LOCAL GOVERNMENT ENERGY AUDIT PROGRAM: ENERGY AUDIT REPORT

BURLINGTON COUNTY COLLEGE

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MOUNT LAUREL CAMPUS
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I. EXECUTIVE SUMMARY

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

Entity: Burlington County College – Mount Laurel Campus

Facilities:

	Area (SF)
Science Building	50,850
Enterprise Center	62,150
Technology and Engineering Center	67,000
Laurel Hall	53,023
Central Energy Plant	10,253
Business Incubator Building	20,000

Municipal Contact Person: Jay Falkenstein, Physical Plant Manager
Facility Contact Person: Jay Falkenstein, Physical Plant Manager

This audit is performed in connection with the New Jersey Clean Energy - Local Government Energy Audit Program for Burlington County College Mt. Laurel Campus. The purpose of this analysis is to provide the College with insight into the energy savings potential that exists within facilities at Mt. Laurel Campus. Energy Efficiency changes and upgrades requires support from the building occupants, operations personnel and the administrators of the College in order to maximize the savings and overall benefit. The efficiency improvement of public buildings provides a benefit for the environment and the residence of New Jersey. Through this report it has been demonstrated that there is significant potential for energy savings and infrastructure improvements at Burlington County College.

Fast Payback Energy Conservation Measures:

The Energy Conservation Measures (ECMs) identified within the reports represent the potential annual savings at each facility. It is recommended to consider all ECMs as part of the College's initiative to save energy, reduce emissions, and lower operating costs. Several ECMs shown within this report represent significant savings relative to the cost to implement. The ECMs shown with a simple payback of 10 years and less are considered very cost effective for a public entity such as the College and should be considered a high priority for Burlington County College. The following ECMs are highly recommended throughout the Mt Laurel Campus.

- Lighting Upgrades (All facilities)

Lighting retrofits throughout the college buildings is a straight forward conservation measure that is prescriptive in nature and provides substantial savings for the investment. Lighting retrofits is a good example of ECMs that can be implemented with "in house" staff to reduce the installation cost and further reduce paybacks. In many facilities such as the Technology and Engineering Center, Enterprise Center, and the Laurel Hall, the measure includes replacing existing 700 series T-8 fluorescent lamps with new higher efficiency T-8 lamps. Overall lighting upgrades represent one of the most easily implemented ECMs and are highly recommended throughout all Burlington County College facilities.

- Lighting Controls (All facilities)

Similar to lighting upgrades, lighting controls are very prescriptive in nature and can save considerable energy. Lighting controls do not require replacement of the fixture and typically can save more energy than lighting upgrades. For the purpose of this energy audit, each ECM is calculated as stand-alone ECMs. The maximum savings can be achieved through the implementation of both the lighting upgrades and lighting controls ECMs. Lighting controls will automatically turn off lights when spaces and rooms are not occupied. It is important to note that ECMs are calculated as stand-alone ECMs and therefore the total savings will be slightly less than the sum of both individual ECMs (Lighting Upgrade and Lighting Controls). The discrepancy between additive ECMs is within the tolerances for this level of analysis (+/- 20%). Lighting controls provide the maximum savings in spaces that have changing occupancy schedules throughout the day. Other facilities with standard operating hours will also see substantial savings because all spaces are not occupied continuously. Lighting controls throughout Burlington County College is highly recommended in addition to the lighting upgrade ECMs.

- VFD Retrofits - AHU Supply, Return & Exhaust Fans (Science Bldg, Tech. Eng. Center)

Some of the facilities in the campus utilize constant speed supply or exhaust fans with either inlet guide vanes or pressure relief dampers or no flow control at all. This ECM includes installation of variable frequency drives to control the volume of air supplied or exhausted by varying the fan speeds. This ECM allows all fans to slow down when there is less than the full air flow required for the building zone. At a payback of below or near 10 years, this ECM is a beneficial approach to reducing the facility's overall energy use.

- Repair or Replace Faulty VFDs (Science Building, Enterprise Center)

Majority of the Air Handling Units in the campus are equipped with Variable Frequency Drives for supply air volume control. During the survey it was observed that some of these VFDs are broken and therefore they were running at bypass mode. This is not only inefficient, but also causes damage to the ductwork by exerting extra pressure and strain. This ECM is developed in order to quantify savings by simply replacing the faulty equipment. In most cases, this task can be performed by the in-house personal. This ECM is recommended for all buildings with faulty ECMs. With approximately high return on investment this is a highly recommended ECM.

- Demand Controlled Ventilation (Enterprise Center, Laurel Hall)

DCV is a concept of automatic ventilation control based on occupant demand. DCV adjusts outside air ventilation based on the actual ventilation demands of the occupants a space. Implementation includes hardware and controls upgrade and it is highly recommended for the spaces with spaces with fluctuating occupancy.

- Condenser Water Supply Temp. Reset (Central Energy Plant)

This ECM is for a control algorithm upgrade, which automatically reset the condenser water temperature to the lowest practically possible temperature by tracking the changes in the ambient air wet-bulb temperature. This will ensure that the chillers will run at maximum efficiency at all times while the cooling tower fans run at minimum theoretical speeds. This is one of the fastest paying ECMs and should be implemented immediately.

- Install Indirect Domestic Hot Water Heater (Laurel Hall)

Domestic hot water heating at the Laurel Hall is produced via an electric hot water heater, which is an expensive method. Since there is no natural gas at this building, it is recommended to install an indirect hot water heater in series with the existing electric domestic water heater tank, which will produce hot water using the campus heating hot water loop during the heating season. This ECM will pay in approximately 1.3 years and it is highly recommended.

- Install Premium Efficiency Motors (Business Incubator)

The simple payback for premium efficiency motor replacements ranges from 5 to 25 years depending on the horse power, existing efficiency, and run hours of the equipment. This ECM is a one-for-one style replacement with dependable savings that is based on a simple calculation. In addition to the savings, this ECM provides new motors for a variety of existing equipment.

Capital Improvement Energy Conservation Measures:

The ECMs that have much longer paybacks are considered capital improvement ECMs. These ECMs typically have high installation costs that are more difficult to justify the savings based solely on the energy savings associated with the improvement. Despite the long paybacks, these ECMs in many cases provide valuable and much needed infrastructure improvements for the facility. These ECMs include HVAC equipment upgrades, VFDs, Combined Heat and Power Systems as well as other large equipment replacements. The savings identified for the following ECMs provides additional incentive for Burlington County College’s capital improvement projects.

- VFD Retrofits for AHU Supply and Return Fans (Bus. Incubator, TEC)
- High Efficiency Condensing Boilers (Business Incubator, TEC)
- Install Premium Efficiency Motors (Science Building, Central Plant, Laurel Hall, Tech. & Eng. Center)
- Campus HW/CW Tie-in (Business Incubator)
- Demand Controlled Ventilation (Laurel Hall)
- Variable Primary Pumping (Central Energy Plant)

- VFD for Pumps (Enterprise Center, Tech & Eng..Center, Laurel Hall)

Combined Heat and Power (CHP) Considerations:

Typically a CHP System is a recommended Energy Conservation Measure (ECM) for larger facilities and campuses due to the significant energy savings impact. The additional benefits of a combined heat and power plant over the calculated energy savings include; added redundancy to the existing system's power supply, electric power pricing security in a volatile energy market, significant reduction in electrical power requirement from the grid and environmental impacts. Unlike most energy conservation measures, a CHP system looks at the facilities potential to greatly increase the efficiency of power production over conventional power plant efficiencies. The energy otherwise rejected as waste heat is captured by the facility while simultaneously reducing the building's electrical requirement from the grid by 26.7%. With the implementation of a CHP plant, the campus overall source EUI rating would be reduced by 6%. In a facility that requires high electrical use to support a significant hours of daily operation, this option represents a moderate impact in overall energy efficiency.

Nevertheless, a typical Combined Heat and Power System require nearly constant full load operation 24 hours per day. Since the majority of the HVAC systems in this facility are scheduled to setback or shut down during nights and weekends, the proposed system is required to shut down and restarted daily. This results in further unpredictable and costly maintenance problems which will quickly offset the annual energy savings, especially due to utilization of absorption chillers. Therefore, a Combined Heat and Power System is not recommended for this facility.

Combined Project Approach:

Although individual projects with a simple payback of 10 years and less are considered financially self sustaining, it is important to consider how multiple projects can be combined together. When ECMs are aggregated into a single project, the lower cost ECMs provides valuable savings to offset the higher cost ECMs. Likewise when multiple facilities are aggregated together into a single entity energy efficiency project, the same benefits are seen on a larger scale.

The Energy Savings Improvement Program (ESIP) allows for financing of any combination of energy efficiency projects across multiple facilities into one large project. The term of the financing must be under 15 years and the savings provides the revenue for the financing cost. The combination of all facilities into one large energy efficiency project provides Burlington County College with the opportunity to implement all ECMs identified within this report with an overall simple payback of 9.4 years. This option allows Burlington County College to implement much needed infrastructure improvements such as new high efficiency HVAC equipments, condensing boilers as well as high efficiency lighting and lighting controls for all facilities. The program financing allows for the implementation with no upfront cost for Burlington County College. Implementation of an ESIP provides significant benefits and should be strongly considered for the College. The total Entity Project Summary table below shows the savings, costs, incentives and paybacks for all ECMs at Burlington County College.

Table 1
ESIP -Total Entity Project Summary

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL ENERGY EFCY. PROJECT					
FACILITY ENERGY EFFICIENCY PROJECTS	**ANNUAL ENERGY SAVINGS ($)**	**PROJECT COST ($)**	**SMART START INCENTIVES**	**CUSTOMER COST**	**SIMPLE PAYBACK**
Science Building	$11,398	$42,717	$3,600	$38,577	3.4
Enterprise Center	$18,662	$166,543	$2,400	$163,783	8.8
Tech. and Engineering Center	$19,621	$159,253	$13,650	$142,590	7.3
Laurel Hall	$10,679	$108,608	$774	$107,658	10.1
Central Energy Plant	$12,411	$208,562	$9,774	$198,672	16.0
Business Incubator Building	$10,725	$135,868	$1,360	$134,066	12.5
Total Entity Project	**$83,495**	**$821,551**	**$31,558**	**$785,345**	**9.4**

Total Entity Energy Costs:	**$809,624**
Est. Total Entity Energy Savings:	**$83,495**
Overall Entity Percent Reduction:	**10.3%**

Burlington County College has the option to utilize the Direct Install program for their facilities. With access to funding through the Energy Efficiency Conservation Block Grant, the College can utilize this funding in conjunction with the Direct Install program to further reduce the project costs. When utilizing Direct Install in lieu of the Smart Start incentive for eligible measures, it is estimated that an additional $275,000 of incentive could be available through the use of this program. The eligibility of the ECMs is dependent on the facility evaluation through the program and must be verified through the program contractor. This approach maximizes the savings for Burlington County College and could reduce the overall project payback to 9.4 years. It is highly recommended to utilize all available incentives including Direct Install by contacting the Direct Install Contractor to perform the site evaluation for all facilities.

Implementation of all ECMs identified within the ESIP – Entity Total Project Summary table represents a total annual savings of approximately $83,495 for Burlington County College. The individual facility project summaries are shown within each facility energy audit report.

Other Considerations

- Maintenance and Operational Measures

In addition to the ECMs, there are maintenance and operational measures that can provide significant energy savings and provide immediate benefit. The ECMs listed above represent investments that can be made to the facility which are justified by the savings seen overtime. However, the maintenance items and small operational improvements below are typically achievable with on site staff or maintenance contractors and in turn have the potential to provide substantial operational savings compared to the costs associated. The following are typical recommendations which should be considered if not already implemented:

1. Chemically clean the hot water and chilled water coils periodically to optimize efficiency. Poorly maintained heat transfer surfaces can reduce efficiency 5-10%.
2. Maintain all weather stripping on entrance doors to limit unnecessary infiltration.
3. Clean all light fixtures to maximize light output to provide better light output and avoid the use of task lighting where otherwise not necessary.
4. Provide frequent air filter changes to decrease overall system power usage and maintain better IAQ.
5. Repair or replace faulty VFDs, faulty control sensors and actuators.

- Renewable Energy Measures

Renewable Energy Measures (REMs) were also reviewed for implementation at Burlington County College. CEG utilized a combination of roof mounted solar arrays and canopy style parking lot solar arrays to house PV systems throughout the College buildings. The total solar electric production potential for these systems is approximately 996,000 kWh, which would reduce Burlington County College's grid purchased electric energy by 21%.The system's calculated simple payback of approximately 9.9 years is below the standard 10 year simple payback threshold and this payback could be further lessened with alternative funding methods. CEG recommends the Owner review all funding options available with the implementation of this renewable energy measure.

Overall Assessment:

Overall, Burlington County College is a well maintained and efficient campus. There are a number of ECMs that can be implemented to further reduce energy use and save on the facility's operating costs. The total energy cost of $809,624 could be reduced by approximately 10.3% through the implementation of the ECMs recommended in this audit. Burlington County College is in a unique position to implement energy efficiency improvements and still include large capital projects. Since the total project is capable of being funded through the savings, CEG highly recommends the College to take advantage of this opportunity.

II. INTRODUCTION

The comprehensive energy audit covers the following buildings at the Mt. Laurel Campus:

- Science Building
- Enterprise Center
- Technology and Engineering Center
- Laurel Hall
- Central Energy Plant
- Business Incubator Building

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

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

The Energy Use Index (EUI) is established for the building. Energy Use Index (EUI) is expressed in British Thermal Units/square foot/year (BTU/ft^2/yr), which is used to compare energy consumption to similar building types or to track consumption from year to year in the same building. The EUI is calculated by converting the annual consumption of all energy sources to BTU's and dividing by the area (gross square footage) of the building. Blueprints (where available) are utilized to verify the gross area of the facility. The EUI is a good indicator of the relative potential for energy savings. A low EUI indicates less potential for energy savings, while a high EUI indicates poor building performance therefore a high potential for energy savings.

Existing building architectural and engineering drawings (where available) are utilized for additional background information. The building envelope, lighting systems, HVAC equipment, and controls information gathered from building drawings allow for a more accurate and detailed review of the building. The information is compared to the energy usage profiles developed from utility data. Through the review of the architectural and engineering drawings a building profile can be defined that documents building age, type, usage, major energy consuming equipment or systems, etc.

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

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

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

III. METHOD OF ANALYSIS

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

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

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

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

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

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

ECM Calculation Equations:

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

$$Simple\ Lifetime\ Savings = \left(Yearly\ Savings \times ECM\ \ Lifetime \right)$$

$$Simple\ Lifetime\ ROI = \frac{(Simple\ Lifetime\ Savings\ - Net\ Cost)}{Net\ Cost}$$

$$Lifetime\ Maintenance\ Savings = \left(Yearly\ Maintenance\ Savings \times ECM\ \ Lifetime \right)$$

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

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

Net Present Value calculations based on Interest Rate of 3%.

