BERGEN COUNTY
PROBATION OFFICE

133 RIVER ST.
HACKENSACK, NJ 07601

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:	Public Service Electric & Gas
Electric Utility Rate Structure:	Not available
Third Party Supplier:	None

Natural Gas Utility Provider:	Public Service Electric & Gas
Utility Rate Structure:	General Service Gas (GSG)
Third Party Supplier:	Great Eastern Energy

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

Electricity billing data was not available for this facility.

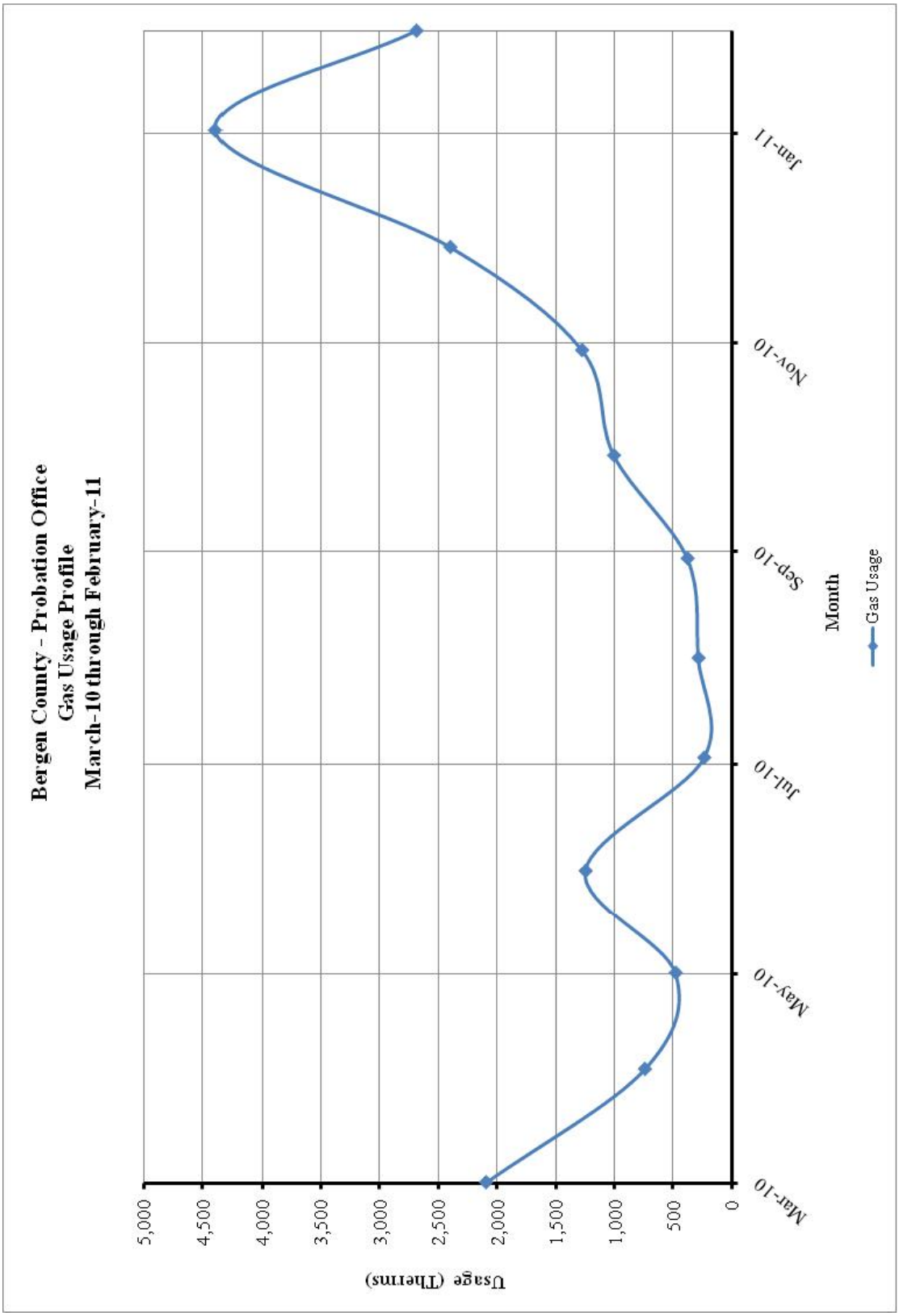
Figure 1
Electricity Usage Profile

Electricity usage profile was not available for this facility.

Table 2
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider: PSE&G		
Rate: GSG		
Meter No: 2807924, 1806081		
Account # 66 939 892 09 , 65 819 128 08		
Third Party Utility Provider: Great Eastern Energy		
TPS Meter No: N/A		
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Mar-10	2,093.16	$2,162.15
Apr-10	741.22	$730.24
May-10	478.34	$494.66
Jun-10	1,245.35	$1,258.45
Jul-10	235.47	$98.95
Aug-10	284.23	$116.06
Sep-10	376.91	$147.03
Oct-10	1,003.41	$397.67
Nov-10	1,274.96	$514.22
Dec-10	2,396.86	$996.31
Jan-11	4,390.24	$1,858.85
Feb-11	2,684.43	$1,033.24
TOTALS	**17,205**	**$9,807.83**
AVERAGE RATE:	**$0.57**	**$/THERM**

Figure 2
Natural Gas Usage Profile



II. FACILITY DESCRIPTION

The 22,205 SF Bergen County Probation Office Building is a single story facility with a mezzanine comprised of offices, restrooms, conference rooms, storage room and mechanical rooms.

