

MONMOUTH COUNTY

FORT MONMOUTH BUILDING #754

WILSON AVENUE
EATONTOWN, NJ 07724

FACILITY ENERGY REPORT

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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:	Jersey Central Power & Lighting (JCP&L)
Electric Utility Rate Structure:	Campus Meter (Individual buildings do not contain meters)
Natural Gas Utility Provider:	New Jersey Natural Gas (NJNG)
Utility Rate Structure:	General Service Small (GSS)
Third Party Supplier:	Woodruff

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.

This facility does not contain an electric meter and is instead served by a campus distribution system for electricity. In order to properly analyze the facility electric usage, Concord has utilized Commercial Building Energy Consumption Survey (CBECS) data based on major fuel consumption intensities by end use which is provided by the U.S. Energy Information Administration. Utilizing these fuel intensity values provides an average overall consumption based on each energy consuming category for the selected building use type. This data along with field observed facility conditioned was used to determine a baseline annual electric consumption. (Data source <http://www.eia.gov/>).

Table 1
Electricity Energy Use Calculation

Fort Monmouth Building 754 is not individually metered for electricity; therefore energy use at the building is estimated based on CBECS data for “Warehouse and Storage”. The site intensity column contains the total kBtu/sf/year for a “warehouse and storage” facility as well as a breakdown of categories for major energy consumers. The site energy column converts the site intensity to kBtu’s for the CBECS typical building. The energy type column is used to identify what categories Building 754 is actually currently utilizing for energy consumption. Lastly, the electric (kWh) column uses the facility square footage along with the site intensity column to estimate the electric consumption for Building 754 based on a building of similar type.

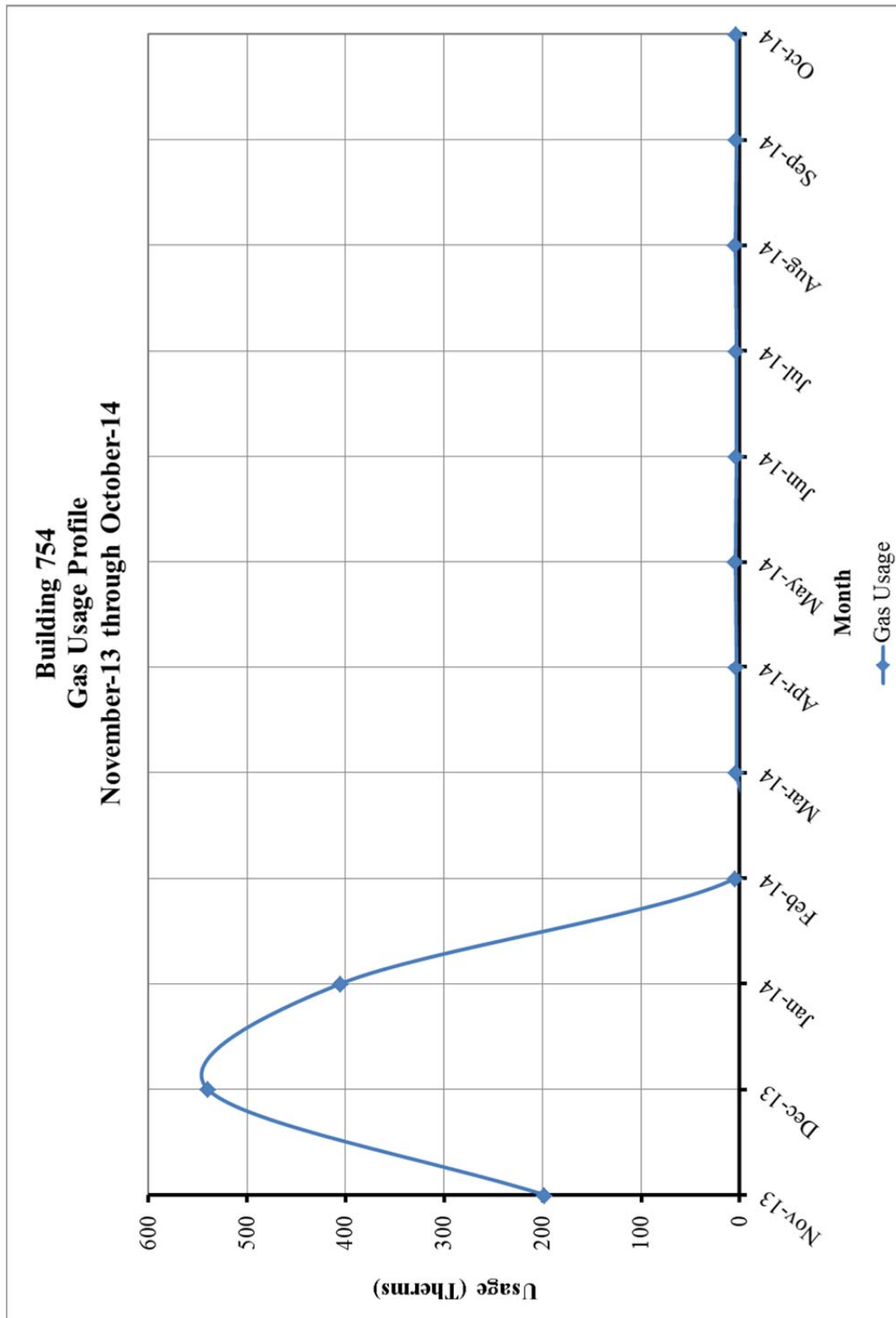
FACILITY ENERGY USAGE CALCULATION				
Description	Site Intensity (kBtu/sf/yr)	Site Energy (kBtu)	Energy Type	Electric (kWh)
<i>Total</i>	<i>45.2</i>			<i>19,118</i>
Space Heating	19.3	83,376	Gas	0
Cooling	1.3	5,616		0
Ventilation	2	8,640	Electric	2,532
Water Heating	0.6	2,592	Gas	0
Lighting	13.1	56,592	Electric	16,586
Cooking	N/A	0		0
Refrigeration	3.5	15,120		0
Office Equipment	0.2	864		0
Computers	0.5	2,160		0
Other	4.8	20,736		0
Notes:	Note use data was excluded for non observed conditions.			