IV. HISTORIC ENERGY CONSUMPTION/COST

A. Energy Usage

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

Table 2
Electric Utility Summary

ELECTRIC UTILITY USAGE PER FACILITY			
FACILITY	**ANNUAL ELECTRIC UTILITY**		
DESCRIPTION	**USAGE (KWH)**	**COST ($)**	**AVE RATE ($/KWH)**
Science Building	566,729	$79,851	$0.14
Enterprise Center	801,146	$117,920	$0.15
Tech. and Engineering Center	1,326,514	$184,303	$0.14
Laurel Hall	641,442	$90,740	$0.14
Central Energy Plant	954,379	$139,934	$0.15
Business Incubator Building	482,720	$72,184	$0.15
Total	**4,772,930**	**$684,932**	**$0.14**

Table 3
Natural Gas Summary

NATURAL GAS UTILTY USAGE PER FACILITY			
FACILITY	**ANNUAL NATURAL GAS UTILITY**		
DESCRIPTION	**USAGE (THERMS)**	**COST ($)**	**AVE RATE ($/THERM)**
Science Building	-	-	-
Enterprise Center	4,385	$5,196	$1.18
Tech. and Engineering Center	29,105	$33,814	$1.16
Laurel Hall	-	-	-
Central Energy Plant	72,724	$76,847	$1.06
Business Incubator Building	7,719	$8,835	$1.14
Total	**113,934**	**$124,692**	**$1.09**

B. Energy Use Index (EUI)

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

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

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

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

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

Table 4
Energy Use Index Summary

ENERGY USE INDEX PER FACILITY				
FACILITY	**BUILDING AREA**	**ENERGY USE INDEX**		
DESCRIPTION	**(SF)**	**SITE (KBTU/SF/YR)**	**SOURCE (KBTU/SF/YR)**	**ELECTRIC (KWH/SF/YR)**
Science Building	50,800	38.1	127.2	11.2
Enterprise Center	62,150	51.1	154.4	12.9
Tech. and Engineering Center	67,000	111.0	271.2	19.8
Laurel Hall	53,023	41.3	137.9	12.1
Central Energy Plant	10,253	1,027.1	1,804.0	93.1
Business Incubator Building	20,000	121.0	315.6	24.1
See the Appendix C - Statement of Energy Performance for comparason to other facilities Highlighted areas are estimated. Individual building EUI does not include hot and chilled water.				
CAMPUS AREA	263,226 SF			
BUILDING SITE EUI	105 (KBTU/SF/YR)			
BUILDING SOURCE EUI	252 (KBTU/SF/YR)			

As a comparison, data has been gathered by the US Department of Energy (DOE) for various facilities cataloguing the standard site and source energy utilization. This data has been published in the 2003 Commercial Building Energy Consumption Survey and is noted as follows for facilities of this type:

- Education – College/University (Campus Level):
  120 kBtu/SF Site Energy, 280 kBtu/SF Source Energy.

Based on the information compiled for the studied campus, as compared to the national average the source energy usage is approximately 10% lower than the baseline data. Similarly, the site energy usage is **12% below the national average**.

C. EPA Energy Benchmarking System

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

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

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

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

[redacted] [redacted]

[redacted] [redacted]

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

Table 5
Energy Star Performance Summary

ENERGY STAR PERFORMANCE RATING PER FACILITY			
FACILITY	**ENERGY STAR PERFORMANCE RATING**		
DESCRIPTION	**SCORE**	**AVERAGE**	**POTENTIAL CERTIFICATIONS**
Science Building	N/A	50	N/A
Enterprise Center	N/A	50	N/A
Tech. and Engineering Center	N/A	50	N/A
Laurel Hall	N/A	50	N/A
Central Energy Plant	N/A	50	N/A
Business Incubator Building	N/A	50	N/A

See the Appendix C - Statement of Energy Performance for comparative facilities
Score: "N/A" represents facility that could not receive a rating. See Energy Star website for details.

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

An Energy Performance Rating cannot be established for the Campus or individual buildings. The Energy Star program does not have enough bin data available to calculate a campus wide Energy Performance Rating at this time. In addition, individual building ratings cannot be established due to the design of the Campus wide utility hot and chilled water distribution system. One year of utility data must be entered for each building or facility, since reliable building energy meters do not exist, this approach cannot be taken.

V. RENEWABLE/DISTRIBUTED ENERGY MEASURES

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

Solar Generation

Solar energy produces clean energy and reduces a building's carbon footprint. This is accomplished via photovoltaic panels which are mounted on all south and southwestern facades of the building. Flat roof, as well as sloped areas can be utilized; flat areas will have the panels turned to an optimum solar absorbing angle. (A structural survey of the roof would be necessary before the installation of PV panels is considered). Parking lots can also be utilized for the installation of a solar array. A truss system can be installed that is high enough to park vehicles under the array and no parking lot area is lost.

The state of NJ has instituted a program in which one Solar Renewable Energy Certificate (SREC) is given to the Owner for every 1000 kWh of generation. SREC's can be sold anytime on the market at their current market value. The value of the credit varies upon the current need of the power companies. The average value per credit used in our financial calculations is $350 per MWH. This equates to $0.35 per kWh generated.

CE has reviewed the existing roof area and parking lot canopy area potential of the facilities included in this audit for the purposes of determining a potential for a photovoltaic system. Where applicable a parking lot canopy system was reviewed due to the large amount of parking space available on the campus. Some areas were not included due to potential shading from campus buildings and surrounding trees. A depiction of the area utilized at each facility is shown in **Renewable / Distributed Energy Measures Calculation Appendix**. The system sizes are shown below for each building where installation of a solar PV system is feasible. The total KWH production for all facilities combined is 995,982 kWh annually, reducing the overall utility bill for the campus by approximately 15% percent. A detailed financial analysis can be found in the **Renewable / Distributed Energy Measures Calculation Appendix** within each facility report. This analysis illustrates the payback of the system over a 15 year period. The eventual degradation of the solar panels and the price of accumulated SREC's are factored into the payback.

Table 6
Renewable Energy Summary

POWER PRODUCTION SUMMARY - PHOTOVOLTAIC SYSTEM PER FACILITY			
FACILITY	**PRODUCTION SUMMARY**		
DESCRIPTION	**ELECTRIC PRODUCTION (KWH)**	**TOTAL FACILITY USE (KWH)**	**% REDUCTION**
Science Building	262,469	566,729	46%
Enterprise Center	44,473	801,146	6%
Tech. and Engineering Center	241,841	1,326,514	18%
Laurel Hall	39,050	641,442	6%
Central Energy Plant	377,690	954,379	40%
Business Incubator Building	30,459	482,720	6%
Total	**995,982**	**4,772,930**	21%

The proposed photovoltaic array layout is designed based on the specifications for the Sun Power SPR-230 panel. This panel has a "DC" rated full load output of 230 watts, and has a total panel conversion efficiency of 18%. Although panels rated at higher wattages are available through Sun Power and other various manufacturers, in general most manufacturers who produce commercially available solar panels produce a similar panel in the 200 to 250 watt range. This provides more manufacturer options to the public entity if they wish to pursue the proposed solar recommendation without losing significant system capacity.

The array system capacity was sized based on available roof space or canopy style system area available at each existing facility. Estimated solar array generation is calculated based on the National Renewable Energy Laboratory PVWatts Version 1.0 Calculator. In order to calculate the array generation an appropriate location with solar data on file must be selected. In addition the system DC rated kilowatt (kW) capacity must be inputted, a DC to AC de-rate factor, panel tilt angle, and array azimuth angle. The DC to AC de-rate factor is based on the panel nameplate DC rating, inverter and transformer efficiencies (95%), mismatch factor (98%), diodes and connections (100%), dc and ac wiring(98%, 99%), soiling, (95%), system availability (95%), shading (if applicable), and age(new/100%). The overall DC to AC de-rate factor has been calculated at an overall rating of 81%. The PVWatts Calculator program then calculates estimated system generation based on average monthly solar irradiance and user provided inputs. The monthly energy generation and offset electric costs from the PVWatts calculator is shown in the **Renewable/Distributed Energy Measures Calculation Appendix**.

The proposed solar array for each facility is qualified by the New Jersey Board of Public Utilities Net Metering Guidelines as a Class I Renewable Energy Source. These guidelines allow onsite customer generation using renewable energy sources such as solar and wind with a capacity of 2 megawatts (MW) or less. This limits a customer system design capacity to being a net user and not a net generator of electricity on an annual basis. Although these guidelines state that if a customer does net generate (produce more electricity than they use), the customer will be credited those kilowatt-hours generated to be carried over for future usage on a month to month basis. Then, on an annual basis if the customer is a net generator the customer will then be compensated by the utility the average annual PJM Grid LMP price per kilowatt-hour for the over generation. Due to the aforementioned legislation, the customer is at limited risk if they generate more than they use at times throughout the year. With the inefficiency of today's energy storage systems, such as batteries, the added cost of storage systems is not warranted and was not considered in the proposed design.

Direct purchase involves Burlington County College paying for 100% of the total project cost upfront in lieu of one of the methods noted in the Installation Funding Options section below. Calculations include a utility inflation rate as well as the degradation of the solar panels over time. The financial summary per facility is as follows:

Table 7
Renewable Financial Summary

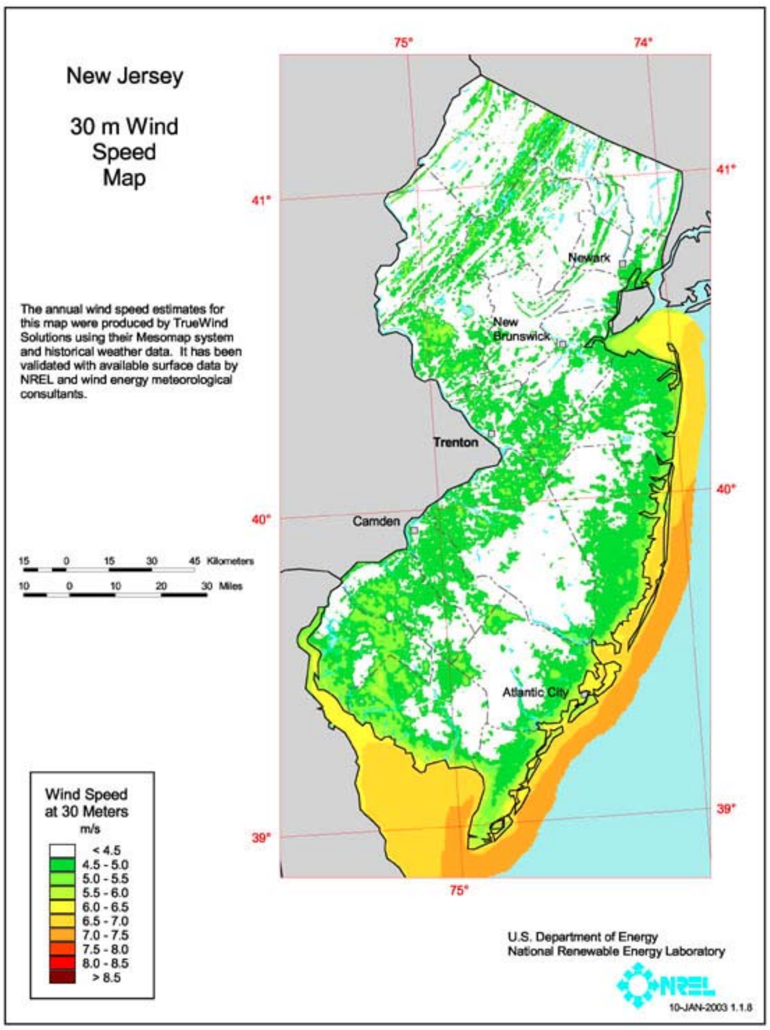
FINANCIAL SUMMARY - PHOTOVOLTAIC SYSTEM PER FACILITY			
FACILITY	**DIRECT PURCHASE FINANCIAL SUMMARY**		
DESCRIPTION	**INSTALATION COST ($)**	**ANNUAL SAVINGS ($)**	**INTERNAL RATE OF RETURN**
Science Building	$1,421,787	$138,217	5.1%
Enterprise Center	$197,444	$25,489	9.7%
Tech. and Engineering Center	$1,271,069	$126,871	5.5%
Laurel Hall	$170,022	$21,072	0%
Central Energy Plant	$2,035,400	$202,293	5.5%
Business Incubator Building	$142,614	$16,436	7.8%
Total	**$5,238,335**	**$530,377**	5.7%

CE recommends Burlington County College to review all options available for installation of solar PV systems at their facilities including a Power Purchase Agreement (PPA). This option utilizes providers who will own, operate, and maintain the system for a period of 15 years. During this time the PPA Provider would sell all of the electric generated by Solar Arrays to the college campus at a reduced rate compared to their existing electric rate.

Wind Generation

In addition to the Solar Analysis, CE also conducted a review of the applicability of wind energy for the facility. Wind energy production is another option available through the Renewable Energy Incentive Program. Wind turbines of various types can be utilized to produce clean energy on a per building basis. Cash incentives are available per kWh of electric usage.

Based on CE's review of the applicability of wind energy for the facility, it was determined that the average wind speed was too low to provide constant power. This speed would be well below the recommended wind speed as suggested by the peak power curve for a standard wind turbine. It would result in a simple payback period exceeding 25 years. Therefore, wind energy is not a viable option to implement and is currently not economically feasible. Referring to the figure below Burlington Count College Mount Laurel Campus can be located within a zone that produces approximately less than 4.5 m/s of wind speed annually on average. A wind speed annual average above 6 m/s is required to have a feasible payback period on the purchase and installation of wind turbines.



VI. ENERGY PURCHASING AND PROCUREMENT STRATEGY

Load Profile:

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

Electricity:

The electricity usage profile demonstrates a typical cooling load profile for facilities that have occupancy during the summer months. Historical usage is higher in the summer months however relatively steady throughout the year with an average monthly usage of 467,024 kWh. Largest consumption months are the summer months of June, July, August and September.

Winter months for electricity are defined as January – May and October – December. Summer months are defined as June – September. The average winter usage is 422,061 kWh and the average summer usage is 556,950 kWh. Both load profiles (winter and summer) are relatively equal and flat. The facilities aggregated historical usage profile is very beneficial and will allow for more competitive energy prices when shopping for alternative suppliers mainly due to this relatively flat load profile. Third Party Supplier (TPS) electric commodity contracts that offer a firm, fixed price for 100% of the facilities electric requirements and are lower than the PSE&G's BGS-FP default rate are recommended.

Natural Gas:

The Natural Gas Usage Profile demonstrates a very typical natural gas (heat load) profile for the facilities. The average monthly winter (Nov-Mar) consumption is 19,850 therms and the average monthly summer (Apr-Oct) consumption is 2,098 therms.