The typical hours of operation for this facility are between 8:30 am and 6:30 pm on the weekdays. The facility is closed on weekends. The facility has 115 staff and approximately 400-500 visitors per day.

Exterior walls are cinder block construction with brick façade. The amount of insulation within the wall is unknown. There are small amount of windows in this facility. The majority of the windows are in poor condition. Typical windows throughout the facility are single pane, ¼" clear glass with metal frames. A small number of the windows were replaced with new energy efficient windows with double pane glass and aluminum frames.

The roof is constructed of a built-up roof with light color stone covering, where all rooftop HVAC equipment is located. The amount of insulation below the roofing is unknown. The building was built in 1950 as a supermarket and acquired by the Bergen County in 1969 to house the County Welfare Department. Rear quarter of the building was utilized as a senior housing until 2009. The building serves as the Bergen County Probation Office since 2010.

HVAC Systems

The Probation Building air conditioning is achieved via three (3) constant volume central rooftop air conditioning units (RTUs) made by Trane. The cooling capacities of the RTUs are 15, 20 and 25 Tons with a total installed cooling capacity of 60 Tons. Two (2) of the Trane rooftop units (15 & 25 Ton) are approximately 17 years old while the third unit is approximately 5 years old. Each unit is equipped with gas heating coils for primary supply air preheating and direct expansion coils for cooling.

In addition to the central rooftop units, there is a 1-Ton Sanyo ductless split air conditioning unit serving the Chief's office and 1-Ton window air conditioning unit serving a conference room in the mezzanine.

The primary heating for the building is achieved via one (1) antiquated, 1,730 MBH, natural gas fired, fire tube steam boiler located in the boiler room in the mezzanine. The boiler is original to the building and it is approximately 58 years old. The boiler is in very poor condition and requires major maintenance and restoration annually in order to keep delivering heat to the building. The insulation on the boiler surfaces is partially missing. The boiler is sized to provide steam for a steam to hot water heat exchanger, which produces heating hot water for the perimeter baseboard heaters. Entrance areas and stairwells are heated with hot water cabinet heaters.

Heating hot water is delivered to the hot water baseboard heater and the cabinet heaters via a ½ HP pipe mounted hot water circulator. Hot water baseboard heaters, pipes, pumps and the insulation appear to be in good condition.

Exhaust System

Air is exhausted from the toilet rooms and the common areas through the roof exhausters. The exhaust fans are interlocked with the air conditioning units.

HVAC System Controls

The three (3) rooftop air conditioning units within the facility are controlled via three (3) digital programmable thermostats located in the each zone fed by each unit. The thermostats are programmed to set-back space temperature during unoccupied hours.

There are approximately 10 hot water perimeter heating zones in the facility. Each perimeter zone temperature is controlled via a mechanical thermostat made by Barber Coleman. Since there is no programmable thermostat for the boiler, the boiler stays at occupied mode at all times during the heating season.

Domestic Hot Water

Domestic hot water for the restrooms and office lounge is provided by a 50 gallon, 36 MBH, gas fired hot water heater made by Rheem. The hot water heater is approximately 14 years old and it is in fair condition. The domestic hot water is circulated throughout the building by a hot water circulation pump. The circulation pump is controlled by an aqua stat. The domestic hot water piping insulation appeared to be in good condition.

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 3
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 equipment upgrade	$24,756	$7,496	3.3	354.2%
ECM #2	CRT Monitors	$4,600	$759	6.1	147.5%
ECM #3	AC Unit upgrades	$39,840	$1,280	31.1	-51.8%
ECM #4	Replace steam boiler with hot water boiler	$91,375	$5,946	15.4	-2.4%
ECM #5	Install Building Automation System	$88,000	$6,843	12.9	16.6%
ECM #6	Window Replacement	$16,500	$466	35.4	-57.6%

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

Table 4
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 equipment upgrade	16.9	43,594	0
ECM #2	CRT Monitors	0	4,600	0
ECM #3	AC Unit upgrades	9.7	7,760	0
ECM #4	Replace steam boiler with hot water boiler	0	0	4,497
ECM #5	Install Building Automation System	0	30,000	1,720
ECM #6	Window Replacement	0.2	587	336

Table 5
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 equipment upgrade	$7,496	$26,576	$1,820	$24,756	3.3
CRT Monitors	$759	$4,600	$0	$4,600	6.1
AC Unit upgrades	$1,280	$43,000	$3,160	$39,840	31.1
Replace steam boiler with hot water boiler	$5,946	$94,000	$2,625	$91,375	15.4
Install Building Automation System	$6,843	$88,000	$0	$88,000	12.9
Window Replacement	$466	$16,500	$0	$16,500	35.4
Design / Construction Extras (15%)		*$40,901*	$0	*$40,901*	
Total Project	**$22,791**	**$313,577**	**$4,445**	**$305,972**	**13.4**

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 Equipment Upgrade

Description:

The majority of the lighting throughout the Bergen County Probation Office is provided with outdated fixtures with T12 lamps and magnetic ballasts. It is recommended to replace all of the T12 fixtures in these areas with higher efficiency fluorescent T8 fixtures with electronic ballasts.

This ECM includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. The new, energy efficient fixtures with supersaver T8 lamps will provide adequate lighting and will save on electrical costs due to better performance of the lamp and ballasts. This ECM also includes maintenance savings through the reduced number of lamps replaced per year. The expected lamp life of a T8 lamp is approximately 30,000 burn-hours, in comparison to the existing T12 lamps which is approximately 20,000 burn-hours. The facility will need approximately 33% less lamps replaced per year for each one for one fixture replaced.

