



LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT PHASE II

PREPARED FOR:

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Enclosures:

Document 1 – Walnut Street Elementary School Energy Report

Document 2 – Cedar Grove Elementary School Energy Report

Document 3 – Hooper Avenue Elementary School Energy Report

Document 4 – Intermediate North School Energy Report

Document 5 – Silver Bay Elementary School Energy Report

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I. EXECUTIVE SUMMARY

This report presents the findings of the energy audit conducted for:

Entity: Toms River Regional Schools

Facilities: Walnut Street Elementary
Cedar Grove Elementary
Hooper Avenue Elementary
Intermediate North
Silver Bay Elementary

District Contact Person: William J. Doering, Business Administrator
Facility Contact Person: Mark B. Wagner, Facilities Manager
District Architect/Engineer: Chris A. Theodos, P.E. - Maser Consulting
District Energy Specialist: Robert J. Romano

This audit is performed in connection with the New Jersey Clean Energy - Local Government Energy Audit Program for the Toms River School District. The purpose of this analysis is to provide the owner insight into the energy savings potential that exists within the facilities. Energy Efficiency changes and upgrades require support from the building occupants, operations personnel, and the administrators of the building in order to maximize the savings and overall benefit. The efficiency improvement of public buildings provides a benefit for the environment and the residents of New Jersey.

The Energy Conservation Measures (ECMs) identified within the reports represent the potential annual savings at each facility. It is recommended the owner consider all ECMs as part of an initiative to save energy, reduce emissions, and lower operating costs. The owner should review and be familiar with all measures presented in the reports prior to making a decision on which projects to move forward with.

Overall Assessment:

Overall, four of the five elementary schools audited for Toms River Regional Schools are operating more efficient compared to the Source Energy Intensity of 141.4 kBtu/square-foot/year for K-12 schools per the U.S. National Median. The District is also paying an average in cost of energy at \$1.19 per square-foot well below the average costs of \$2.00 per square-foot, which can be attributed partly to the District owned solar systems, and Solar PPA Agreement. The District's current efficiency level is the result of its current energy management practices and limited air conditioning in the elementary schools. The District's inefficiencies are due in part to aging equipment that is nearing or past its useful life expectancy.

On the whole, Concord Engineering recommends the District review and be familiar with all measures presented in each facility report prior to making a decision on which projects to move forward with. This will enable the District to effectively align report recommendations with those outlined in their mid/long range facility plans and financial plans. The District should also review all conventional and unconventional funding options, along with all NJCEP funding opportunities for these projects and determine which options fit their budget most positively in the short and long term. The combination of this information will enable the District to put together an effective Energy Savings Improvement Strategy that maximizes the received benefits of the selected projects. The Installation and Funding Options Section further outlines what programs are potentially available to the owner for funding the project.

Table 1
Combined Energy Efficiency Project

COMBINED POTENTIAL ENERGY EFFICIENCY PROJECT					
FACILITY ENERGY EFFICIENCY PROJECTS	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Walnut Street Elementary School	\$44,910	\$1,315,817	\$12,472	\$1,303,345	29.0
Cedar Grove Elementary School	\$49,445	\$1,782,880	\$29,359	\$1,753,522	35.5
Hooper Avenue Elementary School	\$35,334	\$1,312,942	\$12,235	\$1,300,707	36.8
Intermediate North	\$99,764	\$1,523,230	\$29,798	\$1,493,432	15.0
Silver Bay Elementary School	\$37,310	\$1,033,885	\$36,987	\$996,899	26.7
Total Entity Project	\$266,763	\$6,968,754	\$120,850	\$6,847,904	25.7
Total Entity Energy Costs:			\$688,097		
Est. Total Entity Energy Savings:			\$266,763		
Overall Percent Cost Reduction:			38.8%		

The combined energy efficiency project sums all of the measures outlined for each facility, therefore allowing the owner to see what an aggregate project might look like. The District should be aware that if windows were removed from the overall energy project scope it would reduce the project cost by \$2.2 million, while only reducing the energy cost savings by \$24,000; and result in a new combined project simple payback of 18.8 years. While the window replacement is an expensive capital project the District should consider the additional benefits beyond energy savings it would provide, including reducing costs of major equipment replacement projects such as boilers and air conditioning equipment as new windows would reduce the required capacity of these systems due to improved thermal loss performance.

Other Considerations:*Renewable Energy Conservation Measures:*

Renewable Energy Measures (REMs) were also reviewed for implementation at the Toms River Regional Schools. The District currently has already maximized its solar potential through systems purchased by the district and a Power Purchase Agreement with Hudson Solar, and further solar installations are not recommended at this time. The potential for wind generation was also reviewed for the District; however based on historical wind speed data, make it not a viable option.

Energy Procurement Recommendations:

The District is currently contracted with a third party supplier for electric, Concord Engineering recommends they continue to purchase their electric commodity through a third party supplier once the current contract has expired. Furthermore when entering into a new contract it is important the District aggregates all of their facilities into one contract for electric supply in order to maximize commodity price savings. The district should also be aware that its current solar power purchase agreement and owned solar systems will likely impact pricing for electric from 3rd party suppliers.

Maintenance and Operational Recommendations:

In addition to the ECMs and REMs, there are maintenance and operational measures that can provide significant energy savings and provide immediate benefit, many of which the District are already performing. The ECMs listed above represent investments that can be made to the facility which are justified by the savings seen over time. However, the maintenance items and small operational improvements below are typically achievable with on-site staff or maintenance contractors and in turn have the potential to provide substantial operational savings compared to the costs associated. The following are recommendations which should be considered a priority in achieving an energy efficient building, further recommendations per building are provided in the building reports:

1. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
2. Maintain all weather stripping on windows and doors.

3. Clean all light fixtures to maximize light output.
4. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
5. Verify all control systems are utilizing setback and scheduling capabilities.
6. Remind Staff to turn off Classroom Televisions after use and at the end of the day.
7. The District should consider the installation of advanced power strips in classrooms that can be used to charge tablet and laptop computers in order to reduce the amount of idle power draw from these devices. (Smart Power Strips Model LPG3, Price ~\$30)

II. INTRODUCTION

The comprehensive energy audit covers the following buildings in the Toms River Regional Schools:

ENERGY AUDIT FACILITY SUMMARY		
FACILITY	AREA (SQ-FT)	ADDRESS
Walnut Street Elementary School	87,663	60 Walnut Street Toms River, New Jersey
Cedar Grove Elementary School	113,000	173 Cedar Grove Road Toms River, New Jersey
Hooper Avenue Elementary School	87,663	1517 Hooper Avenue Toms River, New Jersey
Intermediate North	178,332	150 Intermediate N Way Toms River, New Jersey
Silver Bay Elementary School	113,000	100 Silver Bay Road Toms River, New Jersey

This audit is performed in connection with the New Jersey Clean Energy - Local Government Energy Audit Program. The energy audit is conducted to promote the mission of the office of Clean Energy, which is to use innovation and technology to solve energy and environmental problems in a way that improves the State's economy. This can be achieved through the wiser and more efficient use of energy.

Electrical and natural gas utility information is collected and analyzed for one full year's energy use of each building. The utility information allows for analysis of the building's operational characteristics; calculate energy benchmarks for comparison to industry averages, estimated savings potential, and baseline usage/cost to monitor the effectiveness of implemented measures. A computer spreadsheet is used to calculate benchmarks and to graph utility information (see the utility profiles below).