This load profile will yield less favorable fixed natural gas pricing when shopping for alternative suppliers. This is because the higher winter month consumption will yield higher pricing which will not be offset by the summer month consumption. Nymex commodity pricing is generally higher in the winter months of November – March and lower in the summer months of April – October. Obtaining a flatter load profile in aggregate for all facilities, (usage is similar each month), will yield optimum natural gas pricing when shopping for alternative suppliers.

Third Party Supplier (TPS) natural gas commodity contracts that offer a product structure that is either 1) a fixed basis rate with a market based Nymex (commodity only) rate or 2) a fixed basis rate with fixed Nymex (commodity only) winter rate (Nov – March) and market based Nymex/commodity rate for the summer months (April – October) for 100% of the facilities

metered natural gas requirements are both recommended due to current market pricing. Third Party Supplier (TPS) natural gas contracts and product structures should allow for NYMEX (commodity only) to be triggered or locked in for either monthly usage or the remainder of the term in the event that market pricing increases.

Tariff Analysis:

Electricity:

The campus receives electrical service through Public Service Gas and Electric (PSE&G) on rate schedule LPLS (Large Power and Light – Secondary) and GLP (General Light and Power.

Upon review of the utility and supplier bills submitted, the facility has contracted with two (2) Third Party Supplier's (TPS), Liberty Power and Hess Energy to provide electric commodity service. The TPS Contract structure was not available for review, however it appears that Liberty Power is providing a fixed rate contract at $.1012/kWh for the Central Utility Plant and Hess is providing a fixed rate contract at $.092172/kwh for the Business Incubator, Enterprise Center and Technical and Engineering Center. Both the Science Building and Laurel Hall are being served from the Central Energy Plant meter.

For electric supply (generation) service, the client has a choice to use PSE&G's fixed default service rate BGS-FP or contract with a Third Party Supplier (TPS) to supply electric.

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

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

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

The utility, PSE&G will continue to be responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity or natural gas from.

The utilities delivery service rate includes the following charges: Customer Service Charge, Distribution Charge (kWh and Demand), Societal Benefits Charge (SBC), and Securitization Transition Charge.

Natural Gas:

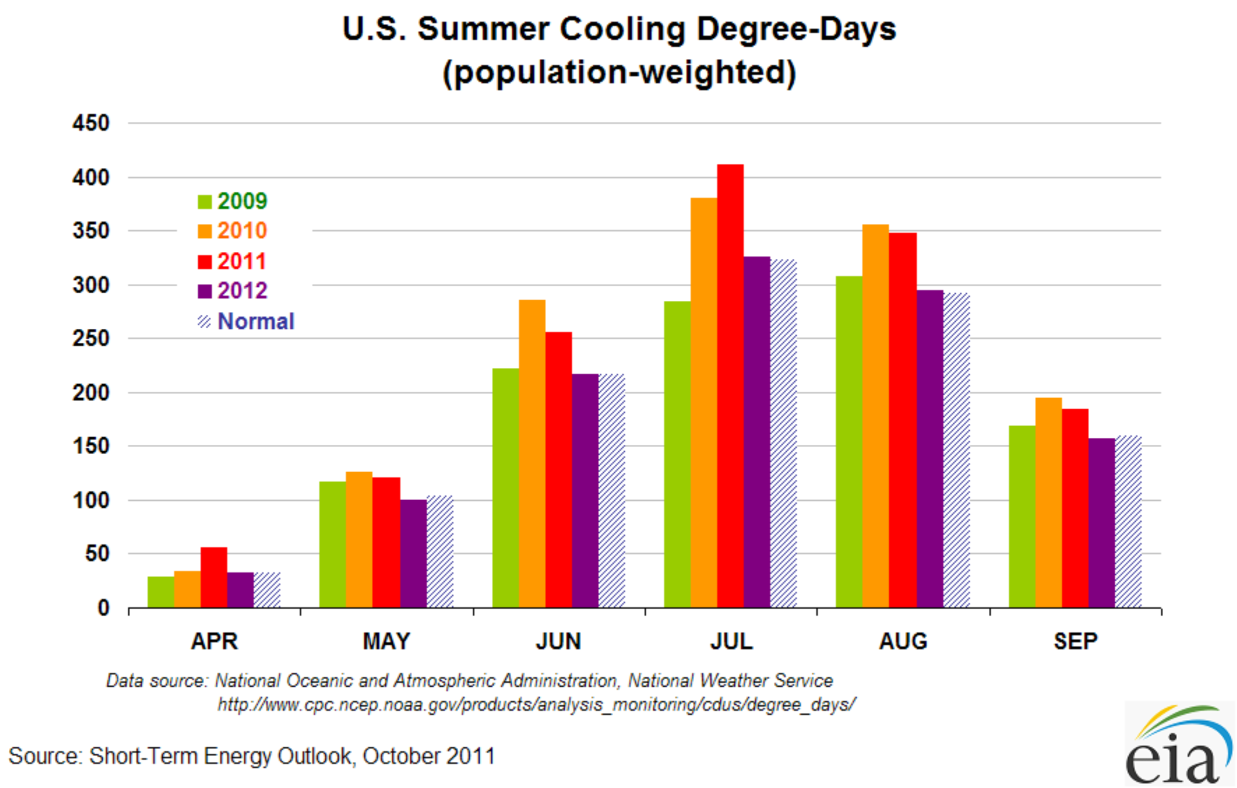
The campus facilities currently receives natural gas distribution service through PSE&G on rate schedules GSG (General Service Gas) and LVG (Large Volume Gas) and has contracted a Third Party Supplier (TPS), Pepco Energy to provide natural gas commodity service. A copy of the contract was not available to review however it appears from the bills reviewed, that the contract is a floating market based contract with triggers. PSE&G provides basic gas supply service (BGSS) to customers who choose not to shop from a Third Party Supplier (TPS) for natural gas commodity. The option is essential to protect the reliability of service to consumers as well as protecting consumers if a third party supplier defaults or fails to provide commodity service. Please refer to the link below for a recap of natural gas BGSS charges from PSE&G for rate schedule GSG and LVG.
http://www.pseg.com/companies/pseandg/schedules/pdf/commodity.pdf

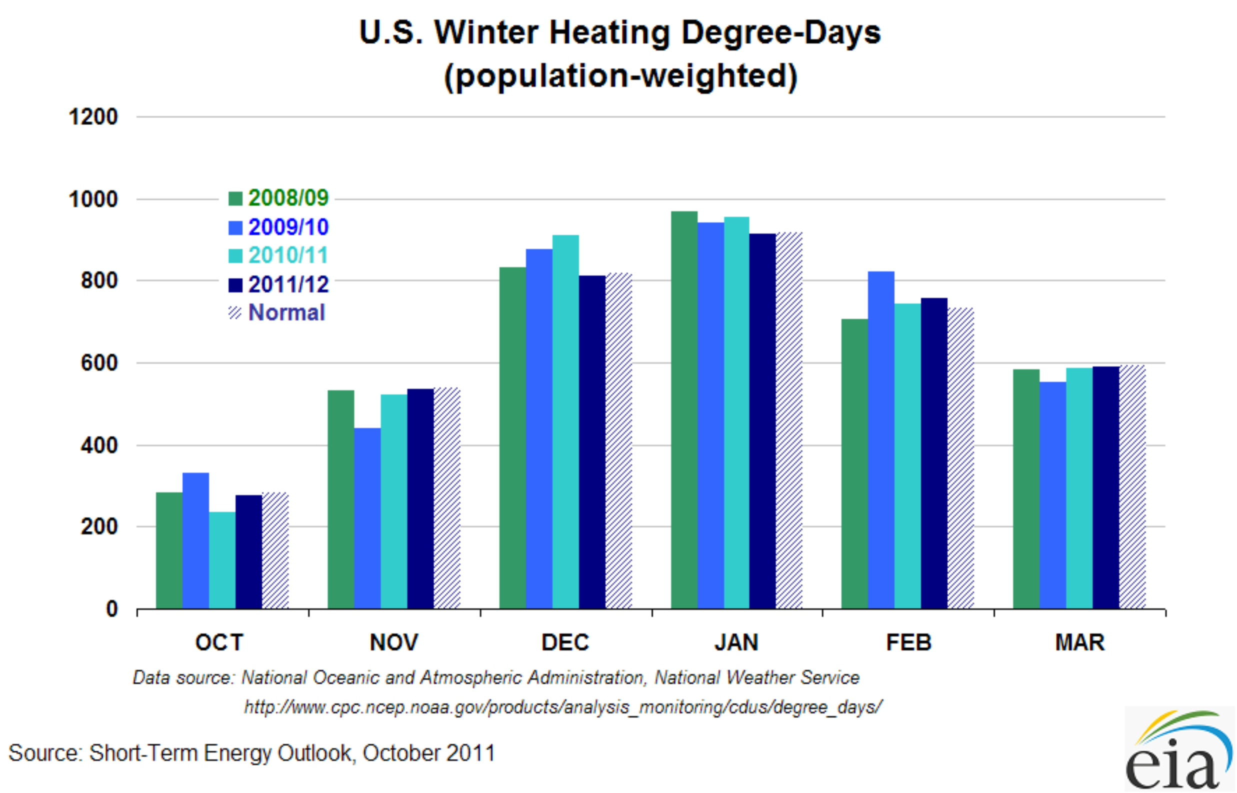
The utility, PSE&G is responsible for maintaining the existing network of wires, pipes and poles that make up the delivery system, which will serve all consumers, regardless of whom they choose to purchase their electricity or natural gas from. PSE&G's delivery service rate includes the following charges: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

Electric and Natural Gas Commodities Market Overview:

Current electricity and natural gas market pricing has remained relatively stable over the last year. Commodity pricing in 2008 marked historical highs in both natural gas and electricity commodity. Commodity pricing commencing spring of 2009 continuing through 2011, has decreased dramatically over 2008 historic highs and continues to be favorable for locking in long term (2-5 year) contracts with 3rd Party Supplier's for both natural gas and electricity supply requirements.

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


U.S. Summer Cooling Degree-Days
(population-weighted)
450
400
350
300
250
200
150
100
50
0
2009
2010
2011
2012
Normal
APR
MAY
JUN
JUL
AUG
SEP
Data source: National Oceanic and Atmospheric Administration, National Weather Service
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/
Source: Short-Term Energy Outlook, October 2011
eia


U.S. Winter Heating Degree-Days
(population-weighted)
1200
1000
800
600
400
200
0
2008/09
2009/10
2010/11
2011/12
Normal
OCT
NOV
DEC
JAN
FEB
MAR
Data source: National Oceanic and Atmospheric Administration, National Weather Service
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/degree_days/
Source: Short-Term Energy Outlook, October 2011
eia

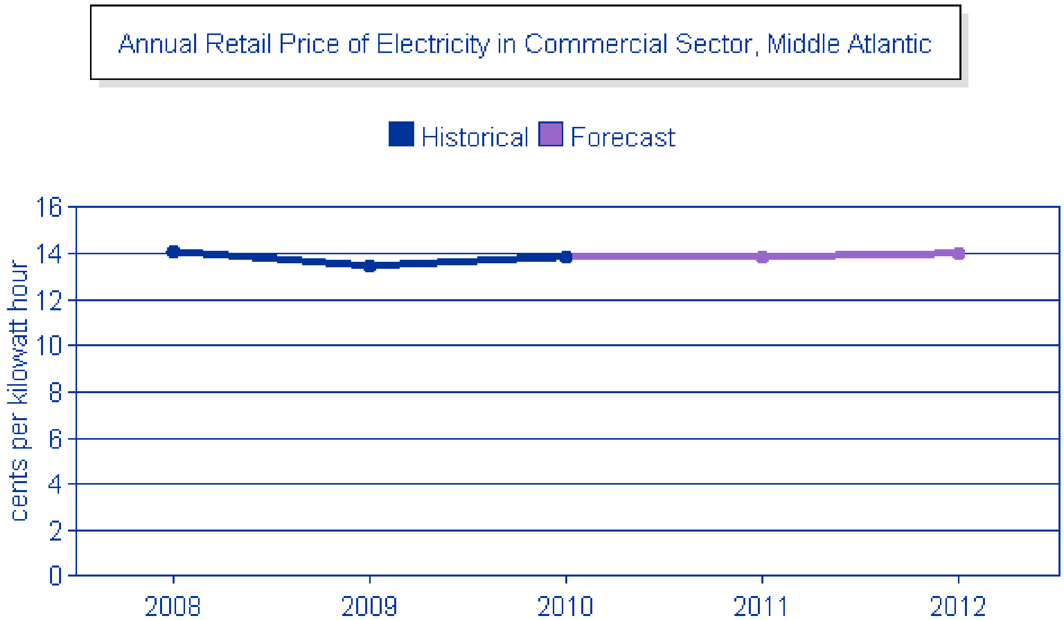
Short Term Energy Outlook - US Energy Information Administration (9/7/2011):

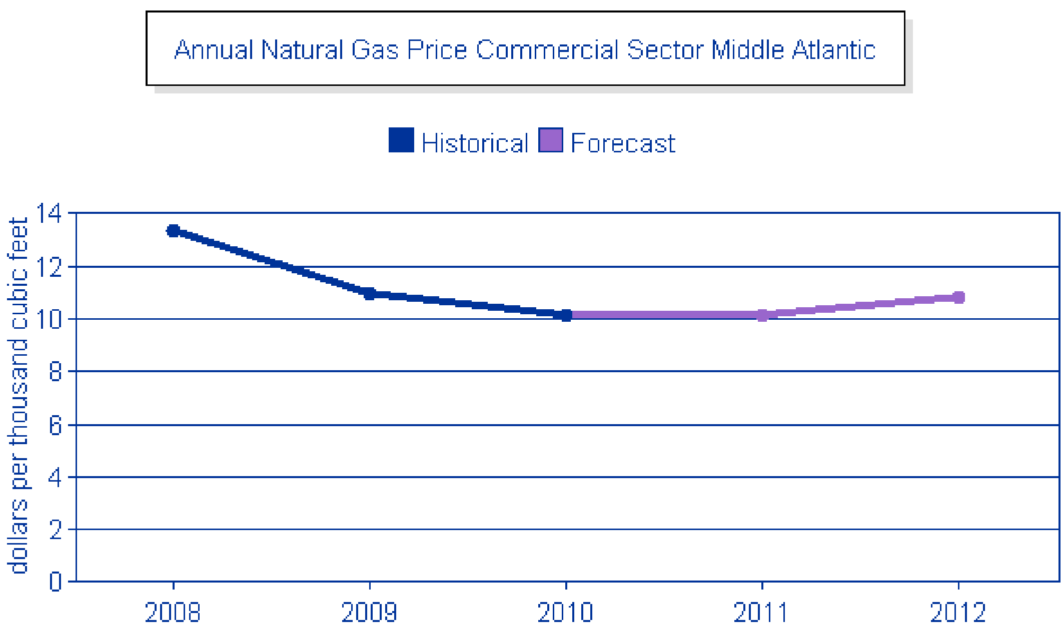
U.S. Natural Gas Prices. *The Henry Hub spot price averaged $4.05 per MMBtu in August 2011, 37 cents lower than the July 2011 average. This month's Outlook lowers the 2011 forecast by 4 cents to $4.20 per MMBtu and lowers the 2012 forecast by 11 cents to $4.30 per MMBtu. The increase in price from 2011 to 2012 reflects some tightening in supply as production growth slows in 2012.*

Uncertainty about natural gas prices is lower this year compared with last year at this time. Natural gas futures for November 2011 delivery (for the 5-day period ending September 1, 2011) averaged $4.07 per MMBtu, and the average implied volatility was 34 percent. The lower and upper bounds for the 95-percent confidence interval for November 2011 contracts are $3.16 per MMBtu and $5.26 per MMBtu. At this time last year, the November 2010 natural gas futures contract averaged $4.07 per MMBtu and implied volatility averaged 48 percent. The corresponding lower and upper limits of the 95-percent confidence interval were $2.84 per MMBtu and $5.83 per MMBtu.

