



ENERGY AUDIT – FINAL REPORT

WINSLOW TOWNSHIP – ANNEX BUILDING

402 TANSBORO ROAD

BERLIN, NJ 08009

**ATTN: MR. JOSEPH GALLAGHER, MPA
Township Administrator**

CEG PROJECT No. 9C09009

CONCORD ENGINEERING GROUP



520 SOUTH BURNT MILL ROAD

VOORHEES, NJ 08043

TELEPHONE: (856) 427-0200

FACSIMILE: (856) 427-6529

WWW.CEG-INC.NET

CONTACTS:

RAYMOND JOHNSON

Cell: (609) 760-4057

rjohnson@ceg-inc.net

Table of Contents

I. EXECUTIVE SUMMARY 3

II. INTRODUCTION 6

III. METHOD OF ANALYSIS..... 7

IV. HISTORIC ENERGY CONSUMPTION / COST 9

 A. Energy Usage / Tariffs 9

 B. Energy Use Intensity (EUI) 12

 C. EPA Energy Benchmarking System..... 13

V. FACILITY DESCRIPTION 15

VI. MAJOR EQUIPMENT LIST 17

VII. ENERGY CONSERVATION MEASURES 18

VIII. RENEWABLE/DISTRIBUTED ENERGY MEASURES 33

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY 34

X. INSTALLATION FUNDING OPTIONS..... 37

XI. ADDITIONAL RECOMMENDATIONS..... 38

Appendix A – Detailed Energy Usage and Costing Data

Appendix B – Detailed Cost Breakdown per ECM

Appendix C – New Jersey Smart Start[®] Program Incentives

Appendix D – Major Equipment List

Appendix E – Investment Grade Lighting Audit

Appendix F – Building Aerial Photo

Appendix G – Energy Star Benchmarking System

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I. EXECUTIVE SUMMARY

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

Winslow Township
Annex Building
402 Tansboro Road
Berlin, NJ 08009

Municipal Contact Person: Robert J. Castagna, Purchasing Agent

This audit was performed in connection with the New Jersey Clean Energy Local Government Energy Audit Program. These energy audits are conducted to promote the office of Clean Energy's mission, 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.

The annual energy costs at this facility are as follows:

Electricity	\$ 8,882
Natural Gas	\$ 3,994
Total	\$ 12,876

The potential annual energy cost savings are shown below in Table 1. Be aware that the measures are not additive because of the interrelation of several of the measures. The cost of each measure for this level of auditing is $\pm 20\%$ until detailed engineering, specifications, and hard proposals are obtained.

Table 1
Energy Conservation Measures (ECM's)

ECM NO.	DESCRIPTION	COST	ANNUAL SAVINGS	SIMPLE PAYBACK (YEARS)	SIMPLE RETURN ON INVESTMENT
1	Lighting Upgrade – Fluorescent Lighting	\$2,884	\$1,310	2.2	66.6 %
2	Lighting Upgrade – CFL Lighting	\$245	\$106	2.3	61.5 %
3	Lighting Upgrade – Lighting Controls	\$715	\$144	4.0	26.1 %
4	Replace Heating Hot Water Boiler	\$12,100	\$642	18.8	0.8 %
5	Domestic Hot Water Heater Upgrade	\$2,350	\$426	5.5	18.5 %
6	Install Programmable Thermostats	\$1,200	\$146	8.2	10.9 %
7	Install 1 st Floor Double-Pane Windows	\$12,100	\$642	18.8	(-1.4 %)
8	Retro-Commissioning	\$2,160	\$644	3.4	29.4 %

The estimated demand and energy savings are shown below in Table 2. The information in this table corresponds to the ECM's in Table 1.

Table 2
Estimated Energy Savings

ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECT DEMAND (KW)	ELECT CONSUMPTION (KWH)	NAT GAS (THERMS)
1	Lighting Upgrade – Fluorescent Lighting	3.195	7,707	-
2	Lighting Upgrade – CFL Lighting	0.539	626	-
3	Lighting Upgrade – Lighting Controls	-	1040	-
4	Replace Heating Hot Water Boiler	-	0	350
5	Domestic Hot Water Heater Replacement	-	0	273
6	Install Programmable Thermostats	-	1.50	94
7	Install 1 st Floor Double-Pane Windows	-	2,973	164
8	Retro-Commissioning	-	2,598	129

Recommendations:

Concord Engineering Group recommends the implementation of all ECM's that provide a calculated simple payback at or under seven (7) years. The potential energy and cost savings from these ECM's are economically justifiable. The following Energy Conservation Measures are recommended for the Winslow Township Annex Building:

- **ECM #1:** Interior T-8 Fluorescent Lighting Upgrades
- **ECM #2:** Install Compact Fluorescent Lamps
- **ECM #3:** Interior Lighting Controls – Occupancy Sensors
- **ECM #5:** Domestic Hot Water Heater
- **ECM #8:** Retro-Commissioning

II. INTRODUCTION

This comprehensive energy audit covers the 7,200 square foot, 2-story, Annex Building that includes; administrative and miscellaneous offices, kitchen, conference/meeting room, restrooms, utility / mechanical room, and storage facilities.

The first task was to collect and review one year's worth of utility energy data for electricity and natural gas. This information was used to analyze operational characteristics, calculate energy benchmarks for comparison to industry averages, estimate savings potential, and establish a baseline to monitor the effectiveness of implemented measures. A computer spreadsheet was used to enter, sum, and calculate benchmarks and to graph utility information (see Appendix A).

The Energy Use Intensity (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft²/yr) and can be 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 annual consumption of all fuels to BTU's then dividing by the area (gross square footage) of the building. EUI is a good indicator of the relative potential for energy savings. A comparatively low EUI indicates less potential for large energy savings. Blueprints (where available) were obtained from the municipality and were utilized to calculate/verify the gross area of the facility.

After gathering the utility data and calculating the EUI, the next step in the audit process is obtaining Architectural and Engineering drawings (where available). By reviewing the Architectural and Engineering drawings, questions regarding the building envelope, lighting systems/controls, HVAC equipment and controls are noted. These questions are then compared to the energy usage profiles developed during the utility data gathering step. Furthermore, 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. After this information is gathered the next step in the process is the site visit.

The site visit was spent inspecting the actual systems and answering specific questions from the preliminary review. The building manager provided occupancy schedules, O & M practices, the building energy management program, and other information that has an impact on energy consumption.

The post-site work includes evaluation of the information gathered during the site visit, researching possible conservation opportunities, organizing the audit into a comprehensive report, and making recommendations on mechanical, lighting and building envelope improvements.

III. METHOD OF ANALYSIS

CEG completed the preliminary audit tasks noted in Section II preparing for the site survey. The site survey is a critical input in deciphering where energy opportunities exist within a facility. The auditor walks the entire site to inventory the building envelope (roof, windows, etc.), the heating, ventilation, and air conditioning equipment (HVAC), the lighting equipment, other facility-specific equipment, and to gain an understanding of how each facility is used.

The collected data is then processed using energy engineering calculations to calculate the anticipated energy usage for the proposed energy conservation measures (ECM's). The actual energy usage is entered directly from the utility bills provided by the Owner. The anticipated energy usage is compared to the actual usage to determine energy savings for the proposed ECM's.

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

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

Our thermal module calculates the savings for temperature reductions utilizing automated engineering calculations within Microsoft Excel™ spreadsheets. The savings are calculated in “output” values – meaning energy, not fuel savings. To show fuel savings we multiply the energy values times the fuel conversion factor (these factors are different for electricity, natural gas, fuel oil, etc.) and also take into account the heating/cooling equipment efficiency. The temperature recommendation savings are lower when the heating/cooling equipment is more efficient or is using a cheaper fuel.

Thermal recommendations (insulation, windows, etc.) are evaluated by taking the difference in the thermal load due to reduced heat transfer. Again, the “thermal load” is the thermal load after the other recommendations have been accounted for.

Lastly, installation costs, refer to Appendix B, are then applied to each recommendation and simple paybacks are calculated. Costs are derived from Means Cost Data, other industry publications, and local contractors and suppliers. The NJ SmartStart Building® program incentives (refer to Appendix C) are calculated for the appropriate ECM's and subtracted from the installed cost prior to calculation of the simple payback. In addition, where applicable, maintenance cost savings are estimated and applied to the net savings. Simple return on

investment is calculated using the standard formula of the difference of gains minus investments, divided by the investments. Included within the gains are the annual energy savings, utility incentives and maintenance savings as a total sum. The calculation is completed assuming the project is 100% direct purchased by the Owner with an energy cost escalation of 2.4% for natural gas and 2.2% for electricity.

IV. HISTORIC ENERGY CONSUMPTION / COST

A. Energy Usage / Tariffs

Table 3 and Figure 1 represent the electrical usage for the surveyed facility from April-08 to March-09. Atlantic City Electric provides electricity to the facility under the MGS / Monthly General Service Rate Schedule. This electric rate has a component for consumption that is measured in kilowatt-hours (kWh). It is calculated by multiplying the wattage of the equipment times the hours that it operates. For example, a 1,000 Watt lamp operating for 5 hours would measure 5,000 Watt-hours. Since one kilowatt is equal to 1,000 Watts, the measured consumption would be 5 kWh. The basic usage charges are shown as generation service and delivery charges along with several non-utility generation charges. Rates used in this report reflect the most current rate structure available.