The Energy Use Index (EUI) is established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft²/yr), which is used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting the annual consumption of all energy sources to BTU's and dividing by the area (gross square footage) of the building. Blueprints (where available) are utilized to verify the gross area of the facility. The EUI is a good indicator of the relative potential for energy savings. A low EUI indicates less potential for energy savings, while a high EUI indicates poor building performance therefore a high potential for energy savings.

Existing building architectural and engineering drawings (where available) are utilized for additional background information. The building envelope, lighting systems, HVAC equipment,

and controls information gathered from building drawings allow for a more accurate and detailed review of the building. The information is compared to the energy usage profiles developed from utility data. Through the review of the architectural and engineering drawings a building profile can be defined that documents building age, type, usage, major energy consuming equipment or systems, etc.

The preliminary audit information is gathered in preparation for the site survey. The site survey provides critical information in deciphering where energy is spent and opportunities exist within a facility. The entire site is surveyed to inventory the following to gain an understanding of how each facility operates:

- Building envelope (roof, windows, etc.)
- Heating, ventilation, and air conditioning equipment (HVAC)
- Lighting systems and controls
- Facility-specific equipment

The building site visit is performed to survey all major building components and systems. The site visit includes detailed inspection of energy consuming components. Summary of building occupancy schedules, operating and maintenance practices, and energy management programs provided by the building manager are collected along with the system and components to determine a more accurate impact on energy consumption.

III. METHOD OF ANALYSIS

This audit is consistent with an ASHRAE level 2 audit. The cost and savings for each measure is $\pm 20\%$. The evaluations are based on engineering estimations and industry standard calculation methods. More detailed analyses would require engineering simulation models, hard equipment specifications, and contractor bid pricing.

Post site visit work includes evaluation of the information gathered, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on HVAC, lighting and building envelope improvements. Data collected is processed using energy engineering calculations to anticipate energy usage for each of the proposed energy conservation measures (ECMs). The actual building's energy usage is entered directly from the utility bills provided by the owner. The anticipated energy usage is compared to the historical data to determine energy savings for the proposed ECMs.

It is pertinent to note, that the savings noted in this report are not additive. The savings for each recommendation is calculated as standalone energy conservation measures. Implementation of more than one ECM may in some cases affect the savings of each ECM. The savings may in some cases be relatively higher if an individual ECM is implemented in lieu of multiple recommended ECMs. For example implementing reduced operating schedules for inefficient lighting will result in a greater relative savings. Implementing reduced operating schedules for newly installed efficient lighting will result in a lower relative savings, because there is less energy to be saved.

The project / Entity summary tables are based on the implementation of multiple measures. The analysis is reviewed and determined if the nature of the ECMs will cause a major conflict of the overall savings. When additive measures do not cause a major effect on the overall savings the ECMs are included. Where a major conflict is identified, the combined savings is evaluated appropriately to ensure the overall estimates are $\pm 20\%$.

ECMs are determined by identifying the building's unique properties and deciphering the most beneficial energy saving measures available that meet the specific needs of the facility. The building construction type, function, operational schedule, existing conditions, and foreseen future plans are critical in the evaluation and final recommendations. Energy savings are calculated based on industry standard methods and engineering estimations. Energy consumption is calculated based on manufacturer's cataloged information when new equipment is proposed.

Cost savings are calculated based on the actual historical energy costs for the facility. Installation costs include labor and equipment costs to estimate the full up-front investment required to implement a change. Costs are derived from Means Cost Data, industry publications, and local contractors and equipment suppliers. The NJ Smart Start Building® program incentives savings (where applicable) are included for the appropriate ECM's and subtracted from the installed cost. Maintenance savings are calculated where applicable and added to the energy savings for each ECM. The life-time for each ECM is estimated based on the typical life of the equipment being replaced or altered. The costs and savings are applied and a simple payback, simple lifetime savings, and simple return on investment are calculated. See below for calculation methods:

ECM Calculation Equations:

$$\text{Simple Payback} = \left(\frac{\text{Net Cost}}{\text{Yearly Savings}} \right)$$

$$\text{Simple Lifetime Savings} = (\text{Yearly Savings} \times \text{ECM Lifetime})$$

$$\text{Simple Lifetime Return on Investment (ROI)} = \frac{(\text{Simple Lifetime Savings} - \text{Net Cost})}{\text{Net Cost}}$$

$$\text{Lifetime Maintenance Savings} = (\text{Yearly Maintenance Savings} \times \text{ECM Lifetime})$$

$$\text{Net Present Value} = \sum_{n=0}^N \left(\frac{\text{Cash Flow of Period}_n}{(1 + \text{DR})^n} \right)$$

$$\text{Internal Rate of Return (IRR)} \rightarrow \text{Net Present Value} = 0 = \sum_{n=0}^N \left(\frac{\text{Cash Flow of Period}_n}{(1 + \text{IRR})^n} \right)$$

Net Present Value calculations are based on Discount Rate (DR) of 3%.

IV. HISTORIC ENERGY CONSUMPTION/COST**A. Energy Usage**

The energy usage for the facilities is tabulated and plotted in graph form as depicted within each facility report (see the individual facility energy audit reports for details). Each energy source has been identified and monthly consumption and cost noted per the information provided by the Owner. The electric and natural gas utilities are shown below in Table 2 & 3 for all facilities:

Table 2
Electric Utility Summary

ELECTRIC UTILITY USAGE PER FACILITY			
FACILITY	ANNUAL ELECTRIC UTILITY		
DESCRIPTION	USAGE (KWH)	COST (\$)	AVE RATE (\$/KWH)
Walnut Street Elementary School	482,093	\$77,425	\$0.161
Cedar Grove Elementary School	465,217	\$77,783	\$0.167
Hooper Avenue Elementary School	467,402	\$39,962	\$0.124
Intermediate North	1,847,453	\$158,747	\$0.124
Silver Bay Elementary School	535,344	\$81,788	\$0.153
Total	3,797,509	\$435,705	\$0.115

Note: Total Usage includes onsite solar generated electric, in the instances where the district owns the system they effectively pay \$0/kWh, thus the average electric rate only reflects the utility purchased electric rate.

Table 3
Natural Gas Summary

NATURAL GAS UTILITY USAGE PER FACILITY			
FACILITY	ANNUAL NATURAL GAS UTILITY		
DESCRIPTION	USAGE (THERMS)	COST (\$)	AVE RATE (\$/THERM)
Walnut Street Elementary School	33,873	\$42,171	\$1.24
Cedar Grove Elementary School	42,912	\$52,731	\$1.23
Hooper Avenue Elementary School	31,289	\$38,633	\$1.23
Intermediate North	54,587	\$68,591	\$1.26
Silver Bay Elementary School	41,808	\$50,266	\$1.20
Total	204,470	\$252,392	\$1.23

B. Energy Use Index (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types. The Oak Ridge National Laboratory (ORNL) Buildings Technology Center under a contract with the U.S. Department of Energy maintains a Benchmarking Building Energy Performance Program. The ORNL website determines how a building's energy use compares with similar facilities throughout the U.S. and in a specific region or state.

Source use differs from site usage when comparing a building's energy consumption with the national average. Site energy use is the energy consumed by the building at the building site only. Source energy use includes the site energy use as well as all of the losses to create and distribute the energy to the building. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses, which allows for a complete assessment of energy efficiency in a building. The type of utility purchased has a substantial impact on the source energy use of a building. The EPA has determined that source energy is the most comparable unit for evaluation purposes and overall global impact. Both the site and source EUI ratings for the building are provided to understand and compare the differences in energy use.

