy at night, during the summer and holidays. Turn lights on, only when working in an area. Consider moving custodial carpet extraction which requires low humidity for drying, to the winter or spring vacations. Ensure refuse is properly sorted and handled for recycling.*

Action taken:

- **The district continues to use “Green” custodial products and encourages the custodial staff to reduce energy based upon efficient custodial procedures.**
 - **The district is developing a new custodial handbook.**
 - **The district has adopted sustainable turf management and landscaping practices.**
6. Improve Preventive Maintenance *SFG suggests that all equipment should be cleaned and serviced on a regular basis and a log should be maintained that documents the operating parameters (voltage of motors, for example) of equipment at the time of each visit, and what work was performed. Water for boilers and chillers needs to be treated, and the existing side stream filters installed and regularly changed, to eliminate corrosion and improve efficient heat transfer. CO₂ sensors need to be annually calibrated.*

Action taken:

- **The district is preparing a new RFP for Preventive Maintenance which will improve**

system reliability and efficiency.

- Currently the district uses two different contractors; one to provide software to operate the Building Automation System and one to perform scheduled maintenance and repairs. In the future, an attempt to utilize one contractor will be reviewed to integrate and efficiently manage both the computer based Building Automation System and the maintenance of HVAC equipment.

7. Optimize Building Automation System Controls *SFG recommends that District 57's mechanical engineer and building automation system contractor collaborate to ensure that the control system protocols are optimized for the HVAC system. Examples of protocols to be reviewed are: space temperature setbacks and set ups, lockout schedules for boiler and chiller operation, optimizing chilled water, boiler water, mixed air and water temperatures. Boilers should be tuned every year. Grants are available for boiler tuning.*

Action taken:

- The district has received 100% funding for retro-commissioning at Lincoln, Fairview, and Lions Park. Retro commissioning improves the efficiency of building HVAC operation by identifying improvements that have an 18 month or less payback without major capital investment. Pearson Engineering was contracted to perform the retro-commissioning and analyze how computer controls and other low cost changes could be employed to improve efficiency. The district implemented several high payback/low cost or no cost retro-commissioning recommendations which reduced energy use.
 - The district replaced the antiquated computer control system for much of Lincoln.
 - More than \$21,000 in grants were obtained to tune and inspect all the district boilers.
8. Reduce Plug Load Electricity Usage *In shared spaces, install occupancy sensors to turn off lighting and appropriate plug loads such as vending machines in teachers' lounges. Since most electronic equipment such as: Smart Boards, TVs and computers, use electricity even when "off", this equipment should be disconnected during vacations. Consider eliminating the use of personal appliances such as microwaves, space heaters, refrigerators and coffee makers in classrooms and private offices.*

Action taken:

- The district installed energy saving devices on vending machines.
 - In the future, the district culture needs tweaking to ensure that unused electrical devices are turned off when appropriate.
 - Personal appliances (e.g., space heaters, fans, microwaves, etc.) should be eliminated. However, uncomfortable environmental issues (i.e., excessive heat, cold, drafts, etc.) within some buildings (especially the Administration Building), will make it difficult to remove some personal appliances.
9. Temperature Set Points *Maintain temperatures at 70 degrees in the heating season and 75 degrees in the cooling season in all classrooms and offices. Lower the temperature in gyms to 65 degrees. During unoccupied times, all temperatures should be set-back or set-up appropriately to save energy. SFG's previous experience has shown this to have a significant energy saving impact.*

Action taken:

- All set points for temperature were changed throughout the district to conserve energy. Staff members are still allowed to adjust temperatures between 68 and 75 degrees within individual classrooms.
- Equipment which provides heating, cooling, and ventilation during occupied times has been tuned to operate more precisely. Hence, if school starts at 8:30 a.m. and is over at 3:30 p.m., the system will conform more closely to these hours than in the past.
- The run time of equipment in the occupied mode (i.e., while students are in attendance) was reduced by 30% since 2012.
- SFG and the District Maintenance Coordinator have visited Lions Park to explain the new operating parameters in detail to the entire staff.

10. Set Annual Or Multi-Year Energy Reduction Goals Set the goal for all schools to become “Energy Stars”. Use monthly utility bill data and “Portfolio Manager” to track progress. SFG can help to obtain and use ComEd’s, free, “Energy Insights Online”, which reports half hour and daily energy data. These programs can help the district develop data driven strategies to save money. Communicate environmental and energy reduction progress to students, staff, parents and the community.

Action taken:

- **SFG and administration have had discussions to increase its awareness to:**
 - fund high pay-back/low cost, energy improvement projects within budget parameters,
 - make data driven decisions which will improve efficiency on a daily basis,
 - identify future significant improvements in energy savings and lowering maintenance costs while improving system performance, and
 - reduce natural gas consumption.