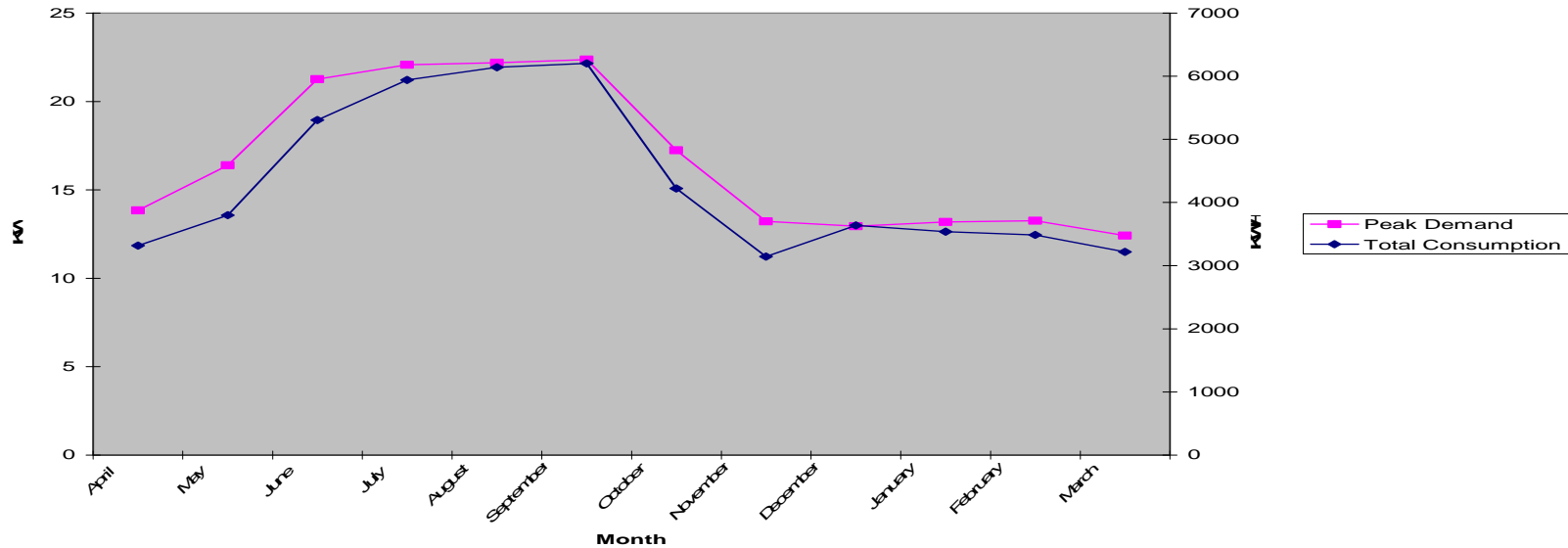
Table 4 and Figure 2 show the natural gas energy usage for the surveyed Annex Building from April-08 to March-09. South Jersey Gas supplies the natural gas and delivers the fuel to the burner at the facility under the GSG / General Service, firm transportation rate. Below is the average unit cost for the utilities at this facility.

<u>Description</u>	<u>Average</u>
Electricity	17¢/kWh
Natural Gas	\$1.55/Therm

**Table 3
Electricity Billing Data**

Annex Building Monthly General Service														
Provider	Month	Start Date	End Date	Account	Utility Type	Billing Days	Peak Demand	Units	Load Factor (%)	Total Consumption	Units	Supply Charge	Delivery Charge	Total \$
Atlantic City Electric	April	3/19/2008	4/18/2008	0304 4079 9994	Electric	30	13.84	kw	33.28%	3316	kwh	\$ 324.72	\$ 198.17	\$ 522.89
Atlantic City Electric	May	4/18/2008	5/19/2008	0304 4079 9994	Electric	31	16.39	kw	31.15%	3799	kwh	\$ 376.63	\$ 231.39	\$ 608.02
Atlantic City Electric	June	5/19/2008	6/18/2008	0304 4079 9994	Electric	30	21.26	kw	34.66%	5306	kwh	\$ 662.58	\$ 278.39	\$ 940.97
Atlantic City Electric	July	6/18/2008	7/18/2008	0304 4079 9994	Electric	30	22.08	kw	37.36%	5940	kwh	\$ 841.18	\$ 276.94	\$ 1,118.12
Atlantic City Electric	August	7/18/2008	8/18/2008	0304 4079 9994	Electric	31	22.2	kw	37.19%	6142	kwh	\$ 870.10	\$ 286.79	\$ 1,156.89
Atlantic City Electric	September	8/18/2008	9/17/2008	0304 4079 9994	Electric	30	22.37	kw	38.52%	6204	kwh	\$ 876.63	\$ 286.15	\$ 1,162.78
Atlantic City Electric	October	9/17/2008	10/20/2008	0304 4079 9994	Electric	33	17.24	kw	30.94%	4224	kwh	\$ 533.01	\$ 196.08	\$ 729.09
Atlantic City Electric	November	10/20/2008	11/17/2008	0304 4079 9994	Electric	28	13.22	kw	35.38%	3143	kwh	\$ 355.04	\$ 133.86	\$ 488.90
Atlantic City Electric	December	11/17/2008	12/17/2008	0304 4079 9994	Electric	30	12.94	kw	39.04%	3637	kwh	\$ 407.35	\$ 149.98	\$ 557.33
Atlantic City Electric	January	12/17/2008	1/19/2009	0304 4079 9994	Electric	33	13.18	kw	33.91%	3540	kwh	\$ 402.65	\$ 153.43	\$ 556.08
Atlantic City Electric	February	1/19/2009	2/18/2009	0304 4079 9994	Electric	30	13.26	kw	36.52%	3487	kwh	\$ 395.06	\$ 147.33	\$ 542.39
Atlantic City Electric	March	2/18/2009	3/19/2009	0304 4079 9994	Electric	29	12.42	kw	37.24%	3219	kwh	\$ 363.33	\$ 134.91	\$ 498.24
							Max Peak:	22.37	kw	Total:	51,957	kwh	Total:	\$ 8,881.70
													Avg. Cost per kwh:	\$ 0.17

**Figure 1
Electricity Usage Profile
Winslow Annex Building**



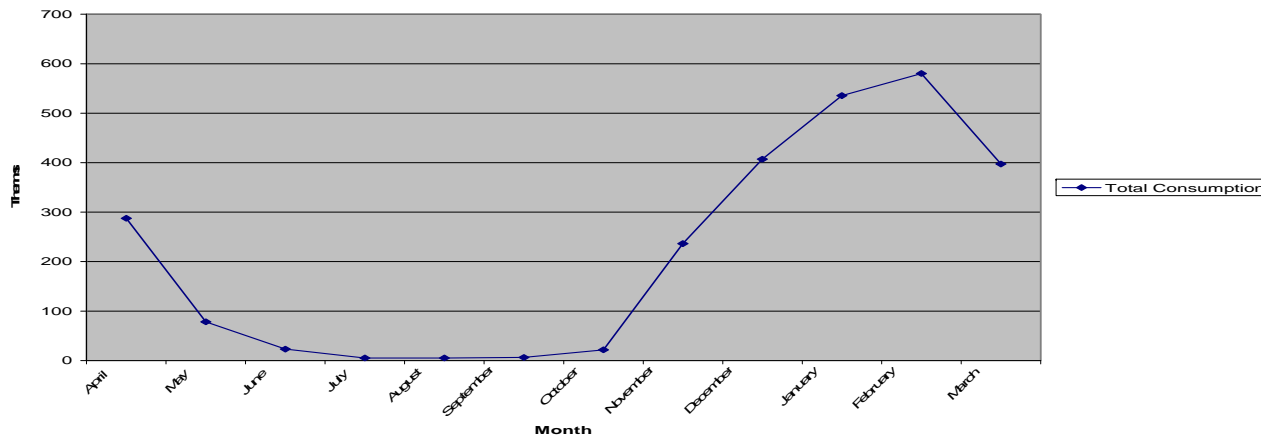
**Table 4
Natural Gas Billing Data**

Annex Building

Provider	Month	Start Date	End Date	Account	Utility Type	Billing Days	Consumption	Units	Total \$
South Jersey Gas	April	3/19/2008	4/16/2008	2 19 03 1470 0 3	Gas	28	287.65	therms	\$ 408.80
South Jersey Gas	May	4/16/2008	5/15/2008	2 19 03 1470 0 3	Gas	29	78.36	therms	\$ 124.70
South Jersey Gas	June	5/15/2008	6/17/2008	2 19 03 1470 0 3	Gas	33	23.04	therms	\$ 51.82
South Jersey Gas	July	6/17/2008	7/17/2008	2 19 03 1470 0 3	Gas	30	5.19	therms	\$ 25.79
South Jersey Gas	August	7/17/2008	8/15/2008	2 19 03 1470 0 3	Gas	29	5.16	therms	\$ 25.13
South Jersey Gas	September	8/15/2008	9/16/2008	2 19 03 1470 0 3	Gas	32	6.17	therms	\$ 28.36
South Jersey Gas	October	9/16/2008	10/17/2008	2 19 03 1470 0 3	Gas	31	21.76	therms	\$ 48.94
South Jersey Gas	November	10/17/2008	11/14/2008	2 19 03 1470 0 3	Gas	28	236.33	therms	\$ 339.81
South Jersey Gas	December	11/14/2008	12/16/2008	2 19 03 1470 0 3	Gas	32	407.15	therms	\$ 622.67
South Jersey Gas	January	12/16/2008	1/16/2009	2 19 03 1470 0 3	Gas	31	535.61	therms	\$ 822.01
South Jersey Gas	February	1/16/2009	2/17/2009	2 19 03 1470 0 3	Gas	32	580.16	therms	\$ 885.45
South Jersey Gas	March	2/17/2009	3/18/2009	2 19 03 1470 0 3	Gas	29	397.32	therms	\$ 610.82
12 Month Total:							2,583.9	therms	\$ 3,994.30
Average Cost per therm:							\$ 1.55		

**Figure 2
Natural Gas Usage Profile**

Winslow Annex Building



B. Energy Use Intensity (EUI)

Energy Use Intensity (EUI) is a measure of a building's energy utilization per square foot of building. This calculation is completed by converting all utility usage (gas, electric, oil) consumed by a building over a specified time period, typically 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 among buildings of similar type. The EUI for this facility is calculated as follows:

$$\text{Building EUI} = \frac{(\text{Electric Usage in kBtu/h} + \text{Gas Usage in kBtu/h})}{\text{Building Square Footage}}$$