Table 2
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: NJNG Rate: General Service Small (GSS) Meter No: 914859 Account No: 22-0014-7235-68 Third Party Utility Provider: Woodruff TPS Meter No: -		
MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
Nov-13	198.00	\$224.66
Dec-13	540.00	\$569.54
Jan-14	405.00	\$433.40
Feb-14	4.29	\$29.33
Mar-14	3.22	\$28.24
Apr-14	3.21	\$28.24
May-14	4.29	\$29.33
Jun-14	3.21	\$28.24
Jul-14	3.21	\$28.24
Aug-14	4.28	\$29.31
Sep-14	3.23	\$28.26
Oct-14	3.23	\$28.09
TOTALS	1,175.17	\$1,484.88
AVERAGE RATE: \$1.26 \$/THERM		

Note: Consumption for November, December and January has been estimated due to insufficient billing data.

Figure 2
Natural Gas Usage Profile



II. FACILITY ENERGY USE INDEX (EUI)

Energy Use Index (EUI) is a measure of a building's annual energy utilization per square foot of building. This calculation is completed by converting all utility usage consumed by a building for one year, to British Thermal Units (BTU) and dividing this number by the building square footage. EUI is a good measure of a building's energy use and is utilized regularly for comparison of energy performance for similar building types. Building Benchmarking data is collected and analyzed within the Commercial Building Energy Consumption Survey (CBECS), performed by the Energy and Information Administration (EIA). Building data is grouped by function types and tabulated, from which a median site and source energy intensity is determined. The national median or PEER Group Comparable in this instance is the middle value of the national population meaning half the buildings use more energy, and half use less. The PEER Group EUI allows us to compare the relative efficiency of the audited building to that of an average building with the same or similar primary function (i.e. group type).

