NORTH BRUNSWICK TOWNSHIP
PUBLIC SCHOOL DISTRICT

BUILDINGS AND GROUNDS OFFICE

300 OLD GEORGES ROAD
NORTH BRUNSWICK, NJ 08902

FACILITY ENERGY REPORT

TABLE OF CONTENTS

I. HISTORIC ENERGY CONSUMPTION/COST

The energy usage for the facility has been tabulated and plotted in graph form as depicted within this section. Each energy source has been identified and monthly consumption and cost noted per the information provided by the Owner.

Electric Utility Provider:	Public Service Electric & Gas
Electric Utility Rate Structure:	General Lighting & Power (GLP)
Third Party Supplier:	South Jersey Energy Company

Natural Gas Utility Provider:	Public Service Electric & Gas
Utility Rate Structure:	Large Volume Gas (LVG)
Third Party Supplier:	None

The electric usage profile represents the actual electrical usage for the facility. The electric utility measures consumption in kilowatt-hours (KWH) and maximum demand in kilowatts (KW). One KWH usage is equivalent to 1000 watts running for one hour. One KW of electric demand is equivalent to 1000 watts running at any given time. 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 historical data received for the facility.

The gas usage profile within each facility report shows the actual natural gas energy usage for the facility. The gas utility measures consumption in cubic feet x 100 (CCF), and converts the quantity into Therms of energy. One Therm is equivalent to 100,000 BTUs of energy.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: PSE&G
Rate: GLP
Meter No: 728012185
Account # E 65-850-044-18
Third Party Utility Provider: South Jersey Energy Company
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Aug-11	2,640	18.0	$568
Sep-11	3,600	13.0	$513
Oct-11	4,000	14.0	$569
Nov-11	3,680	14.0	$529
Dec-11	10,400	20.0	$1,413
Jan-12	6,960	19.0	$972
Feb-12	4,960	18.0	$714
Mar-12	4,080	14.0	$581
Apr-12	2,960	14.0	$429
May-12	3,440	16.0	$661
Jun-12	4,000	20.0	$787
Jul-12	3,840	17.0	$727
Totals	**54,560**	**20.0 Max**	**$8,463**