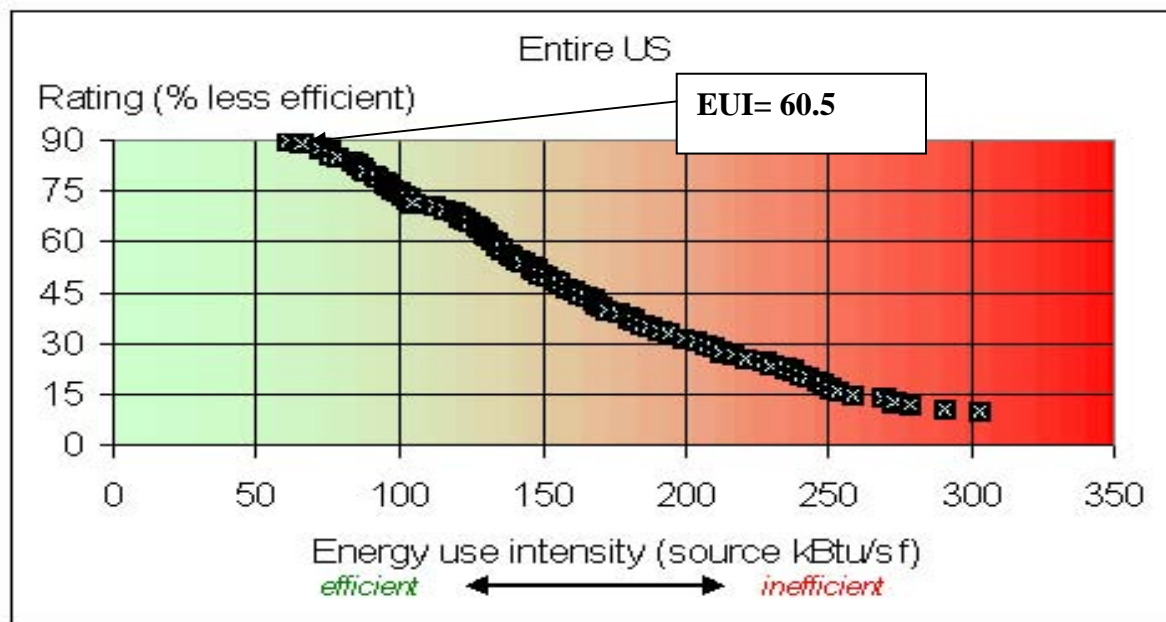
$$\begin{aligned} \text{Electric} &= ((51,957 \text{ kWh}) * (1000 \text{ W/kWh}) * (3.414 \text{ Btu/h} / 1 \text{ W})) / (1000 \text{ Btu/h} / 1 \text{ kBtu/h}) \\ &= 177,381 \text{ kBtu/h} \end{aligned}$$

$$\text{Gas} = ((2,583.9 \text{ therms}) * (100,000 \text{ Btu/h} / 1 \text{ therm})) / (1000 \text{ Btu/h} / 1 \text{ kBtu/h}) = 258,390 \text{ kBtu/h}$$

$$\text{Building EUI} = \frac{(177,381 \text{ kBtu/h} + 258,390 \text{ kBtu/h})}{7,200 \text{ SF}} = \frac{435,771 \text{ kBtu/h}}{7,200 \text{ SF}} = 60.5 \text{ kBtu/SF}$$

$$\text{Annex Building EUI} = \underline{60.5 \text{ kBtu/SF}}$$

Figure 3
Energy Use Intensity Distributions – Offices



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 you to track and assess 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 more emphasis is being placed throughout multiple arenas 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. Therefore, it is vital that local government municipalities assess their energy usage, benchmark this usage utilizing Portfolio Manager, set priorities and goals to lessen their energy usage and move forward with these priorities and goals. Saving energy will in-turn save the environment.

In accordance with the Local Government Energy Audit Program, CEG has created an Energy Star account for the municipality in order to allow access to monitor their yearly energy usage as it compares to facilities of similar type. The following is the user name and password for this account:

User Name:	winslowtownship
Password:	rcastagna

Utilizing the utility bills and other information gathered during the energy audit process, CEG entered the respective data into Portfolio Manager and the following is a summary of the results:

Table 5
ENERGY STAR Performance Rating

FACILITY DESCRIPTION	ENERGY PERFORMANCE RATING	NATIONAL AVERAGE
Winslow Annex Bldg.	58	50

Specific building types are detailed on the ENERGY STAR website. Non-typical buildings are covered by an “Other” category. The “Other” category is used if your building type or a section of the building is not represented by one of the specific categories. An Energy Performance Rating cannot be calculated if more than 10% of a building is classified as “Other.” In addition, office buildings with less than 5000 S.F. cannot generate an Energy Performance Rating. Refer to Appendix G for detailed energy benchmarking report entitled “STATEMENT OF ENERGY PERFORMANCE.”

The Portfolio Manager also calculates the building Energy Use Intensity (EUI).

The EUI is also an important tool that can be used to track the energy efficiency of the building. Baselines for improvement can be set that the municipality can strive to meet. CEG recommends that the Winslow Township keep their Portfolio Manager account up to date to monitor the performance of the building.

The EUI calculated in the previous section and in the Energy Star Portfolio Manager is a good indicator of the energy performance in the absence of the Energy Star Performance Rating.

The EUI distribution, Figure 3, is specific for Office Buildings. The Annex Building has an EUI of 60.5 rating for this type of facility. The lower the EUI the less energy the facility uses per square foot. A low EUI indicates a more efficient building. There maybe some opportunity for improvement making the facility more energy efficient and saving more on the utility costs.

V. FACILITY DESCRIPTION

Facility Description

The Winslow Township Annex Building is located at 402 Tansboro Road, Berlin, N.J. The building was constructed in 1937 and was originally a school. Today the building serves the Township by housing the office of the Tax Assessor, the Construction Department and the Emergency Management Office.

The building is two (2) stories with office areas on the second floor and a large meeting hall on the first floor. The first floor also includes records storage, the O.E.M. Office, a kitchen, public restrooms, electric and boiler rooms, as well as other closets and utility spaces. Each floor is 3,600 sq. ft. for a total of 7,200 sq. ft. of usable interior space.

The building has masonry exterior walls and wood frame and plaster interior walls. Floor/ceiling assemblies and roof framing area also of wood construction. Windows on the first floor are single-pane clear glass with wooden grilles dividing the panes on each sash. These windows appear to be original. Windows on the second floor are vinyl clad, double-pane, clear, insulating type replacement windows. All windows are double-hung style.

Heating System

Heat for the building is produced by a natural gas-fired hot water boiler located in a boiler room in the basement. The boiler is an HB Smith model GB100-W-12 HS1D with 275,000 BTU/H input. The boiler has an automatic vent damper and a rated combustion efficiency of 83% when new.

Heating hot water is distributed through six (6) zone valves by a small, inline, cartridge type circulator. Zone valves are associated with six (6) thermostats in the building, two (2) on the first floor and four (4) on the second floor. Each thermostat on the second floor is located in a different office and controls heating water flow through finned-tube radiators that line the exterior walls. Two (2) thermostats on the first floor control zone valves that serve the north and south sides of the floor.

Finned-tube radiators are the sole form of terminal heating elements throughout the building. Radiators have a 3/4" copper tube with 1 1/2" x 2" aluminum fins in a 6 3/4" high steel enclosure.

Domestic Hot Water

Domestic hot water is produced by a 40 gallon, natural gas-fired water heater. The water heater is manufactured by Bradford White model MI40356FBN4. The heater has 40,000 BTU/H of natural gas input and a 42 gallon/hour recovery rate at 90°F.

Cooling System

Air conditioning is currently provided by numerous window air conditioning units that are installed and removed seasonally. Each air conditioning unit is approximately 5,000 BTU/H and twelve (12) are installed.

Central air conditioning via ducted split systems are designed and are currently being installed at the building.

Exhaust

Exhaust fans exist in all toilet rooms in the building. Small cabinet fans are installed in three (3) different private toilet rooms. The public restrooms on the first floor each have a 14" diameter, sidewall exhaust fan. Both fans are no longer operable and it is recommended that these fans be replaced.

Lighting System

The offices, lobby and stairwells on the first floor are lit via 2-foot by 4-foot lay-in fixtures containing T12 lamps and magnetic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

The offices in the basement are lit via 2-foot by 4-foot lay-in fixtures containing T8 lamps and electronic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

Bathrooms on the first floor are lit via 2-foot by 2-foot lay-in fixtures containing T12 U-tube lamps and magnetic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

All closets, boiler room, bathrooms and storage rooms in basement and first floor are lit via incandescent fixtures and magnetic ballasts.

General area and Kitchen in basement is lit via 2-foot by 4-foot lay-in fixtures containing T12 lamps and magnetic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

Fenced in area in basement is lit via 2-foot by 4-foot lay-in fixtures containing T8 lamps and electronic ballasts. Standard switching is utilized and there are no other types of lighting controls present.

Exit signs throughout the building contain incandescent lamps and consume an estimated 40 watts of electricity per sign.

The exterior lighting is mounted to the building and includes an assortment of wall packs and incandescent fixtures.

VI. MAJOR EQUIPMENT LIST

Following the completion of the field survey a detailed equipment list was created. The equipment within this list is considered major energy consuming equipment whose replacement could yield substantial savings. In addition, the list shows the major equipment in the facility and all pertinent information utilized in energy savings calculations. An approximate age was assigned to the equipment if a manufacturers date was not shown on the equipment's nameplate. The ASHRAE service life for the equipment along with the remaining useful life is also shown in the Appendix.

Equipment denoted by an asterisk indicates an estimate of the equipment ratings due to equipment inaccessibility, worn nameplates, lack of nameplates, etc.

Refer to Appendix D for the Major Equipment List for this facility.

VII. ENERGY CONSERVATION MEASURES

ECM #1: Lighting Upgrade - Upgrade the Fluorescent Lighting

Description:

Improved fluorescent lamps and ballasts are available as direct replacements for the existing lamps and ballasts in the Annex Building. A simple retrofit of the existing fixture can provide substantial savings. A conventional drop-ceiling lay in fixture with four, 4-foot lamps has a total wattage of 154 Watts per fixture. By using the improved lamps and ballasts, the total wattage would be reduced to 96 Watts. The light levels would increase by about 15% and the light quality would increase by 35%.

CEG recommends replacement of the existing T12 lamps and ballasts with the latest technology T8 lamps and high efficiency electronic ballasts. The new energy efficient, T8 lamps will provide adequate lighting and will save the Owner on electrical costs due to the better performance of the electronic ballasts. In addition to functional cost savings, the fixture replacement will also provide operational cost savings. The operational cost savings will be realized through the lesser number of lamps that will be required to be replaced per year. The expected lamp life of the latest high efficiency T8 lamps is approximately 30,000 burn-hours, requiring fewer lamps to replace per year. Based on the operating hours of this portion of the facility, approximately 1000-2500 hours per year, the Owner will be changing approximately 33% less lamps per year.

In addition, a single electronic ballast can operate one, two, three, or four lamps in a fixture. The existing magnetic ballasts can only operate up to two lamps. The electronic ballasts could reduce the amount of ballasts in the facility by half. This can be taken advantage of with “tandem wiring” of ballasts. Instead of using one electronic ballast for every one fixture it is sometimes feasible to use one electronic ballast for every two or more fixtures. The electrician wires a single ballast to operate the lamps in adjacent light fixtures which further reduces the amount of ballasts needed.

Energy Savings Calculations:

A detailed Investment Grade Lighting Audit can be found in Appendix E that outlines the proposed retrofits, costs, savings, and payback periods.