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

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

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

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

Table 3
Energy Use Index Summary

ENERGY USE INTENSITY CALCULATION						
ENERGY TYPE	BUILDING USE			SITE ENERGY	SITE-SOURCE RATIO	SOURCE ENERGY
	kWh	Therms	Gallons	kBtu		kBtu
ELECTRIC	19,118.4			65,270	3.140	204,949
NATURAL GAS		1,175.2		117,517	1.050	123,393
TOTAL				182,787		328,341
*Site - Source Ratio data is provided by the Energy Star Performance Rating Methodology for Incorporating Source Energy Use document.						
AUDITED BUILDING				PEER COMPARISON		
BUILDING TYPE		Storage		Non-Refrigerated Storage		
BUILDING AREA		4,320	SQUARE FEET			
BUILDING SITE EUI		42.31	kBtu/SF/YR		19.80	kBtu/SF/YR
BUILDING SOURCE EUI		76.00	kBtu/SF/YR		47.60	kBtu/SF/YR
		60%	Less Efficient than PEER Comparison			

III. FACILITY DESCRIPTION

The Fort Monmouth Building #754 is located within Fort Monmouth base on Wilson Avenue in Eatontown, New Jersey. This 4,320 SF facility was built in the 1980's with no additions. This facility is a single-story structure with an office, restroom, mechanical room and four garage bay areas. Currently, most of the space in this building is utilized as storage.

Occupancy Profile

This facility is mainly used as storage and has varying occupancy but this facility typically can be in operation from Monday through Friday between 8:00 am and 4:00 pm. There is no standard occupancy profile for this facility.

Building Envelope

The facility is a concrete block construction and single pane windows. The perimeter walls are concrete block construction with little to no insulation. The windows, man doors, and overhead doors are in poor condition. Typical windows throughout the facility are single pane, operable, 1/4" clear glass with aluminum frames.

HVAC Systems

The office and storage/workshop areas are heated by a Reznor Model MS60 gas-fired, heating and ventilation unit rated at 600 MBH input and 480 MBH output for a thermal efficiency of 80%.

Exhaust System

Air is exhausted from various areas through a roof exhauster or wall-mounted exhaust fan.

HVAC System Controls

The Reznor heating and ventilation unit is controlled by an individual wall thermostat. The thermostat for this unit is set to 60°F.

Domestic Hot Water

Domestic hot water for the restroom/sink is provided by an A.O. Smith Model GCV 30 300 gas-fired, 30-gallon capacity, water heater with a 35,500 Btu/hr input capacity.

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.

IV. 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.

V. 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 - Bldg 754	\$7,205	\$454	15.9	-5.4%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	DESCRIPTION	NET INSTALLATION COST	ANNUAL SAVINGS	SIMPLE PAYBACK (Yrs)	SIMPLE LIFETIME ROI
REM #1	12.48 kW PV System Bldg 754	\$60,642	\$3,915	15.5	-3.2%

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 - Bldg 754	1.1	1,898	0
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	12.48 kW PV System Bldg 754	12.5	14,421	0

Table 3
ECM Emissions Summary

ENERGY CONSERVATION MEASURES (ECM's)				
ECM NO.	DESCRIPTION	GREENHOUSE GAS EMISSIONS REDUCTION		
		CO₂ EMISSIONS (LBS)	NO_x EMISSIONS (LBS)	SO₂ EMISSIONS (LBS)
ECM #1	Lighting Upgrade - Bldg 754	2,885	5	12

Notes: A. Emissions Reduction based on NJCEP published factors for electric & gas.

Table 4
Facility Project Summary

FACILITY PROJECT SUMMARY TABLE					
ENERGY CONSERVATION MEASURES	ANNUAL ENERGY SAVINGS (\$)	PROJECT COST (\$)	SMART START INCENTIVES	CUSTOMER COST	SIMPLE PAYBACK
Lighting Upgrade - Bldg 754	\$454	\$7,205	\$0	\$7,205	15.9
Total Project	\$454	\$7,205	\$0	\$7,205	15.9

Note the measure totals in this table do not take into account interactive effects of measures; see Method of Analysis Section III in Executive Report for further explanation.

This project does not qualify for additional incentives through the Pay for Performance Program; please see the Installation Funding Options section for additional program options.

ECM #1: Lighting Upgrade – Building 754**Description:**

The majority of the interior lighting throughout the Fort Monmouth Building 754 is provided with fluorescent fixtures with older generation, 32W T8 lamps with electronic ballasts or 34W T12 lamps with magnetic ballasts. These fixtures can be replaced and retrofit with new LED type fixtures and lamps.

This ECM includes replacing and retrofitting the interior lighting with new LED type lamps and fixtures. It is recommended the County consult with a professional engineer prior to retrofitting or replacing fixtures to ensure code required minimum light levels will be met.