AVERAGE DEMAND **16.4 KW average**
AVERAGE RATE **$0.155 $/kWh**

Figure 1
Electricity Usage Profile

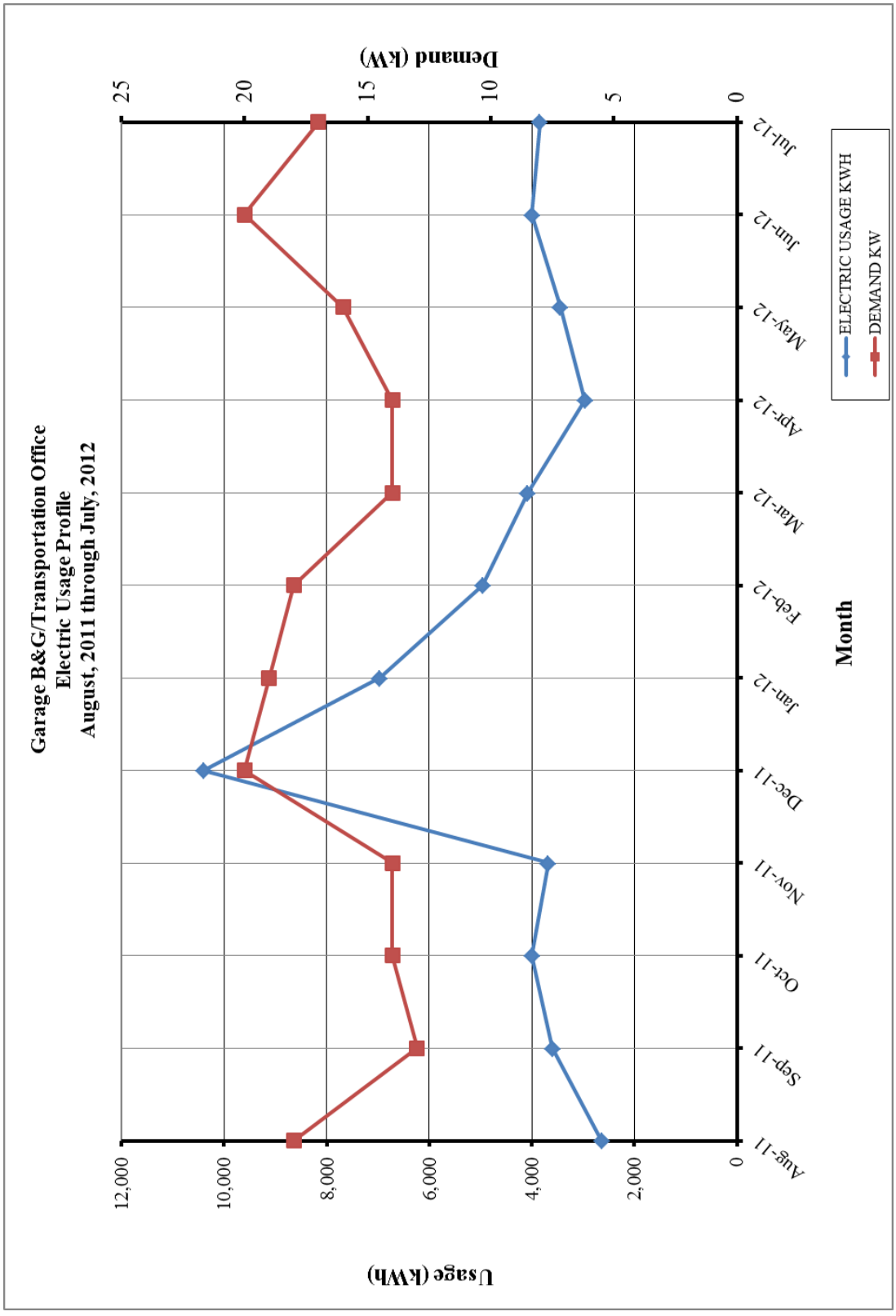
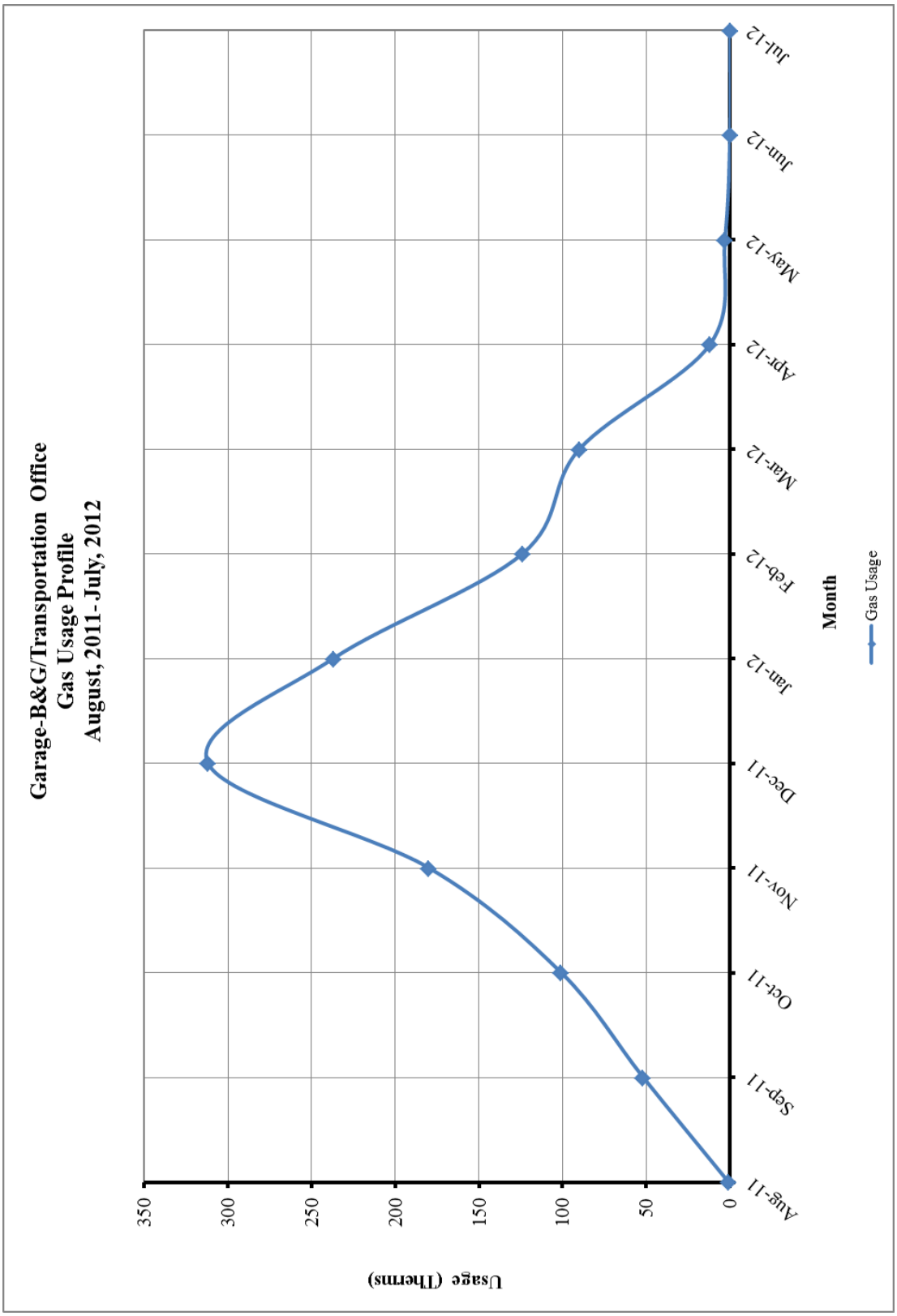


Table 4
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G		
Rate: GSG		
Meter No: 3151764		
Point of Delivery ID: G 65-850-044-18		
Third Party Utility Provider: N/A		
TPS Meter No: N/A		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Aug-11	1.00	$11.76
Sep-11	52.00	$59.90
Oct-11	101.00	$113.99
Nov-11	180.00	$194.82
Dec-11	312.00	$324.16
Jan-12	237.00	$233.92
Feb-12	124.00	$124.50
Mar-12	90.00	$82.66
Apr-12	12.00	$17.60
May-12	3.00	$13.34
Jun-12	0.00	$10.76
Jul-12	0.00	$10.76
TOTALS	**1,112.00**	**$1,198.17**
AVERAGE RATE:	**$1.08**	**$/THERM**

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The North Brunswick Township Buildings and Grounds office is located at 300 Old Georges Road in North Brunswick, New Jersey. The 2,688 SF building was renovated in 2004 to create office space for the buildings and grounds staff. The building also houses garage space used for the maintenance of the school district's fleet of vehicles. The building is a warehouse type of building with a portion of it converted into office space.