The site and source EUI for this facility is calculated as follows:

$$\text{Building Site EUI} = \frac{(\text{Electric Usage in kBtu} + \text{Oil Usage in kBtu})}{\text{Building Square Footage}}$$

$$\text{Building Source EUI} = \frac{(\text{Electric Usage in kBtu} \times \text{SS Ratio} + \text{Oil Usage in kBtu} \times \text{SS Ratio})}{\text{Building Square Footage}}$$

Table 4
Energy Use Index Summary

ENERGY USE INDEX PER FACILITY					
FACILITY	BUILDING AREA	ENERGY USE INDEX		NATIONAL PEER GROUP COMPARISON	PRIMARY FUNCTION
DESCRIPTION	(SF)	SITE (KBTU/SF/YR)	SOURCE (KBTU/SF/YR)	SOURCE (KBTU/SF/YR)	TYPE
Walnut Street Elementary School	87,663	57.4	99.5	141.4	K-12 School
Cedar Grove Elementary School	113,000	52.0	84.0	141.4	K-12 School
Hooper Avenue Elementary School	87,663	53.9	94.6	141.4	K-12 School
Intermediate North	178,332	66.0	143.1	141.4	K-12 School
Silver Bay Elementary School	113,000	53.2	89.6	141.4	K-12 School
Total	579,658	56.5	102.2		

See the Appendix C - Statement of Energy Performance for comparison to other facilities

The chart above depicts the Site and Source Energy for the facilities along with most similar building type National PEER Group Comparison Rating published by Department of Energy in July 2013. The Median Source Energy Use Intensity is the recommended benchmark metric for all buildings, and is the middle value of the national population meaning half the buildings use more energy, and half use less. The reference source for this data comes from the Department of Energy's Commercial Building Energy Consumption Survey (CBECS).

C. EPA Energy Benchmarking System

The United States Environmental Protection Agency (EPA) in an effort to promote energy management has created a system for benchmarking energy use amongst various end users. The benchmarking tool utilized for this analysis is entitled Portfolio Manager. The Portfolio Manager tool allows tracking and assessment of energy consumption via the template forms located on the ENERGY STAR website (www.energystar.gov). The importance of benchmarking for local government municipalities is becoming more important as utility costs continue to increase and emphasis is being placed on carbon reduction, greenhouse gas emissions and other environmental impacts.

Based on information gathered from the ENERGY STAR website, Government agencies spend more than \$10 billion a year on energy to provide public services and meet constituent needs. Furthermore, energy use in commercial buildings and industrial facilities is responsible for more than 50 percent of U.S. carbon dioxide emissions. It is vital that local government municipalities assess facility energy usage, benchmark energy usage utilizing Portfolio Manager, set priorities and goals to lessen energy usage and move forward with priorities and goals.

In accordance with the Local Government Energy Audit Program, an ENERGY STAR account was created for the district to access and monitor the facility's yearly energy usage as it compares to facilities of similar type. The login page for the account can be accessed at the following web address; the username and password are also listed below:

<https://www.energystar.gov/istar/pmpam/index.cfm?fuseaction=login.login>



Note: It is recommended the owner change the account password once the audit process is complete.

The utility bills and other information gathered during the energy audit process are entered into the Portfolio Manager. The following is a summary of the results for the facility:

Table 5
Energy Star Performance Summary

ENERGY STAR PERFORMANCE RATING PER FACILITY			
FACILITY	ENERGY STAR PERFORMANCE RATING		
DESCRIPTION	SCORE	AVERAGE	POTENTIAL CERTIFICATIONS
Walnut Street Elementary School	77	50	Yes
Cedar Grove Elementary School	82	50	Yes
Hooper Avenue Elementary School	74	50	No
Intermediate North	50	50	No
Silver Bay Elementary School	81	50	Yes

See the Appendix C - Statement of Energy Performance for comparative facilities

Score: "N/A" represents facility that could not receive a rating. See Energy Star website for details.

Refer to **Statement of Energy Performance Appendix** for the detailed energy summary for each facility.

V. RENEWABLE/DISTRIBUTED ENERGY MEASURES

Globally, renewable energy has become a priority affecting international and domestic energy policy. The State of New Jersey has taken a proactive approach, and has recently adopted in its Energy Master Plan a goal of 30% renewable energy by 2020. To help reach this goal New Jersey created the Office of Clean Energy under the direction of the Board of Public Utilities and instituted a Renewable Energy Incentive Program to provide additional funding to private and public entities for installing qualified renewable technologies. A renewable energy source can greatly reduce a building's operating expenses while producing clean environmentally friendly energy.

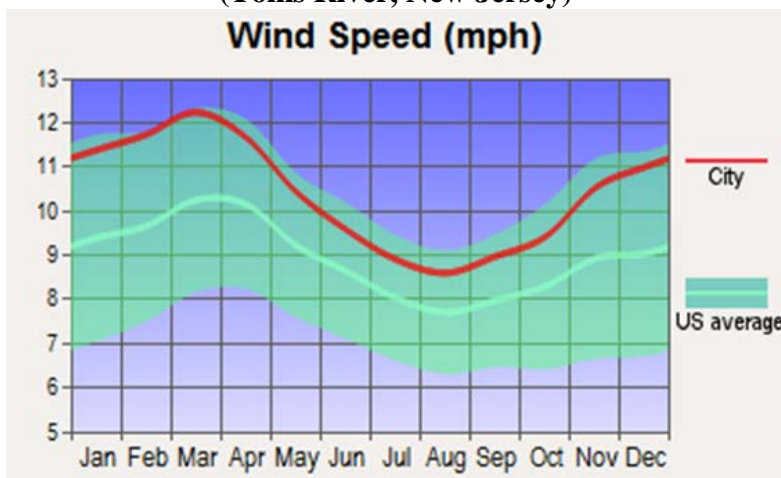
Solar Generation

The District has both purchased solar systems and entered into a Solar Power Purchase Agreement for its schools. The systems were installed on facility roofs. As the District has already maximized its solar potential, Concord does not recommended additional solar at this time.

Wind Generation

In addition to evaluating solar, Concord also conducted a review of the applicability of wind energy for the District. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. Concord investigated the potential for smaller building mountable wind turbines, and horizontal turbines to maximize the available free space. In order to be economically viable a site requires a minimum average wind speed of 6 meters per second (13.5 mph). Based on the obtained wind data shown in **Figure 3** for Toms River the annual average wind speed is 10.4 mph with a peak of 12.25 mph, making this area unattractive for wind development. Therefore, wind energy is not a viable option to implement.