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 each building.

LIGHTING CONTROLS SAVINGS SUMMARY	
DESCRIPTION	SAVINGS
Electric Demand Savings (kW)	2.0
Electric Usage Savings (kWh)	3,787
Electric Cost Savings (\$)	\$454

No maintenance cost savings were estimated for this measure.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost (\$):	\$7,205
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$7,205
Maintenance Savings (\$/Yr):	\$0
Energy Savings (\$/Yr):	\$454
Total Yearly Savings (\$/Yr):	\$454
Estimated ECM Lifetime (Yr):	15
Simple Payback	15.9
Simple Lifetime ROI	-5.4%
Simple Lifetime Maintenance Savings	\$0
Simple Lifetime Savings	\$6,817
Internal Rate of Return (IRR)	-1%
Net Present Value (NPV)	(\$1,779.41)

REM #1: 12.48 kW Solar System**Description:**

The Fort Monmouth Building 754 has available roof and parking lot space that could accommodate solar arrays. Based on the available area a 12.48 kilowatt solar array could be installed. The array will produce approximately 14,421 kilowatt-hours annually. The owner should consult a structural engineer prior to installing any solar array to insure the roof can accommodate the additional weight.

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	
Installation Cost (\$):	\$60,642
NJ Smart Start Equipment Incentive (\$):	\$0
Net Installation Cost (\$):	\$60,642
Maintenance Savings (\$/Yr):	\$2,185
Energy Savings (\$/Yr):	\$1,731
Total Yearly Savings (\$/Yr):	\$3,915
Estimated ECM Lifetime (Yr):	15
Simple Payback	15.5
Simple Lifetime ROI	-3.2%
Simple Lifetime Maintenance Savings	\$32,773
Simple Lifetime Savings	\$58,730
Internal Rate of Return (IRR)	-0.4%
Net Present Value (NPV)	(\$13,901.15)

VI. 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. Maintain all weather stripping on windows and doors.
- B. Clean all light fixtures to maximize light output.
- C. Provide more frequent air filter changes to decrease overall system power usage and maintain better IAQ.
- D. Ensure outside air dampers are functioning properly and only open during occupied mode.

APPENDIX A

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Monmouth County - Fort Monmouth Buildings 754

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	NET PRESENT VALUE (NPV)
		MATERIAL	LABOR	REBATES, INCENTIVES	NET INSTALLATION COST	ENERGY	MAINT. / SREC	TOTAL		(Yearly Saving * ECM Lifetime)	(Yearly Maint Saving * 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)	(\$)	(\$)
ECM #1	Lighting Upgrade - Bldg 754	\$5,440	\$1,765	\$0	\$7,205	\$454	\$0	\$454	15	\$6,817	\$0	-5.4%	15.9	-0.68%	(\$1,779.41)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	12.48 kW PV System Bldg 754	\$60,642	\$0	\$0	\$60,642	\$1,731	\$2,185	\$3,915	15	\$58,730	\$32,773	-3.2%	15.5	-0.40%	(\$13,901.15)

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

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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 from July 1, 2014 to June 30, 2015:

Electric Chillers

Water-Cooled Chillers	\$16 - \$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 - \$450 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
A/C Economizing Controls	≤ 5 tons \$85/unit; >5 tons \$170/unit

Energy Efficiency must comply with ASHRAE 90.1-2007

Gas Heating

Gas Fired Boilers < 300 MBH	\$2.00 per MBH, but not less than \$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	\$400 per unit, AFUE ≥ 95%
Boiler Economizing Controls	\$1,200 - \$2,700
Low Intensity Infrared Heating	\$300 - \$500 per unit

Ground Source Heat Pumps

Closed Loop	\$450 per ton, EER $\geq$ 16 \$600 per ton, EER $\geq$ 18 \$750 per ton, EER $\geq$ 20
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Energy Efficiency must comply with ASHRAE 90.1-2007