Occupancy Profile

The typical hours of operation for Administrative Building are Monday through Friday between 7:30 am and 6:00 pm. The building has a total occupancy of approximately 10 people.

Building Envelope

Exterior walls for the Buildings and Grounds office are prefabricated walls with metal siding. The amount of insulation within the walls is unknown. The windows on the office side of the building are double pane, ¼" clear glass with aluminum frames. Blinds are utilized on all of the windows per occupant comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat gain in the summer. The roof is a pitched, standing seam metal roof. The amount of insulation below the roof is unknown.

HVAC Systems

The garage area is heated by two Reznor unit heaters and ventilated by one exhaust fan. Air is made up by leaving the garage doors open. This space is not cooled.

The office area is heated and cooled by two packaged units located outside on grade. These units are International Comfort Products model PGMF60H150E and PGMG75H150D units that have a heating input rating of 150 MBH and an output rating of 119 MBH. These units also provide 5 and 6 tons of cooling capacity.

Exhaust System

Air is exhausted from the toilet rooms through roof exhausters.

HVAC System Controls

The buildings and grounds building is controlled by individual programmable thermostats.

Domestic Hot Water

The main source of domestic hot water for the building is a GE Smartwater electric water heater with an integrated storage capacity of 30 gallons.

Lighting

Refer to the Investment Grade lighting Audit Appendix for a detailed list of the lighting throughout the facility and estimated operating hours per space.

III. MAJOR EQUIPMENT LIST

The equipment list contains major energy consuming equipment that through implementation of energy conservation measures could yield substantial energy savings. 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 in some cases if a manufactures 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.

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

IV. ENERGY CONSERVATION MEASURES

Energy Conservation Measures are developed specifically for this facility. The energy savings and calculations are highly dependent on the information received from the site survey and interviews with operations personnel. The assumptions and calculations should be reviewed by the owner to ensure accurate representation of this facility. The following ECMs were analyzed:

Table 1
ECM Financial Summary

ENERGY CONSERVATION MEASURES (ECM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST[A]**	**ANNUAL SAVINGS[B]**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
ECM #1	Lighting Upgrade General	$5,960	$1,294	4.6	225.7%
ECM #2	Lighting Controls Upgrade	$1,915	$541	3.5	323.8%
ECM #3	Unit Heater Upgrade	$4,660	$231	20.2	-25.6%
ECM #4	Dual Enthalpy Economizer Controls	$3,000	$531	5.6	165.5%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	15.75 kW Solar Array	$92,371	$6,201	14.9	0.7%

Notes: A. Cost takes into consideration applicable NJ Smart StartTM incentives.
B. Savings takes into consideration applicable maintenance savings.

Table 2
ECM Energy Summary

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
ECM #1	Lighting Upgrade General	2.4	8,349	0
ECM #2	Lighting Controls Upgrade	0	3,491	0
ECM #3	Unit Heater Upgrade	0.0	0	214
ECM #4	Dual Enthalpy Economizer Controls	10.9	21,837	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	**DESCRIPTION**	**ANNUAL UTILITY REDUCTION**		
		ELECTRIC DEMAND (KW)	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
REM #1	15.75 kW Solar Array	15.7	17,919	0

Table 3
Facility Project Summary

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL PROJECT					
ENERGY CONSERVATION MEASURES	**ANNUAL ENERGY SAVINGS ($)**	**PROJECT COST ($)**	**SMART START INCENTIVES**	**CUSTOMER COST**	**SIMPLE PAYBACK**
Lighting Upgrade General	$1,294	$5,960	$0	$5,960	4.6
Lighting Controls Upgrade	$541	$2,050	$135	$1,915	3.5
Unit Heater Upgrade	$231	$4,660	$0	$4,660	20.2
Dual Enthalpy Economizer Controls	$531	$3,000	$0	$3,000	5.6
Design / Construction Extras (15%)	*$0*	*$2,351*	*$0*	*$2,351*	
Total Project	**$2,597**	**$18,021**	**$135**	**$17,886**	**7**

Design / Construction Extras is shown as an additional cost for the facility project summary. This cost is included to estimate the costs associated with construction management fees for a larger combined project.

ECM #1: Lighting Upgrade – General

Description:

The majority of the interior lighting throughout Buildings and Grounds Office Space is provided with fluorescent fixtures with 32W T8 lamps and electronic ballasts. In the garage area, the lighting is predominantly provided by 400 watt metal halide fixtures, but there are also a number of older and outdated fixtures with T12 lamps and magnetic ballasts. It is recommended to replace all of the metal halide fixtures with T5HO fixtures with electronic ballasts and all of the T12 fixtures with higher efficiency fluorescent T8 fixtures with electronic ballasts.

This ECM includes retrofit of all older fluorescent fixtures with T8 or T5 fluorescent fixtures with electronic ballasts in the building. The new, energy efficient T8 fixtures will provide adequate lighting and will save on electrical costs due to better performance of the lamp and ballasts.

The ECM also includes replacement of any incandescent lamps with compact fluorescent lamps. Compact fluorescent lamps (CFL's) were designed 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 26-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. Where the existing fixture is controlled by a dimmer switch, the CFL bulb must be compatible with a dimmer switch. In some locations the bulb replacement will need to be tested to make sure the larger base of the CFL will fit into the existing fixture. The energy usage of an incandescent compared to a compact fluorescent is approximately 3 to 4 times greater. In addition to the energy savings, compact fluorescent fixtures burn-hours are 8 to 15 times longer than incandescent fixtures ranging from 6,000 to 15,000 burn-hours compared to incandescent fixtures ranging from 750 to 1000 burn-hours. However, the maintenance savings due to reduced lamp replacement is offset by the higher cost of the CFL's compared to the incandescent lamps.