U.S. Electricity Generation. A large number of unplanned nuclear plant outages during the spring of 2011 led to the lowest second-quarter level of nuclear generation since 1999. EIA expects that total nuclear generation for 2011 will be 3.4 percent lower than last year's level. In contrast, the share of generation fueled by natural gas continues to increase, spurred by relatively low fuel costs compared with coal and continued warm summer temperatures. EIA expects the fuel share for natural gas to rise from 23.8 percent in 2010 to 24.2 percent this year and 24.9 percent in 2012.

U.S. Electricity Retail Prices. Retail prices of electricity to the residential sector during the first six months of this year were generally higher than the same period in 2010. Growth in residential electricity prices should moderate during the second half. EIA expects average U.S. residential electricity prices to increase by 2.3 percent in 2011 and by 0.6 percent in 2012.





Pricing in the chart above includes both utility distribution and energy commodity charges.

Recommendations:

The below recommendations presented by CEG are based on current information provided by the BCC-Mt. Laurel for its utility usage, any savings presented with these recommendations are estimates only based on that information. It is recommended that further analysis and review of more recent utility data and any current 3rd party supply contracts be performed prior to performing any of the presented recommendations.

1. CEG recommends a continued aggregated approach for 3rd party commodity supply procurement strategies for electric and natural gas supply service. Aggregating all facilities for electricity and natural gas supply service would allow the facilities to continue to achieve reductions in electric and natural gas supply costs verses PSE&G's BGS-FP rates for electricity and BGSS rates for natural gas.

   Energy commodities are among the most volatile of all commodities, however at this point and time, energy is extremely competitive. The current contract rate for the facilities is expected to provide savings over the BGS-FP rates to compare with PSEG.

   Overall, after review of the utility consumption, billing, and current commodity pricing outlook, CEG recommends that the Burlington County Community College continue the utilization of the advisement of 3rd party unbiased Energy Consulting Firm experienced in the aggregation of facilities and procurement of retail natural gas and electricity commodity. The Energy Consulting Firm should incorporate a rational, defensible strategy for purchasing commodity in volatile markets based upon the following:

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

2. CEG recommends that the Burlington County Community College consider utilizing a third party utility billing-auditing service to further analyze historical TPS supplier invoices from Pepco Energy for natural gas. Historical usage billings reviewed are irregular and do not correspond with PSE&G's metered usage. In addition, auditing services should also include water, sewer, and electric for incorrect billings and rate tariff optimization services. This service can be based on a shared savings model with no cost to Burlington County Community College. The service could provide refunds on potential incorrect billings that may have been passed through by the utilities and or supplier and paid by Burlington County Community College.

3. CEG recommends that the Burlington County Community College explore Demand Response Programs that may be available in aggregate for its facilities. Demand response is the action of end users lowering their demand for electric (reducing

consumption) in order to help balance supply and demand on the electric grid and ensure stability. The greatest need for demand response typically occurs during times of peak electricity demand, between the hours of 11 am and 6 pm, when extra strain is placed on the grid from situations such as increased air conditioning use on hot days or downed power lines resulting from a storm. Significant incentives are available for clients enrolled in demand response programs. It is strongly recommended that the County utilize an experienced 3rd party unbiased energy consulting firm prior to initiating any demand response programs. This is recommended due to the potential conflicts with existing and/or future electric supply service agreements and transparency created by the evaluation of current programs and incentives available

VII. INSTALLATION FUNDING OPTIONS

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

A. Incentive Programs:

Pay For Performance

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

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

1. Energy Reduction Plan – Upon completion of an energy reduction plan by an approved program partner, the incentive will grant $0.10 per square foot between $5,000 and $50,000, and not to exceed 50% of the facility's annual energy expense. (Benchmark #1 is not provided in addition to the local government energy audit program incentive.)

2. Project Implementation – Upon installation of the recommended measures along with the "Substantial Completion Construction Report," the incentive will grant savings per KWH or Therm based on the program's rates. Minimum saving must be 15%. (Example $0.11 / kWh for 15% savings, $0.12/ kWh for 17% savings, … and $1.10 / Therm for 15% savings, $1.20 / Therm for 17% saving, …) Increased incentives result from projected savings above 15%.

3. Measurement and Verification – Upon verification 12 months after implementation of all recommended measures, that actual savings have been achieved, based on a completed verification report, the incentive will grant additional savings per kWh or Therm based on the program's rates. Minimum savings must be 15%. (Example $0.07 / kWh for 15% savings, $0.08/ kWh for 17% savings, … and

$0.70 / Therm for 15% savings, $0.80 / Therm for 17% saving, …) Increased incentives result from verified savings above 15%.

Smart Start Program

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

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

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

Energy Efficiency and Conservation Block Grants

The EECGB provides supplemental funding up to $50,000 for counties and local government entities to implement energy conservation measures. The EECGB funding is provided through the American Recovery and Reinvestment Act (ARRA). The local government must be among the eligible local government entities listed on the NJ Clean Energy website as follows - http://njcleanenergy.com/commercial-industrial/programs/eecbg-eligible-entities. This program is limited to municipalities and counties that have not already received grants directly through the US department of Energy.

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

B. Financing Options:

Municipal Bonds

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

Power Purchase Agreement

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

Energy Savings Improvement Program (ESIP):

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

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

The underlining program requirement is the limitation of the project term to 15 years. The ESIP project size is open for multiple buildings to be included within one project. In addition all applicable incentive programs can also be utilized to help reduce the overall construction cost.

The following breakdown is an estimated project scope with the potential to qualify for the ESIP. An ESP is required to verify the costs and savings as part of an ESIP project.

Table 8
ESIP -Total Entity Project Summary

ENERGY SAVINGS IMPROVEMENT PROGRAM - POTENTIAL ENERGY EFCY. PROJECT					
FACILITY ENERGY EFFICIENCY PROJECTS	**ANNUAL ENERGY SAVINGS ($)**	**PROJECT COST ($)**	**SMART START INCENTIVES**	**CUSTOMER COST**	**SIMPLE PAYBACK**
Science Building	$11,398	$42,717	$3,600	$38,577	3.4
Enterprise Center	$18,662	$166,543	$2,400	$163,783	8.8
Tech. and Engineering Center	$19,621	$159,253	$13,650	$142,590	7.3
Laurel Hall	$10,679	$108,608	$774	$107,658	10.1
Central Energy Plant	$12,411	$208,562	$9,774	$198,672	16.0
Business Incubator Building	$10,725	$135,868	$1,360	$134,066	12.5
Total Entity Project	**$83,495**	**$821,551**	**$31,558**	**$785,345**	**9.4**

Total Entity Energy Costs:	**$809,624**
Est. Total Entity Energy Savings:	**$83,495**
Overall Entity Percent Reduction:	**10.3%**

VIII. ENERGY AUDIT ASSUMPTIONS

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

A. Cost Estimates noted within this report are based on industry accepted costing data such as RS Means^{TM} Cost Data, contractor pricing and engineering estimates. All cost estimates for this level of auditing are +/- 20%. Prevailing wage rates for the specified region has been utilized to calculate installation costs. The cost estimates indicated within this audit should be utilized by the owner for prioritizing further project development post the energy audit. Project development would include investment grade auditing and detailed engineering.
B. Energy savings noted within this audit are calculated utilizing industry standard procedures and accepted engineering assumptions. For this level of auditing, energy savings are not guaranteed.
C. Information gathering for each facility is strongly based on interviews with operations personnel. Information dependent on verbal feedback is used for calculation assumptions including but not limited to the following:
    a. operating hours
    b. equipment type
    c. control strategies
    d. scheduling
D. Information contained within the major equipment list is based on the existing owner documentation where available (drawings, O&M manuals, etc.). If existing owner documentation is not available, catalog information is utilized to populate the required information.
E. Equipment incentives and energy credits are based on current pricing and status of rebate programs. Rebate availability is dependent on the individual program funding and applicability.
F. Equipment (HVAC, Plumbing, Electrical, & Lighting) noted within an ECM recommendation is strictly noted as a **basis for calculation** of energy savings. The owner should use this equipment information as a benchmark when pursuing further investment grade project development and detailed engineering for specific energy conservation measures.
G. Utility bill annual averages are utilized for calculation of all energy costs unless otherwise noted. Accuracy of the utility energy usage and costs are based on the information provided. Utility information including usage and costs is estimated where incomplete data is provided.

BURLINGTON COUNTY COLLEGE
MOUNT LAUREL CAMPUS

SCIENCE BUILDING

100 COLLEGE CIRCLE
MT. LAUREL, NJ 08054

FACILITY ENERGY REPORT

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Appendix B – New Jersey Smart Start® Program Incentives

Appendix C – Portfolio Manager "Statement of Energy Performance"

Appendix D – Major Equipment List

Appendix E – Investment Grade Lighting Audit

Appendix F – Renewable / Distributed Energy Measures Calculations

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 (PSEG)
Electric Utility Rate Structure:	Large Power and Light Service (LPLP)
Third Party Supplier:	HESS Energy

Chilled Water:	Central Energy Plant
Heating Hot Water:	Central Energy Plant

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.

Hot water and chilled water are measured using a combined meter. The hot and chilled water usage within each report shows the actual hot water and chilled water usages for the facility. The consumption is measured in Gallon x 1000, and converted the quantity into kBTU (1,000 BTU) of energy.

Table 1
Electricity Billing Data

ELECTRIC USAGE

Utility Provider: Public Service Electric & Gas (PSEG)
Rate: Large Power and Lighting Service (LPLP)
Meter No: -
Account # -
Third Party Utility Provider: HESS Energy
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND KW		TOTAL BILL
Jul-10	41,779	64.0		$6,517
Aug-10	43,467	92.0		$6,737
Sep-10	47,570	96.0		$7,231
Oct-10	42,289	104.0		$5,751
Nov-10	52,656	108.0		$7,056
Dec-10	51,752	120.0		$7,038
Jan-11	48,218	144.0		$6,461
Feb-11	53,306	152.0		$6,983
Mar-11	47,826	152.0		$6,409
Apr-11	49,882	140.0		$6,734
May-11	42,100	104.0		$5,683
Jun-11	45,884	140.0		$7,250
Totals	**566,729**	**152.0**	**Max**	**$79,851**

AVERAGE DEMAND **118.0 KW average**
AVERAGE RATE **$0.141 $/kWh**

Figure 1

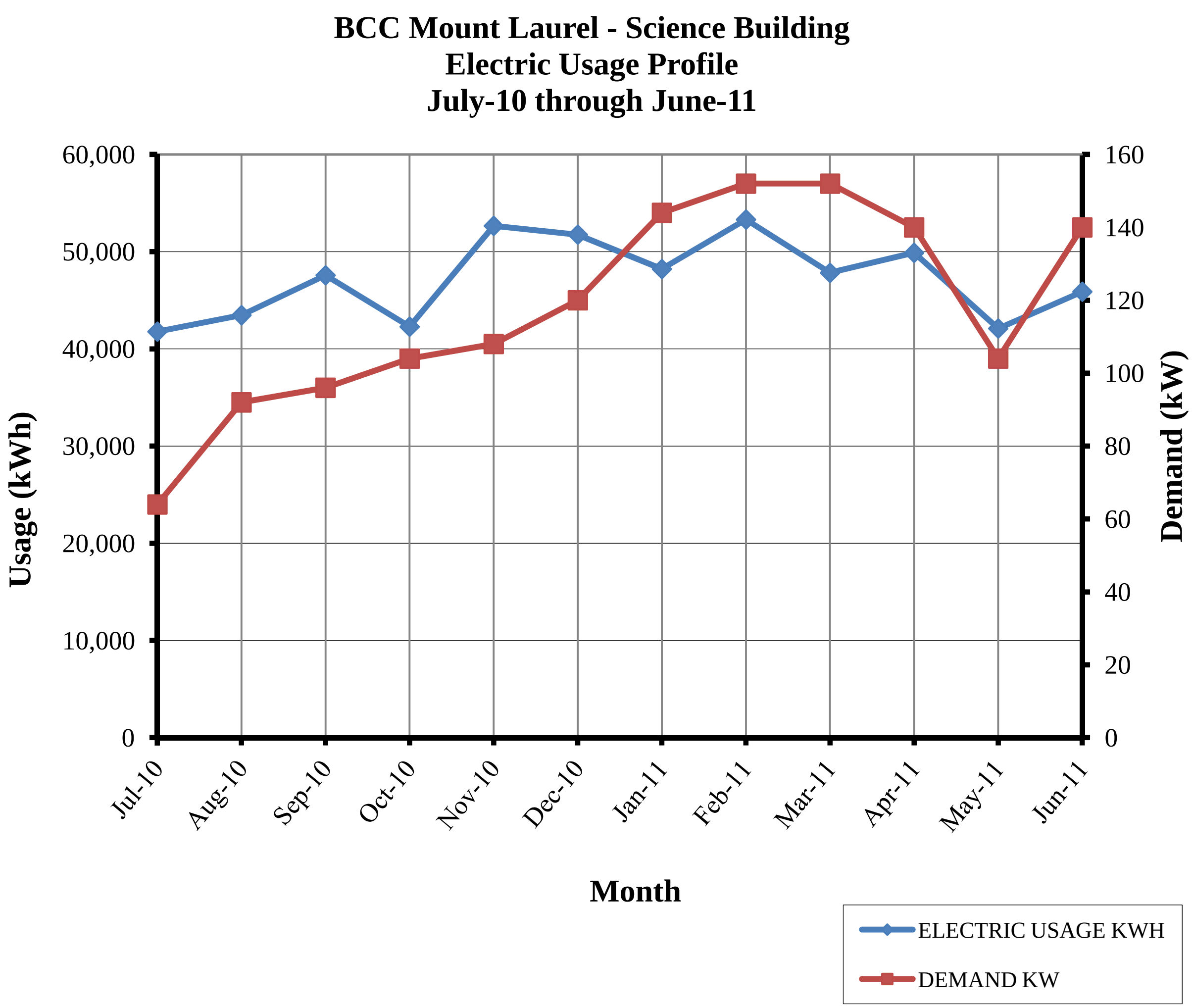

BCC Mount Laurel - Science Building
Electric Usage Profile
July-10 through June-11
Usage (kWh)
Demand (kW)
60,000
50,000
40,000
30,000
20,000
10,000
0
160
140
120
100
80
60
40
20
0
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Month
ELECTRIC USAGE KWH
DEMAND KW