11. Replace Damaged Rooftop and Boiler Insulation SFG can assist the district in applying for grants that are available to replace piping insulation.

Action taken:

- **A major re-insulation project was completed in 2014-15 in the boiler rooms and on mechanical piping throughout the district.**

12. Organize District Reference Materials Construction documents, operations and maintenance manuals, as-built drawings, balancing reports, and warrantee information, should be organized and readily available. This will allow engineers and architects to more completely ascertain existing conditions; for example, is piping concealed in a wall to be demolished? Having documents organized and available can reduce costly construction change orders, assist in grant procurement, and provide other indirect but significant cost savings.

Action taken:

- **All district documents were organized and a database was set up. Originals of approximately 100 “blueprints” as well as 50 operations and maintenance manuals and warrantees are now located and safely stored with the District Maintenance Coordinator at the maintenance building.**

13. Check On The Boilers Adjust custodial responsibilities so that the boiler rooms and mechanical rooms are visited at least twice daily. This will provide some advance notice of problems such as leaks, excessive vibration, pump failures, etc. Currently, HVAC equipment is not regularly monitored. SFG recommends improving the illumination in all boiler rooms and mechanical spaces.

Action taken:

- **Illumination was improved and all boilers were tuned.**
- **District received a grant in the amount of \$21,700 to tune all boilers.**
- **Increased awareness of Building Facility Supervisors, District Maintenance Coordinator, and contractors regarding boiler inspections.**

14. Infiltration Heat Losses Entry/exit door weather stripping should be replaced as needed. Fan coil units at doors should be turned off during non-heating months.

Action taken:

- **A complete pictorial study of all doors in the district was completed which serves as a document for exterior door improvements in the future. The document itemizes problems and presents consistent solutions to improve security and energy efficiency and appearance for all district exterior doors. As a result, two major entrance doors and associated glass and framework were replaced at Lincoln last summer. Future replacements to be considered via the district’s Master Facility Plan.**
- **Fan-coil units are scheduled off during warm weather.**
- **Future projects need to address deficiencies (especially at Lincoln and Administration Building) to improve building envelope problems which result in high energy losses, uncomfortable spaces, and lower performance.**

B. Grants Received

Many of the recommendations in this audit are eligible for grants and incentives. All gas and electricity users pay for ComEd’s and Nicor’s, “Energy Efficiency Program”. Twenty-five percent of the tens of millions of dollars in these programs are available to all school districts. Other monies are available from, Illinois Clean Energy, in the form of matching grants for energy conservation projects. SFG can assist the district in getting a generous share of these energy grant funds.

Following are Energy Efficiency Grants that were obtained:

Retro Commissioning at Lincoln	\$25,000
Retro Commissioning at Fairview and Lions Park	\$25,000
Lighting Grant Lincoln	\$55,371
Lighting Grant Lincoln and Westbrook	\$8,637
Boiler Tune Up at All Facilities	\$21,700
Variable Speed Drive at Fairview	\$920
Gas and Electricity Grant at Fairview and Lions Park	\$3,177
Gas Grant at Lincoln	\$6,425
	\$6,425
Estimated Total Value	\$146,230

C. Electricity Savings 2010-11 Versus 2014-15

- Annual electricity use in kilowatt hours (kWh).
- Cost avoidance based on 2010-11 rates.

	<i>A</i>	<i>B</i>	<i>(A-B)/A=% Change</i>	
School	2010-11 Electric kWh	2014-15 Electric kWh	% Savings in kWh	Savings at 2010-11 Electrical Rates
Westbrook	438,483	352,528	19.6	\$10,667
Fairview/Admin	783,588	629,735	19.6	\$14,820
Lions Park	666,684	566,980	15.0	\$11,341
Lincoln	913,645	689,675	24.5	\$21,813
All Schools	2,802,400	2,238,918	20.1%	\$58,641 Savings

Electrical use at Lincoln has been reduced by nearly a quarter, the largest amount of any school. This achievement correlates with the emphasis of the administration to improve the oldest and most heavily used facility. Further work is needed to replace aging mechanical equipment and improve the integrity of the building envelope by upgrading doors, windows, roofs, etc.

Fairview and Lions Park are both more than 20 years old and some HVAC equipment is reaching the end of its useful life. Chillers and building controls will need to be considered for replacement in the future.

The district-wide Building Automation System resides on an outdated software platform that will no longer be supported after 2015. The individual building systems will need replacement beginning in 2016.

Natural Gas:

The district has not been able to achieve any improvements in natural gas usage over the same time period, normalized for weather. Gas comprises of approximately 25%-30% of the total energy cost. Fortunately the price of natural gas, unlike electricity, is at historic lows. In the future, the district seeks to make improvements in reducing natural gas consumption on a par with electrical savings.