Energy Savings Calculations:

The **Investment Grade Lighting Audit Appendix** outlines the hours of operation, proposed retrofits, costs, savings, and payback periods for each set of fixtures in the building.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,960
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$5,960
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,294
Total Yearly Savings ($/Yr):	$1,294
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.6
Simple Lifetime ROI	225.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$19,410
Internal Rate of Return (IRR)	20%
Net Present Value (NPV)	$9,487.69

ECM #2: Lighting Controls Upgrade – Occupancy Sensors

Description:

Some of the lights in the Buildings and Grounds Office are left on unnecessarily. In many cases the lights are left on because of the inconvenience to manually switch lights off when a room is left or on when a room is first occupied. This is common in rooms that are occupied for only short periods and only a few times per day. In some instances lights are left on due to the misconception that it is better to keep the lights on rather than to continuously switch lights on and off. Although increased switching reduces lamp life, the energy savings outweigh the lamp replacement costs. The payback timeframe for when to turn the lights off is approximately two minutes. If the lights are expected to be off for at least a two minute interval, then it pays to shut them off.

Lighting controls come in many forms. Sometimes an additional switch is adequate to provide reduced lighting levels when full light output is not needed. Occupancy sensors detect motion and will switch the lights on when the room is occupied. Occupancy sensors can either be mounted in place of a current wall switch, or on the ceiling to cover large areas.

The U.S. Department of Energy sponsored a study to analyze energy savings achieved through various types of building system controls. The referenced savings is based on the "Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways," document posted for public use April 2005. The study has found that commercial buildings have the potential to achieve significant energy savings through the use of building controls. The average energy savings are as follows based on the report:

- Occupancy Sensors for Lighting Control 20% - 28% energy savings.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 20% of the total light energy controlled by occupancy sensors (The majority of the savings is expected to be after school hours when rooms are left with lights on)

This ECM includes installation of ceiling or switch mount sensors for individual offices, classrooms, large bathrooms, and Media Centers. Sensors shall be manufactured by Sensorswitch, Watt Stopper or equivalent. The **Investment Grade Lighting Audit Appendix** of this report includes the summary of lighting controls implemented in this ECM and outlines the proposed controls, costs, savings, and payback periods. The calculations adjust the lighting power usage by the applicable percent savings for each area that includes lighting controls.

Energy Savings Calculations:

$$\text{Energy Savings} = \left(\%\ \text{Savings} \times \text{Controlled Light Energy}\ \left(\text{kWh/Yr}\right)\right)$$

$$\text{Savings.} = \text{Energy Savings}\left(\text{kWh}\right) \times \text{Ave Elec Cost}\left(\frac{\$}{\text{kWh}}\right)$$

Rebates and Incentives:

From the **NJ Smart Start® Program Incentives Appendix**, the installation of a lighting control device warrants the following incentive:

Smart Start Incentive
= (# Wall mount sensors × $20 per sensor)
+ (# Ceiling mount sensors × $35 per sensor)

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$2,050
NJ Smart Start Equipment Incentive ($):	$135
Net Installation Cost ($):	$1,915
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$541
Total Yearly Savings ($/Yr):	$541
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.5
Simple Lifetime ROI	323.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$8,115
Internal Rate of Return (IRR)	28%
Net Present Value (NPV)	$4,543.42

ECM #3: Infra-Red Radiant Unit Heater in Garage

Description:

The Buildings and Grounds Office for the North Brunswick Township School District (2,688 SF) has several offices and a garage containing two (2) gas fired unit heaters mounted from the ceiling steel structure. These unit heaters are approaching their ASHRAE service life and are rated at approximately 40,000 Btuh output each. These units are used to keep the garage at 60°F in the wintertime.

This ECM would upgrade the public works garage by installing more efficient gas-fired, infrared tube heaters rated at 100% thermal efficiency. When compared to convective heating systems, Infrared heaters provide more efficient heating in large areas and warehouses because they only heat people and objects (not air).The installation will require venting and unit combustion air piping. Basis of design for replacement of the existing unit heaters with infrared tube heating is the Sterling SL150 infrared heater or equivalent.

Energy Savings Calculations:

INFRA-RED RADIANT UNIT HEATER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Unit Heaters	New Radiant Heating System	-
Existing Nat Gas (Therms)	698	-	-
Efficiency (%)	78%	90%	12%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	-
Equivalent Building Heat Usage (MMBTUs)	54	54	-
Ave. Gas Cost ($/Therm)	1.08	1.08	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	698	484	214
Energy Cost ($)	$754	$523	$231
COMMENTS:			

NJ Smart Start® Program Incentives are not currently available for this ECM.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,660
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$4,660
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$231
Total Yearly Savings ($/Yr):	$231
Estimated ECM Lifetime (Yr):	15
Simple Payback	20.2
Simple Lifetime ROI	-25.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$3,465
Internal Rate of Return (IRR)	-3%
Net Present Value (NPV)	($1,902.34)

ECM #4: Dual Enthalpy Economizer Controls

Description:

The existing ICP rooftop units that serve the office area currently are not fitted with economizer controls. Economizer controls compare outside to indoor conditions and if the enthalpy and temperature are such that a "free cooling" mode could be utilized the economizer controls fully open the outside air dampers on the unit and circulate fresh air into the building. This results in reduced operating hours for mechanical cooling.

This ECM would install dual enthalpy economizer controls that are compatible with the ICP rooftops. These units can be field installed on the packaged units.