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 energy usage of an incandescent lamp compared to a compact fluorescent lamp 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 each building.

Rebates and Incentives:

NJ Smart Start® Program Incentives are calculated using the **Smart Start® Incentive Appendix** as follows:

Retrofit of T-12 fixtures to T-5 or T-8 with electric ballasts	$10 per fixture (1-4 lamp retrofits)

$$\text{Smart Start® Incentive} = (\#\ \text{of fixtures} \times \$10) = 182 \times \$10 = \$1820$$

Replacement and Maintenance Savings are calculated as follows:

$$\text{Savings} = (\text{reduction in lamps replaced per year}) \times (\text{repacment\$ per lamp} + \text{Labor\$ per lamp})$$

$$\text{Savings} = 43.37 \times (\$2\,\text{per lamp} + \$5\,\text{per lamp}) = \$304$$

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$26,576
NJ Smart Start Equipment Incentive ($):	$1,820
Net Installation Cost ($):	$24,756
Maintenance Savings ($/Yr):	$304
Energy Savings ($/Yr):	$7,193
Total Yearly Savings ($/Yr):	$7,496
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.3
Simple Lifetime ROI	354.2%
Simple Lifetime Maintenance Savings	$4,553
Simple Lifetime Savings	$112,447
Internal Rate of Return (IRR)	30%
Net Present Value (NPV)	$64,736.72

ECM #2: Computer Monitor Replacement

Description:

Some of the computers in the Probation Office utilize CRT computer monitors. These computer monitors are outdated and have several disadvantages such as; significantly increased higher energy consumption, uses large amount of desk space, poor picture quality, distortions and flickering image, secular glare problems, and high weight, and electromagnetic emissions. Many of the drawbacks are difficult to quantify except for the energy use. CRT monitors use considerably more energy than an alternative flat panel LCD monitor. Replacement of the existing CRT monitors with LCD monitors saves considerable energy as well as provides other ergonomic benefits as well.

Based on the site survey it was noted that a number of the computers may be left on and allowed to run 24 / 7. Some of the monitors were left in screen saver mode, which is deceiving since this mode only saves the computer screen from image burn in, however it does not save on energy consumption. The average operating hours for all computers and monitors is estimated based on the site survey observations. Energy consumption of computer monitors are based on manufacture's specifications.

This ECM includes replacement of all existing CRT monitors with LCD flat panel monitors throughout the school. Installation costs were neglected for this ECM with the intention that this ECM would be replaced by the school employees. The calculations are based on the following operating assumptions:

Energy Savings Calculations:

# of Computers:	46
Run Time %:	100%
Weeks per Yr:	50
Hrs per Week:	40

$$\text{Electric Usage} = \frac{\#\text{of Computers} \times \text{Run Time \%} \times \text{Monitor Power (W)} \times \text{Operation (Hrs)}}{1000\left(\frac{\text{W}}{\text{KW}}\right)}$$

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

COMPUTER MONITOR CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CRT Monitors	LCD Monitor	
# of Computers	46	46	
Monitor Power Cons. (W)	75	25	
Run Time %	100%	100%	
Operating Hrs per Week	40	40	
Operating Weeks per Yr	50	50	
Elec Cost ($/kWh)	0.165	0.165	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Usage (kWh)	6,900	2,300	4,600
Energy Cost ($)	$1,139	$380	$759
COMMENTS:			

Installation cost of new monitors is estimated based on current pricing for a 17" LCD monitor on the market today. No labor costs were included for replacing the existing monitors with the new monitors. No incentives are available for installation of computer monitors. Net cost per monitor was estimated to be $100.

Installation Costs: # Monitors X Cost per Monitor
46 Monitors X $100 per Monitor
$4,600

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$4,600
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$4,600
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$759
Total Yearly Savings ($/Yr):	$759
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.1
Simple Lifetime ROI	147.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$11,385
Internal Rate of Return (IRR)	14%
Net Present Value (NPV)	$4,460.89

ECM #3: Air Conditioning Unit Upgrades

Description:

Air conditioning for the Bergen County Probation Office is provided with three main rooftop air conditioning units. Two of these units are older and inefficient units while the third unit was installed approximately 5 years ago and appear to be in good condition.

The older units are standard efficiency units and they can be replaced with new high efficiency units for energy savings. New air conditioners provide higher full load and part load efficiencies due to advances in inverter motor technologies, heat exchangers and refrigerants.

This ECM includes one-for-one replacement of the older air conditioning units with new higher efficiency systems. It is recommended to fully evaluate the capacity needed for all new systems prior to moving forward with this ECM. A summary of the unit replacements for this ECM can be found in the table below:

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	**COOLING CAPACITY, BTU/Hr**	**ANNUAL COOLING HOURS**	**EXISTING UNITS (S)EER**	**SPLIT UNITS (S)EER**	**# OF UNITS**	**ENERGY SAVINGS kWh**	**DEMAND SAVINGS kW**
RTU-1 Trane YCD300	300,000	800	9.7 EER	11.5 EER	1	3,873	4.8
RTU-3 Trane YCD180	180,000	800	8.6 EER	11.2 EER	1	3,887	4.9
Total					2	7,760	9.7

The manufacturer used for the design basis is Aaon. The units are one for one style replacements with matching capacity of the new units to the old units.