Table 2
Hot & Chilled Water Usage Data

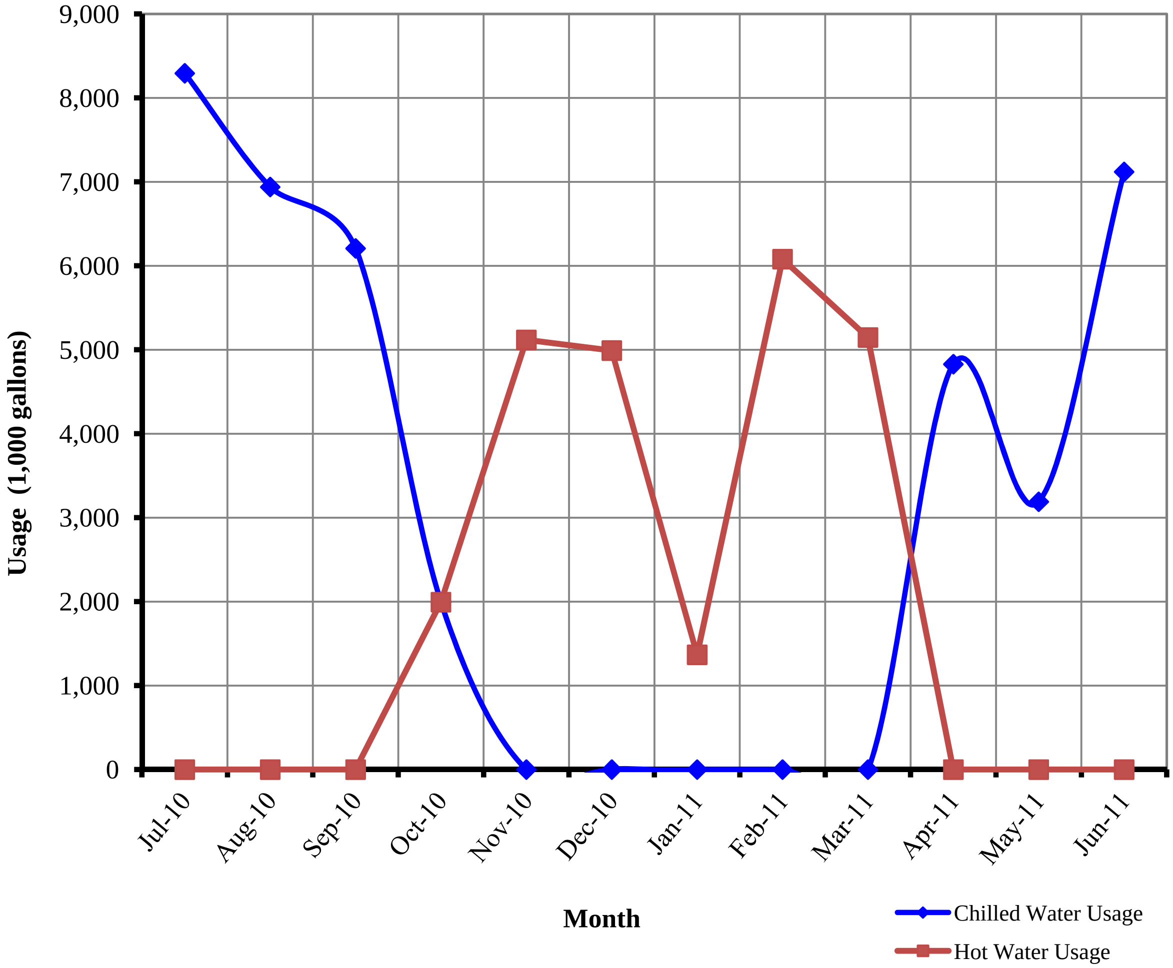
HOT WATER / CHILLED WATER USAGE SUMMARY			
Utility Provider:	Central Energy Plant		
Estimated Average ΔT	15°F (Hot Water)		
Estimated Average ΔT	8°F (Chilled Water)		
MONTH OF USE	**CHILLED WATER CONSUMPTION (1,000 GALLONS)**	**HOT WATER CONSUMPTION (1,000 GALLONS)**	**TOTAL BILL**
Jul-10	*8,294*	-	-
Aug-10	*6,939*	-	-
Sep-10	6,208	-	-
Oct-10	*1,995*	1,995	-
Nov-10		5,118	-
Dec-10	-	4,991	-
Jan-11	-	1,367	-
Feb-11	-	6,080	-
Mar-11	-	5,147	-
Apr-11	4,829	-	-
May-11	3,190	-	-
Jun-11	7,120	-	-
TOTALS	**38,575**	**24,698**	**-**

Usage estimated for Jul-Aug 2010 based on monthly electricity consumption

May chilled water usages assumed to be 50% of total hot/chilled water

Figure 2

BCC - Mount Laurel - Science Buiding
Chilled Water Usage Profile
July-10 through June-11



II. FACILITY DESCRIPTION

The 50,850 SF Science Building was built in 2002 with no additions or renovations. The building is a two story facility with a large penthouse. The first two floors are comprised of classrooms, instructional laboratories, student lounge, bookstore and offices. Major HVAC equipments are located in the penthouse floor of this building.

Occupancy Profile

The typical hours of operation for the Science Building are Monday through Friday between 8:00 am and 10:00 pm. The facility is open on Saturday between 8:00 am and 10:00 pm. The Science Building occupancy varies during the day.

Building Envelope

Exterior walls for the Science Building are brick faced with a concrete block construction. The amount of insulation within the walls couldn’t be verified. The windows throughout the Science Building are in excellent condition and appear to be well maintained. Typical windows throughout the building are double pane, non-operable, ¼” tinted glass with aluminum frames. Blinds are utilized in some areas for occupancy comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The building has a pitched, standing seam metal roof. The HVAC equipment is located in the penthouse floor. The roof is spray insulated from beneath.

HVAC Systems

The HVAC systems in the Science Building use hot and chilled water supplied by the campus Central Energy Plant. Pumps at the Enterprise Center mechanical room circulates hot and chilled water through the Air Handling Units in the Science Building.

The Science Building houses many instructional laboratories with laboratory fume hoods. Majority of the fume hoods are running 24 hours per day during majority of the year maintain a set face velocity. They cannot be shutdown according to the instructions. Therefore, some of the HVAC and exhaust systems in the Science Building operate continuously to maintain stable static pressure within the spaces.

HVAC is provided to the Science Building via six (6) Air Handling Units (AHU) located in the penthouse mechanical room and fan powered VAV (Variable Air Volume) boxes in the spaces. All of the AHUs are equipped with hot and chilled water coils with 2-way control valves. Conditioned air is delivered to fan powered VAV boxes for space zoning.

AHU-1 and AHU-2 are make-up air units providing 100% outside air to the science laboratories located in the 1st and 2nd floors. These units are fitted with variable frequency drives to maintain static air pressure in the building. AHU-3 is a mixed air unit providing heating and air conditioning to the classrooms in the 1st floor. AHU-4 provides air conditioning to the corridors in the 1st and 2nd floors and the lobby. AHU-5 is a mixed air unit providing heating and air conditioning to the classrooms in the 2nd floor. Finally, AHU-6 is a constant volume unit feeding the bookstore area.

Variable Frequency Drives

During the survey, it was found that three (3) of the VFDs were running at "Bypass" mode due to malfunction. It is recommended to repair or replace all the faulty VFDs and restore system operation at full modulation.

Exhaust System

Air is exhausted from the scientific fume hoods and other general exhaust points through a central exhaust system in the penthouse mechanical room. The exhaust system consists of a main inlet box with a relief damper and two constant volume centrifugal fans. The damper is located on the inlet side of the fans. It opens and closes to modulate the low pressure in the main exhaust trunk.

HVAC System Controls

The air handling units and the fan powered VAV boxes in the science building are controlled via the Siemens central DDC system. Majority of the AHUs in the Science Building operate 24 hours per day in order to provide makeup air for the laboratory fume hoods. The fume hoods in the Science Building have digital controls for turning on, off and adjusting air velocity. Majority of the fume hoods stay ON most of the year.

Fan powered VAV boxes and the reheat valves are also monitored and controlled by the Siemens central DDC control system. Each space within the building is equipped with a remote temperature sensor with override capability.

Domestic Hot Water

Domestic hot water for the restrooms and the laboratories are supplied to the Science Building from the Enterprise Center.

Lighting

The lighting throughout the Building is provided with modern fixtures with T8 lamps and electronic ballasts. 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	$11,590	$1,445	8.0	87%
ECM #2	VFD on Central Exhaust System	$8,555	$3,604	2.4	532%
ECM #3	Repair or Replace Faulty VFDs	$13,400	$6,348	2.1	611%
ECM #4	Install NEMA Premium Efficiency Motors	$18,690	$728	26	-42%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	214 KW PV Array	$1,421,787	$138,217	10.3	46%
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)				
		ANNUAL UTILITY REDUCTION		
ECM NO.	DESCRIPTION	ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Equipment Upgrade	5.0	10,251	-
ECM #2	VFD on Central Exhaust System	-	25,562	-
ECM #3	Repair or Replace Faulty VFDs	-	46,801	-
ECM #4	Install NEMA Premium Efficiency Motors	1.2	5,161	-

RENEWABLE ENERGY MEASURES (REM's)				
		ANNUAL UTILITY REDUCTION		
ECM NO.	DESCRIPTION	ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	214 KW PV Array	214.8	262,469	-

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	$1,445	$11,590	$0	$11,590	8.0
VFD on Central Exhaust System	$3,604	$12,155	$3,600	$8,555	2.4
Repair or Replace Faulty VFDs	$6,348	$13,400	$0	$13,400	2.1
Install NEMA Premium Efficiency Motors	$728	$19,265	$575	$18,690	25.7
Design / Construction Extras (15%)	-	$5,572	-	$5,032	-
Total Project	**$11,398**	**$42,717**	**$3,600**	**$38,577**	**3.4**

*Items highlighted yellow are not included in the final project totals.

*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 Lighting & Re-Lamping

Description:

Majority of the interior lighting throughout Science Building is provided with fluorescent fixtures with older generation, 700 series 32W T8 lamps and electronic ballasts. Although 700 series T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output.

This ECM includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. 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 2,700K 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 your existing fixtures, or hardwired into your 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 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:

There are no Smart Start incentives for the prescribed retrofits in this ECM.

Replacement and Maintenance Savings:

Maintenance savings is negligible for this ECM and has not been included in the energy savings summary

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$11,590
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$11,590
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,445
Total Yearly Savings ($/Yr):	$1,445
Estimated ECM Lifetime (Yr):	15
Simple Payback	8.0
Simple Lifetime ROI	87.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$21,681
Internal Rate of Return (IRR)	58%
Net Present Value (NPV)	$38,210.00

ECM #2: Install VFD's for Exhaust Fans

Description:

This ECM includes installation of Variable Frequency Drives on the two existing 15 HP exhaust fans located in the Science Building. There is a single unit that contains both exhaust fans, each powered by a separate 15 HP motor operating at 93% efficiency. The exhaust fans power the lab fume hoods located in the building. The exhaust fan's themselves are located in the Penthouse MER area of the building. Each unit is currently a constant volume with a relief damper in place. A variable frequency drive can be installed on each exhaust fan in order to vary the speed based on the temperature of the ambient air and required CFM for the space.

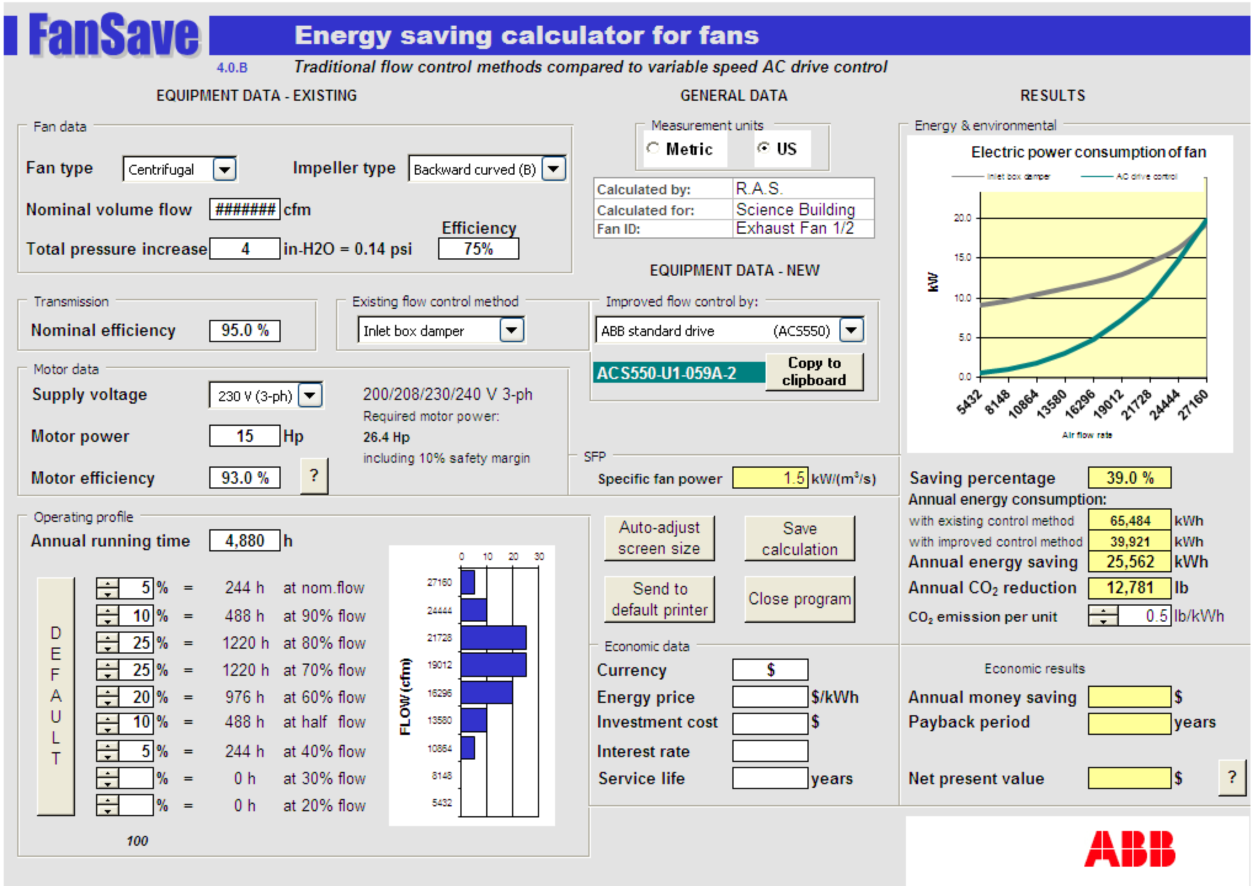
Energy and cost savings calculations are based on calculation software "FanSave v4.0" provided by ABB. Existing equipment information where available was used to estimate the decrease in energy use with an installed VFD. Through the use of FanSave an estimated energy usage for the existing system and the system with a VFD installed. The motors currently in use are already high efficiency; a replacement of these motors was not included in the cost of this ECM.