Energy Savings Calculations:

$$\text{Energy Savings} = \text{Operation Testing Factor} \times \text{Savings Factor} \times \text{Capacity (tons)} \times \frac{1}{EER}$$

Savings Factor = 4576 for units under 5.4 tons; and 3318 for units 5.4 tons and over

$$\text{Demand Savings} = \text{Savings}/\text{Operating Hours}$$

Operating Hours = 4,438

DUAL ENTHALPY ECONOMIZER CONTROLS CALCULATIONS			
ECM INPUTS	**RTU-1**	**RTU-2**	**TOTAL**
Quantity of Units	1	1	2
Total Cooling Capacity (Tons)	5.0	6	11
Operational Test Factor	0.8	0.8	-
Savings Factor	4,576	3,318	-
Cooling Efficiency (S/EER)	10 SEER	10 SEER	-
Economizer Operating Hours	4,438	4,438	-
Electric Rate ($/kWh)	0.155	0.155	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**RTU-1**	**RTU-2**	**TOTAL**
Demand Savings (kW)	0.4	0.4	0.8
Electric Savings (kWh)	1,830	1,593	3,423
Energy Cost ($)	$284	$247	$531
COMMENTS:			

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$3,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$3,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$531
Total Yearly Savings ($/Yr):	$531
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.6
Simple Lifetime ROI	165.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$7,965
Internal Rate of Return (IRR)	16%
Net Present Value (NPV)	$3,339.04

REM #1: 15.75 kW Solar System

Description:

The North Brunswick Buildings and Grounds Office has available roof space that could accommodate a significant amount of solar generation. Based on the available areas a 15.75 KW DC solar array could be installed, assuming the existing roof structure is capable of supporting an array. The array will produce approximately 17,919 kilowatt-hours annually that will reduce the overall electric usage of the facility by 32.84%.

Energy Savings Calculations:

See **Renewable / Distributed Energy Measures Calculations Appendix** for detailed financial summary and proposed solar layout areas. Financial results in table below are based on 100% financing of the system over a fifteen year period.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW_{DC}):	15.75
Electric Generation (KWH/Yr):	17,919
Installation Cost ($):	$92,371
SREC Revenue ($/Yr):	$3,424
Energy Savings ($/Yr):	$2,777
Total Yearly Savings ($/Yr):	$6,201
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	14.9
Analysis Period Electric Savings ($):	$51,657
Analysis Period SREC Revenue ($):	$49,601
Net Present Value (NPV)	($29,939.00)

V. 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. Clean all light fixtures to maximize light output.

D. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.

E. Turn off computers when not in use. Ensure computers are not running in screen saver mode which saves the monitor screen not energy.

F. Ensure outside air dampers are functioning properly and only open during occupied mode.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

North Brunswick Township BOE - Buildings and Grounds Office

ECM ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM NO.	DESCRIPTION	INSTALLATION COST				YEARLY SAVINGS			ECM LIFETIME	LIFETIME ENERGY SAVINGS	LIFETIME MAINTENANCE SAVINGS	LIFETIME ROI	SIMPLE PAYBACK	INTERNAL RATE OF RETURN (IRR)	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Svaing * ECM Lifetime)	(Lifetime Savings - Net Cost) / (Net Cost)	(Net cost / Yearly Savings)	$\sum_{n=0}^{N} \frac{C_n}{(1+IRR)^n}$	$\sum_{n=0}^{N} \frac{C_n}{(1+DR)^n}$
		($)	($)	($)	($)	($/Yr)	($/Yr)	($/Yr)	(Yr)	($)	($)	(%)	(Yr)	($)	($)
ECM #1	Lighting Upgrade General	$3,880	$2,080	$0	$5,960	$1,294	$0	$1,294	15	$19,410	$0	225.7%	4.6	20.36%	$9,487.69
ECM #2	Lighting Controls Upgrade	$1,650	$400	$135	$1,915	$541	$0	$541	15	$8,115	$0	323.8%	3.5	27.51%	$4,543.42
ECM #3	Unit Heater Upgrade	$2,160	$2,500	$0	$4,660	$231	$0	$231	15	$3,465	$0	-25.6%	20.2	-3.49%	($1,902.34)
ECM #4	Dual Enthalpy Economizer Controls	$3,000	$0	$0	$3,000	$531	$0	$531	15	$7,965	$0	165.5%	5.6	15.72%	$3,339.04
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	15.75 kW Solar Array	$92,371	$0	$0	$92,371	$2,777	$3,424	$6,201	15	$93,015	$51,360	0.7%	14.9	0.09%	($126,837.81)

Notes:

1) The variable Cn in the formulas for Internal Rate of Return and Net Present Value stands for the cash flow during each period.
2) The variable DR in the NPV equation stands for Discount Rate
3) For NPV and IRR calculations: From n=0 to N periods where N is the *lifetime of ECM* and Cn is the *cash flow during each period* .

APPENDIX B

Concord Engineering Group, Inc.