Variable Frequency Drives

Variable Air Volume	\$65 - \$155 per hp
Chilled-Water Pumps $\geq$ 20 hp	\$60 per VFD rated hp
Rotary Screw Air Compressors $\geq$ 25 hp	\$5,250 to \$12,500 per drive
Centrifugal Fan Applications on Constant Volume HVAC Systems	\$80 per VFD rated hp, maximum \$6,000 per drive
Cooling Towers $\geq$ 10 hp	\$60 per VFD rated hp
Boiler Fans $\geq$ 5 HP	\$65 to \$155 per hp
Boiler Feed Water Pumps $\geq$ 5 HP	\$60 to \$155 per hp
Commercial Kitchen Hood up to 50 HP	Retrofit \$55 – \$300 per hp New Hood \$55 - \$250 per hp

Natural Gas Water Heating

Gas Water Heaters $\leq$ 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

T-8 reduced Wattage (28w/25w 4', 1-4 lamps) Lamp & ballast replacement	\$10 per fixture
For retrofit of T-8 fixtures by permanent de-lamping & new reflectors (Electronic ballast replacement required)	\$15 per fixture
T-5 and T-8 High Bay Fixtures	\$16 - \$200 per fixture
HID $\geq$ 100w Replace with new induction fixture. (must be 30% less watts/fixture than HID system)	\$70 per fixture
HID $\geq$ 100w Retrofit with induction lamp, power coupler and generator (must be 30% less watts/fixture than HID system)	\$50 per fixture

Prescriptive Lighting - LED

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 Architectural Flood and Spot Luminaires	\$50 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	\$30 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 Linear Ambient Luminaires (Indirect, Indirect/Direct, Direct/Indirect, Direct)	2' Fixtures - \$20/fixture 3' Fixtures - \$30/fixture 4' Fixtures - \$45/fixture 6' Fixtures - \$60/fixture 8' Fixtures - \$75/fixture
LED Stairwell and Passageway Luminaires	\$40 per fixture
LED Bollard Fixtures	\$50 per fixture
Luminaires for Ambient Lighting of Interior Commercial Spaces (1x4, 2x2, 2x4)	\$50 per fixture
LED Fuel Pump Canopy	\$100 per fixture
LED Screw-based & Pin-based (PAR, MR, BR, R) Standards (A-Style) and Decorative Lamps	\$5 per lamp for R/PAR20,MR/PAR16,Globe,Candelabra or Misc \$10 per lamp for LED R/BR/PAR 30, R/BR/PAR 38-40, A-Lamp

LED Refrigerator/Freezer case lighting replacement of fluorescent in medium and low temperature display case	\$30 per 4 foot \$42 per 5 foot \$65 per 6 foot
LED Retrofit Kits	To be evaluated through the customer measure path

Lighting Controls – Occupancy Sensors

Wall Mounted (Existing Facilities Only)	\$20 per control
Remote Mounted (Existing Facilities Only)	\$35 per control
Daylight Dimming Controls	\$45 per fixture controlled
Occupancy Based hi-low Dimming Control	\$35 per fixture controlled
Occupancy Sensor Remote Mounted	\$35 per control

Refrigeration Doors/Covers

Energy-Efficient Doors/Covers for Installation on Open Refrigerated Cases	\$100 per door
Aluminum Night Curtains for Installation on Open Refrigerated Cases	\$3.50 per linear foot

Refrigeration Controls

Door Heater Controls	\$50 per control
Electric Defrost Controls	\$50 per control
Evaporator Fan Controls	\$75 per control
Novelty Cooler Shutoff	\$50 per control

Food Service Equipment

Combination Oven/Steamer (Electric)	\$1,000/oven
Combination Oven/Steamer (Natural Gas)	\$750/oven
Convection Oven (Electric)	\$350/oven
Convection Oven (Natural Gas)	\$500/oven
Rack Oven (Natural Gas)	\$1,000/single oven, \$2,000/double oven
Conveyor Oven (Natural Gas)	\$500/small deck \$750/large deck
Fryer (Electric)	\$250/vat
Fryer (Natural Gas)	\$749/vat
Large Vat Fryer (Electric)	\$200/vat
Large Vat Fryer (Natural Gas)	\$500/vat
Griddle (Electric)	\$300/griddle
Griddle (Natural Gas)	\$125/griddle
Steam Cooker (Electric)	\$1,250/steamer
Steam Cooker (Natural Gas)	\$2,000/steamer
Insulated Holding Cabinets	\$200 to \$300/unit
Glass Door Refrigerators	\$75 to \$150/unit
Solid Door Refrigerators	\$50 to \$200/unit
Glass Door Freezers	\$200 to \$1,000/unit
Solid Door Freezers	\$100 to \$600/unit
Ice Machines	\$50 to \$500/unit
Dishwashers	\$400 to \$1,500/unit

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 an IRR of at least 10%.