**Figure 3: Monthly Wind Speed
(Toms River, New Jersey)**



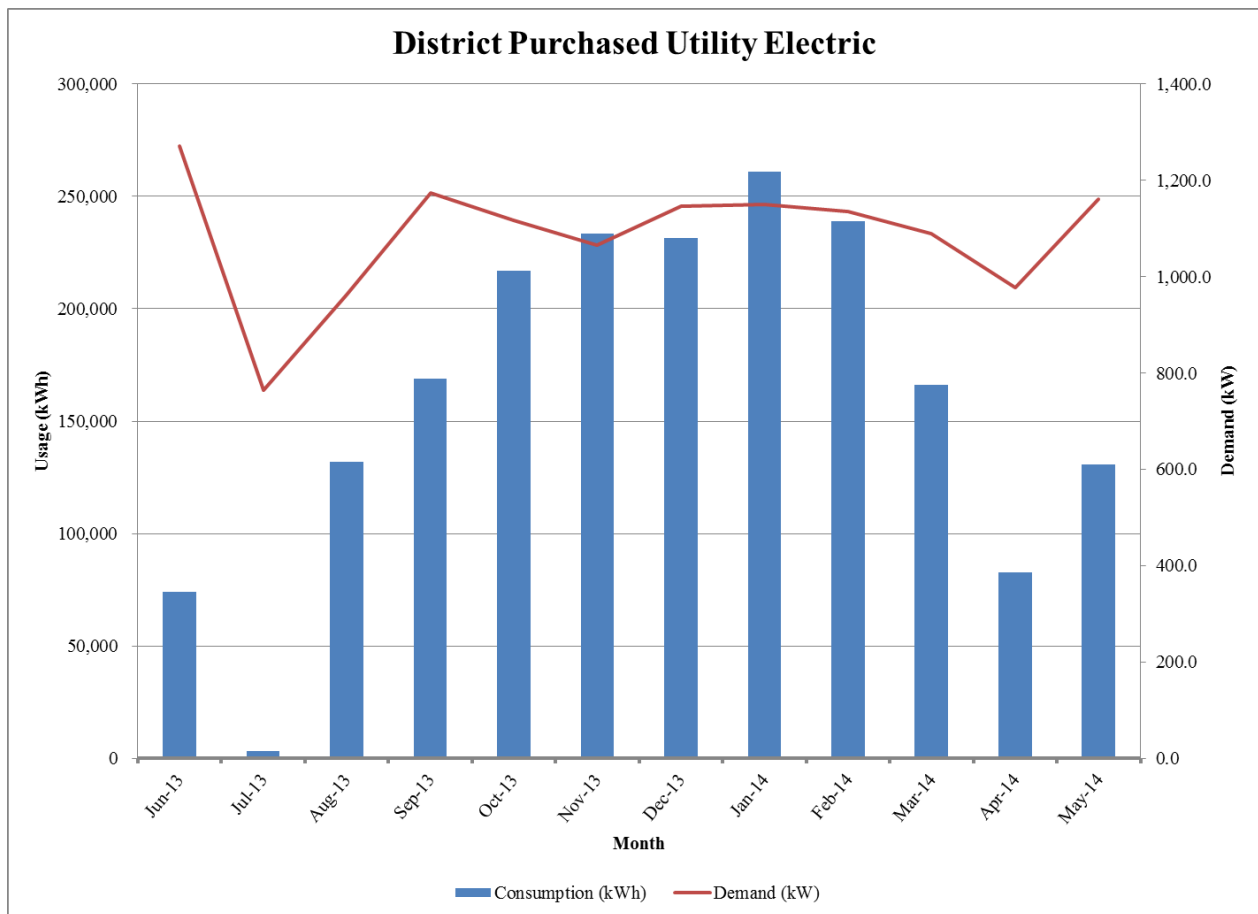
VI. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facilities. Irregularities in the load profile will indicate potential problems within the facilities. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facilities energy consumption data was gathered in table format and plotted in graph form to create the load profile. Refer to The Electric and Natural Gas Usage Profiles included within this report to reference the respective electricity and natural gas usage load profiles.

Electricity:

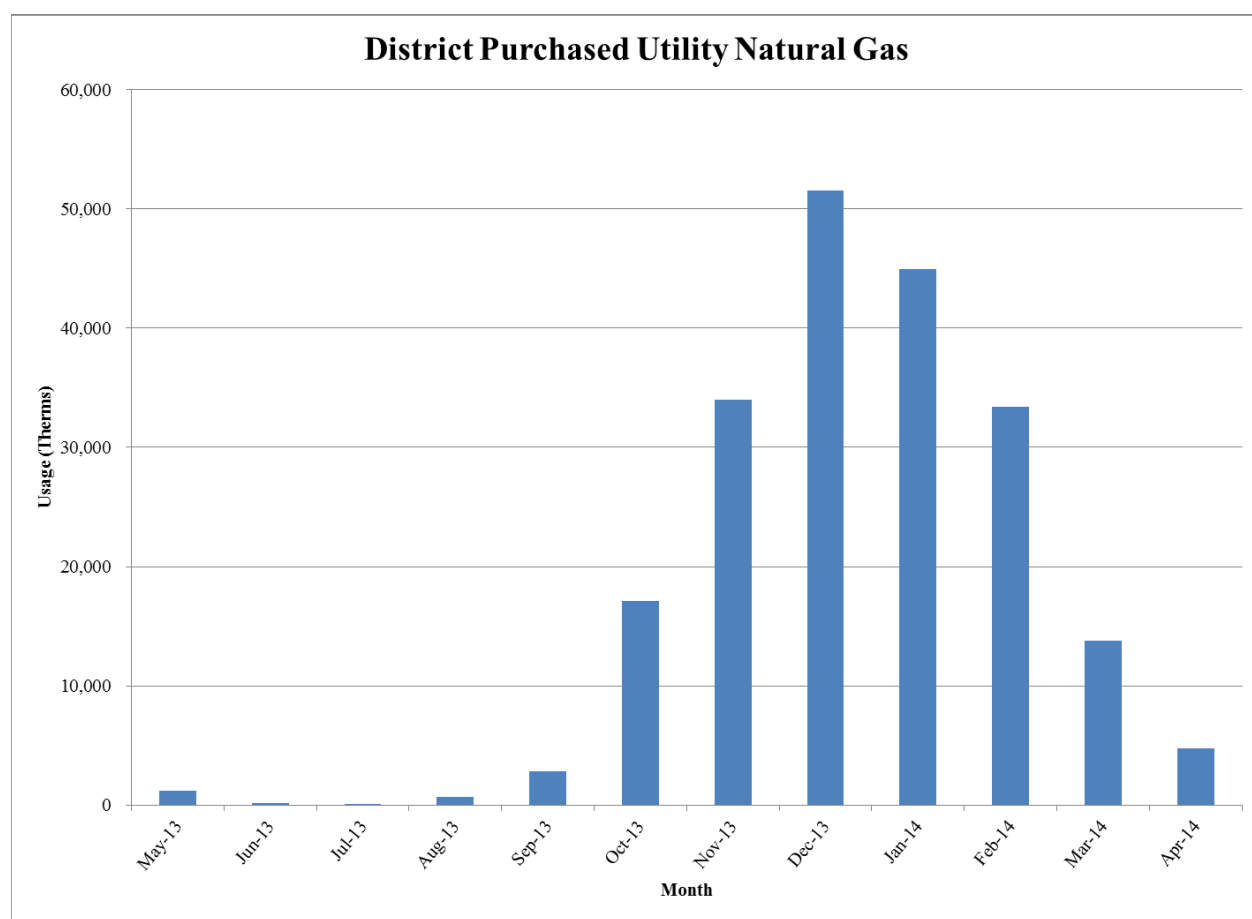
The total utility purchased electric usage profile for the facilities represents a winter dominated load profile with peak consumption occurring during the winter months. This can be attributed to both the schools being lightly used in the summer along with the peak production of the solar system. The figure below depicts the combined consumption and total demand pattern for electricity of the district facilities audited.



While typically winter commodity rates are lower due to reduced demand on the grid, compared with summer the recently cold winter saw rates spike up dramatically due to the sustained below average temperatures. This could result in higher than normal pricing for fixed contracts with higher winter electric demand.

Natural Gas:

The Natural Gas Usage Profile demonstrates a heating load dominated profile, with minimal consumption being contributed by domestic hot water and other gas consumers during the summer. The figure below depicts the total consumption pattern for natural gas of the District facilities audited.