Maintenance Savings are calculated as follows:

Maintenance Savings = (# of lamps x % reduction x \$ per lamp) + Installation Labor

Maintenance Savings = (221 x 33% reduction x \$2.00) + (\$20 x 73) = \$1605.86

Total ECM Lifetime Energy Savings = 25 Years (Est.) x \$1,310 / yr. = \$32,750

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$5,070
NJ Smart Start Equipment Incentive (\$):	(\$580)
Maintenance Savings (\$):	(\$1,606)
Net Installation Cost (\$):	\$2,884
Total Energy Savings (\$ / yr):	\$1,310
Estimated ECM Lifetime (yrs):	25
Simple Lifetime Energy Savings (\$):	\$32,750
Simple Payback (yrs):	2.2
Simple Return on Investment:	66.6 %

ECM #2: Lighting Upgrade – Install Compact Fluorescent Lighting

Description:

Compact fluorescent lamps (CFL's) were created to be direct replacements for the standard incandescent lamps which are common to table lamps, spot lights, hi-hats, bathroom vanity lighting, etc. The light output of the CFL has been designed to resemble the incandescent lamp. The color rendering index (CRI) of the CFL is much higher than standard fluorescent lighting, and therefore provides a much "truer" light.

The CFL is available in a myriad of shapes and sizes depending on the specific application. Typical replacements are: a 13-Watt CFL for a 60-Watt incandescent lamp, an 18-Watt CFL for a 75-Watt incandescent lamp, and a 25-Watt CFL for a 100-Watt incandescent lamp.

The CFL is also available for a number of "brightness colors" that is indicated by the Kelvin rating. A 2700K CFL is the "warmest" color available and is closest in color to the incandescent lamp. CFL's are also available in 3000K, 3500K, and 4100K. The 4100K would be the "brightest" or "coolest" output.

A CFL can be chosen to screw right into existing fixtures, or hardwired into existing fixtures.

Energy Savings Calculations:

A detailed Investment Grade Lighting Audit can be found in Appendix E that outlines the proposed retrofits, costs, savings, and payback periods.

Maintenance Savings are calculated as follows:

Maintenance Savings = (# of lamps x % reduction x \$ per lamp) + Installation Labor

Maintenance Savings = (13 x 75% reduction x \$5) + (\$15 x 10) = \$199

Total ECM Lifetime Energy Savings = 25 Years (Est.) x \$106 / yr. = \$2,650

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$509
NJ Smart Start Equipment Incentive (\$):	\$0
Annual Maintenance Savings (\$):	(\$199)
Net Installation Cost (\$) After 1 Year:	\$245
Total Energy Savings (\$ / yr):	\$106
Estimated ECM Lifetime (yrs):	25
Simple Lifetime Energy Savings (\$):	\$2,650
Simple Payback (yrs):	2.3
Simple Return on Investment:	61.5 %

ECM #3: Lighting Upgrade – Install Lighting Controls

Description:

In some areas the lighting is left on unnecessarily. There has been a belief that it is better to keep the lights on rather than to continuously switch them on and off. The on/off dilemma was studied and it was determined that the best option is to turn the lights off whenever possible. Although this practice reduces the lamp life, the energy savings far outweigh the lamp replacement costs.

Lighting controls are available in many forms. Lighting controls can be as simplistic as an additional switch. Time-clocks are often used which allows the user to set an on/off schedule. Time-clocks range from a dial clock with on/off indicators to a small box the size of a thermostat with user programs for on/off schedule in a digital format. Occupancy sensors detect motion and will switch the lights on when the room is occupied. They can either be mounted in place of the current wall switch, or they can be mounted on the ceiling to cover large areas. Lastly, photocells are a lighting control that sense light levels and will turn the lights off when there is adequate daylight. These are mostly used outside, but they are becoming much more popular in energy-efficient office designs as well.

To determine an estimated savings for lighting controls, we used ASHRAE 90.1-2004 (NJ Energy Code). Appendix G states that occupancy sensors have a 10% power adjustment factor for daytime occupancies for buildings over 5,000 SF. CEG recommends the installation of dual technology occupancy sensors in all private offices, conference rooms, mechanical rooms, storage rooms, file rooms, etc.

CEG would recommend wall switches for individual rooms, ceiling mount sensors for large office areas or restrooms, and fixture mount box sensors for some applications as manufactured by Sensorswitch, Watt Stopper, etc.

Energy Savings Calculations:

From Appendix E of this report, we calculated the lighting power density (Watts/ft²) of the existing facility to be 1.50 Watts/SF. Ten percent of this value is the resultant energy savings due to installation of occupancy sensors:

$$\text{Savings} = 10\% \times 1.50 \text{ Watts/SF} \times 3704 \text{ SF} \times 1,872 \text{ hrs/yr.}$$

$$= 1040 \text{ kWh/yr.} \times \$0.17/\text{kWh}$$

$$\text{Annual Savings} = \underline{\$177 / \text{yr.}}$$

Installation cost per dual-technology sensor is \$75/unit.

The SmartStart Buildings® incentive is \$20 per control which equates to an installed cost of \$55/unit. Total number of rooms to be retrofitted is 13 (3704 SF).

Total cost to install sensors is $\$55 \times 13 \text{ units} = \715 .

Total ECM Lifetime Energy Savings = 15 Years (Est.) $\times \$177 / \text{yr.} = \$2,655$

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$975
NJ Smart Start Equipment Incentive (\$):	(\$260)
Maintenance Savings (\$):	\$0
Net Installation Cost (\$):	\$715
Total Energy Savings (\$ / yr):	\$177
Estimated ECM Lifetime (yrs):	15
Simple Lifetime Energy Savings (\$):	\$2,655
Simple Payback (yrs):	4.0
Simple Return on Investment:	26.1 %

ECM #4: Replace Heating Hot Water Boiler

Description:

The Annex is heated by a H. B. Smith natural gas fired hot water boiler which presently is about 83% efficient. The exact date of installation is unknown. The estimated service life for the furnace is 25 years as outlined in Chapter 36 of the 2007 ASHRAE Applications Handbook. In this energy conservation measure we are suggesting replacing the existing boiler with a new Lochinvar Knight boiler rated at 226 MBH and 96% efficient.

Existing Heating Hot Water Boiler:

Rated Capacity = 275 MBH Input (Natural Gas)
 Combustion Efficiency = 83%
 Radiation Losses = 5%
 Thermal Efficiency = 60%

Replacement Boiler:

High Efficiency Lochinvar or Equal (with Sequencing Control & O/A HW Reset)
 Rated Capacity = 285 MBH Input (Natural Gas)
 Combustion Efficiency = 96%
 Radiation Losses = 5%
 Thermal Efficiency = 87.5%

Operating Data:

Heating Season Fuel Consumption = 2583.9 Therms
 (Based on gas billing data)
 Average Cost of Natural Gas = \$1.55/Therm

Energy Savings Calculations:

$$\text{AnnualEnergySavings} = \text{YearlyConsumption} \times \frac{\text{NewBoilerEff.} - \text{OldBoilerEff.}}{\text{NewBoilerEff.}}$$

$$\text{AnnualEnergySavings} = 2583.9 \text{ Therms} \times \frac{96 - 83}{96} = 349.9 \text{ Therms}$$

$$\text{Cost Savings} = \text{Annual Energy Savings} \times \$/\text{Therm}$$

$$\text{Cost Savings} = 349.9 \text{ Therms} \times \$1.55/\text{Therm} = \$542.35 / \text{yr.}$$

$$\text{Total ECM Lifetime Energy Savings} = 25 \text{ Years (Est.)} \times \$542.35 / \text{yr.} = \$13,558.75$$

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$12,500
NJ Smart Start Equipment Incentive (\$):	(\$300)
Maintenance Savings (\$):	(\$100)
Net Installation Cost (\$):	\$12,100
Total Energy Savings (\$ / yr):	\$642
Estimated ECM Lifetime (yrs):	25
Simple Lifetime Energy Savings (\$):	\$13,559
Simple Payback (yrs):	18.8
Simple Return on Investment:	0.8 %

ECM #5: Domestic Hot Water Heater Replacement

Description:

The existing domestic hot water heater for the building is a 40 gallon, natural gas fired unit with a combustion efficiency of 83%. This energy conservation measure will replace the existing unit with a natural gas-fired, tankless water heater. Tankless water heaters heat water directly without the use of a storage tank. Therefore, they avoid the standby heat losses associated with storage water heaters. In a gas-fired tankless water heater, a gas burner heats the water and provides a constant supply of hot water. Therefore, you do not need to wait for the storage tank to fill up with enough hot water as is typical with storage-type hot water heaters.

Energy Savings Calculations:

Existing Natural Gas DHW Heater

Rated Capacity = 40 MBH Input

Energy Factor (EF) = 0.83

40 gallons storage

Proposed High-Efficiency Gas-Fired Tankless Water Heater

Rated Capacity = 5 gallons per minute

Operating Data for existing DHW Heater:

Average cost of natural gas = \$1.55/Therm

Annual operational time for existing 40 Gallon unit = 1,040 Hrs.

Electric usage = $(1,040 \text{ Hrs} \times 40,000 \text{ Btu/Hr}) \div 100,000 \text{ Btu/Therms} = 416 \text{ Therms/Year}$

Cost = $416 \text{ Therms} \times \$1.55/\text{Therm} = \$645$

Operating Data for new tankless gas-fired DHW heater:

Average cost of natural gas = \$1.53/Therm

Annual gas usage for 5 GPM tankless gas-fired units = 143 Therms

Cost = $143 \text{ Therms} \times \$1.53/\text{Therm} = \$219$

Energy Savings = $\$645 - \$219 = \$426/\text{yr.}$

Total ECM Lifetime Energy Savings = $18 \text{ Years (Est.)} \times \$426/\text{yr.} = \$7,668$

NJ Smart Start[®] Program Incentives are calculated as follows:

From Appendix C, a natural gas-fired domestic hot water heater less than 50 gallons warrants the following incentive:

Smart Start® Incentive = (Quantity × \$50 per DHW Heater) = (1 × \$50) = \$50

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$2,400
NJ Smart Start Equipment Incentive (\$):	(\$50)
Maintenance Savings (\$):	(\$0)
Net Installation Cost (\$):	\$2,350
Total Energy Savings (\$ / yr):	\$426
Estimated ECM Lifetime (yrs):	18
Simple Lifetime Energy Savings (\$):	\$7,668
Simple Payback (yrs):	5.5
Simple Return on Investment:	18.5 %

ECM #6: Programmable Thermostat

Description:

Throughout the building there are standard, manual wall thermostats for the finned tube radiation that provide local control with adjustable settings. These aged, indoor temperature controls are inaccurate due to temperature drift, age, and not having been re-calibrated. These units also do not have unoccupied setback features.

New programmable thermostats are available that utilize programming schedules for occupied and unoccupied times and can be set to vary space temperature at these respective times. In addition, the programmable thermostats can be used in conjunction with a motion sensor. When the space is not occupied the equipment can operate at the unoccupied set-point. Once the space becomes occupied the motion sensor sends a signal to the thermostat to raise the temperature of the space to the occupied set-point. This control system approach is ideal for facilities with intermittent occupancy.