Date: February 2, 2012
To: Board of Education, Mount Prospect School District 57
From: Seymour M. Schwartz, Director, School Facilities Group
Subject: School District 57 Energy Audit

EXECUTIVE SUMMARY

Based upon EPA and Department of Energy data, if the other schools in the district can become as efficient as Westbrook School, the District would save \$88,000 annually on energy. This would result in a 26% reduction in the \$350,000 spent annually on gas and electricity. SFG believes that a 26% reduction in energy use is achievable by implementing recommendations contained in the discussion section.

In general, these recommendations include, scheduling of equipment, energy management, preventive maintenance, improving the waste removal contract, replacing inefficient lighting, increasing the awareness of excessive energy usage, and increased scrutiny of contracts.

As an example, SFG found a discrepancy while assembling utility bill data Lincoln School. This resulted in a credit of \$4,045.27 to the district for overcharges.

SFG has identified Department of Commerce and Economic Opportunity (DCEO) grants available for many of the projects suggested.

DISCUSSION

The main sections of this report are:

- One - Benchmarking
- Two - Low Cost and No Cost Savings Recommendations
- Three - Capital Improvement Recommendations
- Four - Grants
- Appendices
- Proposal Letter

One - Benchmarking School Energy Efficiency

A. Portfolio Manager

Benchmarking provides a baseline for judging current energy efficiency and measuring future changes.

According to EPA and the Department of Energy's, Energy Star "Portfolio Manager", Westbrook School, which is in the 74th percentile is the most efficient school in the district, and is one percentile point short

of a meritorious award. On a scale of 1-100, Lincoln, Lions Park, and Fairview Schools are rated 35th, 37th and 41st percentiles, respectively.

SFG assembled gas and electricity billing information from the 2010-2011 year. See appendix 1. Data was entered into "Portfolio Manager". Each school's rating is representative of all similar elementary and middle schools. Portfolio Manager is the most widely accepted benchmarking tool. This tool is helpful to measure improvements in efficiency and to project resultant cost savings. See Table I.

Table I.

School	2010-11 energy use rating	2010-11 energy cost	Savings at 50 th percentile rating	Savings at 75 th percentile rating
WESTBROOK	74	\$52,856.00	N/A	\$60.00
FAIRVIEW	41	\$82,095.00	\$5,719.00	\$22,366.00
LIONS PARK	37	\$91,800.00	\$9,781.00	\$27,658.00
LINCOLN	35	\$121,860.00*	\$15,044.00	\$38,333.00
ALL SCHOOLS		\$348,611.00	\$30,544.00	\$88,417.00

* Due to a billing error, the total cost of energy at Lincoln School for 2010-2011, should be reduced by \$2,776.17 to \$119,083.83.

- Table I projects savings of more than \$88,000 per year if all schools in the district were as efficient as Westbrook School.
- Electricity savings have the most impact on the utility bottom line because the district spends three times more on electricity than natural gas.
- The district buys its energy in two forms, therms of natural gas and kilowatt-hours of electricity from the Illinois Energy Consortium (IEC). IEC direct charges make up only a portion of your total energy cost, for example:
 - In addition to IEC's direct charge for natural gas, almost 40% of your total gas bill is composed of additional charges passed through to the district from Nicor, and other taxing bodies.
 - In addition to IEC's direct charge for electricity, almost 60% of your total electricity bill is composed of additional charges passed through to the district from ComEd and other add-ons for transmission, distribution, taxes, etc.
 - A charge is assessed every month to all Comed and Nicor customers for energy efficiency programs. Twenty five percent of this money is returned to school districts in the form of energy grants.