This load profile will yield less than favorable natural gas prices due to the heating dominated profile. Higher winter month consumption will yield higher pricing which will not be offset by the summer month consumption. Nymex commodity pricing is generally higher in the winter months of November – March and lower in the summer months of April – October.

Third Party Supplier (TPS) natural gas commodity contracts that offer a product structure to include a Fixed percentage savings product structure for 100% of the facilities **metered** natural gas requirements is recommended. Several natural gas third party suppliers are offering this product service for end users for a guaranteed savings strategy.

Tariff Analysis:

Electricity:

All the facilities receive electrical service from Jersey Central Power & Light (JCP&L) under commercial rate classifications General Service Secondary 3-Phase. All facilities have contracted a Third Party Supplier (TPS) to provide electric commodity service. Hess/Direct Energy has been contracted however; the contract particulars such as product structure, price, term and conditions were not available for review or comments. In addition to 3rd party supply the District has entered into a Solar Power Purchase Agreement for some of its facilities with Hudson Solar. For electric supply (generation) service, the client has a choice to either use JCP&L's default service rate BGS or contract with a Third Party Supplier (TPS) to supply electricity.

ELECTRIC UTILITY & 3RD PARTY PROVIDERS				
FACILITY	UTILITY		THIRD PARTY	ONSITE SOLAR
DESCRIPTION	PROVIDER	RATE CLASS	PROVIDER	PROVIDER
Walnut Street Elementary School	JCP&L	GS-3P	Hess/Direct Energy	Hudson Solar
Cedar Grove Elementary School	JCP&L	GS-3P	Hess/Direct Energy	Hudson Solar
Hooper Avenue Elementary School	JCP&L	GS-3P	Hess/Direct Energy	District Owned
Intermediate North	JCP&L	GS-3P	Hess/Direct Energy	District Owned
Silver Bay Elementary School	JCP&L	GS-3P	Hess/Direct Energy	Hudson Solar

Each year since 2002, the four New Jersey Electric Distribution Companies (EDCs) - Public Service Gas & Electric Company (PSE&G), Atlantic City Electric Company (ACE), Jersey Central Power & Light Company (JCP&L), and Rockland Electric Company (RECO) - have procured several billion dollars of electric supply to serve their Basic Generation Service (BGS) customers through a statewide auction process held in February.

BGS refers to the service of customers who are not served by a third party supplier or competitive retailer. This service is sometimes known as Standard Offer Service, Default Service, or Provider of Last Resort Service.

The Auction Process has consisted of two auctions that are held concurrently, one for larger customers on an hourly price plan (BGS-CIEP) and one for smaller commercial and residential customers on a fixed-price plan (BGS-FP). This facility's rate structure is based on the fixed-price plan (BGS-FP).

The utility will continue to be responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity or natural gas from. JCP&L's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge (kWh and Demand), Societal Benefits Charge (SBC), and Securitization Transition Charge.

Natural Gas:

The facilities currently receive natural gas distribution service from New Jersey Natural Gas (NJNG) under rate schedules General Service Large (GSL). The facilities have contracted with a Third Party Supplier (TPS), Hess/Direct Energy, to provide natural gas commodity service. The current TPS's provider information was not available and contract particulars such as product structure, price, term and conditions were not available for review or comments. For natural gas supply service, the client has a choice to either use NJNG's default service rate BGSS or contract with a Third Party Supplier (TPS) to supply natural gas commodity service.

NATURAL GAS UTILITY & 3RD PARTY PROVIDERS			
FACILITY	UTILITY		THIRD PARTY
DESCRIPTION	PROVIDER	RATE CLASS	PROVIDER
Walnut Street Elementary School	NJNG	GSL	Hess/Direct Energy
Cedar Grove Elementary School	NJNG	GSL	Hess/Direct Energy
Hooper Avenue Elementary School	NJNG	GSL	Hess/Direct Energy
Intermediate North	NJNG	GSL	Hess/Direct Energy
Silver Bay Elementary School	NJNG	GSL	Hess/Direct Energy

NJNG provides basic gas supply service (BGSS) to customers who choose not to shop from a Third Party Supplier (TPS) for natural gas commodity. The option is essential to protect the reliability of service to consumers as well as protecting consumers if a third party supplier defaults or fails to provide commodity service.

The utilities are responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity or natural gas from. NJNG's delivery service rate includes the following charges: Customer Service Charge, Distribution Charge, & Societal Benefits Charge (SBC).

Electric and Natural Gas Commodities Market Overview:

Winter 2014 proved to be one for the record books. Across the United States, temperatures plunged and states that rarely see snow have been paralyzed by icy conditions. The energy market was not spared. Market rates have been fluctuating wildly, reaching as much as \$1,765 per MWh (\$1.765/kWh) in PJM-West Hub when winter storms swept much of the northern half of the nation in January.

In our region, electricity is produced by natural gas, nuclear, coal and renewables. Much of the recent electricity increases are in relation to very high spot natural gas pricing on generation that produces electricity and the retirement of coal plants. Currently in PJM (PJM is the independent operating system that provides power to Pennsylvania, DC, New Jersey, Delaware and Maryland states) the severe cold in January 2014 led to the temporary lift of the \$1000/MWh cap on electric market based pricing. This cap is lifted thru March 31, 2014. Many natural gas generators were not hedged on natural gas and the natural gas spot market on January 24th reached over \$124.00/dth or \$12.40/therm. Unfortunately, these costs are now being passed on to clients who were not in a fixed price contract.

Commodity pricing in 2008 and winter of 2014 marked historical highs in both natural gas and electricity commodity. Commodity pricing commencing spring of 2014 although higher than previous years continues to be favorable for locking in long term (2-5 year) contracts with 3rd Party Supplier's for both natural gas and electricity supply requirements.

It is important to note that both natural gas and electric commodity market prices are moved by supply and demand, political conditions, market technicals and trader sentiment. The market is continuously changing Energy commodity pricing is also correlated to weather forecasts. Because weather forecasts are dependable only in the short-term, prolonged temperature extremes can really cause extreme price swings.

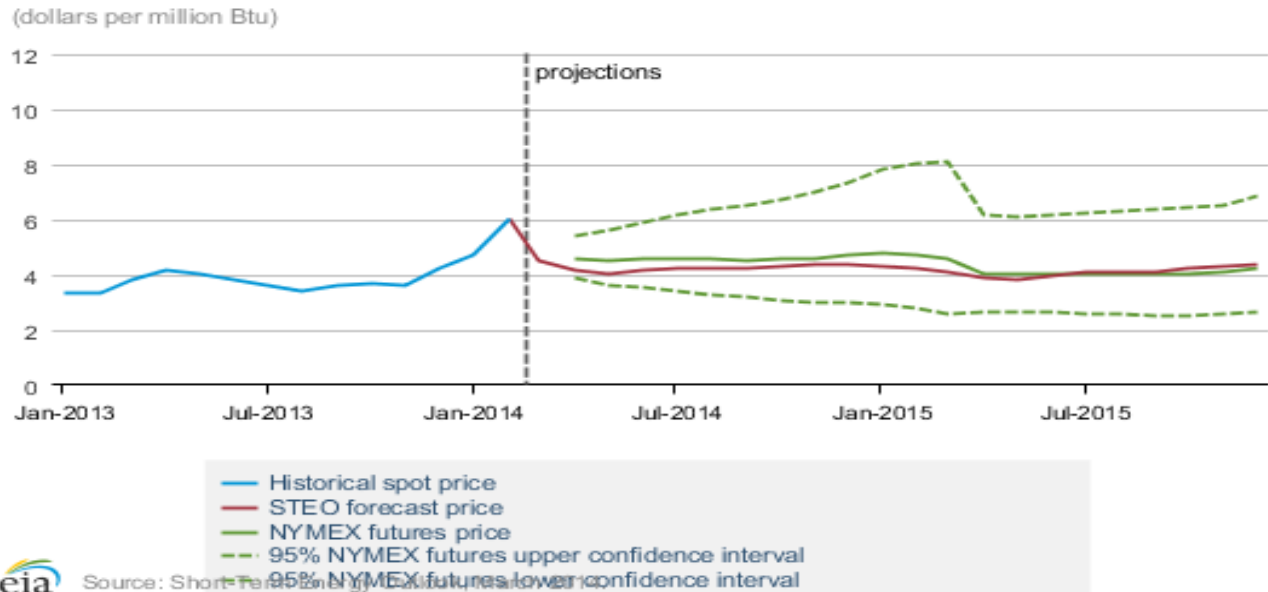
Short Term Energy Outlook - US Energy Information Administration (March/April 2014):