Energy Savings Calculations:

Cooling Energy Savings:

Seasonal energy consumption of the air conditioners at the cooling mode is calculated with the equation below:

$$\text{Energy Savings, kWh} = \text{Cooling Capacity,} \frac{\text{BTU}}{\text{Hr}} \times \left(\frac{1}{\text{SEER}_{\text{Old}}} - \frac{1}{\text{SEER}_{\text{New}}} \right) \times \frac{\text{Operation Hours}}{1000 \frac{\text{W}}{\text{kWh}}}$$

$$\text{Demand Savings, kW} = \frac{\text{Energy Savings (kWh)}}{\text{Hours of Cooling}}$$

$$\text{Cooling Cost Savings} = \text{Energy Savings, kWh} \times \text{Cost of Electricity} \left(\frac{\$}{\text{kWh}} \right)$$

ENERGY SAVINGS CALCULATIONS							
ECM INPUTS	**COOLING CAPACITY, BTU/Hr**	**ANNUAL COOLING HOURS**	**EXISTING UNITS (S)EER**	**SPLIT UNITS (S)EER**	**# OF UNITS**	**ENERGY SAVINGS kWh**	**DEMAND SAVINGS kW**
RTU-1 Trane YCD300	300,000	800	9.7 EER	11.5 EER	1	3,873	4.8
RTU-3 Trane YCD180	180,000	800	8.6 EER	11.2 EER	1	3,887	4.9
Total					2	7,760	9.7

Project Cost, Incentives and Maintenance Savings

From the NJ Smart Start® Program appendix, the replacement of split system AC units and unitary systems with high efficiency AC systems falls under the category "Unitary HVAC Split System" and warrants an incentive based on efficiency (EER/SEER). The program incentives are calculated as follows:

$$\text{SmartStart® Incentive} = (\text{Cooling Tons} \times \$/\text{Ton Incentive})$$

UNITARY / SPLIT SYSTEM AC UNITS REBATE SUMMARY				
UNIT DESCRIPTION	**UNIT EFFICIENCY**	**REBATE $/TON**	**PROPOSED CAPACITY TONS**	**TOTAL REBATE $**
≥20 to 30 tons	10.5 EER	79	25	$1,975
≥ 11.25 to < 20 tons	11.5 EER	79	15	$1,185
≥ 5.4 to < 11.25 tons	11.5 EER	73	0	$0
5.4 tons or less Unitary AC and Split System	≥14 SEER	$92	0	$0
TOTAL			**40**	**$3,160**

Summary of cost, savings and payback for this ECM is below.

COST & SAVINGS SUMMARY							
ECM INPUTS	**INSTALLED COST**	**# OF UNITS**	**TOTAL COST**	**REBATES**	**NET COST**	**ENERGY SAVING**	**PAY BACK YEARS**
RTU-1 Trane YCD300	$26,000	1	$26,000	$1,975	$24,025	$639	37.6
RTU-3 Trane YCD180	$17,000	1	$17,000	$1,185	$15,815	$641	24.7
Total		2	$43,000	$3,160	$39,840	$1,280	31.1

There is no significant maintenance savings due to implementation of this ECM.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$43,000
NJ Smart Start Equipment Incentive ($):	$3,160
Net Installation Cost ($):	$39,840
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,280
Total Yearly Savings ($/Yr):	$1,280
Estimated ECM Lifetime (Yr):	15
Simple Payback	31.1
Simple Lifetime ROI	-51.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$19,205
Internal Rate of Return (IRR)	-8%
Net Present Value (NPV)	($24,555.17)

ECM #4: Condensing Boiler Installation

Description:

The primary source of heating for the building is an antiquated, 1,730 MBH, natural gas fired, fire tube steam boiler located in the boiler room in the mezzanine. The boiler is original to the building and it is approximately 58 years old. The boiler is in very poor condition and requires major maintenance and restoration annually in order to keep delivering heat to the building. The insulation on the boiler surfaces is partially missing. The boiler is sized to provide steam for a steam to hot water heat exchanger, which produces heating hot water for the perimeter baseboard heaters. Steam heat is inherently an inefficient method for space heating. It is recommended to replace the steam boiler and the heat exchanger with a condensing hot water boiler.

New condensing boilers could substantially improve the operating efficiency of the heating system of the building. Condensing boiler's peak efficiency tops out at 99% depending on return water temperature. Due to the operating conditions of the building, the annual average operating efficiency of the proposed condensing boiler is expected to be 88%. The estimated efficiency of the existing system is approximately 65%, which results in a 28% increase in overall heating system efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature.

This ECM includes installation of one condensing gas fired boilers to replace the existing steam boiler. The basis for this ECM is Aerco condensing boiler model BMK 2.0 The boiler installation is based on a one for one replacement based on capacity of the existing boiler. Owner should retain a professional engineer to properly size the

Energy Savings Calculations:

Baseline Gas Use for Hot Water: 299 Therms (Ave from July - September Gas Use)

Annual Gas Use for Heating: 17,205 Therms – (299 Therms X 12 Months)
13,618 Therms

$$\text{Bldg Heat Required} = \text{Existing Nat Gas}\,(\text{Therms}) \times \text{Heating Eff.}(\%) \times \text{Fuel HeatValue}\left(\frac{\text{BTU}}{\text{Therm}}\right)$$

$$\text{Proposed Heating Gas Usage} = \frac{\text{Bldg Heat Required}\,(\text{BTU})}{\text{Heating Eff.}(\%) \times \text{Fuel Heat Value}\left(\frac{\text{BTU}}{\text{Therm}}\right)}$$

$$\text{Energy Cost} = \text{Heating Gas Usage}(\text{Therms}) \times \text{Ave Fuel Cost}\left(\frac{\$}{\text{Therm}}\right)$$

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Cast Iron Boilers	New Condensing Boilers	
Existing Nat Gas (Therms)	17,205	0	
Boiler Efficiency (%)	65%	88%	23%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	
Equivalent Building Heat Usage (MMBTUs)	1,118	1,118	
Gas Cost ($/Therm)	1.10	1.10	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	17,205	12,708	4,497
Energy Cost ($)	$18,925	$13,979	$4,946
COMMENTS:			

Installation cost of the new condensing boilers, demolition, flue piping, boiler water piping modifications, gas piping modifications, electric, etc. is estimated to be $94,000.