APPENDIX C

MAJOR EQUIPMENT LIST

Concord Engineering Group

Building 754

AC Units

Tag			
Unit Type	Window AC		
Qty	2		
Location	Office		
Area Served	Office		
Manufacturer	GE		
Model #	ASQ10AKS1		
Serial #	DM380356		
Cooling Type	DX, R-22		
Cooling Capacity (Tons)	10,000 Btu/hr		
Cooling Efficiency (SEER/EER)	9.8 EER		
Heating Type	N/A		
Heating Input (MBH)	N/A		
Efficiency	N/A		
Fuel	N/A		
Approx Age	7		
ASHRAE Service Life	15		
Remaining Life	8		
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Building 754

AHUs

Tag	DH-1,2	H&V-1	
Unit Type	Duct Heaters	Heating & Ventilating Unit	
Qty	2	1	
Location	Mechanical Room	Mechanical Room	
Area Served	Garage Area & Office	Garage Area & Office	
Manufacturer	Sterling	Sterling	
Model #	QVS-300H	MS60	
Serial #	0459-95-4	-	
Cooling Type		N/A	
Cooling Capacity (Tons)	N/A	N/A	
Cooling Efficiency (SEER/EER)	N/A	N/A	
Heating Type	Gas Furnace	(2) Duct Heaters	
Heating Input (MBH)	300	600 (Total)	
Efficiency	80%	80%	
Fuel	Natural Gas	Natural Gas	
Approx Age	19	19	
ASHRAE Service Life	15	15	
Remaining Life	(4)	(4)	
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

Building 754

Domestic Water Heaters

Tag			
Unit Type	Automatic Storage Water Heater		
Qty	1		
Location	Mechanical Room		
Area Served	Domestic Hot Water Loop		
Manufacturer	A.O. Smith		
Model #	GCV 30 300		
Serial #	1224A010586		
Size (Gallons)	30		
Input Capacity	35,500 Btu/hr		
Recovery (Gal/Hr)	36.33		
Efficiency %	80%		
Fuel	Natural Gas		
Approx Age	2		
ASHRAE Service Life	12		
Remaining Life	10		
Comments			

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

APPENDIX D

CEG Project #: 1C14167
 Facility Name: Building 754
 Address: Wilson Ave
 City, State, Zip: Eatontown, NJ 07724

Fixture Reference #	Location	Average Burn Hours	EXISTING FIXTURES						PROPOSED FIXTURE RETROFIT						RETROFIT ENERGY SAVINGS			PROPOSED LIGHTING CONTROLS						
			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, \$	Control Ref #	Controls Description	Qty of Controls	Hour Reduction %	Energy Savings, kWh	Energy Savings, \$
	Building 754																							
15	Garage	2000	8' Channel, 2 Lamp, 60w T12, Mag. Ballast, Surface Mnt., No Lens	2	115.2	23	2.65	5,299	Replace Fixture	1x4 Surface LED 48w	1	48	23	1.10	2,208	1.55	3,091	\$371	0	No New Controls	0	0.0%	0	\$0
15	Mechanical Room	400	8' Channel, 2 Lamp, 60w T12, Mag. Ballast, Surface Mnt., No Lens	2	115.2	2	0.23	92	Replace Fixture	1x4 Surface LED 48w	1	48	2	0.10	38	0.13	54	\$6	0	No New Controls	0	0.0%	0	\$0
3	Office	2000	2x4 4-Lamp 34w T12 Magnetic Recessed Prismatic Lens	4	144	3	0.43	864	LED Retrofit Kit	Install Philips LED Evo 2x4 Retrofit Kit	1	39	3	0.12	234	0.32	630	\$76	0	No New Controls	0	0.0%	0	\$0
17	Restroom	400	2x2 2-Lamp 32w U T8 Electronic Recessed Prismatic Lens	2	62	1	0.06	25	LED Retrofit Kit	Install Philips LED Evo 2x2 Retrofit Kit	1	31	1	0.03	12	0.03	12	\$1	0	No New Controls	0	0.0%	0	\$0
TOTAL						29	3	6,280					29	1	2,493	2	3,787	\$454			0	0	0	\$0