U.S. Natural Gas Prices. Natural gas spot prices averaged \$6.00/MMBtu at the Henry Hub in February, up \$1.29/MMBtu from January, the result of bitterly cold weather during the month. At the end of February, both spot and futures prices declined rapidly, falling below \$5/MMBtu. EIA projects that the March spot price will average \$4.48/MMBtu, and will continue to decline in the spring. Projected Henry Hub natural gas prices average \$4.44/MMBtu in 2014 and \$4.14/MMBtu in 2015.

Natural gas futures prices for June 2014 delivery (for the five-day period ending March 6, 2014) averaged \$4.55/MMBtu. Current options and futures prices imply that market participants place

the lower and upper bounds for the 95% confidence interval for June 2014 contracts at \$3.51/MMBtu and \$5.90/MMBtu, respectively. At this time last year, the natural gas futures contract for June 2013 averaged \$3.61/MMBtu and the corresponding lower and upper limits of the 95% confidence interval were \$2.79/MMBtu and \$4.67/MMBtu.

Henry Hub Natural Gas Price

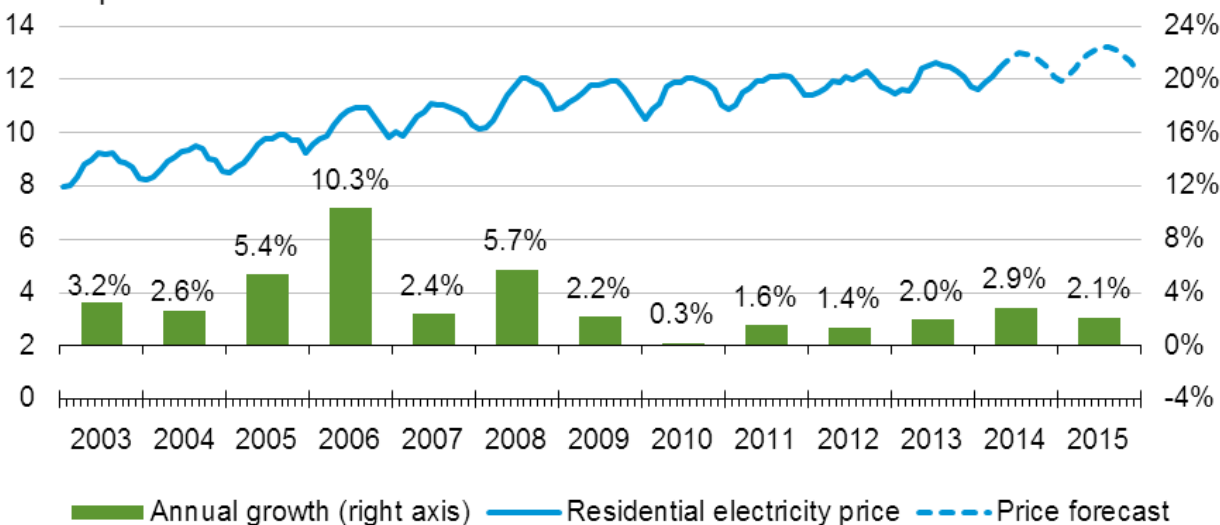


Note: Confidence interval derived from options market information for the 5 trading days ending Mar. 6, 2014. Intervals n

U.S. Electricity Retail Prices. EIA expects the U.S. residential price of electricity to average 12.3 cents per kilowatthour during 2014, an increase of 1.9% from 2013. Residential electricity prices increase 2.0% during 2015.

U.S. Residential Electricity Price

cents per kilowatthour



Source: Short-Term Energy Outlook, May 2014.

Contracting with Third Party Suppliers and BGS Bidding Options

Cooperative Purchasing:

Cooperative Purchasing agreements allow multiple parties to come together under the premise of using purchasing power in order to reduce the price for goods and services. In this instance the Cooperative is under the unified goal of reducing energy prices for its members. As such members of the cooperative pool their respective energy consumption together into a single bid to obtain low cost energy pricing.

Many Cooperatives have a formal bidding process and insure all suppliers provide the required documentation and paperwork necessary per New Jersey Administrative Code and Procurement Law. In addition, a Master Agreement is incorporated into the bid specifications with terms and conditions for the energy supply award protecting Local Government Entities. Concord does not recommend signing any Third Party Supplier contract or agreement unless it has been heavily vetted by an attorney that understands commodity law and regulation. Many government clients that have signed third party supplier contracts are now experiencing regulatory pass-thru charges due to vague or inadvertently agreed terms and conditions.

Important information can be found on DCA's website regarding Cooperative Purchasing. Please visit web link:

http://www.state.nj.us/dca/divisions/dlgs/programs/lpcl_docs/Procuring_Power_Supply_through_a_Cooperative_Purchasing_System.pdf

It is important with any commodity procurement undertaking that you incorporate a rational, defensible strategy for purchasing commodity in volatile markets based upon the following:

- Budgets that reflect sound market intelligence

- An understanding of historical prices and trends
- Awareness of seasonal opportunities (e.g. shoulder months)
- Negotiation of fair contractual terms
- An aggressive, market based price

Bidding Practices and Processes:

Different bid processes and methodologies can create different objectives, but transparency is always a primary goal. Closed bid competitive purchase RFBs, online bid receipt or online reverse auctions can be utilized. Firms which can provide online bidding and reverse auctions are approved by the New Jersey Division of Local Government Services pursuant to the Local Unit Electronic Technology Program, (P.L.2001, c. 30). Approved firms can be found on the website at: <http://www.state.nj.us/dca/divisions/dlgs/programs/lpcl.html>

Over the last decade, Concord has been involved with numerous approaches to bidding including the Traditional Sealed Bid format and Online Reverse Auction methods. In our experience, Online Reverse Auctions do not always produce optimum results for retail commodity purchases. The procurement consultant with the Client should determine a bidding practice that will yield optimum results and create a robust competitive environment. Many factors will come into consideration to determine whether the Online Bidding and/or Reverse Auction method is appropriate. Factors such as annual consumption, number and complexity of accounts, potential supplier participation as well as rate tariffs must be taken into consideration.