From the **NJ Smart Start Appendix**, the installation of new condensing boilers warrants the following incentive: $1.75 per MBH.

$$\text{SmartStart® Incentive} = (\text{Boiler MBH} \times \$1.75) = (1500 \times \$1.75) = \$2{,}625$$

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$94,000
NJ Smart Start Equipment Incentive ($):	$2,625
Net Installation Cost ($):	$91,375
Maintenance Savings ($/Yr):	$1,000
Energy Savings ($/Yr):	$4,946
Total Yearly Savings ($/Yr):	$5,946
Estimated ECM Lifetime (Yr):	15
Simple Payback	15.4
Simple Lifetime ROI	-2.4%
Simple Lifetime Maintenance Savings	$15,000
Simple Lifetime Savings	$89,195
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	($20,388.29)

ECM #5: Digital Energy Management System (DDC EMS)

Description:

The heating and air conditioning systems within the facility are controlled via a verity of programmable and non-programmable thermostats scattered throughout the space. Although a common practice, multiple independent thermostats throughout is usually an inefficient and cumbersome way of controlling multiple heating and air conditioning systems in a facility. Often the settings on these thermostats are altered, set to hold or over-ride position or set to maximum heat or cool positions by the occupants rendering the supervisory controls inapplicable over the energy systems in the facility.

This ECM includes installing a Building Automation system with Direct Digital Controls (DDC) wired through an Ethernet backbone and front end controller within the building. The system will include new temperature sensors and new local thermostats with limited over-ride capability, a front end computer and main controller. The system will also include central controls for lighting. With the communication between the control devices and the front end computer interface, the facility manager will be able to take advantage of scheduling for occupied and unoccupied periods based on the actual occupancy of each space in the facility. Due to the fact that the building may have diverse hours of occupancy, including evening and weekend activities, having supervisory control over all of the equipment makes sense. The DDC system will also aid in the response time to service / maintenance issues when the facility is not under normal maintenance supervision, i.e. after-hours.

The new DDC system has the potential to provide significant savings by controlling the HVAC systems as a whole and provide operating schedules and features such as space averaging, night set-back, temperature override control, etc. 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 referenced report:

- Energy Management and Control System Savings: 5%-15%.

Savings resulting from the implementation of this ECM for energy management controls are estimated to be 10% of each utility type utilized in this building.

The basis for this ECM is the Honeywell Light Commercial Energy Management System or similar.

Energy Savings Calculations:

Since some of the key utility consumption and cost information was not available, estimated values are used for the unit cost of natural gas, total electricity usage and unit cost of electricity.

Energy savings for each utility is calculated with the equation below.

$$\text{Energy Savings (Utility)} = \text{Current Energy Consumption} \times \text{Estimated Savings, \%}$$

Following table summarizes energy savings for this facility via implementation of an Energy Management System:

DDC ENERGY MANAGEMENT SYSYEM CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Controls w/ Local Thermostats	DDC Controls	
Existing Nat Gas Usage (Therms)	17,205	-	
Existing Electricity Usage (kWh)	*300,000*	-	
Energy Savings, Nat. Gas	-	10%	
Energy Savings, Electricity	-	10%	
Gas Cost ($/Therm)	*$1.10*	*$1.10*	
Electricity Cost ($/kWh)	*$0.165*	*$0.165*	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	17,205	15,484	1,720
Electricity Usage (kWh)	300,000	270,000	30,000
Natural Gas Cost ($)	$18,925	$17,033	$1,893
Electricity Cost ($)	$49,500	$44,550	$4,950
Energy Cost ($)	$68,425	$61,583	$6,843
COMMENTS:	*Values in italic were not available during this study therefore they are estimated.*		

Demand savings due to implementation of this ECM is minimal.

The cost of a full DDC system with new field devices, controllers, computer, software, programming, etc. is approximately $4.00 per SF in accordance with recent Contractor pricing

for systems of this magnitude. Savings from the implementation of this ECM will be from the reduced energy consumption currently used by the HVAC system by proper control of schedule and temperatures via the DDC system.

Cost of complete DDC System = ($4.00/SF x 22,000 SF) = $88,000

Currently, there are no prequalified NJ SmartSmart Incentives for installation of the DDC system.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$88,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$88,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$6,843
Total Yearly Savings ($/Yr):	$6,843
Estimated ECM Lifetime (Yr):	15
Simple Payback	12.9
Simple Lifetime ROI	16.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$102,638
Internal Rate of Return (IRR)	2%
Net Present Value (NPV)	($6,314.65)

ECM #6: Window Replacement

Description:

The majority of the facility's envelope was updated with double pane windows in aluminum frames. However, there are several offices and storage spaces with older windows with single pane glass and uninsulated metal frames.

The windows account for significant energy use through leakage heat loss and conductive heat loss. The age and condition of the windows contribute to the leakage rate of the building. The single pane construction allows higher thermal (conductive) energy loss. These factors lead to increased energy use in the heating season. The heating loss due to single pane glass is combined with heat loss due to poor seals at each operable window. New double pane windows with low E glazing offer a substantial improvement in thermal performance in the summer months.