B. HVAC Impact on Energy Use

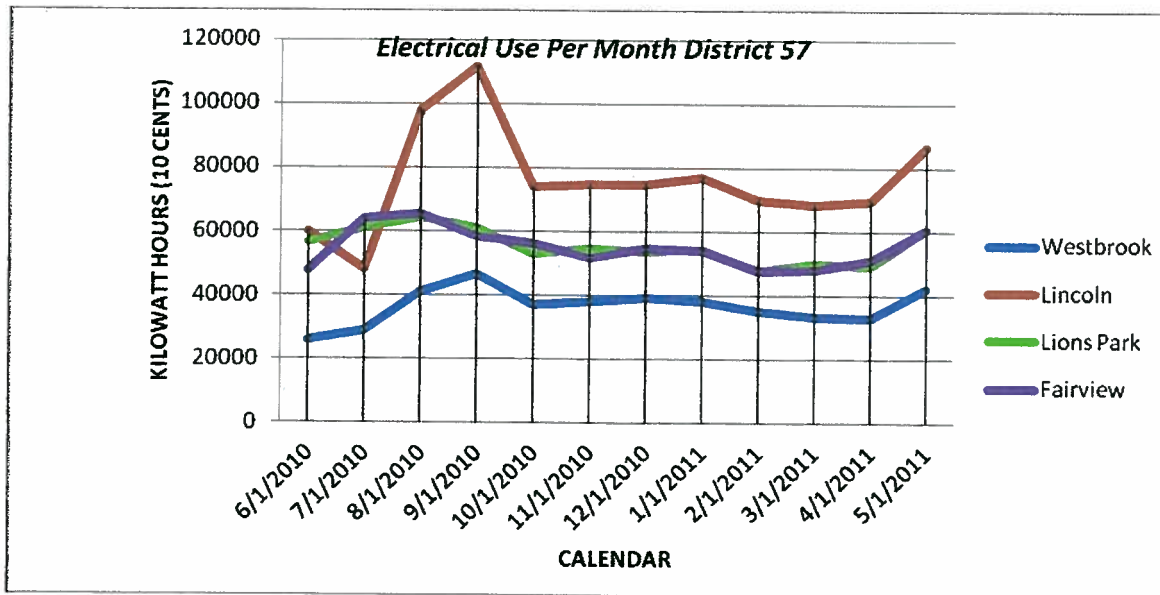
A study by the Energy Information Administration, indicates that in K-12 schools, such as yours, approximately,

- 15% of total energy is used for lighting,
- 15% is used for plug-in loads, such as computers and refrigerators, and,
- 70% is consumed by HVAC and food service systems which provide hot water, heating, ventilation, dehumidification, cooling, temperature control and other related environmental services.
- SFG recommendations emphasize improving HVAC efficiency, which can provide the largest potential benefit.

The graph below illustrates the scale of potential savings resulting from shutting HVAC equipment off.

At Lincoln School (red line), during the summer of 2010, renovation work necessitated a partial shut-down of HVAC systems and electrical usage in July declined to about 50,000 KWh. One month later, when equipment was restarted, consumption had doubled to 100,000 KWh. If Lincoln School had had its equipment shut off in July, and August, savings of \$10,000 could have been realized by the district.

The current four day summer work week which the district has recently adopted, along with other proposed changes in summer school scheduling, should benefit the district.



Most of the work described in this audit is at Lincoln School, which is the oldest and largest school. Westbrook School, which underwent recent improvements, as a result, is the most efficient. Fairview School and Lions Park School, despite their modern appearance, are more than 15 years old, and are beginning to approach the time when HVAC equipment and other systems, will need major overhaul or replacement. The administration building needs major renovation of almost all systems to achieve comfort and efficiency.

Two - Low Cost and No Cost Savings Recommendations

1. **Schedule energy use.** Most HVAC equipment and lighting should operate only when needed. The HVAC system should automatically shut down or reset to a lower setting at the end of the school day, and at all unoccupied times, such as vacations and weekends. When needed for after school activities or special events, equipment can be scheduled “on”, via the building automation system, for a limited and defined period of time. Scheduling should be done daily. SFG recommends assigning this task to an existing clerical person, so the head of maintenance can devote his/her time to other, more technical tasks. Finding and training a person who is committed to this goal would result in great benefit to the district. In SFG’s opinion, improved HVAC scheduling, is the number one opportunity for energy savings.
2. **Adjust waste hauling contract.** The total cost of the contract, to remove recyclables, and non-recyclable refuse is more than \$17,700. SFG believes that the contract cost can be reduced to under \$10,000. Charges for waste removal are based on the number of pickups and the size of the container. Dumpster size and pickup frequency for non-recyclable refuse can be reduced, since recyclable waste, should exceed refuse, in schools. Still, according to the contract, (see Appendix 2), refuse dumpsters are larger and picked up more often than recyclables. The cost of refuse disposal by itself is more than \$13,700 per year. SFG looked in the dumpsters on many occasions to verify the quantity of refuse and recyclables. Additional savings can be achieved by having a separate summer time pick up schedule. Recycling should not jeopardize proper sanitation standards and pest control management.
3. **Lighting retrofits.** Replace or retrofit existing incandescent and obsolete fluorescent light fixtures, at Westbrook and Lincoln Schools. Install high efficiency fluorescent fixtures. SFG estimates that these changes would save 30 to 50% of the energy used for lighting in these spaces.
4. **Spot market or fixed energy procurement.** Well in advance of the automatic roll-over date, review existing gas and electricity contracts. Based upon market and budget considerations, evaluate whether a spot market, (price changes each month), or fixed cost, (price is the same each month), strategy is most advantageous to the district. Include the administration building and the maintenance building in the contract.
5. **Maintain “green” habits.** Encourage students and staff to continue support of energy conservation, and recycling. Promote good habits such as turning off lights and other devices at the end of the school day. Encourage custodians to conserve energy at night, during the summer and holidays. Turn lights on, only when working in an area. Consider moving custodial carpet extraction which requires low humidity for drying, to the winter or spring vacations. Ensure refuse is properly sorted and handled for recycling.
6. **Improve preventive maintenance.** SFG suggests that all equipment should be cleaned and serviced on a regular basis and a log should be maintained that documents the operating parameters (voltage of motors, for example) of equipment at the time of each visit, and what work was performed. Water for boilers and chillers needs to be treated, and the existing side

stream filters installed and regularly changed, to eliminate corrosion and improve efficient heat transfer. CO₂ sensors need to be annually calibrated.