This energy conservation measure would replace the various HVAC unit thermostats with programmable 7-day thermostats with night time setback control. The recommended thermostat set-points for heating are as follows:

Occupied Heating =	70° F
Unoccupied Heating =	60° F

CEG recommends replacement of the existing remote thermostats with Honeywell RTH7500D 7-day programmable thermostat or equivalent.

Energy Savings Calculations:

The energy savings of a 7-day programmable thermostat was calculated by using Energy Star Life Cycle Cost Estimate software for qualified programmable thermostats. The referenced calculator can be found at www.energystar.gov.

Calculated energy savings for heating only = \$146/Unit

Total ECM Lifetime Energy Savings = 15 Years (Est.) x \$146 / yr. = \$2,190

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$1,200
NJ Smart Start Equipment Incentive (\$):	(\$0)
Maintenance Savings (\$):	(\$0)
Net Installation Cost (\$):	\$1,200
Total Energy Savings (\$ / yr):	\$146
Estimated ECM Lifetime (yrs):	15
Simple Lifetime Energy Savings (\$):	\$2,190
Simple Payback (yrs):	8.2
Simple Return on Investment:	10.9 %

ECM #7: Install Double-Pane Insulating Windows

Description:

The first floor of the Annex building has single-pane windows which allow substantial heat losses and gains resulting in cooler interior surfaces during the heating season and warmer interior surfaces during the cooling season. In addition, these windows are a source of cold air leakage into the building. Finally, single-pane glass may result in condensation-related problems when warm interior air contacts cold surfaces.

High-performance windows can provide many benefits including:

- Improved comfort by reducing radiant heat exchange
- Improved indoor air quality by reducing air leakage that can bring dirt, dust, and other impurities into the building
- Lower utility bills since these windows are better insulated and more air-tight
- Fewer condensation problems since these windows stay warmer in the heating season resulting in drier windows

This energy conservation measure would replace all of the single-pane windows with double-pane, insulating windows.

Energy savings calculations:

Heating Degree Days = 5,169°F – day/yr.

Cooling Degree Days = 3198°F – day/yr.

Total window area to be retrofitted = 228 SF

U exist. = 1.13 Btu/hr – ft² - °F

U new = 0.55 Btu/hr – ft² - °F

Annual Energy Savings (Heating) =

= 24 hrs * Window Areas * (U exist - U new) * HD Days

= 24 * 228 * (1.13-0.55) * 5,169 = 16,405 MBH/Year

Energy Savings = 164.1 Therms x \$1.55/Therm = \$254/year

Annual Energy Savings (Cooling) =

= 24 hrs * Window Areas * (U exist - U new) * CD Days

= 24 * 228 * (1.13-0.55) * 3,198 = 10,149 MBH/Year = 2973 kWh/year

Energy Savings = 2973 kWh/year x \$0.17 = \$505/year

Upgraded Window Cost = \$15,200

Total Annual Savings = \$254 + \$505 = \$759/Year

Total ECM Lifetime Energy Savings = 25 Years (Est.) x \$759 / yr. = \$18,975

Energy Savings Summary:

ECM #7 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$15,200
NJ Smart Start Equipment Incentive (\$):	(\$0)
Maintenance Savings (\$):	(\$0)
Net Installation Cost (\$):	\$15,200
Total Energy Savings (\$ / yr):	\$759
Estimated ECM Lifetime (yrs):	25
Simple Lifetime Energy Savings (\$):	\$18,975
Simple Payback (yrs):	20
Simple Return on Investment:	(-1.4 %)

ECM #8: Retro-Commissioning

Description:

Retro-commissioning is a quality-oriented process for verifying and documenting that HVAC systems perform as closely as possible to defined performance criteria. The benefits include documenting accurately the existing system's function and performance; Verifying that system performance meets the facility's requirements; benchmarking the performance of existing systems for future changes; and identifying problems in the system.

The cost of retro-commissioning of the public works facility is between \$0.15 and \$0.30 per Square Foot (Source: Thorne & Nadel "Retro-Commissioning: Program Strategies To Capture Energy Savings in Existing Buildings (2003)" – average Retro-Commissioning costs of \$0.22 in TX, TN, CO, MA, AZ, OR, CA).

The energy savings from retro-commissioning critical systems such as HVAC and power systems is approximately 5% of the total energy used (Source: E. Mills et al, "Cost-effectiveness of Commissioning 224 Buildings across 21 states – 2004").

Energy Savings Calculations:

Estimated Cost of Retro-Commissioning = $\$0.30 \times 7200 \text{ SF} = \$2,160$

Estimated Energy Savings = $5\% \times \$12,876 = \643.80

Energy Savings Summary:

ECM #8 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$2,160
NJ Smart Start Equipment Incentive (\$):	(\$0)
Maintenance Savings (\$):	(\$0)
Net Installation Cost (\$):	\$2,160
Total Energy Savings (\$ / yr):	\$644
Estimated ECM Lifetime (yrs):	N/A
Simple Lifetime Energy Savings (\$):	N/A
Simple Payback (yrs):	3.4
Simple Return on Investment:	29.4 %

* N/A Not Applicable

VIII. 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. CEG has assessed the feasibility of installing renewable energy technologies for the Winslow Township Annex Building, and concluded that there is no potential for roof mounted solar energy generation.

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which will be mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). The state of NJ has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit is around \$350, this value was used in our financial calculations. This equates to \$0.35 per kWh generated.

CEG has reviewed the existing roof area of the building being audited for the purposes of determining a potential for a roof mounted photovoltaic system. Due to the limited pitched roof area facing south and the extensive tree shading it is our opinion that a roof mounted system is not plausible for a PV system on the Annex Building. An illustration of the building, orientation, pitched roof direction, and the adjacent areas, are shown in Appendix F.

Wind energy production is another option available through the Renewable Energy Incentive Program. Small wind turbines can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage. CEG has reviewed the applicability of wind energy for Winslow Township and has determined it is not a viable option. Low average wind speeds for the area are not adequate for wind turbine generation. Typical wind turbines start producing energy at 8 mph wind speeds. Winslow Township averages 4 mph wind speeds making this application impractical.

IX. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

Load Profile analysis was performed to determine the seasonal energy usage of the facility. Irregularities in the load profile will indicate potential problems within the facility. Consequently based on the profile a recommendation will be made to remedy the irregularity in energy usage. For this report, the facility's energy consumption data was gathered in table format and plotted in graph form to create the load profile. Refer to Section IV, Figures 1 and 2 included within this report to reference the respective electricity and natural gas usage load profile for April 2008 through March 2009.

Electricity:

Section IV, Figure 1 demonstrates a typical cooling profile, (April –October), complimenting the heating load (November – March). It is evident that there is a significant reduction in consumption from October to December 2008 and a substantial increase from May to September 2008. The summertime load is typical, with some expected increased consumption in the June-September period. This facility currently utilizes window air-conditioning units. Base-load shaping is important because a flat consumption profiles will yield more competitive pricing.

Natural Gas:

Section IV, Figure 2 demonstrates a typical heating load (November –March), and a very complimentary cooling load (April –October). Consequently there is a clear separation between summer and winter loads consistent with energy commodity prices traded on the New York Mercantile Exchange. Heating loads carry a much higher average cost because of the higher demand for natural gas during the winter for heating. This facility is heated by a natural gas fired boiler.

Tariff Analysis:

Electricity:

The Annex Building receives electrical service from Atlantic City Electric on a MGS (Monthly General Service) and (BGS) Basic General Service rate.

MGS:

Available at any point of Company's system where facilities of adequate character and capacity exist for the entire electric service requirements of any customer delivered at one point and metered on at or compensated to the voltage of delivery. This schedule is not available to residential customers. This service has the following charges: Delivery Service Charge, Customer Charge, Single Phase Charge, Three Phase Charge, Distribution Demand Charge, Reactive Demand Charge, Distribution Rates, Non-Utility Generation Charge, Societal Benefits

Charge, Regulatory Assets Charge, Transition Bond Charge, Market Transition Charge Tax, System Control Charge, CIEP Standby Charge, Transition Enhancement Charge, Basic Generation Service Charge and Regional Greenhouse Gas Initiative Recovery Charge.

BGS:

Since the passage and implementation of the Electric Discount and Competition Act (EDECA) in 1999, there have been many changes brought about by deregulation of the electric energy industry in New Jersey. Since that time, customers in New Jersey have been able to choose their electric supplier. Customers who do not choose to switch to a Third Party Supplier (TPS), or who leave a TPS to return to their Electric Delivery Company are supplied with Basic Generation Service (BGS). BGS is the default electric supply service provided by Atlantic City Electric. The customer can elect to have the Commodity Charge serviced through the utility or by a Third Party Supplier (TPS).

While may be on a typical rate structure with the local utility some variations in price do cause some concern, and are worth investigating further. The average delivered price for this rate is above market based rates and the June – September pricing seems to be much above current market rates. Winslow should consider aggregating this electric load with its other accounts for optimum costs.

Natural Gas:

The Annex receives natural gas service through South Jersey Gas Company (SJG) on a BGSS (Basic Gas Supply Service) rate class, when not receiving commodity by a Third Party Supplier. This tariff is designed to cover SJG's cost of gas applicable to customers who purchased gas from SJG. The company earns no profit from BGSS. BGSS consists of two (2) pricing mechanisms:

1. Periodic BGSS pricing is applicable to residential customers and commercial customers who consume less than 5000 therms annually.
2. Monthly BGSS pricing is applicable to commercial and industrial customers who consume at least 5000 therms annually.

The customer can elect to have the Commodity Charge serviced through the utility or by a Third Party Supplier (TPS). It is pertinent to note, should the TPS not deliver, and the customer will receive replacement service from the utility which carries an extremely high penalty cost of service.

Imbalances can occur when Third Party Suppliers are used to supply natural gas, full-delivery is not made, and when a new supplier is contracted or the customer returns to the utility. It is important when utilizing a Third Party Supplier, that an experienced regional supplier is used. Otherwise, under delivery can occur, jeopardizing economics and scheduling.

From review of the information provided by the Annex is utilizing the services of a South Jersey Gas Company. Based on the data available, these prices can be improved by 27% by using alternative sourcing advisement.

Recommendations:

CEG recommends a global approach that will be consistent with all facilities within the Township. CEG's primary observation is seen in the electricity costs. The "Price to Compare" (comparing the utility price) per kWh (kWh, kilowatt hour is the common unit of electric measure). Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. The Township could see significant savings if it were to take advantage of these current market prices quickly, before energy increases. Based on last year's historical consumption (April – March 2009) and current electric rates, savings of over \$27,000 per year could be realized (Note: Savings were calculated using Winslow's Average Annual Consumption of 855,185 kWh and a variance of \$.0321/kWh utilizing a fixed one-year commodity contract). CEG recommends aggregating the entire electric load to gain the most optimal energy costs. CEG also recommends advisement for alternative sourcing and supply of energy on a "managed approach".