This ECM includes the replacement of all remaining older windows single pane glass in the facility with double pane windows with low emissivity glass. The proposed windows include reduced outside air leakage. In addition the double pane structure will significantly increase the insulation value compared to the existing single pane window structure.

The basis for this ECM is Anderson Windows at $75 per SF of window installed. Below is a list of areas with older and inefficient windows:

WINDOW REPLACEMENT SUMMARY			
ECM INPUTS	**NUMBER OF WINDOWS**	**SIZE**	**TOTAL AREA**
Offices and storage spaces	18	Various	220
TOTAL		**-**	**220**

Energy Savings Calculations:

$$\text{Infiltration}\left(\frac{\text{Ft}^3}{\text{Min.}}\right) = \text{Window Area}\left(\text{Ft}^2\right) \times \text{Estimated Infiltration per SF of Window}\left(\frac{\text{CFM}}{\text{Ft}^2}\right)$$

$$\text{Heat Load}\left(\frac{\text{Btu}}{\text{Hr.}}\right) = 1.1 \times \text{Infiltration}\left(\frac{\text{Ft}^3}{\text{Min}}\right) \times \text{Design Temperature Difference}\left(^{\circ}\text{F}\right)$$

$$\text{Cooling Load}\left(\text{Ton}\right) = \text{Infiltration}\left(\frac{\text{Ft}^3}{\text{Min}}\right) \times \frac{1\,\text{Ton Cooling}}{400\left(\frac{\text{Ft}^3}{\text{Min}}\right)}$$

$$\text{Heating Leakage Energy}\left(\text{Therms}\right)=\frac{\text{Heat Load}\left(\frac{\text{Btu}}{\text{Hr.}}\right)\times\text{HDD}\left(\text{Day }^{\circ}\text{F}\right)\times 24\left(\frac{\text{Hr.}}{\text{Day}}\right)\times\left(0.60\right)}{65\left(^{\circ}\text{F}\right)\times\text{Fuel Heat Value}\left(\frac{\text{Btu}}{\text{Therms}}\right)\times\text{Heating Efficiency}\left(\%\right)}$$

$$\text{Cooling Leakage Energy}\left(\text{kWh}\right)=\frac{\text{Cooling Load}\left(\text{Ton}\right)\times\left(\frac{12{,}000\text{ Btu}}{\text{Ton Hr.}}\right)\times\text{Full Load Cooling Hours}}{\frac{1000\text{ W.h}}{\text{kWh}}\times\text{Cooling Efficiency}\left(\text{EER}\right)}$$

$$\text{Conductive Energy}\left(\text{Therms}\right)=\frac{\text{U}-\text{Value}\times\text{Area}\left(\text{Ft}^2\right)\times\text{HDD}\left(\text{Day }^{\circ}\text{F}\right)\times 24\left(\frac{\text{Hr.}}{\text{Day}}\right)\times\left(0.60\right)}{65\left(^{\circ}\text{F}\right)\times\text{Fuel Heat Value}\left(\frac{\text{Btu}}{\text{Therms}}\right)\times\text{Heating Efficiency}\left(\%\right)}$$

$$\text{Heating Energy Cost} = \text{Total Heating Energy}\left(\text{Therms}\right)\times\text{Ave Fuel Cost}\left(\frac{\$}{\text{Therms}}\right)$$

$$\text{Cooling Energy Cost} = \text{Total Cooling Energy}\left(\text{kWh}\right)\times\text{Ave Fuel Cost}\left(\frac{\$}{\text{kWh}}\right)$$

WINDOW REPLACEMENT CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Description:	Existing Single Pane Windows	Double Pane Low-E Windows	-
Window (SF)	220	220	-
U-Value (BTU/HR/SF*°F)	0.8	0.45	0.35
Estimated Infiltration, CFM per SF Window	3	2	-
Total Infiltration, CFM	660	440	220
Heating System Efficiency (%)	65%	65%	-
Heating Degree Days (HDD)	4,750	4,750	-
Design Day Temp Diff (°F)	65	65	-
Heating Hrs Per Day (Hrs)	24	24	-
Full Load Cooling Hours	800	800	-
Average Cooling Efficiency, EER	9.0	9.0	-
Gas Cost ($/Therm)	*1.10*	*1.10*	-
Electric Cost ($/kWh)	*0.165*	*0.165*	-
Gas Heat Value (BTU/Therm)	100,000	100,000	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Heat Load (BTU/Hr)	47,190	31,460	15,730
Leakage Energy (Therms)	764	509	255
Conductive Energy (Therms)	185	104	81
Total Heating Energy (Therms)	949	613	336
Cooling Load (Ton)	2	1	1
Cooling Demand (kW)	0.6	0.4	0.2
Total Cooling Energy (kWh)	1,760	1,173	587
Gas Energy Cost ($)	$1,044	$675	$369
Electric Energy Cost ($)	$290	$194	$97
Total Energy Cost ($)	$1,334	$868	$466
Comments:	1. Proposed window U-value Based on ASHRAE 90.1 - 2007 Utility cost data estimated.		

Estimated cost for replacing the inefficient windows at this facility $16,500.

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$16,500
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$16,500
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$466
Total Yearly Savings ($/Yr):	$466
Estimated ECM Lifetime (Yr):	15
Simple Payback	35.4
Simple Lifetime ROI	-57.6%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$6,991
Internal Rate of Return (IRR)	-9%
Net Present Value (NPV)	($10,936.27)

REM: Renewable Energy Measures

Description:

Solar Energy Analysis: Based on a preliminary structural analysis, the roof of the Probation Office is not suitable for a substantial solar system. Therefore, a solar photovoltaic system is not recommended.