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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 February 15, 2011:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2007

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

Electric Unitary HVAC

Unitary AC and Split Systems	$73 - $92 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
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2007

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, AFUE ≥ 92%

Ground Source Heat Pumps

Closed Loop	\$450 per ton, EER ≥ 16 \$600 per ton, EER ≥ 18 \$750 per ton, EER ≥ 20

Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	\$65 - \$155 per hp
Chilled-Water Pumps	\$60 per VFD rated hp
Compressors	\$5,250 to \$12,500 per drive
Cooling Towers ≥ 10 hp	\$60 per VFD rated hp

Natural Gas Water Heating

Gas Water Heaters ≤ 50 gallons, 0.67 energy factor or better	\$50 per unit
Gas-Fired Water Heaters > 50 gallons	\$1.00 - \$2.00 per MBH
Gas-Fired Booster Water Heaters	\$17 - \$35 per MBH
Gas Fired Tankless Water Heaters	\$300 per unit

Prescriptive Lighting

Retro fit of T12 to T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$10 per fixture (1-4 lamps)
Replacement of T12 with new T-5 or T-8 Lamps w/Electronic Ballast in Existing Facilities	\$25 per fixture (1-4 lamps)
Replacement of incandescent with screw-in PAR 38 or PAR 30 (CFL) bulb	\$7 per bulb
T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
Hard-Wired Compact Fluorescent	\$25 - \$30 per fixture
Metal Halide w/Pulse Start Including Parking Lot	\$25 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$200 per fixture
HID ≥ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture
HID ≥ 100w Replacement with new HID ≥ 100w	\$70 per fixture

Prescriptive Lighting - LED

LED New Exit Sign Fixture Existing Facility < 75 kw Existing Facility > 75 kw	 $20 per fixture $10 per fixture
LED Display Case Lighting	$30 per display case
LED Shelf-Mtd. Display & Task Lights	$15 per linear foot
LED Portable Desk Lamp	$20 per fixture
LED Wall-wash Lights	$30 per fixture
LED Recessed Down Lights	$35 per fixture
LED Outdoor Pole/Arm-Mounted Area and Roadway Luminaries	$175 per fixture
LED Outdoor Pole/Arm-Mounted Decorative Luminaries	$175 per fixture
LED Outdoor Wall-Mounted Area Luminaries	$100 per fixture
LED Parking Garage Luminaries	$100 per fixture
LED Track or Mono-Point Directional Lighting Fixtures	$50 per fixture
LED High-Bay and Low-Bay Fixtures for Commercial & Industrial Bldgs.	$150 per fixture
LED High-Bay-Aisle Lighting	$150 per fixture
LED Bollard Fixtures	$50 per fixture
LED Linear Panels (2x2 Troffers only)	$100 per fixture
LED Fuel Pump Canopy	$100 per fixture
LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	$42 per 5 foot $65 per 6 foot

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
Daylight Dimming - office	$50 per fixture controlled

Premium Motors

Three-Phase Motors	$45 - $700 per motor
Fractional HP Motors Electronic Communicated Motors (replacing shaded pole motors in refrigerator/freezer cases)	$40 per electronic communicated motor

Other Equipment Incentives

Performance Lighting	$1.00 per watt per SF below program incentive threshold, currently 5% more energy efficient than ASHRAE 90.1-2007 for New Construction and Complete Renovation
Custom Electric and Gas Equipment Incentives	not prescriptive
Custom Measures	$0.16 KWh and $1.60/Therm of 1st year savings, or a buy down to a 1 year payback on estimated savings. Minimum required savings of 75,000 KWh or 1,500 Therms and a IRR of at least 10%.
Multi Measures Bonus	15%

APPENDIX C

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
North Brunswick BOE - Buildings & Grounds Office

Building ID: 3316364
For 12-month Period Ending: July 31, 2012[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: November 07, 2012

Facility
North Brunswick BOE - Buildings & Grounds Office
300 Old Georges Road
North Brunswick, NJ 08902

Facility Owner
North Brunswick Township Board of Education
300 Old Georges Road
North Brunswick, NJ 08902

Primary Contact for this Facility
Susan Irons
300 Old Georges Road
North Brunswick, NJ 08902

Year Built: 1986
Gross Floor Area (ft²): 2,688

Energy Performance Rating[2] (1-100) N/A

Site Energy Use Summary[3]

Electricity - Grid Purchase(kBtu)	188,250
Natural Gas (kBtu)[4]	120,083
Total Energy (kBtu)	308,333

Energy Intensity[4]

Site (kBtu/ft²/yr)	115
Source (kBtu/ft²/yr)	281

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	33

Electric Distribution Utility
Public Service Electric & Gas Co

National Median Comparison

National Median Site EUI	68
National Median Source EUI	164
% Difference from National Median Source EUI	71%
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 Standards[5] **for Indoor Environmental Conditions:**

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

Certifying Professional
Michael Fischette
520 South Burnt Mill Road
Voorhees, NJ 08043

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. Values represent energy intensity, annualized to a 12-month period.
5. 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) or a Registered Architect (RA) 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 or RA 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	☑
Building Name	North Brunswick BOE - Buildings & Grounds Office	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	300 Old Georges Road, North Brunswick, NJ 08902	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of a hospital, k-12 school, hotel and senior care facility) nor can they be submitted as representing only a portion of a building.		☐
buildings and grounds office (Office)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	2,688 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.		☐
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.		☐
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 5.3 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	5	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Public Service Electric & Gas Co

Fuel Type: Electricity

Meter: electric (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
06/29/2012	07/28/2012	4,000.00
05/29/2012	06/28/2012	3,440.00
04/29/2012	05/28/2012	2,960.00
03/29/2012	04/28/2012	4,080.00
02/29/2012	03/28/2012	4,960.00
01/29/2012	02/28/2012	6,960.00
12/29/2011	01/28/2012	10,400.00
11/29/2011	12/28/2011	3,680.00
10/29/2011	11/28/2011	4,000.00
09/29/2011	10/28/2011	3,600.00
08/29/2011	09/28/2011	2,640.00
electric Consumption (kWh (thousand Watt-hours))		**50,720.00**
electric Consumption (kBtu (thousand Btu))		**173,056.64**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**173,056.64**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: gas (therms)
Space(s): Entire Facility