7. **Optimize building automation system controls.** SFG recommends that District 57's mechanical engineer and building automation system contractor collaborate to ensure that the control system protocols are optimized for the HVAC system. Examples of protocols to be reviewed are: space temperature setbacks and set ups, lockout schedules for boiler and chiller operation, optimizing chilled water, boiler water, mixed air and water temperatures. Boilers should be tuned every year. Grants are available for boiler tuning.
8. **Reduce plug load electricity usage.** In shared spaces, install occupancy sensors to turn off lighting and appropriate plug loads such as vending machines in teachers' lounges. Since most electronic equipment such as: Smart Boards, TVs and computers, use electricity even when "off", this equipment should be disconnected during vacations. Consider eliminating the use of personal appliances such as microwaves, space heaters, refrigerators and coffee makers in classrooms and private offices.
9. **Temperature set points.** Maintain temperatures at 70 degrees in the heating season and 75 degrees in the cooling season in all classrooms and offices. Lower the temperature in gyms to 65 degrees. During unoccupied times, all temperatures should be set-back, or set-up, appropriately, to save energy. SFG's previous experience has shown this to have a significant energy saving impact.
10. **Set annual or multi-year energy reduction goals.** Set the goal for all schools to become "Energy Stars". Use monthly utility bill data and "Portfolio Manager" to track progress. SFG can help to obtain and use ComEd's, free, "Energy Insights Online", which reports half hour and daily energy data. These programs can help the district develop data driven strategies to save money. Communicate environmental and energy reduction progress to students, staff, parents and the community.
11. **Replace damaged rooftop and boiler insulation.** SFG can assist the district in applying for grants that are available to replace piping insulation.
12. **Organize district reference materials:** Construction documents, operations and maintenance manuals, as-built drawings, balancing reports, and warrantee information, should be organized and readily available. This will allow engineers and architects to more completely ascertain existing conditions; for example, is piping concealed in a wall to be demolished? Having documents organized and available can reduce costly construction change orders, assist in grant procurement, and provide other indirect but significant cost savings.
13. **Check on the boilers.** Adjust custodial responsibilities so that the boiler rooms and mechanical rooms are visited at least twice daily. This will provide some advance notice of problems such as leaks, excessive vibration, pump failures, etc. Currently, HVAC equipment is not regularly monitored. SFG recommends improving the illumination in all boiler rooms and mechanical spaces.

14. **Infiltration heat losses.** Entry/exit door weather stripping should be replaced as needed. Fan coil units at doors should be turned off during non-heating months.

Three - Capital Improvement Recommendations

Based on the Green Associates, "Master Facility Plan", SFG suggests these projects have the greatest energy and money saving potential:

1. Boiler and pump replacement at Lincoln 100 building.
2. Replace the library air handling unit at Lincoln.
3. Replace the music wing roof top unit at Lincoln.
4. Replace the lobby roof top unit at Lincoln.
5. Replace the west gym, Busse gym and girls' locker room air handling units at Lincoln.

SFG suggests considering the following additional work at each school, unless noted otherwise:

1. Control operation of all air handlers in multipurpose rooms and gyms with CO₂ sensors, occupancy sensors, and install variable speed motor drives and high efficiency motors. Energy will be saved by precisely matching energy use to the actual load.
2. Replace boiler burner mechanical linkages with direct digital control of air and fuel mixtures. Doing so will improve safety, increase efficiency and provide data on combustion gases and allow for continuous boiler tuning.
3. At Fairview and Lions Park Schools, provide a separate DX cooling unit for the air handler which supplies the office area. During the summer, this will permit the shut down of the chiller plant serving the rest of the school.
4. Install variable speed drives and high efficiency motors for chillers and air handling units.
5. Inspect the operation of the Lincoln School office HVAC system. During the summer the system produced cool but high humidity conditions.
6. Retro-commission the entire HVAC plant; balance air and water flow, and reduce fan and pump horsepower.
7. Many systems of the Administration Building are well past their useful life. Develop a strategic plan for major improvements.
8. Develop a medium term plan for replacement of chillers.

Four - Grants

Many of the recommendations in this audit are eligible for grants and incentives. All gas and electricity users pay for ComEd's and Nicor's, "Energy Efficiency Program". Twenty-five percent of the tens of millions of dollars in these programs are available to all school districts. Other monies are available from, Illinois Clean Energy, in the form of matching grants for energy conservation projects. SFG can assist the district in getting a generous share of these energy grant funds.