Wind Energy Analysis: Based on CEG's review of the applicability of wind energy for the facility; the low average wind speed, proximity to residential neighborhoods, and limited site space make this facility a poor candidate for wind energy production.

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.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Bergen County Probation 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 equipment upgrade	$10,630	$15,946	$1,820	$24,756	$7,193	$304	$7,496	15	$112,447	$4,553	354.2%	3.3	29.67%	$64,736.72
ECM #2	CRT Monitors	$4,600	$0	$0	$4,600	$759	$0	$759	15	$11,385	$0	147.5%	6.1	14.27%	$4,460.89
ECM #3	AC Unit upgrades	$28,000	$15,000	$3,160	$39,840	$1,280	$0	$1,280	15	$19,205	$0	-51.8%	31.1	-7.99%	($24,555.17)
ECM #4	Replace steam boiler with hot water boiler	$35,000	$59,000	$2,625	$91,375	$4,946	$1,000	$5,946	15	$89,195	$15,000	-2.4%	15.4	-0.30%	($20,388.29)
ECM #5	Install Building Automation System	$88,000	$0	$0	$88,000	$6,843	$0	$6,843	15	$102,638	$0	16.6%	12.9	1.99%	($6,314.65)
ECM #6	Window Replacement	$16,500	$0	$0	$16,500	$466	$0	$466	15	$6,991	$0	-57.6%	35.4	-9.21%	($10,936.27)

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* .

Concord Engineering Group, Inc.

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VOORHEES, NEW JERSEY 08043
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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, 2010:

Electric Chillers

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

Energy Efficiency must comply with ASHRAE 90.1-2004

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 - $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
Occupancy Controlled Thermostat (Hospitality & Institutional Facility)	$75 per thermostat

Energy Efficiency must comply with ASHRAE 90.1-2004

Ground Source Heat Pumps

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

Energy Efficiency must comply with ASHRAE 90.1-2004

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%

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
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 (1-2 lamps) $30 per fixture (3-4 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	$25 per fixture
LED Exit Signs	$10 - $20 per fixture
T-5 and T-8 High Bay Fixtures	$16 - $284 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
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 90.1-2004 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%

STATEMENT OF ENERGY PERFORMANCE

Probation Office

Not able to generate report due to incomplete utility data.

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County Probation Office

Boilers

Tag	Boiler-1		
Unit Type	Fire-tube Steam boiler		
Qty	1		
Location	Boiler room in mezz.		
Area Served	Entire facility hot water baseboard		
Manufacturer	Superior		
Model #	C4RB40A		
Serial #	F230614		
Input Capacity (MBH)	1730 CFH (Burner firing rate)		
Rated Output Capacity (MBH)	-		
Approx. Efficiency %	60% estimated overall efficiency		
Fuel	Natural Gas		
Approx Age	58		
ASHRAE Service Life	30		
Remaining Life	(28)		
Comments	Superior burner model # 4B-G-40. Very old and inefficient boiler with many maintenance problems		

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County Probation Office

Pumps

Tag	HWP-1		
Unit Type	Heating hot water circulator		
Qty	1		
Location	Boiler room		
Area Served	Perimeter hot water heating loop		
Manufacturer	BG		
Model #	-		
Serial #	-		
Horse Power	1/2		
Flow	-		
Motor Info	-		
Electrical Power	-		
RPM	-		
Motor Efficiency %	-		
Approx Age	10		
ASHRAE Service Life	20		
Remaining Life	10		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County Probation Office

Domestic Water Heaters

Tag	HWH-1		
Unit Type	Tank heater		
Qty	1		
Location	Boiler room		
Area Served	Faucets		
Manufacturer	Rheem		
Model #	21V50-2		
Serial #	RN 0397D00121		
Size (Gallons)	50		
Input Capacity (MBH/KW)	36 MBH		
Recovery (Gal/Hr)	-		
Efficiency %	80%		
Fuel	Natural Gas		
Approx Age	14		
ASHRAE Service Life	12		
Remaining Life	(2)		
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County Probation Office

Packaged AC Units

Tag	RTU-1	RTU-2	RTU-3
Unit Type	Rooftop AC Unit	Rooftop AC Unit	Rooftop AC Unit
Qty	1	1	1
Location	Roof	Roof	Roof
Area Served	Offices	Offices	Offices
Manufacturer	Trane	Trane	Trane
Model #	YCD300B3H0DB	TCD241C3HRCB	YCD180B3L0DB
Serial #	J31145131D	617100732D	U34142BD40
Cooling Type	Direct expansion	Direct expansion	Direct expansion
Cooling Capacity (Tons)	25	20	15
Cooling Efficiency (SEER/EER)			
Heating Type	Gas fired	Gas fired	Gas fired
Heating Input (MBH)	400	400	250
Efficiency	81%	81%	81%
Fuel	Natural gas	Natural gas	Natural gas
Approx Age	17	5	17
ASHRAE Service Life	15	15	15
Remaining Life	(2)	10	(2)
Comments			