Energy Savings Calculations:

$$\text{Energy Cons.}\left(\text{kWh}\right) = \text{Power}\left(\text{HP}\right) \times 0.746\left(\frac{\text{KW}}{\text{HP}}\right) \times \text{Operation}\left(\text{Hrs.}\right)$$

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

Exhaust Fan VFD Energy:



EXHAUST FAN VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Exhaust Fan	VFD Fan	
Flow Control	Variable Damper	VFD	-
Number of Fans	2	2	
Fan Horse Power	15	15	-
Ave. Motor Efficiency (%)	93%	93%	-
Operating Hrs	4,880	4,880	-
Elec Cost ($/kWh)	0.141	0.141	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	65,484	39,921	25,562
Electric Energy Cost ($)	$9,233	$5,629	$3,604
COMMENTS:	- VFD Exhaust Fan energy is based on ABB energy savings calculator for fans, "Fan Save," version 4.0.		

Installation cost for two 15 HP VFDs, removal of existing equipment, pressure sensors, controls points, and labor comes to an estimated total of $12,115.

Currently there are **NJ Smart Start® Program Incentives** for installation of Variable Frequency Drives. The total incentive for the installed VFD's is $3,600.

Cumulative Motor HP Controlled by Each VFD	Incentive $/Cumulative HP Controlled
5 to < 10 HP	$155 per HP
10 to < 20 HP	$120 per HP
20+ HP	$65 per HP

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$12,155
NJ Smart Start Equipment Incentive ($):	$3,600
Net Installation Cost ($):	$8,555
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,604
Total Yearly Savings ($/Yr):	$3,604
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.4
Simple Lifetime ROI	531.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$54,060
Internal Rate of Return (IRR)	42%
Net Present Value (NPV)	$34,469

ECM #3: Replace Faulty VFD's

Description:

This ECM replaces two existing 15 HP supply fans located in the Science Building on AHU-4 and AHU-5. It also includes replacement of a 7.5 return fan on AHU-4. These fans currently contain a VFD's but are not being used (set to bypass) due to a faulty VFD that needs to be replaced. The two supply fans are powered by a 15 HP motor with an efficiency of 91%, the return fan is powered by a 7.5 HP motor with an efficiency of 88.5%. New variable frequency drives can be installed to replace the faulty units to vary the speed based on the supply air static pressure.

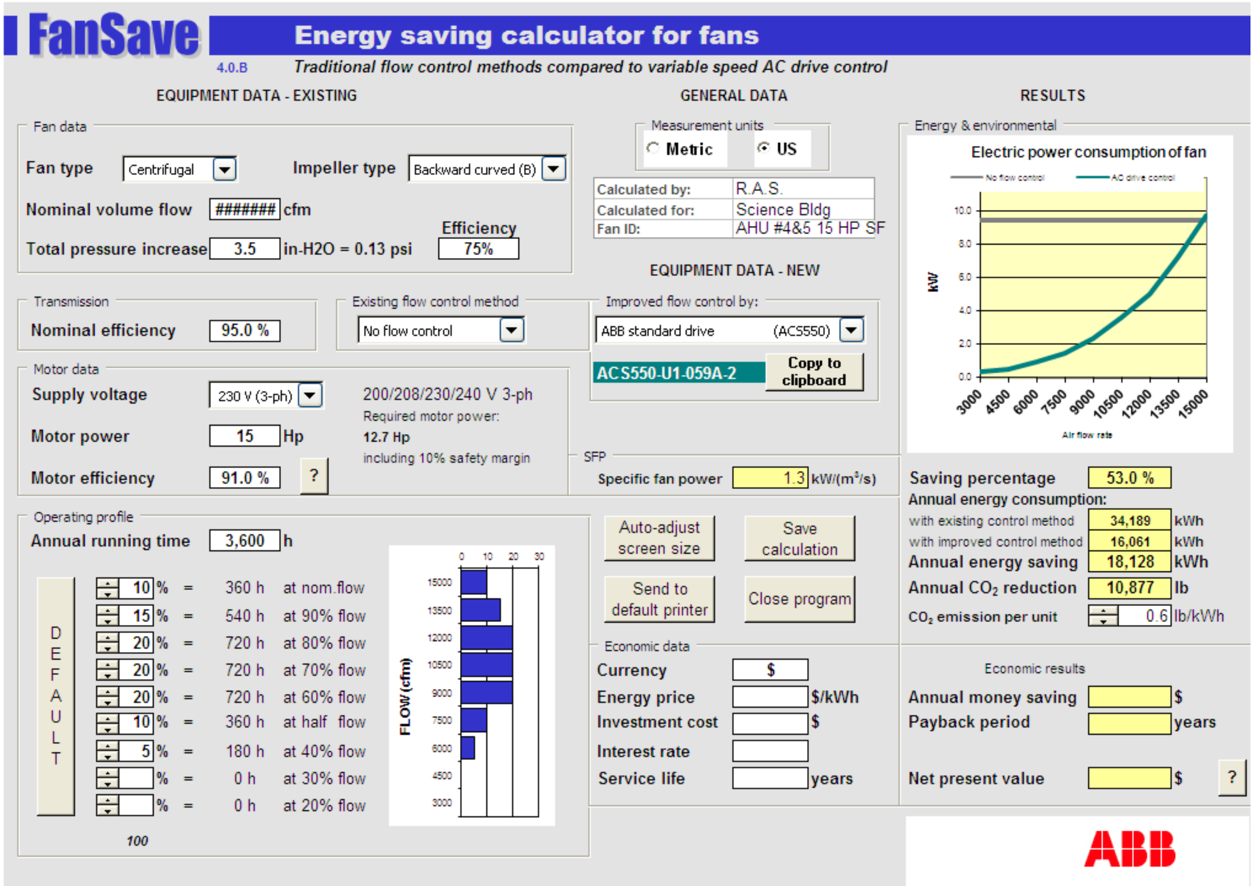
Energy and cost savings calculations are based on calculation software "FanSave v4.0" provided by ABB. Existing equipment information where available was used to estimate the decrease in energy use with an installed VFD. Through the use of FanSave an estimated energy usage for the existing system and the system with a VFD installed. The motors currently in use on the supply fan are already high efficiency; a replacement high efficiency motor could be installed on the return fan but the cost and benefits are not included in this ECM.

Energy Savings Calculations:

$$\text{EnergyCons.}(\text{kWh}) = \text{Power}(\text{HP}) \times 0.746\left(\frac{\text{KW}}{\text{HP}}\right) \times \text{Operation}(\text{Hrs.})$$

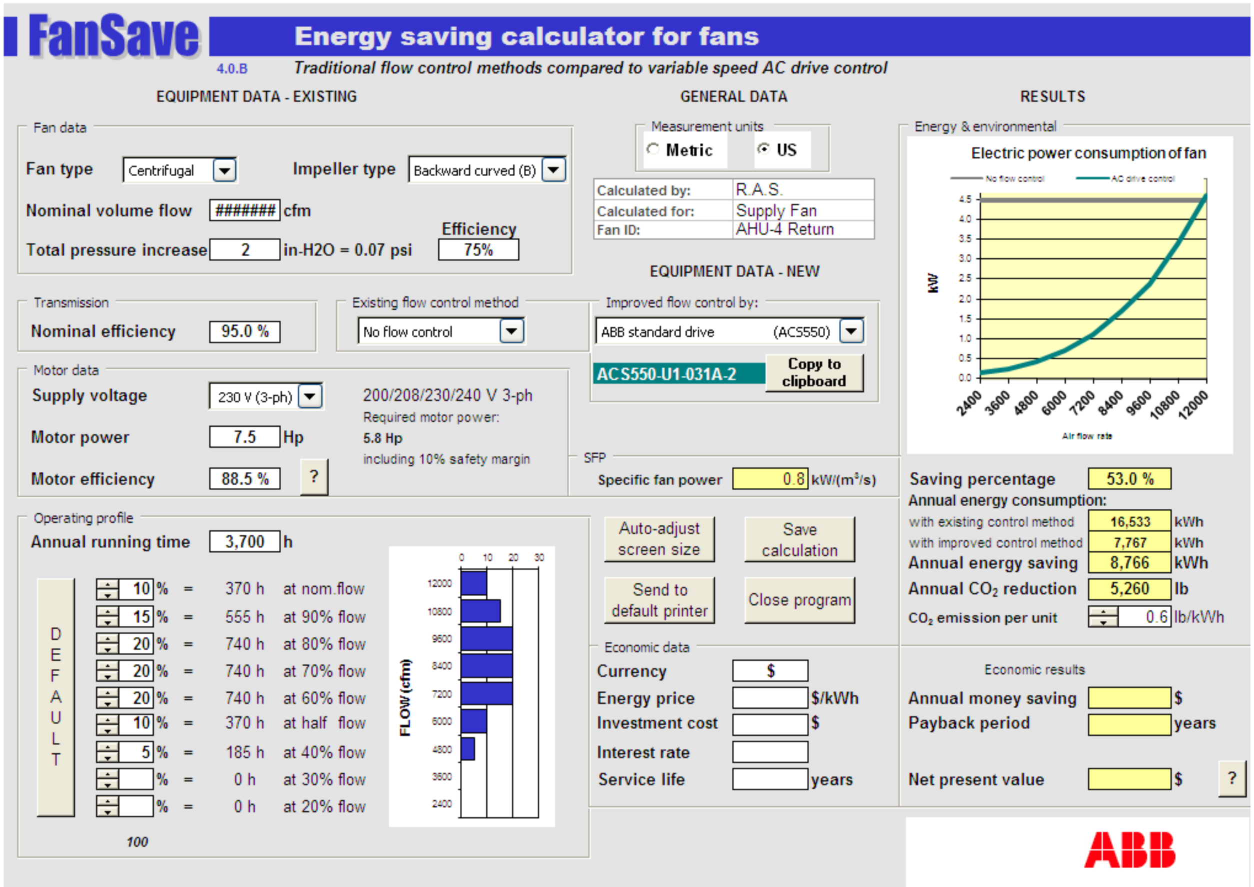
$$\text{EnergyCost} = \text{EnergyUsage}(\text{kWh}) \times \text{Ave Electric Cost}\left(\frac{\$}{\text{kWh}}\right)$$

2 x 15 HP Supply Fans' VFD Calculation:



AHU #4 & 5: SUPPLY FAN VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Supply Fan	VFD Supply Fan	
Flow Control	Bypass VFD	VFD	-
Ave. Motor Efficiency (%)	91%	91%	-
Ave. Operating Hrs	3,600	3,600	-
Estimated Total Horse Power	15	15	-
Elec Cost ($/kWh)	0.141	0.141	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	68,378	32,122	36,256
Electric Energy Cost ($)	$9,641	$4,529	$5,112
COMMENTS:	- VFD Fan energy is based on ABB energy savings calculator for fans "Fan Save," version 4.0.		

7.5 HP Return Fan VFD Energy:



AHU #4 RETURN FAN VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Return Fan	VFD Return Fan	
Flow Control	Bypass VFD	VFD	-
Ave. Motor Efficiency (%)	88.5%	88.5%	0.0%
Operating Hrs	3,700	3,700	-
Estimated Total Horse Power	7.5	7.5	-
Elec Cost ($/kWh)	0.141	0.141	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	16,533	7,767	8,766
Electric Energy Cost ($)	$2,331	$1,095	$1,236
COMMENTS:	- VFD Fan energy is based on ABB energy savings calculator for fans "Fan Save," version 4.0.		

Installation cost for two 15 HP Supply VFDs and one 7.5 HP Return VFD, removal of existing equipment, and labor comes to an estimated total of $13,400. Control points and sensors were not included due to this being a replacement and not a new installation.

This ECM does not qualify for **NJ Smart Start® Incentives.**

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$13,400
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$13,400
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$6,348
Total Yearly Savings ($/Yr):	$6,348
Estimated ECM Lifetime (Yr):	15
Simple Payback	2.1
Simple Lifetime ROI	610.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$95,222
Internal Rate of Return (IRR)	47%
Net Present Value (NPV)	$62,383.99

ECM #4: Install NEMA Premium® Efficiency Motors

Description:

The improved efficiency of the NEMA Premium® efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95% of its total lifetime operating cost. Due to the fact that many motors operate continuously 24 hours a day, even small increases in efficiency can yield substantial energy and dollar savings.

The electric motors driving the hot water pumps and supply fans in some of the HVAC equipment are candidates for replacing with premium efficiency motors. These standard efficiency motors run considerable amount of time over a year.

This energy conservation measure replaces existing inefficient electric motors with NEMA Premium® efficiency motors. NEMA Premium® is the most efficient motor designation in the marketplace today.

IMPLEMENTATION SUMMARY					
EQMT ID	**FUNCTION**	**MOTOR HP**	**HOURS OF OPERATION**	**EXISTING EFFICIENCY**	**NEMA PREMIUM EFFICIENCY**
AHU-1	2nd Floor Labs	25	4,880	91.7%	93.6%
AHU-2	1st Floor Labs	20	4,880	91.0%	93.0%
AHU-4	1st and 2nd Floor Lobby	15	3,700	91.0%	92.4%
AHU-5	2nd Floor Labs	15	2,600	91.0%	92.4%
AHU-6	1st Floor Bookstore Area	7.5	3,600	88.5%	91.7%

Energy Savings Calculations:

$$\text{Electric usage, kWh} = \frac{\text{HP} \times \text{LF} \times 0.746 \times \text{Hours of Operation}}{\text{Motor Efficiency}}$$

$$\text{where, HP} = \text{Motor Nameplate Horsepower Rating}$$

$$\text{LF} = \text{Load Factor} \qquad \text{Motor Efficiency} = \text{Motor Nameplate Efficiency}$$

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric cost savings} = \text{Electric Usage Savings} \times \text{Electric Rate}\left(\frac{\$}{\text{kWh}}\right)$$

The calculations were carried out and the results are tabulated in the table below:

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWH	COST SAVINGS
AHU-1	25	90%	91.7%	93.6%	0.37	1,823	$257
AHU-2	20	90%	91.0%	93.0%	0.32	1,557	$220
AHU-4	15	90%	91.0%	92.4%	0.17	624	$88
AHU-5	15	90%	91.0%	92.4%	0.17	438	$62
AHU-6	7.5	90%	88.5%	91.7%	0.20	719	$101
TOTAL					**1.2**	**5,161**	**$728**

Equipment Cost and Incentives

Below is a summary of SmartStart Building® incentives for premium efficiency motors:

INCENTIVES	
HORSE POWER	NJ SMART START INCENTIVE
1	$50
1.5	$50
2	$60
3	$60
5	$60
7.5	$90
10	$100
15	$115
20	$125
25	$130
30	$150
40	$180

The following table outlines the summary of motor replacement costs and incentives:

MOTOR REPLACEMENT SUMMARY						
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK
AHU-1	25	$5,930	$130	$5,800	$257	22.6
AHU-2	20	$4,635	$125	$4,510	$220	20.5
AHU-4	15	$3,652	$115	$3,537	$88	40.2
AHU-5	15	$3,652	$115	$3,537	$62	57.2
AHU-6	7.5	$1,971	$90	$1,881	$101	18.6
TOTAL	**Totals:**	**$19,840**	**$575**	**$19,265**	**$728**	**26.5**

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$19,265
NJ Smart Start Equipment Incentive ($):	$575
Net Installation Cost ($):	$18,690
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$728
Total Yearly Savings ($/Yr):	$728
Estimated ECM Lifetime (Yr):	15
Simple Payback	25.7
Simple Lifetime ROI	-41.6%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$10,920
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	($9,999.18)

REM #1: Rooftop Solar Photovoltaic Array

Description:

The Science Building has approximately 20,600 square-feet of available roof space that can accommodate a 214.8 kilowatt solar array, assuming the existing roof structure is capable of supporting an array.