Appendix 1

Lions Park School 2010-2011 Electricity Spreadsheet

Lincoln School 2010-2011 Gas Spreadsheet

District 57

Lions Park

2010-11 Electricity Data

School Facilities Group

LIONS PARK ELECTRICITY	Date	Meters A= 141515859	District 57		Total		IEC		Total Demand		Previous Month		Comed		PJM		Total Cost	
			IEC	KWh	KWh Charge	IEC Rate	%	Peak KW	ComEd Charge	with Munic Tax	%	Capacity	%	Total Cost	\$/ kWh			
6/7/2010			56,785	\$ 2,799.12	\$ 0.049	40%	264.9	\$2,402.50	34%	\$1,807.86	26%	\$ 7,009.48	\$0.123					
7/7/2010		A	60,987	\$ 3,009.06	\$ 0.049	47%	231.2	\$1,674.34	26%	\$1,747.86	27%	\$ 6,425.26	\$0.105					
8/5/2010		A	64,388	\$ 3,178.25	\$ 0.049	46%	249.5	\$1,993.67	29%	\$1,750.13	25%	\$ 6,922.05	\$0.108					
9/3/2010		A	60,944	\$ 3,009.86	\$ 0.049	41%	252.6	\$2,346.53	32%	\$1,931.23	27%	\$ 7,287.62	\$0.120					
10/5/2010		A	59,097	\$ 2,619.28	\$ 0.049	39%	265.2	\$2,929.27	35%	\$1,750.18	26%	\$ 6,698.73	\$0.126					
11/3/2010		A	54,772	\$ 2,700.96	\$ 0.049	46%	122.2	\$1,139.47	20%	\$1,991.58	34%	\$ 5,832.01	\$0.106					
12/6/2011		A	53,703	\$ 2,648.82	\$ 0.049	46%	123.9	\$1,154.49	20%	\$1,931.23	34%	\$ 5,734.54	\$0.107					
1/7/2011		A	54,503	\$ 2,687.74	\$ 0.049	47%	122.5	\$1,157.36	20%	\$1,931.23	33%	\$ 5,776.33	\$0.106					
2/8/2011		A	47,823	\$ 2,362.10	\$ 0.049	46%	124.8	\$1,123.32	22%	\$1,689.83	33%	\$ 5,175.25	\$0.108					
3/8/2011		A	49,858	\$ 2,461.32	\$ 0.049	46%	120.1	\$1,109.89	21%	\$1,810.53	34%	\$ 5,375.74	\$0.108					
4/7/2011		A	49,265	\$ 2,432.41	\$ 0.049	38%	241.3	\$2,196.22	34%	\$1,750.18	27%	\$ 6,378.81	\$0.129					
5/6/2011		A	60,651	\$ 3,029.28	\$ 0.050	43%	239.3	\$2,242.22	32%	\$1,721.50	25%	\$ 6,993.00	\$0.115					
Total 2010/11			665,774	\$ 32,932.20		46%		\$20,869.28	27%	\$21,813.34	29%	\$ 75,608.82	\$0.113					