MAJOR EQUIPMENT LIST

Concord Engineering Group

Bergen County Probation Office

Packaged AC Units

Tag	Window Unit	Mini split unit	
Unit Type	Window AC Unit	Ductless mini split unit	
Qty	1	1	
Location	Conference room in mezz.	CU on roof, Indoor unit Chief's office	
Area Served	Conference room in mezz.	Chief's office	
Manufacturer	Friedrich	Sanyo	
Model #	-	CL1211	
Serial #	-	0013861	
Cooling Type	Direct Expansion	Direct Expansion	
Cooling Capacity (Tons)	12,000 BTU/h (Est)	12,000 BTU/h	
Cooling Efficiency (SEER/EER)	9 EER (Est)	10 SEER	
Heating Type	-	-	
Heating Input (MBH)	-	-	
Efficiency	-	-	
Fuel	-	-	
Approx Age	5	5	
ASHRAE Service Life	15	15	15
Remaining Life	10	10	
Comments			

Investment Grade Lighting Audit

CEG Job #: 9C10085

Project: Bergen County Probation
133 River St
Hackensack, NJ

Bldg. Sq. Ft. 22,205

Bergen County Probation

KWH COST: $0.165
(Estimated)

ECM #1: Lighting Upgrade - General

EXISTING LIGHTING										PROPOSED LIGHTING									SAVINGS			
CEG Type	Fixture Location	Yearly Usage	No. Fixts	No. Lamps	Fixture Type	Fixt Watts	Total kW	kWh/Yr Fixtures	Yearly $ Cost	No. Fixts	No. Lamps	Retro-Unit Description	Watts Used	Total kW	kWh/Yr Fixtures	Yearly $ Cost	Unit Cost (INSTALLED)	Total Cost	kW Savings	kWh/Yr Savings	Yearly $ Savings	Yearly Simple Payback
132.24	Open Office	2600	176	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Recessed Mnt., Parabolic Lens	127	22.35	58,115.2	$9,589.01	176	2	2 Lamp, 28w T8, Elect. Ballast, Specular Reflector; retrofit	50	8.80	22880	$3,775.20	$100.00	$17,600.00	13.55	35235.2	$5,813.81	3.03
221.11	Back Hall	2600	9	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.56	1,450.8	$239.38	9	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.45	1170	$193.05	$14.00	$126.00	0.11	280.8	$46.33	2.72
232.21	Back Open Office	2600	74	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	6.36	16,546.4	$2,730.16	74	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	5.33	13852.8	$2,285.71	$21.00	$1,554.00	1.04	2693.6	$444.44	3.50
232.21	Lunch Room	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.69	1,788.8	$295.15	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	1497.6	$247.10	$21.00	$168.00	0.11	291.2	$48.05	3.50
563	Side Entrance	1600	5	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	0.26	416.0	$68.64	5	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
111.11	Desk Task Lighting	2600	83	1	1x4, 1-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	48	3.98	10,358.4	$1,709.14	83	1	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	25	2.08	5395	$890.18	$80.00	$6,640.00	1.91	4963.4	$818.96	8.11
222.21	Restrooms	2600	2	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	322.4	$53.20	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$42.90	$14.00	$28.00	0.02	62.4	$10.30	2.72
121.14	Mezzanine	500	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., No Lens	78	0.16	78.0	$12.87	2	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.10	50	$8.25	$80.00	$160.00	0.06	28	$4.62	34.63
118.14	Mezzanine	500	3	1	8' Channel, 1 Lamp, 60w T12, Mag. Ballast, Surface Mnt., No Lens	76	0.23	114.0	$18.81	3	1	(1) 8' Lamps to (2) 4' Lamps - 28w T8, Elect Ballast; retrofit	50	0.15	75	$12.38	$100.00	$300.00	0.08	39	$6.44	46.62
128.11	Mezzanine	500	1	2	8' Channel, 2 Lamp, 96w T12, Mag. Ballast, Surface Mnt., No Lens	209	0.21	104.5	$17.24	1	4	(2) 8' Lamps to (4) 4' Lamps - 28w T8, Elect Ballast; retrofit	96	0.10	48	$7.92	$100.00	$100.00	0.11	56.5	$9.32	10.73
221.11	Storage Room #1	500	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	31.0	$5.12	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	25	$4.13	$14.00	$14.00	0.01	6	$0.99	14.14
221.11	Storage Room #2	500	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Prismatic Lens	62	0.06	31.0	$5.12	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	25	$4.13	$14.00	$14.00	0.01	6	$0.99	14.14
121.11	Mezzanine Corridor	2600	3	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.23	608.4	$100.39	3	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.15	390	$64.35	$80.00	$240.00	0.08	218.4	$36.04	6.66
132.15	Mens Room	2600	3	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Akrylic Lens	127	0.38	990.6	$163.45	3	2	Delamp 1, 2 Lamp, 28w T8, Elect. Ballast, Specular Reflector; retrofit	50	0.15	390	$64.35	$100.00	$300.00	0.23	600.6	$99.10	3.03
132.15	Ladies Room	2600	3	3	2x4, 3-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Akrylic Lens	127	0.38	990.6	$163.45	3	2	Delamp 1, 2 Lamp, 28w T8, Elect. Ballast, Specular Reflector; retrofit	50	0.15	390	$64.35	$100.00	$300.00	0.23	600.6	$99.10	3.03
121.11	Conference Room	500	2	2	1x4, 2-Lamp, 34w T12, Mag. Ballast, Surface Mnt., Prismatic Lens	78	0.16	78.0	$12.87	2	2	Reballast & Relamp; Sylvania Lamp FO28/841/SS/ECO	50	0.10	50	$8.25	$80.00	$160.00	0.06	28	$4.62	34.63
	Totals		362	23				89,190	$14,716	362	22			17.6	45,180	$7,455		$26,576	16.9	43,594	$7,193	3.69