CEG's secondary recommendation coincides with the natural gas costs. CEG recognized the natural gas cost is not competitive with current market prices. Based on the current market Winslow is paying approximately \$4.12 / dth (per unit of measure) above market in the South Jersey Gas service territory or over \$13,000 / year in savings. CEG recommends further advisement on these prices. Winslow should also consider procuring energy (natural gas) on its own. CEG recommends alternative sourcing strategies.

CEG also recommends that Winslow Township schedule a meeting with their current utility providers to review their utility charges and current tariff structures for electricity and natural gas. This meeting would provide insight regarding alternative procurement options that are currently available. Through its meeting with the Local Distribution Company (LDC), the Township will learn more about the competitive supply process and can acquire a list of approved Third Party Suppliers from the New Jersey Board of Public Utilities website at www.nj.gov/bpu. They should also consider using a billing-auditing service to further analyze the utility invoices, manage the data and use the data to manage ongoing demand-side management projects. Furthermore, CEG recommends special attention to credit mechanisms, imbalances, balancing charges and commodity charges when meeting with their utility representative. In addition, Winslow should also ask the utility representative about alternative billing options. Some utilities allow for consolidated billing options when utilizing the service of a Third Party Supplier.

Finally, if the Winslow Township frequently changes its supplier for energy (natural gas), it needs to closely monitor balancing, particularly when the contract is close to termination.

X. INSTALLATION FUNDING OPTIONS

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

- i. *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.
- ii. *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.
- iii. *Power Purchase Agreement* – Public Law 2008, Chapter 3 authorizes contractor of up to fifteen (15) years for 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.

CEG 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.

XI. ADDITIONAL RECOMMENDATIONS

The following recommendations include no cost/low cost measures, Operation & Maintenance (O&M) items, and water conservation measures with attractive paybacks. These measures are not eligible for the Smart Start Buildings incentives from the office of Clean Energy but save energy none the less.

- A. Chemically clean the condenser and evaporator coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
- B. Maintain all weather stripping on windows and doors.
- C. Use cog-belts instead of v-belts on all belt-driven fans, etc. These can reduce electrical consumption of the motor by 2-5%.
- D. Reduce lighting in specified areas where the foot candle levels are above 70 in private offices and above 30 in corridor, lobbies, etc.
- E. Provide more frequent air filter changes to decrease overall fan horsepower requirements and maintain better IAQ.
- F. Recalibrate existing sensors serving the office spaces
- G. Install a Vending Miser system to turn off the vending machines in the lunch room when not in use.
- H. Clean all light fixtures to maximize light output.
- I. Confirm that outside air economizers on the rooftop units that serve the Office Areas are functioning properly to take advantage of free cooling.

APPENDIX

Electric Cost Summary

**Winslow Township
Annex Building
ATLANTIC CITY
ELECTRIC
Acct.No:0304 4079 9994**

Appendix A

Month	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Total
Last Meter Read Date	3/19/2008	4/16/2008	5/15/2008	6/17/2008	7/17/2008	8/15/2008	9/16/2008	10/17/2008	11/14/2008	12/16/2008	1/16/2009	2/17/2009	3/19/2008
Current Meter Read Date	4/16/2008	5/15/2008	6/17/2008	7/17/2008	8/15/2008	9/16/2008	10/17/2008	11/14/2008	12/16/2008	1/16/2009	2/17/2009	3/18/2009	3/18/2009
Billing Days	28	29	33	30	29	32	31	28	32	31	32	29	364
KWH	3,316	3,799	5,306	5,940	6,142	6,204	4,224	3,143	3,637	3,540	3,487	3,219	51,957
KW	14	16	21	22	22	22	17	13	13	13	13	12	22
Monthly Load Factor	36%	33%	32%	37%	40%	36%	33%	35%	37%	36%	34%	37%	36%
Electric Delivery, \$	\$198	\$231	\$278	\$277	\$287	\$286	\$196	\$134	\$150	\$153	\$147	\$135	\$2,473
Delivery \$/kwh	\$0.060	\$0.061	\$0.052	\$0.047	\$0.047	\$0.046	\$0.046	\$0.043	\$0.041	\$0.043	\$0.042	\$0.042	\$0.048
Electric Supply, \$	\$325	\$377	\$663	\$841	\$870	\$877	\$533	\$355	\$407	\$403	\$395	\$363	\$6,408
Supply \$/kwh	\$0.098	\$0.099	\$0.125	\$0.142	\$0.142	\$0.141	\$0.126	\$0.113	\$0.112	\$0.114	\$0.113	\$0.113	\$0.120
Total Cost, \$	\$523	\$608	\$941	\$1,118	\$1,157	\$1,163	\$729	\$489	\$557	\$556	\$542	\$498	\$8,882
\$/KWH	\$0.1577	\$0.1600	\$0.1773	\$0.1882	\$0.1884	\$0.1874	\$0.1726	\$0.1556	\$0.1532	\$0.1571	\$0.1555	\$0.1548	\$0.1709

Natural Gas Cost Summary

**Winslow Township
Annex Building
SOUTH JERSEY GAS
Acct. No. 219 03 1470 03**

Month	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Total
Billing Days	28	29	33	30	29	32	31	28	32	31	32	29	364
Last Meter Read Date	3/19/2008	4/16/2008	5/15/2008	6/17/2008	7/17/2008	8/15/2008	9/16/2008	10/17/2008	11/14/2008	12/16/2008	1/16/2009	2/17/2009	3/19/2008
Current Meter Read Date	4/16/2008	5/15/2008	6/17/2008	7/17/2008	8/15/2008	9/16/2008	10/17/2008	11/14/2008	12/16/2008	1/16/2009	2/17/2009	3/18/2009	3/18/2009
Gas Used per 100 cu ft	279	76	22	5	5	6	21	229	393	516	560	385	2,497
BTU Factor	1.03	1.03	1.04	1.04	1.03	1.04	1.04	1.03	1.04	1.04	1.04	1.03	1.03
Therms (Burner Tip)	288	78	23	5	5	6	22	236	407	536	580	397	2,584
Total Distribution Cost	\$134	\$50	\$30	\$21	\$20	\$22	\$28	\$114	\$187	\$244	\$269	\$189	\$1,307
Cost per Therm	\$0.465	\$0.635	\$1.308	\$4.017	\$3.913	\$3.599	\$1.293	\$0.481	\$0.458	\$0.456	\$0.464	\$0.475	\$1.464
Total Commodity Cost	\$275	\$75	\$22	\$5	\$5	\$6	\$21	\$226	\$436	\$578	\$617	\$422	\$2,687
Cost per Therm	\$0.96	\$0.96	\$0.96	\$0.96	\$0.96	\$0.95	\$0.96	\$0.96	\$1.07	\$1.08	\$1.06	\$1.06	\$0.99
Total Cost	\$409	\$125	\$52	\$26	\$25	\$28	\$49	\$340	\$623	\$822	\$885	\$611	\$3,994
Cost per Therm	\$1.42	\$1.59	\$2.27	\$4.97	\$4.87	\$4.54	\$2.25	\$1.44	\$1.53	\$1.53	\$1.53	\$1.54	\$1.55

Annex Building

CONSTRUCTION COST AND REBATES					
<u>ECM # 1 - UPGRADE FLUORESCENT LIGHTING</u>					
	<u>Qty</u>	<u>Unit Cost \$</u>	<u>Material \$</u>	<u>Labor \$</u>	<u>Total \$</u>
New T-8 Linear Fluorescent Lamps & Ballasts	1	\$1,590	\$1,590	\$3,480	\$5,070
Total Cost					\$5,070
Utility Incentive					-\$580
Total Net Cost					\$4,490
<u>ECM # 2 - INSTALL CFL LIGHTING</u>					
	<u>Qty</u>	<u>Unit Cost \$</u>	<u>Material \$</u>	<u>Labor \$</u>	<u>Total \$</u>
Compact Fluorescent	1	\$59	\$59	\$450	\$509
Total Cost					\$509
Total Net Cost					\$509
<u>ECM # 3 - INSTALL LIGHTING CONTROLS</u>					
	<u>Qty</u>	<u>Unit Cost \$</u>	<u>Material \$</u>	<u>Labor \$</u>	<u>Total \$</u>
Occupancy Sensors	13	\$75	\$975	\$0	\$975
Total Cost					\$975
Utility Incentive					-\$260
Total Net Cost					\$715
<u>ECM # 4 - REPLACE HEATING HOT WATER BOILER</u>					
	<u>Qty</u>	<u>Unit Cost \$</u>	<u>Material \$</u>	<u>Labor \$</u>	<u>Total \$</u>
Demo Existing Boiler	1	\$0	\$0	\$1,000	\$1,000
Boiler	1	\$5,000	\$5,000	\$5,000	\$10,000
Pump	1	\$500	\$500	\$1,000	\$1,500
Total Cost					\$12,500
Utility Incentive					-\$300
Total Net Cost					\$12,200
<u>ECM # 5 - DOMESTIC HOT WATER HEATER REPLACEMENT</u>					
	<u>Qty</u>	<u>Unit Cost \$</u>	<u>Material \$</u>	<u>Labor \$</u>	<u>Total \$</u>
New HWH	1	\$1,200	\$1,200	\$1,200	\$2,400
Total Cost					\$2,400
Utility Incentive					-\$50
Total Net Cost					\$2,350
<u>ECM # 6 - PROGRAMMABLE THERMOSTAT</u>					
	<u>Qty</u>	<u>Unit Cost \$</u>	<u>Material \$</u>	<u>Labor \$</u>	<u>Total \$</u>
Programmable Thermostat	6	\$100	\$600	\$600	\$1,200
Total Cost					\$1,200
Utility Incentive					\$0
Total Net Cost					\$1,200

Annex Building

<u>ECM # 7 - DOUBLE PANE INSULATING WINDOWS</u>	<u>Qty</u>	<u>Unit Cost \$</u>	<u>Material \$</u>	<u>Labor \$</u>	<u>Total \$</u>
New Windows	19	\$400	\$7,600	\$7,600	\$15,200
Total Cost					\$15,200
Utility Incentive					<u>\$0</u>
Total Net Cost					\$15,200
<u>ECM #8 - RETRO-COMMISSIONING</u>	<u>Qty</u>	<u>Unit Cost \$</u>	<u>Material \$</u>	<u>Labor \$</u>	<u>Total \$</u>
Retro-Commissioning	1	\$1,080	\$0	\$0	\$1,080
Total Cost					\$1,080
Utility Incentive					<u>\$0</u>
Total Net Cost					\$1,080

Concord Engineering Group, Inc.