DATE	Pre Month IEC Gas Adjust Therms	Pre Month IEC Gas Adjust Cost	Pre Month IEC Customer Charge	UDE Cost Share	Adjusted IEC Program Therms	Adjusted IEC Program Therms	Adjusted IEC Program Cost	Adjusted IEC Cost	Adjusted IEC Cost/Therm	Nicor Dist Charge	Adjusted Nicor Cost/Therm	Actual Invoice	Corrected Monthly Cost	Cost/Therm	
6/1/2010	15	\$ 6.46	\$20.00	\$9.00	44	18	\$21.94	\$30.03	\$2.16	\$296.52	\$15.78	\$343.92	\$322.92		
7/1/2010	-26	\$ (12.09)	\$20.00	\$9.00	44	23	\$17.59	\$41.23	\$1.79	\$285.14	\$12.40	\$308.57	\$286.37		
8/1/2010	-13	\$ (6.95)	\$20.00	\$9.00	53	69	\$21.41	\$77.05	\$1.12	\$291.58	\$4.23	\$517.19	\$568.63		
9/1/2010	-484	\$ (189.96)	\$20.00	\$9.00	1,681	962	\$89.04	\$389.86	\$0.60	\$350.22	\$0.62	\$826.26	\$890.18		
10/1/2010	-1,059	\$ (373.08)	\$20.00	\$9.00	3,061	2,781	\$143.26	\$1,908.12	\$0.47	\$336.74	\$0.19	\$1,410.40	\$1,945.86		
11/1/2010	564	\$ (183.14)	\$20.00	\$9.00	5,023	5,967	\$194.33	\$2,896.62	\$0.52	\$306.67	\$0.14	\$3,007.93	\$3,709.29		
12/1/2010	894	\$ (265.29)	\$20.00	\$9.00	4,824	5,808	\$234.88	\$2,890.12	\$0.50	\$345.15	\$0.15	\$3,462.94	\$3,735.27		
1/1/2011	-571	\$ (246.73)	\$20.00	\$9.00	5,904	4,793	\$270.33	\$2,483.60	\$0.52	\$733.77	\$0.16	\$4,080.72	\$5,217.37		
2/1/2011	84	\$ (40.41)	\$20.00	\$9.00	3,889	3,973	\$2,058.45	\$2,127.86	\$0.54	\$343.59	\$0.16	\$2,565.49	\$2,771.89		
3/1/2011	405	\$ (197.28)	\$20.00	\$9.00	2,267	2,672	\$1,064.13	\$1,290.41	\$0.48	\$302.75	\$0.19	\$1,768.07	\$1,793.16		
4/1/2011	96	\$ (51.66)	\$20.00	\$9.00	414	510	\$196.53	\$277.19	\$0.54	\$349.09	\$0.69	\$916.56	\$928.28		
5/1/2011	-275	\$ (186.58)	\$20.00	\$106.00	52	52	\$24.17	\$53.17	\$1.02	\$5,027.23	\$0.22	\$81.17	\$81.17	\$0.73	
TOTAL 7/2010 to 6/2011					27,978	26,768	\$13,890.05	\$18,928.18	\$0.52				\$19,499.09	\$19,768.01	
DATE	Pre Month IEC Gas Adjust Therms	Pre Month IEC Gas Adjust Cost	Pre Month IEC Customer Charge	UDE Cost Share	Adjusted IEC Program Therms	Adjusted IEC Program Therms	Adjusted IEC Program Cost	Adjusted IEC Cost	Adjusted IEC Cost/Therm	Nicor Dist Charge	Adjusted Nicor Cost/Therm	Actual Invoice	Corrected Monthly Cost	Cost/Therm	
6/1/2010	-111	\$ (47.82)	\$20.00	\$9.00	44	-41	\$21.94	\$11.41	-\$0.28	\$ 146.10	-\$3.23	\$ 140.230	\$ 143.760		
7/1/2010	-65	\$ (26.53)	\$20.00	\$9.00	101	26	\$49.35	\$47.40	\$1.82	\$ 132.35	\$5.22	\$ 162.170	\$ 163.090		
8/1/2010	-75	\$ (30.56)	\$20.00	\$9.00	977	75	\$388.52	\$38.29	\$1.31	\$ 142.11	\$1.89	\$ 523.260	\$ 240.400		
9/1/2010	-748	\$ (281.05)	\$20.00	\$9.00	1,775	527	\$334.74	\$302.69	\$0.57	\$ 172.69	\$0.39	\$ 987.630	\$ 474.620		
10/1/2010	514	\$ (244.41)	\$20.00	\$9.00	2,502	3,016	\$1,155.17	\$1,428.98	\$0.47	\$ 280.66	\$0.09	\$ 1,086.090	\$ 1,709.240		
11/1/2010	701	\$ (365.83)	\$20.00	\$9.00	3,905	4,606	\$2,005.12	\$2,393.95	\$0.52	\$ 380.11	\$0.08	\$ 2,554.190	\$ 2,744.060		
12/1/2010	994	\$ (514.24)	\$20.00	\$9.00	3,983	4,657	\$2,749.13	\$2,286.37	\$0.50	\$ 845.15	\$0.19	\$ 2,469.070	\$ 3,131.520		
1/1/2011	-696	\$ (420.37)	\$20.00	\$9.00	5,504	4,908	\$2,701.33	\$1,500.28	\$0.55	\$ 278.09	\$0.06	\$ 4,080.720	\$ 2,579.060		
2/1/2011	-347	\$ (166.94)	\$20.00	\$9.00	2,772	2,425	\$1,487.22	\$1,500.28	\$0.55	\$ 288.19	\$0.11	\$ 1,335.940	\$ 1,587.480		
3/1/2011	-169	\$ (82.32)	\$20.00	\$9.00	1,855	1,666	\$661.35	\$808.03	\$0.49	\$ 224.00	\$0.13	\$ 972.960	\$ 1,082.090		
4/1/2011	-168	\$ (80.40)	\$20.00	\$9.00	704	536	\$334.19	\$272.79	\$0.51	\$ 172.43	\$0.32	\$ 465.070	\$ 445.220		
5/1/2011	-402	\$ (204.19)	\$20.00	\$106.00	57	57	\$26.50	\$53.50	\$0.97		\$0.00	\$ 348.530	\$ 35.500		
6/1/2011	-1,677.00	\$ (307.35)	\$20.00	\$216.00	30,877.00	23,768	\$11,892.58	\$11,394.25	\$0.52	\$ 9,187.77	\$0.14	\$ 14,986.20	\$ 14,928.92	\$0.66	
TOTAL 7/2010 to 6/2011					60,956.00	60,956.00	\$29,169.62	\$28,163.48	\$0.52	\$ 9,095.00	\$0.19		\$ 9,768.01	\$ 9,768.01	