Start Date	End Date	Energy Use (therms)
06/29/2012	07/28/2012	0.00
05/29/2012	06/28/2012	3.00
04/29/2012	05/28/2012	12.00
03/29/2012	04/28/2012	90.00
02/29/2012	03/28/2012	124.00
01/29/2012	02/28/2012	237.00
12/29/2011	01/28/2012	312.00
11/29/2011	12/28/2011	180.00
10/29/2011	11/28/2011	101.00
09/29/2011	10/28/2011	52.00
08/29/2011	09/28/2011	1.00

gas Consumption (therms)	**1,112.00**
gas Consumption (kBtu (thousand Btu))	**111,200.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**111,200.00**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?	☐

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.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same PE or RA that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

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
North Brunswick BOE - Buildings & Grounds Office
300 Old Georges Road
North Brunswick, NJ 08902

Facility Owner
North Brunswick Township Board of Education
300 Old Georges Road
North Brunswick, NJ 08902

Primary Contact for this Facility
Susan Irons
300 Old Georges Road
North Brunswick, NJ 08902

General Information

North Brunswick BOE - Buildings & Grounds Office	
Gross Floor Area Excluding Parking: (ft^2)	2,688
Year Built	1986
For 12-month Evaluation Period Ending Date:	July 31, 2012

Facility Space Use Summary

buildings and grounds office	
Space Type	Office
Gross Floor Area (ft^2)	2,688
Weekly operating hours	40
Workers on Main Shift	15
Number of PCs	5
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 07/31/2012)	**Baseline** (Ending Date 07/31/2012)	**Rating of 75**	**Target**	**National Median**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft^2)	115	115	34	N/A	68
Source (kBtu/ft^2)	281	281	82	N/A	164
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/$ft^2$/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	33	33	10	N/A	20
$kgCO_2e/ft^2$/year	12	12	4	N/A	7

More than 50% of your building is defined as Office. This building is currently ineligible for a rating. Please note the National Median column represents the CBECS national median data for Office. This building uses 71% more energy per square foot than the CBECS national median for Office.

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

APPENDIX D

MAJOR EQUIPMENT LIST

Concord Engineering Group

North Brunswick Twp. B&G

AC Units

Tag	RTU-1	RTU-2	
Unit Type	Packaged Unit	Packaged Unit	
Qty	1	1	
Location	Outside on Grade	Outside on Grade	
Area Served	Offices	Offices	
Manufacturer	International Comfort Products	International Comfort Products	
Model #	PGMF60H150E	PGMG75H150D	
Serial #	G045030935	G044950967	
Cooling Type	DX, R-22	DX, R-22	
Cooling Capacity (Tons)	5	6	
Cooling Efficiency (SEER/EER)	10 SEER	10 SEER	
Heating Type	Gas HX	Gas HX	
Heating Input (MBH)	150	150	
Efficiency	79%	79%	
Fuel	Natural Gas	Natural Gas	
Approx Age	8	8	
ASHRAE Service Life	15	15	
Remaining Life	7	7	
Comments	208-230V 3P	208-230V 3P	

Note:
"N/A" = Not Applicable.
"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

North Brunswick Twp. B&G

Unit Heaters

Tag	UH-1, 2		
Unit Type	Unit Heater		
Qty	2		
Location	Garage		
Area Served	Garage		
Manufacturer	Reznor		
Model #	F-75		
Serial #	-		
Input Capacity (Btu/Hr)	75,000		
Rated Output Capacity (Btu/Hr)	60,000		
Approx. Efficiency %	80.0%		
Fuel	Nat Gas		
Approx Age	-		
ASHRAE Service Life	25		
Remaining Life	-		
Comments			

Note:

"N/A" = Not Applicable.
"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

North Brunswick Twp. B&G

Domestic Water Heaters

Tag			
Unit Type	Electric Hot Water Heater		
Qty	1		
Location	Closet		
Area Served	Whole Building		
Manufacturer	GE		
Model #	GE30M06AAG		
Serial #	GE 0505B47860		
Size (Gallons)	30		
Input Capacity (MBH/KW)	4.5KW		
Recovery (Gal/Hr)	N/A		
Efficiency %	98%		
Fuel	Electricity		
Approx Age	7		
ASHRAE Service Life	25		
Remaining Life	18		
Comments			

Note:
"N/A" = Not Applicable.
"-" = Info Not Available

APPENDIX E

CEG Project #: 9C12053
Facility Name: BOE Offices
Address: Old Bridges Road
City, State, Zip North Brunswick, NJ 08902