520 BURNT MILL ROAD
 VOORHEES, NEW JERSEY 08043
 PHONE: (856) 427-0200
 FAX: (856) 427-6508

SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of January, 2009:

Electric Chillers

Water-Cooled Chillers	\$12 - \$170 per ton
Air-Cooled Chillers	\$8 - \$52 per ton

Gas Cooling

Gas Absorption Chillers	\$185 - \$400 per ton
Gas Engine-Driven Chillers	Calculated through custom measure path)

Desiccant Systems

	\$1.00 per cfm – gas or electric
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Electric Unitary HVAC

Unitary AC and Split Systems	\$73 - \$93 per ton
Air-to-Air Heat Pumps	\$73 - \$92 per ton
Water-Source Heat Pumps	\$81 per ton
Packaged Terminal AC & HP	\$65 per ton
Central DX AC Systems	\$40- \$72 per ton
Dual Enthalpy Economizer Controls	\$250

Ground Source Heat Pumps

Closed Loop & Open Loop	\$370 per ton
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Gas Heating

Gas Fired Boilers < 300 MBH	\$300 per unit
Gas Fired Boilers ≥ 300 - 1500 MBH	\$1.75 per MBH
Gas Fired Boilers ≥1500 - ≤ 4000 MBH	\$1.00 per MBH
Gas Fired Boilers > 4000 MBH	(Calculated through Custom Measure Path)
Gas Furnaces	\$300 - \$400 per unit

Variable Frequency Drives

Variable Air Volume	\$65 - \$155 per hp
Chilled-Water Pumps	\$60 per hp
Compressors	\$5,250 to \$12,500 per drive

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons	\$50 per unit
Gas-Fired Water Heaters >50 gallons	\$1.00 - \$2.00 per MBH
Gas-Fired Booster Water Heaters	\$17 - \$35 per MBH

Premium Motors

Three-Phase Motors	\$45 - \$700 per motor
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Prescriptive Lighting

T-5 and T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 - \$30 per fixture, (depending on quantity)
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start	\$25 per fixture
LED Exit Signs	\$10 - \$20 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$284 per fixture

Lighting Controls – Occupancy Sensors

Wall Mounted	\$20 per control
Remote Mounted	\$35 per control
Daylight Dimmers	\$25 per fixture
Occupancy Controlled hi- low Fluorescent Controls	\$25 per fixture controlled

Lighting Controls – HID or Fluorescent Hi-Bay Controls

Occupancy hi-low	\$75 per fixture controlled
Daylight Dimming	\$75 per fixture controlled

Other Equipment Incentives

Performance Lighting	\$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2004 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive

Winslow Township Annex Building

TAG	MAKE	MODEL	TYPE	CAPACITY	EFFICIENCY	SERVES	LOCATION	REMAINING USEFUL LIFE	NOTES
B-1	H B SMITH	GB100-W-12-HSID	GAS-FIRED BOILER	275 MBH INPUT, 229 MBH OUTPUT	83.3%	ENTIRE BUILDING	BOILER ROOM	5 YEARS	WITH VENT DAMPER
HWP-1	TACO	007-F5	IN-LINE CIRCULATOR	1/25 HP	UNKNOWN	ENTIRE BUILDING	BOILER ROOM	2 YEARS	SIX SOLENOID TYPE ZONE VALVES
EX-1	UNKNOWN	14 INCH	WALL MOUNTED PROPELLER FAN	UNKNOWN	UNKNOWN	MENS ROOM	IN OUTSIDE WALL	0 YEARS	OUT OF ORDER, NEEDS REPLACEMENT
EX-2	UNKNOWN	14 INCH	WALL MOUNTED PROPELLER FAN	UNKNOWN	UNKNOWN	WOMENS ROOM	IN OUTSIDE WALL	0 YEARS	OUT OF ORDER, NEEDS REPLACEMENT
DHW-1	BRADFORD WHITE	MI40356FBN4	GAS FIRED WITH STORAGE	40 MBH, 40 GALLON	83%	ENTIRE BUILDING	BOILER ROOM	10 YEARS	NATURAL GAS

CEG Project #: BS09-011
Project Name : MUNICIPAL ANNEX BLDG.
Address: 402 TANSBORO ROAD
City, State: Berlin, NJ
Building SF: 4000

CONCORD ENERGY SERVICES

kwh Cost 0.17

Existing Lighting Fixture Type	Room Name	Existing Fixtures						Proposed Fixtures						Fixtures Retrofitted						Unit Installation Cost				Rebate Estimate	Simple Payback			
		Lighting Fixture Description	Lamps per Fixture	Voltage	Watts	Qty of Fixtures	Total Watts	New Lighting Fixture Type	Existing/Replace	Description	Lamps per Fixture	Watts	Qty of Fixtures	Total Watts	Wattage Reduction	Average Burn Hours	Ave \$/kwh	Energy Savings, kWh	Energy Savings, \$	Qty	Material Each	Labor Each	Total Each			Total Materials	Total Labor	Total All
Basement																												
A	Hall Area	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	8	1232	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	8	768	464	2500	\$0.17	1,160	\$197.20	8	27.88	60	\$87.88	\$223.04	\$480.00	\$703.04	\$80.00	3.2
H	Hall Area (by kitchen)	3L-T12-40W 2'x4' Recessed Troffer	3	120	115	1	115	NH	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	3	72	1	72	43	2500	\$0.17	108	\$18.28	1	25.38	60	\$85.38	\$25.38	\$60.00	\$85.38	\$10.00	4.1
I	Hall Area (by kitchen)	2L-T12-40W 2'x4' Recessed Troffer	2	120	77	2	154	NI	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	2	48	2	96	58	2500	\$0.17	145	\$24.65	2	22.88	60	\$82.88	\$45.76	\$120.00	\$165.76	\$20.00	5.9
B	Boiler Room	1L-75w A-Lamp Wall Fixture	1	120	75	2	150	NB	Relamp	1L-CFL-26w Med base	1	28	2	56	94	1000	\$0.17	94	\$15.98	2	4.55	37.5	\$42.05	\$9.10	\$75.00	\$84.10	\$0.00	5.3
C	Mens Toilet Room	1L-60w A-Lamp Ceiling Fixture	1	120	60	1	60	NC	Relamp	1L-CFL-26w Med base	1	28	1	28	32	1500	\$0.17	48	\$8.16	1	4.55	37.5	\$42.05	\$4.55	\$37.50	\$42.05	\$0.00	5.2
C	Closet (Adjacent to Mens Toilet Rm)	1L-60w A-Lamp Ceiling Fixture	1	120	60	1	60	NC	Relamp	1L-CFL-26w Med base	1	28	1	28	32	1000	\$0.17	32	\$5.44	1	4.55	37.5	\$42.05	\$4.55	\$37.50	\$42.05	\$0.00	7.7
D	Closet (Adjacent to Womens Toilet Rm)	1L-60w A-Lamp Wall Fixture	1	120	60	1	60	ND	Relamp	1L-CFL-26w Med base	1	28	1	28	32	1000	\$0.17	32	\$5.44	1	4.55	37.5	\$42.05	\$4.55	\$37.50	\$42.05	\$0.00	7.7
C	Womens Toilet Room	1L-60w A-Lamp Ceiling Fixture	1	120	60	1	60	NC	Relamp	1L-CFL-26w Med base	1	28	1	28	32	1000	\$0.17	32	\$5.44	1	4.55	37.5	\$42.05	\$4.55	\$37.50	\$42.05	\$0.00	7.7
E	Records Office	4L-T8-40W 2'x4' Recessed Troffer	4	120	96	2	192	NE	Existing to Remain	Existing to Remain	4	96	2	192	0	8760	\$0.17	0	\$0.00	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
E	Records Room (caged area)	4L-T8-40W 2'x4' Recessed Troffer	4	120	96	5	480	NE	Existing to Remain	Existing to Remain	4	96	5	480	0	0	\$0.17	0	\$0.00	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
E	Records Room (open area)	4L-T8-40W 2'x4' Recessed Troffer	4	120	96	2	192	NE	Existing to Remain	Existing to Remain	4	96	2	192	0	8750	\$0.17	0	\$0.00	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
A	Records Room (by exterior door)	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	1	154	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	1	96	58	2000	\$0.17	116	\$19.72	1	27.88	60	\$87.88	\$27.88	\$60.00	\$87.88	\$10.00	3.9
F	Electrical Closet	2L-60w A-Lamp Ceiling Fixture	2	120	120	1	120	NF	Relamp	2L-CFL-18w Med base	2	38	1	38	82	1000	\$0.17	82	\$13.94	1	9	37.5	\$46.50	\$9.00	\$37.50	\$46.50	\$0.00	3.3
E	OEM Office	4L-T8-40W 2'x4' Recessed Troffer	4	120	96	4	384	NE	Existing to Remain	Existing to Remain	4	96	4	384	0	0	\$0.17	0	\$0.00	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
G	OEM Office Closet	2L-T8-U-32W 2'x2' Recessed Troffer	2	120	48	1	48	NG	Existing to Remain	Existing to Remain	2	48	1	48	0	0	\$0.17	0	\$0.00	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	
A	Kitchen	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	2	308	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	2	192	116	2500	\$0.17	290	\$49.30	2	27.88	60	\$87.88	\$55.76	\$120.00	\$175.76	\$20.00	3.2
Total Basement						35	3769				35	2726	1043				2,139	\$363.55	21			\$414	\$1,103	\$1,517	\$140	3.8		
First Floor																												
A	Construction office (public side)	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	8	1232	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	8	768	464	2500	\$0.17	1,160	\$197.20	8	27.88	60	\$87.88	\$223.04	\$480.00	\$703.04	\$80.00	3.2
A	Construction office (staff)	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	10	1540	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	10	960	580	2500	\$0.17	1,450	\$246.50	10	27.88	60	\$87.88	\$278.80	\$600.00	\$878.80	\$100.00	3.2
A	Construction Official Office	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	2	308	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	2	192	116	2500	\$0.17	290	\$49.30	2	27.88	60	\$87.88	\$55.76	\$120.00	\$175.76	\$20.00	3.2
B	Construction Office Closet	1L-75w A-Lamp Wall Fixture	1	120	75	1	75	NB	Relamp	1L-CFL-26w Med base	1	28	1	28	47	1000	\$0.17	47	\$7.99	1	4.55	37.5	\$42.05	\$4.55	\$37.50	\$42.05	\$0.00	5.3
J	Construction Office (Mens Room)	2L-T12-U-35W 2'x2' Recessed Troffer (parabolic lens)	2	120	74	1	74	NJ	Relamp, Reballast	32w-T8-Uenergy saver w/ electronic T8 High Efficiency ballast	2	48	1	48	26	1000	\$0.17	26	\$4.42	1	22.88	60	\$82.88	\$22.88	\$60.00	\$82.88	\$10.00	16.5
J	Construction Office (Womens Room)	2L-T12-U-35W 2'x2' Recessed Troffer (parabolic lens)	2	120	74	1	74	NJ	Relamp, Reballast	32w-T8-Uenergy saver w/ electronic T8 High Efficiency ballast	2	48	1	48	26	1000	\$0.17	26	\$4.42	1	22.88	60	\$82.88	\$22.88	\$60.00	\$82.88	\$10.00	16.5
A	Lobby Area	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	5	770	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	5	480	290	2500	\$0.17	725	\$123.25	5	27.88	60	\$87.88	\$139.40	\$300.00	\$439.40	\$50.00	3.2
A	Tax Assessor Staff	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	8	1232	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	8	768	464	2500	\$0.17	1,160	\$197.20	8	27.88	60	\$87.88	\$223.04	\$480.00	\$703.04	\$80.00	3.2
B	Tax Assessor Closet	1L-75w A-Lamp Wall Fixture	1	120	75	1	75	NB	Relamp	1L-CFL-26w Med base	1	28	1	28	47	1000	\$0.17	47	\$7.99	1	4.55	37.5	\$42.05	\$4.55	\$37.50	\$42.05	\$0.00	5.3
J	Tax Assessor Bathroom	2L-T12-U-35W 2'x2' Recessed Troffer (parabolic lens)	2	120	74	1	74	NJ	Relamp, Reballast	32w-T8-Uenergy saver w/ electronic T8 High Efficiency ballast	2	48	1	48	26	2500	\$0.17	65	\$11.05	1	22.88	60	\$82.88	\$22.88	\$60.00	\$82.88	\$10.00	6.6
A	Tax Assessor's Office	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	2	308	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	2	192	116	2500	\$0.17	290	\$49.30	2	27.88	60	\$87.88	\$55.76	\$120.00	\$175.76	\$20.00	3.2
A	Corridor (adjacent to Conf room)	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	2	308	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	2	192	116	2500	\$0.17	290	\$49.30	2	27.88	60	\$87.88	\$55.76	\$120.00	\$175.76	\$20.00	3.2
A	Conference Room	4L-T12-40W 2'x4' Recessed Troffer	4	120	154	2	308	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	2	192	116	1000	\$0.17	116	\$19.72	2	27.88	60	\$87.88	\$55.76	\$120.00	\$175.76	\$20.00	7.9