LGE's Purchasing Options:

Per DCA's paper entitled "Taking Advantage of Lower Electric Rates for your Government Agency" they state, "First, it is important to emphasize that procurement of power supply *must* be consistent with the Local Public Contracts Law (LPCL) or for boards of education, the Public School Contracts Law (PSCL). Bottom line: When the estimated amount of spending for *power supply* is above the contracting unit's bid threshold, power supply must be publicly bid or purchased subject to an exception to the bid law. "Full text can be found via web link: http://www.state.nj.us/dca/divisions/dlgs/programs/lpcl_docs/Taking_Advantage_of_Lower_Electric_Rates_for_your_Government_Agency.pdf

1. Cooperative Purchasing

"When local governments put aside provincial interests in exchange for the broader benefits to be achieved through Cooperative Purchasing, they can secure the provision and performance of goods and services at a lower cost. Cooperative Purchasing has demonstrated a strong ability to serve as an effective tool to assist local officials save taxpayer dollars. Cooperative Purchasing represents viable alternatives to the conventional "go-it-alone" bidding process. " Many Cooperatives in the state utilize online bidding to secure attractive electricity and natural gas supply service. Utilizing a Cooperative is highly recommended.

Benefits can include:

- Increase staff effectiveness

- Reduce duplication of bidding and contract processing
- Reduce time, effort and costs associated with developing and managing the bid process
- Leverage established and large volume pricing of contracted products
- Great alternative contract option to save time, money and ensure quality products & services

2. Online Reverse Auctions and Online Sealed Bids

“For local government entities, the requirement to bid does not mean the solicitation of quotes; it means a formal process where there is a bid specification, notice to bidders, and a level playing field for all potential bidders. The Division’s E-Procurement Pilot program (authorized under P.L. 2001, c. 30) allows local units to purchase commodities and services, including energy supply, through online bidding and reverse auctions programs approved by the Division. Any online organization participating in the online pilot program must be approved by the Division. Once the Division has approved an online service, any local unit can take advantage of the service. When conducted through an online service, however, the local unit is responsible to ensure that the online service is operating consistent with procurement laws for an individual procurement.”

Both online reverse auctions and online sealed bids can produce significant cost savings results. The process is transparent and seamless. Many platforms are very flexible allowing for full customization to meet the Client’s needs.

All providers of online reverse auction and online bidding charge a fee indirectly to LGE’s. The fee is included in the bid pricing shown by suppliers as a \$/kWh or \$/therm charge and paid directly by the supplier to the vendor. Although LGE’s do not have to formally bid for this type of service should they utilize a DCA pre-approved vendor, we would recommend that any and all fees paid by the supplier to the vendor be disclosed prior to any engagement of services.

An overview of both the Online Reverse Auction vs Sealed bid format was published in the NJBIZ Spring of 2007. To view this article, please go to web link:
<http://www.nbizmag.com/magarticles/sealedbidvsreverseauction.pdf>

Benefits can include:

- Provides full transparency during the procurement process with unbiased decision making
- Drives prices down through real-time competition
- Allows client to actively participate during the entire auction or online bidding process
- Execution of contracts are completed within hours of the auction’s close
- Places the focus for suppliers solely on price, since all other factors and related contracting documentation is received and pre-qualified before the final auction bid due date

- Full audit and archival capabilities to substantiate award decisions
- Improves knowledge capture, transfer and re-use capabilities

3. Traditional Sealed Bid Format

This type of bid format is not endorsed by the Division of Local Government Services for the bidding of power supply. However, in a recent review of bidding methodologies and which methodology would likely to produce lower cost results, a NJ Government Agency allowed suppliers to choose the bidding format. The bidding options allowed were either via an Online Reverse Auction or via a Traditional Sealed Bid. The Agency understood that many suppliers will not participate in an online auction format or methodology and wanted to allow all NJBPU suppliers to participate. The Agency is the 2nd largest Cooperative in the state which includes participants from five Counties and over 200 municipalities. After the online reverse auction bid was closed and the traditional sealed bids opened and reviewed, the Agency awarded the electricity contract to a bidder that was the lowest price and submitted their bid via the Traditional Sealed Bid Format.

The below recommendations presented by Concord Engineering are based on current information provided by the District for their facilities historical energy usage. Any savings presented with these recommendations are estimates only based on that information. It is recommended that further analysis and review of more recent utility data and actual TPS electricity and natural gas supply contracts and historical billings be performed prior to performing any of the presented recommendations.

Recommendations:

1. Concord recommends the District continue its aggregation approach for 3rd party commodity supply procurement strategies for the purchase of electricity and natural gas. Aggregating the usage of all facilities for both electricity and natural gas supply service, allows the District to continue to achieve lower prices in commodity supply costs over the utility default service programs. Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive and contract terms longer than 12 months are desirable. Contracts due to expire in the near term would continue to yield very favorable pricing. It is important to aggregate usage where available and take advantage of these current market prices quickly, before energy increases.
2. After review of the utility consumption report and current commodity pricing outlook, Concord recommends that the District utilize the advisement of a 3rd party unbiased Energy Consulting Firm licensed by the State of New Jersey Board of Public Utilities that is experienced in the procurement of commodities, New Jersey procurement laws, aggregation of facilities and energy supply risk and commodity management. This firm should be able to provide full service advisement over the term of the contract, provide market watch opportunities and identify any additional opportunities that may further

reduce costs. Many of these opportunities may include: energy rates; utility bill auditing; energy data analytics; and efficiency improvements.

It is important that a rational, defensible strategy for purchasing commodity in volatile markets is incorporated. Examples include:

- Budgets that reflect sound market intelligence
- An understanding of utility and market historical prices and trends
- Awareness of seasonal opportunities (e.g. shoulder months)
- Negotiation of fair contractual terms
- An aggressive, market based price

VII. INSTALLATION FUNDING OPTIONS

CEG has reviewed various funding options for the facility owner to utilize in subsidizing the costs for installing the energy conservation measures noted within this report. Below are a few alternative funding methods:

A. Incentive Programs:

Pay for Performance

The New Jersey Smart Start Pay for Performance Existing Buildings Program includes incentives based on savings resulted from implemented ECMs. The program is available for all buildings that were audited as part of the NJ Clean Energy's Local Government Energy Audit Program. The facility's participation in the program is assisted by an approved program partner. An "Energy Reduction Plan" is created with the facility and approved partner to shown at least 15% reduction in the building's current energy use. Multiple energy conservation measures implemented together are applicable toward the total savings of at least 15%. No more than 50% of the total energy savings can result from lighting upgrades / changes.

Total incentive is capped at 50% of the project cost. The program savings is broken down into three benchmarks; Energy Reduction Plan, Project Implementation, and Measurement and Verification. Each step provides additional incentives as the energy reduction project continues. The benchmark incentives are as follows:

1. Energy Reduction Plan – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant \$0.10 per square foot between \$5,000 and \$50,000, and not to exceed 50% of the facility's annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)
2. Project Implementation – Upon installation of the recommended measures along with the "Substantial Completion Construction Report," the incentive will grant savings per KWH or Therm based on the program's rates. Minimum saving must be 15%. (Example \$0.09 / kWh for 15% savings, \$0.10/ kWh for 17% savings, ... and \$0.90 / Therm for 15% savings, \$1.00 / Therm for 17% saving, ...) Increased incentives result from projected savings above 15%.
3. Measurement and Verification – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program's rates. Minimum savings must be 15%. (Example \$0.09 / kWh for 15% savings, \$0.10/ kWh for 17% savings, ... and \$0.90 / Therm for 15% savings, \$1.00 / Therm for 17% saving, ...) Increased incentives result from verified savings above 15%.

Based on the provided data within each facility report and the estimated energy savings of each measure, the following facilities are believed to qualify for the Pay for Performance Program; and using each Facility Project Summary program incentives were estimated.