			Existing Fixtures						Proposed Fixtures Retrofit							Retrofit Energy Savings			Lighting Retrofit Costs					Proposed Lighting Controls					
Fixture Reference #	Location	Average Burn Hours	Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Work Description	Equipment Description	Lamps per Fixture	Watts per Fixture	Qty of Fixtures	Total kW	Usage kWh/Yr	Energy Savings, kW	Energy Savings, kWh	Energy Savings, $	Material	Total Labor	Total All	Rebate Estimate	Simple Payback	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, $
231.11	Transportation Office	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	3	9	9	0.08	211	Existing to Remain	0	3	9	0	0.08	211	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	4	Dual Technology Occupancy Sensor - Remote Mnt.	1	20.0%	42	$7
231.11	Transportation Office - Restroom	1200	1x4, 3 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	3	86	1	0.09	103	Existing to Remain	0	3	86	0	0.09	103	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
231.11	Transportation Office	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	3	86	4	0.34	894	Existing to Remain	0	3	86	0	0.34	894	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	179	$28
232.21	Building and Grounds Office	2600	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	3	86	6	0.52	1,342	Existing to Remain	0	3	86	0	0.52	1,342	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	268	$42
232.11	Building and Grounds Side Office	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	3	86	5	0.43	1,118	Existing to Remain	0	3	86	0	0.43	1,118	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	224	$35
231.11	Plan Storage	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	3	86	4	0.34	894	Existing to Remain	0	3	86	0	0.34	894	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	179	$28
231.11	O'Conner Office	2600	1x4, 3 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	3	86	5	0.43	1,118	Existing to Remain	0	3	86	0	0.43	1,118	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	5	Dual Technology Occupancy Sensor - Switch Mnt.	1	20.0%	224	$35
221.11	Restroom	1200	1x4, 2 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	2	62	1	0.06	74	Existing to Remain	0	2	62	0	0.06	74	0.00	0	$0	$0.00	$0.00	$0.00	$0.00	-	0	No New Controls	0	0.0%	0	$0
769	Garage	3000	400w MH, Hi-Bay	1	465	11	5.12	15,345	Remove and Return	1x4, 6 Lamp, 54w T5HO, Elect. Ballast, Lo Bay	6	360	11	3.96	11,880	1.16	3,465	$537	$2,200.00	$1,650.00	$3,850.00	$0.00	7.17	4	Dual Technology Occupancy Sensor - Remote Mnt.	2	20.0%	2,376	$368
121.34	Garage	3000	1x4, 2-Lamp, 34w T12, Mag. Ballast, Pendant Mnt., No Lens	2	78	1	0.08	234	Reballast & Relamp	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	2	50	1	0.05	150	0.03	84	$13	$30.00	$70.00	$100.00	$0.00	7.68	0	No New Controls	0	0.0%	0	$0
800	Exterior	4000	Pole Mount, 500w Quartz Flood	1	500	3	1.50	6,000	Remove and Return	100w Hi Power LED Flood	1	100	3	0.30	1,200	1.20	4,800	$744	$1,650.00	$360.00	$2,010.00	$0.00	2.70	0	No New Controls	0	0.0%	0	$0
	TOTAL					**50**	**9**	**27,334**					**15**	**6.60**	**18,985**	**2.38**	**8,349**	**$1,294**	**$3,880.00**	**$2,080.00**	**$5,960.00**	**$0.00**	**4.61**			**8**		**3,491**	**$541**

APPENDIX F

Location Description	Area (Sq FT)	Panel	Qty	Panel Sq Ft	Panel Total Sq Ft	Total KW_{DC}	Total Annual kWh	Total KW_{AC}	Panel Weight (41.9 lbs)	W/SQFT
Buildings and Grounds	1275	SHARP NU-U235F2	67	17.5	1,175	15.75	17,919	12.1	2,807	13.40

.= Proposed PV Layout

Notes:

1. Estimated kWH based on the National Renewable Energy Laboratory PVWatts Version 1 Calculator Program.

Project Name: **LGEA Solar PV Project - Buildings and Grounds**
Location: **North Brunswick, NJ**
Description: **Photovoltaic System 100% Financing - 15 year**

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$92,371
Annual kWh Production	17,919
Annual Energy Cost Reduction	$2,777
Average Annual SREC Revenue	$3,424

Simple Payback: **14.89** Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.155**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value ($/kWh)	$0.191

Period	Additional Cash Outlay	Energy kWh Production	Energy Cost Savings	Additional Maint Costs	SREC Revenue	Interest Expense	Loan Principal	Net Cash Flow	Cumulative Cash Flow
0	$0	0	0	0	$0	0	0	0	0
1	$0	17,919	$2,777	$0	$4,480	$5,436	$3,918	($2,097)	($2,097)
2	$0	17,829	$2,861	$0	$4,457	$5,194	$4,160	($2,036)	($4,132)
3	$0	17,740	$2,947	$0	$4,435	$4,937	$4,416	($1,972)	($6,104)
4	$0	17,652	$3,035	$0	$4,413	$4,665	$4,689	($1,906)	($8,010)
5	$0	17,563	$3,126	$181	$4,391	$4,376	$4,978	($2,018)	($10,028)
6	$0	17,475	$3,220	$180	$3,495	$4,069	$5,285	($2,819)	($12,847)
7	$0	17,388	$3,316	$179	$3,478	$3,743	$5,611	($2,739)	($15,586)
8	$0	17,301	$3,416	$178	$3,460	$3,397	$5,957	($2,656)	($18,241)
9	$0	17,215	$3,518	$177	$3,443	$3,029	$6,324	($2,570)	($20,811)
10	$0	17,129	$3,624	$176	$2,569	$2,639	$6,714	($3,337)	($24,148)
11	$0	17,043	$3,733	$176	$2,556	$2,225	$7,129	($3,240)	($27,388)
12	$0	16,958	$3,845	$175	$2,544	$1,786	$7,568	($3,140)	($30,528)
13	$0	16,873	$3,960	$174	$2,531	$1,319	$8,035	($3,037)	($33,565)
14	$0	16,789	$4,079	$173	$1,679	$823	$8,531	($3,769)	($37,334)
15	$0	16,705	$4,201	$172	$1,670	$297	$9,057	($3,654)	($40,988)
	Totals:	259,578	$51,657	$1,941	$49,601	$47,935	$92,371	($40,988)	($291,807)

Net Present Value (NPV) **($29,939)**