Existing Lighting Fixture Type	Room Name	Existing Fixtures						Proposed Fixtures						Fixtures Retrofitted						Unit Installation Cost						Rebate Estimate	Simple Payback	
		Lighting Fixture Description	Lamps per Fixture	Voltage	Watts	Qty of Fixtures	Total Watts	New Lighting Fixture Type	Existing/Replace	Description	Lamps per Fixture	Watts	Qty of Fixtures	Total Watts	Wattage Reduction	Average Burn Hours	Ave \$/kwh	Energy Savings, kWh	Energy Savings, \$	Qty	Material Each	Labor Each	Total Each	Total Materials	Total Labor			Total All
A	Home Inspection Office	4L-T12-40W 2x4' Recessed Troffer	4	120	154	2	308	NA	Relamp, Reballast	32w-T8 energy saver w/ electronic T8 High Efficiency ballast	4	96	2	192	116	2500	\$0.17	290	\$49.30	2	27.88	60	\$87.88	\$55.76	\$120.00	\$175.76	\$20.00	3.2
B	Home Inspection Office Closet	1L-75w A-Lamp Wall Fixture	1	120	75	1	75	NB	Relamp	1L-CFL-26w Med base	1	28	1	28	47	1000	\$0.17	47	\$7.99	1	4.55	37.5	\$42.05	\$4.55	\$37.50	\$42.05	\$0.00	5.3
K	Exterior Front Entrance	1L-MH 70w Wall Pack Fixture	1	120	70	2	140	NK	Existing to Remain	Existing to Remain	1	70	2	140	0	2500	\$0.17	0	\$0.00	0	0	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	5.3
B	Exterior Side Entrance	1L-75w A-Lamp Wall Fixture	1	120	75	1	75	NB	Relamp	1L-CFL-26w Med base	1	28	1	28	47	1000	\$0.17	47	\$7.99	1	4.55	37.5	\$42.05	\$4.55	\$37.50	\$42.05	\$0.00	5.3
B	Corridor Closet	1L-75w A-Lamp Wall Fixture	1	120	75	1	75	NB	Relamp	1L-CFL-26w Med base	1	28	1	28	47	2500	\$0.17	118	\$19.98	1	4.55	37.5	\$42.05	\$4.55	\$37.50	\$42.05	\$0.00	2.1
Total First Floor						51	7051					51	4360	2691				6,194	\$1,052.90	49			\$1,234	\$2,828	\$4,062	\$440	3.4	



Winslow Township Annex Building
402 Tansboro Road
Berlin, NJ 08009

← North



STATEMENT OF ENERGY PERFORMANCE

Annex Building

Building ID: 1784022
For 12-month Period Ending: February 28, 2009¹
Date SEP becomes ineligible: N/A

Date SEP Generated: July 17, 2009

Facility
 Annex Building
 402 Tansboro Road
 Berlin, NJ 08009

Facility Owner
 N/A

Primary Contact for this Facility
 N/A

Year Built: 1945
Gross Floor Area (ft²): 7,200

Energy Performance Rating² (1-100) 58

Site Energy Use Summary³

Electricity (kBtu)	170,217
Natural Gas (kBtu) ⁴	232,848
Total Energy (kBtu)	403,065

Energy Intensity⁵

Site (kBtu/ft ² /yr)	59
Source (kBtu/ft ² /yr)	119

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	38
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Electric Distribution Utility

Atlantic City Electric Co

National Average Comparison

National Average Site EUI	65
National Average Source EUI	131
% Difference from National Average Source EUI	-9%
Building Type	Office

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Meets Industry Standards⁶ for Indoor Environmental Conditions:

Ventilation for Acceptable Indoor Air Quality	N/A
Acceptable Thermal Environmental Conditions	N/A
Adequate Illumination	N/A

Certifying Professional
 N/A

Notes:

1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.

NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Building Name	Annex Building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		<input type="checkbox"/>
Type	Office	Is this an accurate description of the space in question?		<input type="checkbox"/>
Location	402 Tansboro Road, Berlin, NJ 08009	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		<input type="checkbox"/>
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		<input type="checkbox"/>
Annex (Office)				
CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	<input checked="" type="checkbox"/>
Gross Floor Area	7,200 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		<input type="checkbox"/>
Weekly operating hours	40 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		<input type="checkbox"/>
Workers on Main Shift	15	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		<input type="checkbox"/>
Number of PCs	10	Is this the number of personal computers in the Office?		<input type="checkbox"/>
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		<input type="checkbox"/>
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		<input type="checkbox"/>

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Atlantic City Electric Co

Fuel Type: Electricity		
Meter: Electric (kWh)		
Space(s): Entire Facility		
Start Date	End Date	Energy Use (kWh)
01/19/2009	02/18/2009	3,487.00
12/19/2008	01/18/2009	3,540.00
11/19/2008	12/18/2008	3,637.00
10/19/2008	11/18/2008	3,143.00
09/19/2008	10/18/2008	4,224.00
08/19/2008	09/18/2008	6,204.00
07/19/2008	08/18/2008	6,142.00
06/19/2008	07/18/2008	5,940.00
05/19/2008	06/18/2008	5,306.00
04/19/2008	05/18/2008	3,799.00
03/19/2008	04/18/2008	3,316.00
Electric Consumption (kWh)		48,738.00
Electric Consumption (kBtu)		166,294.06
Total Electricity Consumption (kBtu)		166,294.06
Is this the total Electricity consumption at this building including all Electricity meters?		<input type="checkbox"/>

Fuel Type: Natural Gas		
Meter: Gas (therms)		
Space(s): Entire Facility		
Start Date	End Date	Energy Use (therms)
01/19/2009	02/18/2009	580.16
12/19/2008	01/18/2009	535.61
11/19/2008	12/18/2008	407.15
10/19/2008	11/18/2008	236.33
09/19/2008	10/18/2008	21.76
08/19/2008	09/18/2008	6.17
07/19/2008	08/18/2008	5.16
06/19/2008	07/18/2008	5.19
05/19/2008	06/18/2008	23.04
04/19/2008	05/18/2008	78.36

03/19/2008	04/18/2008	287.65
Gas Consumption (therms)		2,186.58
Gas Consumption (kBtu)		218,658.00
Total Natural Gas Consumption (kBtu)		218,658.00
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		<input type="checkbox"/>

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	<input type="checkbox"/>

Certifying Professional

(When applying for the ENERGY STAR, this must be the same PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

APPENDIX G

PG 4 OF 5

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA. PG 5 OF 5

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Annex Building
402 Tansboro Road
Berlin, NJ 08009

Facility Owner
N/A

Primary Contact for this Facility
N/A

General Information

Annex Building	
Gross Floor Area Excluding Parking: (ft ²)	7,200
Year Built	1945
For 12-month Evaluation Period Ending Date:	February 28, 2009

Facility Space Use Summary

Annex	
Space Type	Office
Gross Floor Area(ft ²)	7,200
Weekly operating hours	40
Workers on Main Shift	15
Number of PCs	10
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

Performance Metrics	Evaluation Periods		Comparisons		
	Current (Ending Date 02/28/2009)	Baseline (Ending Date 02/28/2009)	Rating of 75	Target	National Average
Energy Performance Rating	58	58	75	N/A	50
Energy Intensity					
Site (kBtu/ft ²)	59	59	48	N/A	65
Source (kBtu/ft ²)	119	119	97	N/A	131
Energy Cost					
\$/year	\$ 12,163.03	\$ 12,163.03	\$ 9,897.31	N/A	\$ 13,383.67
\$/ft ² /year	\$ 1.69	\$ 1.69	\$ 1.38	N/A	\$ 1.86
Greenhouse Gas Emissions					
MtCO ₂ e/year	38	38	31	N/A	42
kgCO ₂ e/ft ² /year	5	5	4	N/A	6

More than 50% of your building is defined as Office. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:

- o - This attribute is optional.
- d - A default value has been supplied by Portfolio Manager.