POTENTIAL FACILITY PAY FOR PERFORMANCE INCENTIVES					
DESCRIPTION	QUALIFY	INCENTIVE #1	INCENTIVE #2	INCENTIVE #3	TOTAL INCENTIVES
Walnut Street Elementary School	Yes	\$4,383	\$31,508.11	\$31,508.11	\$67,399
Cedar Grove Elementary School	Yes	\$5,650	\$33,843.57	\$33,843.57	\$73,337
Hooper Avenue Elementary School	Yes	\$4,383	\$28,233.71	\$28,233.71	\$60,851
Intermediate North	Yes	\$8,917	\$85,609.03	\$85,609.03	\$180,135
Silver Bay Elementary School	Yes	\$5,650	\$26,334.59	\$26,334.59	\$58,319
Total	5				\$440,041

Direct Install Program

The New Jersey Clean Energy's Direct Install Program is a state funded program that targets small commercial and industrial facilities with peak demand of less than 200 kW. This turnkey program is aimed at providing owners a seamless, comprehensive process for analysis, equipment replacement and financial incentives to reduce consumption, lower utility costs and improve profitability. The program covers up to 70% of the cost for eligible upgrades including lighting, lighting controls, refrigeration, HVAC, motors, variable speed drives, natural gas and food service. Participating contractors (refer to www.njcleanenergy.com) conduct energy assessments in addition to your standard local government energy audit and install the cost-effective measures.

The following facilities qualify to apply for the Direct Install Program based on current program criteria.

DIRECT INSTALL PROGRAM	
DESCRIPTION	QUALIFY
Walnut Street Elementary School	Yes
Cedar Grove Elementary School	Yes
Hooper Avenue Elementary School	Yes
Intermediate North	No
Silver Bay Elementary School	Yes
Total	4

Smart Start Program

Prescriptive Measures - The New Jersey Clean Energy's Smart Start prescriptive measures incentives include unit pricing incentives for installation of energy efficient equipment and controls. Proposed equipment and controls must meet the minimum efficiency requirements as well as other application requirements. The Smart Start prescriptive incentives applicable for new construction, renovations, remodeling and equipment replacements, for a wide range of equipment including:

- Electric Chillers
- Gas Cooling
- Electric Unitary HVAC
- Ground Source Heat Pumps
- Gas Heating
- Variable Frequency Drives
- Gas Water Heating
- Premium Motors
- Prescriptive Lighting
- Lighting Controls
- Commercial Kitchen Equipment
- Technical Studies

Custom Measures - The New Jersey Clean Energy's Smart Start prescriptive measures incentives include all measures not identified in the prescriptive measures category or measures that must have savings verified through additional analysis such as energy model simulations. Custom measures are intended to include savings as a result of unique energy efficiency measures, which are typically facility specific such as waste heat recovery. Custom incentives are provided based on the amount of energy saved and minimum internal rate of return in order to be eligible.

The owner should refer to the Clean Energy Program website for further details on specific incentives available. (www.njcleanenergy.com)

Concord Engineering recommends the Owner review the use of the above-listed funding options in addition to utilizing their standard method of financing for facilities upgrades in order to fund the proposed energy conservation measures.

B. Financing Options:Municipal Bonds

Municipal bonds are a bond issued by a city or other local government, or their agencies. Potential issuers of municipal bonds include cities, counties, redevelopment agencies, school districts, publicly owned airports and seaports, and any other governmental entity (or group of governments) below the state level. Municipal bonds may be general obligations of the issuer or secured by specified revenues. Interest income received by holders of municipal bonds is often exempt from the federal income tax and from the income tax of the state in which they are issued, although municipal bonds issued for certain purposes may not be tax exempt.

Power Purchase Agreement

Public Law 2008, Chapter 3 authorizes contracts of up to fifteen (15) years for energy purchase contracts commonly known as “power purchase agreements.” These are programs where the contracting unit (Owner) procures a contract for, in most cases, a third party to install, maintain, and own a renewable energy system. These renewable energy systems are typically solar panels, windmills or other systems that create renewable energy. In exchange for the third party’s work of installing, maintaining and owning the renewable energy system, the contracting unit (Owner) agrees to purchase the power generated by the renewable energy system from the third party at agreed upon energy rates.

Energy Savings Improvement Program (ESIP):

Public Law 2009, Chapter 4 authorizes government entities to make energy related improvements to their facilities and pay for the costs using the value of energy savings that result from the improvements. The “Energy Savings Improvement Program (ESIP)” law provides a flexible approach that can allow all government agencies in New Jersey to improve and reduce energy usage with minimal expenditure of new financial resources. This program provides public entities to make valuable facility infrastructure improvements that are associated with energy savings. All energy savings projects are eligible as long as the financing period does not extend beyond 15 years. The financing can be utilized for all aspects of energy efficiency project implementation including, energy savings plan development, engineering, construction management, construction management, commissioning, and measurement and verification.

This program provides the much needed financing for energy efficiency projects without the burden of increased debt. The program allows for procurement of financing without voter approval or extending existing debt. The program requires evaluation to ensure a positive cash-flow through the entire 15 year financing period. The first phase of implementing an ESIP is the development of an Energy Savings Plan (ESP) to verify the energy savings, construction costs, and overall financial model.

VIII. ENERGY AUDIT ASSUMPTIONS

The assumptions utilized in this energy audit include but are not limited to following:

- A. Cost Estimates noted within this report are based on industry accepted costing data such as RS MeansTM Cost Data, contractor pricing and engineering estimates. All cost estimates for this level of auditing are +/- 20%. Prevailing wage rates for the specified region has been utilized to calculate installation costs. The cost estimates indicated within this audit should be utilized by the owner for prioritizing further project development post the energy audit. Project development would include investment grade auditing and detailed engineering.
- B. Energy savings noted within this audit are calculated utilizing industry standard procedures and accepted engineering assumptions. For this level of auditing, energy savings are not guaranteed.
- C. Information gathering for each facility is strongly based on interviews with operations personnel. Information dependent on verbal feedback is used for calculation assumptions including but not limited to the Operating Hours, Equipment Type, Control Strategies, and Scheduling.
- D. Information contained within the major equipment list is based on the existing owner documentation where available (drawings, O&M manuals, etc.). If existing owner documentation is not available, catalog information is utilized to populate the required information.
- E. Equipment incentives and energy credits are based on current pricing and status of rebate programs. Rebate availability is dependent on the individual program funding and applicability. It is the owner's responsibility to ensure installed measure equipment meets NJOCE program rules and requirements to receive incentives.
- F. Equipment (HVAC, Plumbing, Electrical, & Lighting) noted within an ECM recommendation is strictly noted as a **basis for calculation** of energy savings. The owner should use this equipment information as a benchmark when pursuing further investment grade project development and detailed engineering for specific energy conservation measures.
- G. Utility bill annual averages are utilized for calculation of all energy costs unless otherwise noted. Accuracy of the utility energy usage and costs are based on the information provided. Utility information including usage and costs is estimated where incomplete data is provided.
- H. Greenhouse Gas Emissions are calculated for each ECM, the basis for these emissions reductions are NJCEP published standard emissions factors, which are the following:
 - a. Electric Savings:
 - 1. CO₂: 1.52 lbs/kWh
 - 2. NO_x: 0.0028 lbs/kWh
 - 3. SO₂: 0.0065 lbs/kWh
 - b. Natural Gas Savings:
 - 1. CO₂: 11.7 lbs/therm
 - 2. NO_x: 0.0092 lbs/therm