APPENDIX E

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
Building 754	1280	SHARP ND-240QCJ	52	17.5	912	12.48	14,421	10.1	2,179	13.68



= Proposed PV Roof Layout



= Proposed PV Parking Layout

Notes:

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

Project Name: LGEA Solar PV Project - Building 754										
Location: Eatontown, New Jersey										
Description: Photovoltaic System 100% Financing - 15 year										
Simple Payback Analysis										
		Photovoltaic System 100% Financing - 15 year								
Total Construction Cost		\$60,642								
Annual kWh Production		14,421								
Annual Energy Cost Reduction		\$1,731								
Average Annual SREC Revenue		\$2,185								
Simple Payback:		15.49						Years		
Life Cycle Cost Analysis										
Analysis Period (years):		15						Financing %:		100%
Discount Rate:		3%						Maintenance Escalation Rate:		3.0%
Average Energy Cost (\$/kWh)		\$0.120						Energy Cost Escalation Rate:		3.0%
Financing Rate:		6.00%						Average SREC Value (\$/kWh)		\$0.152
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	14,421	\$1,731	\$0	\$3,605	\$3,569	\$2,572	(\$805)	(\$805)	
2	\$0	14,349	\$1,782	\$0	\$3,587	\$3,410	\$2,731	(\$771)	(\$1,576)	
3	\$0	14,277	\$1,836	\$0	\$3,569	\$3,241	\$2,899	(\$736)	(\$2,312)	
4	\$0	14,206	\$1,891	\$0	\$2,841	\$3,063	\$3,078	(\$1,409)	(\$3,721)	
5	\$0	14,135	\$1,948	\$146	\$2,827	\$2,873	\$3,268	(\$1,512)	(\$5,232)	
6	\$0	14,064	\$2,006	\$145	\$2,813	\$2,671	\$3,470	(\$1,467)	(\$6,699)	
7	\$0	13,994	\$2,066	\$144	\$2,099	\$2,457	\$3,684	(\$2,120)	(\$8,819)	
8	\$0	13,924	\$2,128	\$143	\$2,089	\$2,230	\$3,911	(\$2,067)	(\$10,886)	
9	\$0	13,854	\$2,192	\$143	\$2,078	\$1,989	\$4,152	(\$2,013)	(\$12,899)	
10	\$0	13,785	\$2,258	\$142	\$1,378	\$1,733	\$4,408	(\$2,646)	(\$15,545)	
11	\$0	13,716	\$2,326	\$141	\$1,372	\$1,461	\$4,680	(\$2,585)	(\$18,130)	
12	\$0	13,647	\$2,395	\$141	\$1,365	\$1,172	\$4,969	(\$2,521)	(\$20,652)	
13	\$0	13,579	\$2,467	\$140	\$679	\$866	\$5,275	(\$3,134)	(\$23,786)	
14	\$0	13,511	\$2,541	\$139	\$676	\$540	\$5,600	(\$3,063)	(\$26,849)	
15	\$0	13,444	\$2,618	\$138	\$672	\$195	\$5,946	(\$2,990)	(\$29,839)	
Totals:		208,906	\$32,186	\$1,562	\$31,650	\$31,470	\$60,642	(\$29,839)	(\$187,749)	
Net Present Value (NPV)							(\$21,238)			



**AC Energy
&
Cost Savings**



(Type comments here to appear on printout; maximum 1 row of 80 characters.)

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	12.5 kW
DC to AC Derate Factor:	0.810
AC Rating:	10.1 kW
Array Type:	Fixed Tilt
Array Tilt:	10.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	11.2 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	2.39	749	83.89
2	3.17	908	101.70
3	4.07	1270	142.24
4	4.83	1408	157.70
5	5.70	1675	187.60
6	5.94	1636	183.23
7	5.77	1624	181.89
8	5.38	1504	168.45
9	4.65	1294	144.93
10	3.61	1065	119.28
11	2.35	679	76.05
12	2.01	610	68.32
Year	4.16	14421	1615.15

Output Hourly Performance Data

[About the Hourly Performance Data](#)

Output Results as Text

[Saving Text from a Browser](#)