The array will produce approximately 262,469 kilowatt-hours annually that will reduce the overall electric usage of the facility 46.31%.

Energy Savings Calculations:

See **LGEA Solar Financials Appendix F** for detailed financial summary and proposed solar layout areas.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW_{DC}):	224.43
Electric Generation (KWH/Yr):	262,469
Installation Cost ($):	$1,421,787
SREC Revenue ($/Yr):	$101,209
Energy Savings ($/Yr):	$37,008
Total Yearly Savings ($/Yr):	$138,218
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	10.3
Analysis Period Electric Savings ($):	$688,311
Analysis Period SREC Revenue ($):	$1,466,140
Net Present Value (NPV)	$8,873.59

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. Maintain all weather stripping on windows and doors.

B. Clean all light fixtures to maximize light output.

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

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

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Burlington County College, Mt. Laurel Campus - Science Building

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	$11,590	$0	$0	$11,590	$1,445	$0	$1,445	15	$21,681	$0	87.1%	8.0	57.6%	$38,210.00
ECM #2	VFD on Central Exhaust System	$12,155	$0	$3,600	$8,555	$3,604	$0	$3,604	15	$54,060	$0	531.9%	2.4	41.9%	$34,469.32
ECM #3	Repair or Replace Faulty VFDs	$13,400	$0	$0	$13,400	$6,348	$0	$6,348	15	$95,222	$0	610.6%	2.1	47.2%	$62,383.99
ECM #4	Install NEMA Premium Efficiency Motors	$19,265	$0	$575	$18,690	$728	$0	$728	15	$10,920	$0	-41.6%	25.7	-6.1%	($9,999.18)
3															
REM #1	214 KW PV Array	$1,421,787	$0	$0	$1,421,787	$37,008	$101,209	$138,217	15	$2,073,255	$1,518,135	45.8%	10.3	5.1%	$228,238.32

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.

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

SmartStart Building Incentives

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

Building ID: 2846436
For 12-month Period Ending: June 30, 2011[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 29, 2011

Facility
Science Building
100 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Year Built: 2000
Gross Floor Area (ft²): 50,800

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	1,934,410
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	1,934,410

Energy Intensity[5]	
Site (kBtu/ft²/yr)	38
Source (kBtu/ft²/yr)	127

Emissions (based on site energy use)
Greenhouse Gas Emissions ($MtCO_2e$/year) 274

Electric Distribution Utility
Public Service Electric & Gas Co

National Average Comparison	
National Average Site EUI	120
National Average Source EUI	280
% Difference from National Average Source EUI	-55%
Building Type	College/University (Campus-Level)

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[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
Mike 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	Science Building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	College/University (Campus-Level)	Is this an accurate description of the space in question?		☐
Location	100 College Circle, Mount Laurel, NJ 08054	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 acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐

Science Building (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	50,800 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.		☐
Number of PCs	N/A(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	N/A(Optional)	Is this the total number of hours per week that the 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	N/A(Optional)	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.		☐

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))**
05/10/2011	06/09/2011	42,100.00
04/10/2011	05/09/2011	49,882.00
03/10/2011	04/09/2011	47,826.00
02/10/2011	03/09/2011	53,306.00
01/10/2011	02/09/2011	48,218.00
12/10/2010	01/09/2011	51,752.00
11/10/2010	12/09/2010	52,656.00
10/10/2010	11/09/2010	42,289.00
09/10/2010	10/09/2010	47,570.00
08/10/2010	09/09/2010	43,467.00
07/10/2010	08/09/2010	41,779.00
Electric Consumption (kWh (thousand Watt-hours))		**520,845.00**
Electric Consumption (kBtu (thousand Btu))		**1,777,123.14**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,777,123.14**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity 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
Science Building
100 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

General Information

Science Building	
Gross Floor Area Excluding Parking: (ft²)	50,800
Year Built	2000
For 12-month Evaluation Period Ending Date:	June 30, 2011

Facility Space Use Summary

Science Building	
Space Type	Other - College/University (Campus-Level)
Gross Floor Area(ft²)	50,800
Number of PCs°	N/A
Weekly operating hours°	N/A
Workers on Main Shift°	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 06/30/2011)	**Baseline** (Ending Date 06/30/2011)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	38	38	0	N/A	120
Source (kBtu/ft²)	127	127	0	N/A	280
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/ft²/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	274	274	0	N/A	863
$kgCO_2e/ft^2$/year	5	5	0	N/A	16

More than 50% of your building is defined as College/University (Campus-Level). This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for College/University (Campus-Level). This building uses X% less energy per square foot than the CBECS national average for College/University (Campus-Level).

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt. Laurel Campus - Science Building

Air Handling Units

Tag	**AHU-1**	**AHU-2**	**AHU-3**
Unit Type	Air Handling Unit with Hot and Chilled Water	Air Handling Unit with Hot and Chilled Water	Air Handling Unit with Hot and Chilled Water
Qty	1	1	1
Location	Penthouse MER	Penthouse MER	Penthouse MER
Area Served	2nd Floor Labs	1st Floor Labs	1st Classrooms
Manufacturer	York	York	York
Model #	BA0061457	BA0061337	BA0060827
Serial #	DEJM-04027B	DEJM-04030B	DEJM-04001B
Cooling Type	Chilled Water	Chilled Water	Chilled Water
Cooling Capacity (Tons)	1,139	704	89
Heating Type	Hot Water	Hot Water	Hot Water
Heating Input (MBH)	788	487	41
Supply Fan HP **Motor Efficiency**	25 91.7%	20 91%	-
Return Fan HP **Motor Efficiency**	-	-	1 HP
Approx Age	9	9	9
ASHRAE Service Life	15	15	15
Remaining Life	6	6	6
Comments	100% OA Unit Unit on VFD	100% OA Unit Unit on VFD	Mixed Air Unit Unit on VFD

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt. Laurel Campus - Science Building

Air Handling Units

Tag	AHU-4	AHU-5	AHU-6
Unit Type	Air Handling Unit with Hot and Chilled Water	Air Handling Unit with Hot and Chilled Water	Air Handling Unit with Hot and Chilled Water
Qty	1	1	1
Location	Penthouse MER	Penthouse MER	Penthouse MER
Area Served	1st & 2nd Floor Corridor and Lobby	2nd Floor Labs	1st Floor Bookstore Area
Manufacturer	York	York	York
Model #	BA006337	BA0060832	BA0061130
Serial #	DEJM-04025B	DEJM-04007B	DEJM-04015B
Cooling Type	Chilled Water	Chilled Water	Chilled Water
Cooling Capacity (Tons)	427	304	120
Heating Type	Hot Water	Hot Water	Hot Water
Heating Input (MBH)	163	36	75
Supply Fan HP Motor Efficiency	15 91%	15 91%	7.5 88.5%
Return Fan HP Motor Efficiency	7.5 88.5%	5 87.5%	-
Approx Age	9	9	9
ASHRAE Service Life	15	15	15
Remaining Life	6	6	6
Comments	Mixed Air Unit Unit on VFD (2) VFD's on Bypass	Unit on VFD Return VFD on Bypass	Constant Volume Unit

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt. Laurel Campus - Science Building

Computer Room Air Conditioners

Tag	CRACs		
Unit Type	Split AC Unit		
Qty	2		
Location	Split Condenser in Penthouse MER		
Area Served	1st and 2nd Floor Data Rooms		
Manufacturer	Heatcraft Compressors		
Condensing Unit Model / Serial #	FCB21C2F / D00E08070		
Air Handler Model / Serial #	-		
Cooling Capacity (Tons)			
Cooling Efficiency (SEER/EER)	-		
Heating Type	N/A		
Heating Input (MBH)	N/A		
Efficiency	-		
Approx Age	9		
ASHRAE Service Life	15		
Remaining Life	6		
Comments	R22 Units		

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt. Laurel Campus - Science Building

Exhaust Fans & Fume Hoods

Tag	EF #1 & 2	EF-3	Lab Fume Hoods
Unit Type	Exhaust Fan	Exhaust Fan	Laboratory Fume Hoods
Qty	1 Unit (2 Fans)	1	28
Location	Penthouse MER	Roof	Bio / Chem Gen Purp. Labs and Haz/Flam
Area Served	Lab fume hoods	Toilet Rooms	Laboratories
Manufacturer	Penn: Barry Blower	-	Phoenix
Model / Serial #	300 70P AF 00W 50000223	-	-
Air Flow Capacity	13,580 CFM @ 4 inWG	3,700 CFM @ 1 inWG	785 CFM
Supply Fan Motor HP & Efficiency	2 x 15 93%	2	-
Approx Age	9	9	10
ASHRAE Service Life	15	15	15
Remaining Life	6	6	5
Comments	Constant volume units with relief damper		100 FPM min. face velocity

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt. Laurel Campus - Science Building

Air Compressor

Tag	Air Compressor		
Unit Type	Duplex Reciprocating, Air Cooled		
Qty	1		
Location	Penthouse MER		
Area Served	Laboratory		
Manufacturer	Quincy Compressor		
Model #	-		
Serial #	-		
Tank Capacity	100		
Voltage / Phase	208/1		
Motor HP	2 x 3 HP		
Approx Age	3 Est		
Comments	Unit is seldom used. It is in good condition		

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

Investment Grade Lighting Audit

CEG Job #: 9C11023

Project: Science Building

Science Building

KWH COST: $0.141

Bldg. Sq. Ft.

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
221.34	3rd Floor Storage	1000	18	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	1.04	1,044.0	$147.20	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	900	$126.90	$30.00	$540.00	0.14	144	$20.30	26.60
221.34	3rd Floor Mech. Room	1000	18	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	1.04	1,044.0	$147.20	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	900	$126.90	$30.00	$540.00	0.14	144	$20.30	26.60
232.22	Room 202	960	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.26	247.7	$34.92	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	207.36	$29.24	$45.00	$135.00	0.04	40.32	$5.69	23.75
232.22	Room 201	1500	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	1,032.0	$145.51	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	864	$121.82	$45.00	$360.00	0.11	168	$23.69	15.20
232.21	Prep Room	0	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	0.0	$0.00	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	0	$0.00	$45.00	$135.00	0.04	0	$0.00	0.00
221.34	Custodial Closet	300	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	34.8	$4.91	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	30	$4.23	$30.00	$60.00	0.02	4.8	$0.68	88.65
221.34	Data Closet	300	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.23	69.6	$9.81	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	60	$8.46	$30.00	$120.00	0.03	9.6	$1.35	88.65
221.34	Electrical Closet	300	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	34.8	$4.91	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	30	$4.23	$30.00	$60.00	0.02	4.8	$0.68	88.65
221.21	Room 207	2600	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.50	1,289.6	$181.83	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1040	$146.64	$30.00	$240.00	0.10	249.6	$35.19	6.82
232.21	Hall - 200 to 212	2600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	670.8	$94.58	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	561.6	$79.19	$45.00	$135.00	0.04	109.2	$15.40	8.77
221.21	Room 212	1000	47	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.91	2,914.0	$410.87	47	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.35	2350	$331.35	$30.00	$1,410.00	0.56	564	$79.52	17.73
232.22	Room 213	1000	7	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.60	602.0	$84.88	7	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.50	504	$71.06	$45.00	$315.00	0.10	98	$13.82	22.80
232.21	Men's Restroom	2600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	670.8	$94.58	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	561.6	$79.19	$45.00	$135.00	0.04	109.2	$15.40	8.77
232.21	Women's Restroom	2600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	670.8	$94.58	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	561.6	$79.19	$45.00	$135.00	0.04	109.2	$15.40	8.77
221.22	Room 215	2600	31	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.92	4,997.2	$704.61	31	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.55	4030	$568.23	$30.00	$930.00	0.37	967.2	$136.38	6.82
221.22	Room 218	2600	30	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.86	4,836.0	$681.88	30	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.50	3900	$549.90	$30.00	$900.00	0.36	936	$131.98	6.82
558		2600	20	1	Recessed Down Light, 90w R30 Lamp	90	1.80	4,680.0	$659.88	20	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	0.52	1352	$190.63	$20.00	$400.00	1.28	3328	$469.25	0.85

Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
232.22	Room 219	300	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	206.4	$29.10	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	172.8	$24.36	$45.00	$360.00	0.11	33.6	$4.74	75.99
242.33	2nd Floor Corridor	2600	11	4	2x4, 4 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/Indirect	104	1.14	2,974.4	$419.39	11	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	1.08	2802.8	$395.19	$60.00	$660.00	0.07	171.6	$24.20	27.28
563		2600	14	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	0.73	1,892.8	$266.88	14	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Room 101	1600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.26	412.8	$58.20	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	345.6	$48.73	$45.00	$135.00	0.04	67.2	$9.48	14.25
221.22	Room 100	2000	37	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.29	4,588.0	$646.91	37	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.85	3700	$521.70	$30.00	$1,110.00	0.44	888	$125.21	8.87
221.34	Prep Room 107	2000	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.35	696.0	$98.14	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	600	$84.60	$30.00	$180.00	0.05	96	$13.54	13.30
232.22	Room 110	2000	15	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.29	2,580.0	$363.78	15	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.08	2160	$304.56	$45.00	$675.00	0.21	420	$59.22	11.40
232.21	Hall - 100-114	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.52	1,341.6	$189.17	6	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.43	1123.2	$158.37	$45.00	$270.00	0.08	218.4	$30.79	8.77
221.34	Data Closet	300	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.23	69.6	$9.81	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	60	$8.46	$30.00	$120.00	0.03	9.6	$1.35	88.65
221.34	Electrical Closet	300	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.23	69.6	$9.81	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	60	$8.46	$30.00	$120.00	0.03	9.6	$1.35	88.65
221.34	Custodial Closet	600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	69.6	$9.81	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	60	$8.46	$30.00	$60.00	0.02	9.6	$1.35	44.33
221.22	Room 114	2600	36	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.23	5,803.2	$818.25	36	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.80	4680	$659.88	$30.00	$1,080.00	0.43	1123.2	$158.37	6.82
232.21	Men's Restroom	2600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	670.8	$94.58	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	561.6	$79.19	$45.00	$135.00	0.04	109.2	$15.40	8.77
232.21	Women's Restroom	2600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	670.8	$94.58	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	561.6	$79.19	$45.00	$135.00	0.04	109.2	$15.40	8.77
563	Vending	2600	12	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	0.62	1,622.4	$228.76	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
612		2600	3	4	Pendant Mnt. Light, 26w CFL Lamp	104	0.31	811.2	$114.38	3	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
	Totals		377	82				49,317	$6,954	377	74			18.9	34,740	$4,898		$11,590	5.0	10,251	$1,445	8.02

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Lamp totals only include T-12 tube replacement calculations

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
Science Building	20600	SHARP NU-U235F2	955	17.5	16,751	224.43	262,469	214.8	40,015	13.40

Panels facing east/west are sub-optimal compared to south facing panels. For the same install cost their is an estimated reduction of 20% ouput over south facing panels.