Appendix 2

Waste Hauling Purchase Order



Purchase Order

Mount Prospect School District 57

701 West Gregory Street
 Mount Prospect, Illinois 60056
 Phone 847-394-7300
 Fax 847-395-3740

Date: 12/01/2010 Number: 0000110370
 Requested By: Amy McPardlin
 Location :ADMINISTRATION Year: C

Groot Industries
 2500 Landmeier Road
 Elk Grove Village, IL 60007
 Phone: 847-734-6440
 Fax: 847-734-6432

ADMINISTRATION
 701 W. GREGORY ST.
 MOUNT PROSPECT, IL 60056

6.00	Waste Removal and Recycling Services	230020	\$1,477.00	\$8,862.00
0.00	per Bid Agreement with D214 dated 10/07/10	230020	\$0.00	\$0.00
0.00	Annual Cost to District 57 will be \$17,724.00	230020	\$0.00	\$0.00
0.00	Monthly Cost \$1,477.00. Current PO issued	230020	\$0.00	\$0.00
0.00	from 01/03/11 - 06/30/11.	230020	\$0.00	\$0.00
Order Total:				\$8,862.00

PAID
 12/1/10

If you cannot ship on the date specified, please immediately notify the purchasing coordinator of the earliest shipping date. Merchandise shipped by freight or express will be packed, packed, and described so as to obtain the lowest rate possible under freight or express classification. Any substitution or alteration of any kind, or change in the price of merchandise, must receive prior written district approval. Merchandise is accepted subject to our inspection on arrival. Merchandise may be returned to the vendor at our discretion. Material returned on account of inferior quality or workmanship will be returned for full credit plus all shipping charges incurred. You are responsible for compliance with all applicable laws, Federal and local laws. All invoices must be dated to Mt. Prospect Public Schools, 701 W. Gregory St., Mt. Prospect, Illinois 60056. Payment is subject to the School District's Policies as to terms of payment and discounts. All prices appearing on invoices must be F.O.B., Mt. Prospect, IL. Please prepare all express, mail, or shipping charges. School District 57 is exempt from all Federal and State taxes under exemption no. 23007-0200-02.

Authorization Signature: *DL FM*

Date: 12-1-10
[Signature]

District 57 Locations

		Fairview						
Bid #	Qty	Elementary	Unit	Frequency	Monthly			
8-001.	1	Year Round	8 yd-refuse	3x/week 24cy x 52 wks	8-001.\$ 231.00 x 12=	\$ 2772.00	1248	24y
8-002.	1	Year Round	6 yd-recycle	2x/week 12cy x 52 wks	8-002.\$ 82.00 x 12=	\$ 984.00	624	

		Lions Park						
Bid #	Qty	Elementary	Unit	Frequency	Monthly			
9-001.	1	Year Round	8 yd-refuse	3x/week 24cy x 52 wks	9-001.\$ 231.00 x 12=	\$ 2772.00	1248	
9-002.	1	Year Round	6 yd-recycle	2x/week 12cy x 52	9-002.\$ 82.00 x 12=	\$ 984.00	624	

		Lincoln						
Bid #	Qty	Middle School	Unit	Frequency	Monthly			
10-001.	1	Year Round	8 yd-refuse	6x/wk 48cy x 52	10-001.\$ 49.00 x 12=	\$ 5,472.00	2496	
10-002.	1	Year Round	6 yd-recycling	2x/wk 12cy x 52	10-002.\$ 82.00 x 12=	\$ 984.00	624	

		Westbrook						
Bid #	Qty	School	Unit	Frequency	Monthly			
11-001.	1	Year Round	8 yd-refuse	3x/wk 24cy x 52	11-001.\$ 231.00 x 12=	\$ 2,772.00	1248	
11-002.	1	Year Round	6 yd-recycling	2x/wk 12cy x 52	11-002.\$ 82.00 x 12=	\$ 984.00	624	

Annual District 57 total from above \$17,724.00

Cumulative Bid for D214 & D57 \$107,056.00

SCHEDULED, NOT ACTUAL
 TOTAL REFUSE = 6240 cy/yr.
 TOTAL COST = \$13,788
 COST/cy = \$2.21 cy

TOMU recycling = 2496 cy/yr
 COST = \$3936.
 COST per cyd = \$1.58 cy.