.= Proposed PV Layout

Notes:

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

PVWatts Program Data Output - Pitched Roof Panels

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	50.5 kW
DC to AC Derate Factor:	0.810
AC Rating:	40.9 kW
Array Type:	Fixed Tilt
Array Tilt:	25.0°
Array Azimuth:	270.0°
Energy Specifications	
Cost of Electricity:	14.1 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.02	2444	344.60
2	2.78	3142	443.02
3	3.78	4694	661.85
4	4.76	5602	789.88
5	5.53	6606	931.45
6	5.78	6409	903.67
7	5.71	6489	914.95
8	5.05	5752	811.03
9	4.28	4792	675.67
10	3.10	3578	504.50
11	2.08	2310	325.71
12	1.73	1974	278.33
Year	3.89	53792	7584.67

PVWatts Program Data Output - Parking Canopy Panels

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	173.9 kW
DC to AC Derate Factor:	0.810
AC Rating:	140.9 kW
Array Type:	Fixed Tilt
Array Tilt:	7.5°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	14.1 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.46	10695	1508.00
2	3.22	12846	1811.29
3	4.23	18269	2575.93
4	5.15	21020	2963.82
5	5.83	24171	3408.11
6	6.14	23604	3328.16
7	6.05	23796	3355.24
8	5.50	21750	3066.75
9	4.76	18514	2610.47
10	3.65	14883	2098.50
11	2.55	10242	1444.12
12	2.13	8886	1252.93
Year	4.31	208677	29423.46

Project Name: **BCC Mount Laurel Campus**
Location: **Science Building**
Description: **Photovoltaic System 100% Financing - 15 year**

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$4,935,039
Annual kWh Production	262,469
Annual Energy Cost Reduction	$37,008
Average Annual SREC Revenue	$101,209

Simple Payback: **35.70** Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.141**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value ($/kWh)	$0.386

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	262,469	$37,008	$0	$144,358	$290,408	$209,328	($318,370)	($318,370)
2	$0	261,157	$38,118	$0	$143,636	$277,497	$222,239	($317,981)	($636,351)
3	$0	259,851	$39,262	$0	$129,925	$263,790	$235,946	($330,549)	($966,900)
4	$0	258,552	$40,440	$0	$116,348	$249,237	$250,499	($342,948)	($1,309,848)
5	$0	257,259	$41,653	$2,650	$115,766	$233,787	$265,949	($344,966)	($1,654,814)
6	$0	255,973	$42,903	$2,637	$115,188	$217,384	$282,352	($344,282)	($1,999,096)
7	$0	254,693	$44,190	$2,623	$101,877	$199,969	$299,767	($356,293)	($2,355,389)
8	$0	253,419	$45,515	$2,610	$101,368	$181,480	$318,256	($355,463)	($2,710,852)
9	$0	252,152	$46,881	$2,597	$88,253	$161,851	$337,885	($367,199)	($3,078,051)
10	$0	250,891	$48,287	$2,584	$87,812	$141,011	$358,725	($366,221)	($3,444,272)
11	$0	249,637	$49,736	$2,571	$74,891	$118,885	$380,851	($377,680)	($3,821,952)
12	$0	248,389	$51,228	$2,558	$74,517	$95,395	$404,341	($376,550)	($4,198,502)
13	$0	247,147	$52,765	$2,546	$61,787	$70,457	$429,279	($387,730)	($4,586,232)
14	$0	245,911	$54,348	$2,533	$61,478	$43,980	$455,756	($386,443)	($4,972,676)
15	$0	244,682	$55,978	$2,520	$48,936	$15,869	$483,866	($397,342)	($5,370,017)
	Totals:	3,802,180	$688,311	$28,430	$1,466,140	$2,561,000	$4,935,039	($5,370,017)	($41,423,322)

Net Present Value (NPV) **($3,994,388)**

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
Science Building	20600	SHARP NU-U235F2	955	17.5	16,751	224.43	262,469	214.8	40,015	13.40

Panels facing east/west are sub-optimal compared to south facing panels. For the same install cost their is an estimated reduction of 20% ouput over south facing panels.

.= Proposed PV Layout

Notes:

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

PVWatts Program Data Output - Pitched Roof Panels

Station Identification	
City:	Atlantic_City
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Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	50.5 kW
DC to AC Derate Factor:	0.810
AC Rating:	40.9 kW
Array Type:	Fixed Tilt
Array Tilt:	25.0°
Array Azimuth:	270.0°
Energy Specifications	
Cost of Electricity:	14.1 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.02	2444	344.60
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5	5.53	6606	931.45
6	5.78	6409	903.67
7	5.71	6489	914.95
8	5.05	5752	811.03
9	4.28	4792	675.67
10	3.10	3578	504.50
11	2.08	2310	325.71
12	1.73	1974	278.33
Year	3.89	53792	7584.67

PVWatts Program Data Output - Parking Canopy Panels

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	173.9 kW
DC to AC Derate Factor:	0.810
AC Rating:	140.9 kW
Array Type:	Fixed Tilt
Array Tilt:	7.5°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	14.1 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.46	10695	1508.00
2	3.22	12846	1811.29
3	4.23	18269	2575.93
4	5.15	21020	2963.82
5	5.83	24171	3408.11
6	6.14	23604	3328.16
7	6.05	23796	3355.24
8	5.50	21750	3066.75
9	4.76	18514	2610.47
10	3.65	14883	2098.50
11	2.55	10242	1444.12
12	2.13	8886	1252.93
Year	4.31	208677	29423.46

Project Name: BCC Mount Laurel Campus
Location: Science Building
Description: Photovoltaic System 100% Financing - 15 year

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$1,421,787
Annual kWh Production	262,469
Annual Energy Cost Reduction	$37,008
Average Annual SREC Revenue	$101,209

Simple Payback: **10.29** Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.141**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value ($/kWh)	$0.386

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	262,469	$37,008	$0	$144,358	$83,667	$60,307	$37,392	$37,392
2	$0	261,157	$38,118	$0	$143,636	$79,947	$64,027	$37,780	$75,172
3	$0	259,851	$39,262	$0	$129,925	$75,998	$67,976	$25,213	$100,385
4	$0	258,552	$40,440	$0	$116,348	$71,805	$72,169	$12,814	$113,199
5	$0	257,259	$41,653	$2,650	$115,766	$67,354	$76,620	$10,796	$123,995
6	$0	255,973	$42,903	$2,637	$115,188	$62,628	$81,346	$11,480	$135,474
7	$0	254,693	$44,190	$2,623	$101,877	$57,611	$86,363	($531)	$134,943
8	$0	253,419	$45,515	$2,610	$101,368	$52,285	$91,690	$299	$135,242
9	$0	252,152	$46,881	$2,597	$88,253	$46,629	$97,345	($11,437)	$123,805
10	$0	250,891	$48,287	$2,584	$87,812	$40,625	$103,349	($10,459)	$113,346
11	$0	249,637	$49,736	$2,571	$74,891	$34,251	$109,723	($21,919)	$91,427
12	$0	248,389	$51,228	$2,558	$74,517	$27,483	$116,491	($20,788)	$70,639
13	$0	247,147	$52,765	$2,546	$61,787	$20,299	$123,676	($31,968)	$38,671
14	$0	245,911	$54,348	$2,533	$61,478	$12,671	$131,304	($30,682)	$7,989
15	$0	244,682	$55,978	$2,520	$48,936	$4,572	$139,402	($41,580)	($33,591)
	Totals:	3,802,180	$688,311	$28,430	$1,466,140	$737,826	$1,421,787	($33,591)	$1,268,089

Net Present Value (NPV) **$8,874**

BURLINGTON COUNTY COLLEGE
MOUNT LAUREL CAMPUS

ENTERPRISE CENTER

500 COLLEGE CIRCLE
MT. LAUREL, NJ 08054

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 (PSEG)
Electric Utility Rate Structure:	Large Power and Light Service (LPLP)
Third Party Supplier:	HESS Energy

Natural Gas Utility Provider:	Public Service Electric & Gas (PSEG)
Utility Rate Structure:	Large Volume Gas (LVG)
Third Party Supplier:	Pepco Energy Services

Chilled Water:	Central Energy Plant
Heating Hot Water:	Central Energy Plant

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.

Hot water and chilled water are measured using a combined meter. The hot and chilled water usage within each report shows the actual hot water and chilled water usages for the facility. The consumption is measured in Gallon x 1000, and converted the quantity into kBTU (1,000 BTU) of energy.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: Public Service Electric & Gas (PSEG)
Rate: Large Power and Lighting Service (LPLP)
Meter No: -
Account # -
Third Party Utility Provider: HESS
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Jul-10	88,236	164	$13,972
Aug-10	67,435	148	$11,208
Sep-10	63,764	108	$9,751
Oct-10	59,968	184	$8,425
Nov-10	67,638	192	$9,409
Dec-10	63,313	180	$9,219
Jan-11	63,666	132	$8,847
Feb-11	59,993	148	$8,367
Mar-11	74,897	148	$9,672
Apr-11	66,729	148	$9,407
May-11	58,414	196	$8,630
Jun-11	67,093	136	$11,013
Totals	**801,146**	**196.0 Max**	**$117,920**

AVERAGE DEMAND 157.0 KW average
AVERAGE RATE $0.147 $/kWh

Figure 1

BCC Mount Laurel - Enterprise Center
Electric Usage Profile
July-10 through June-11

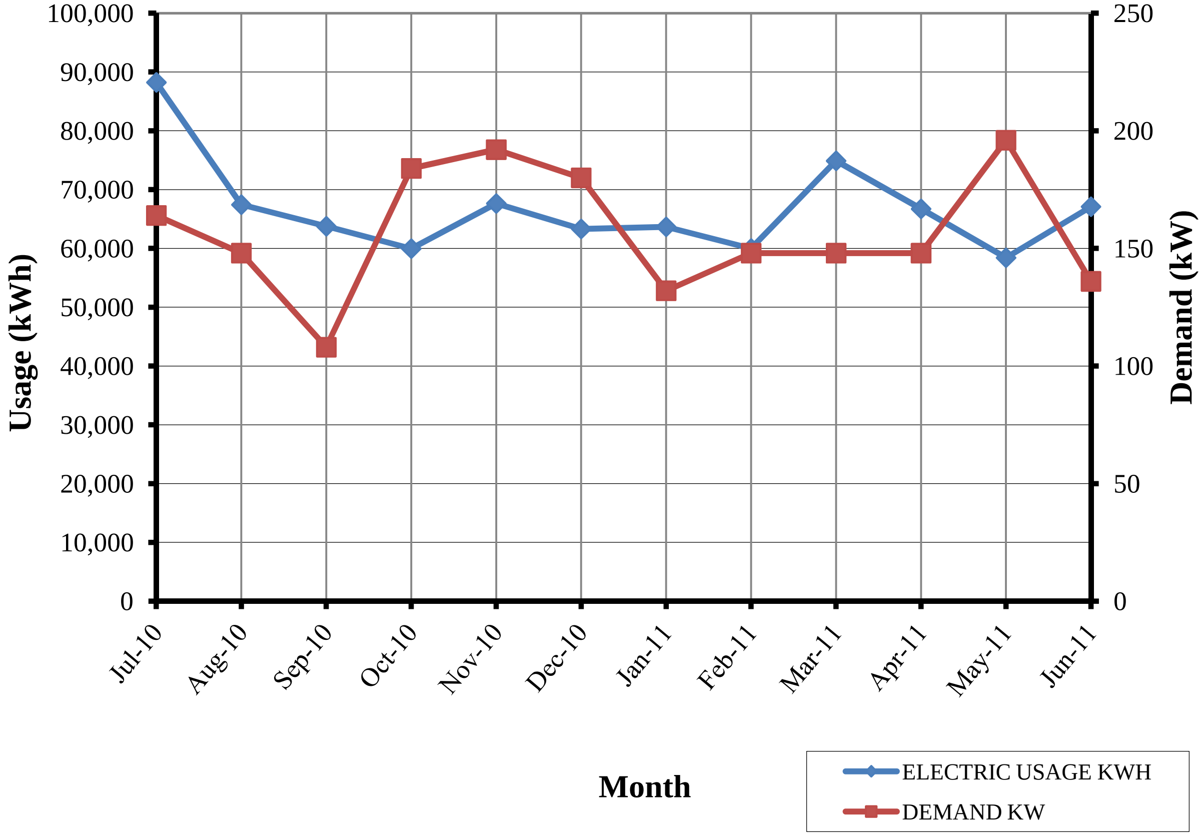


Table 2
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	PSEG	
Rate:	GSG	
Meter No:	3010435	
Point of Delivery ID:	PG000008566019921214	
Third Party Utility Provider:	Pepco Energy	
TPS Meter No:	-	
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Jun-10	163.04	$254.67
Jul-10	238.44	$218.50
Aug-10	311.87	$246.39
Sep-10	398.85	$312.17
Oct-10	457.36	$566.74
Nov-10	386.73	$563.06
Dec-10	390.96	$510.12
Jan-11	449.95	$504.86
Feb-11	460.54	$505.76
Mar-11	403.10	$535.61
Apr-11	370.55	$500.15
May-11	353.98	$478.25
TOTALS	**4,385.38**	**$5,196.28**
AVERAGE RATE:	**$1.18**	**$/THERM**

Figure 2
BCC Mount Laurel - Enterprise Center
Gas Usage Profile
June-10 through May-11

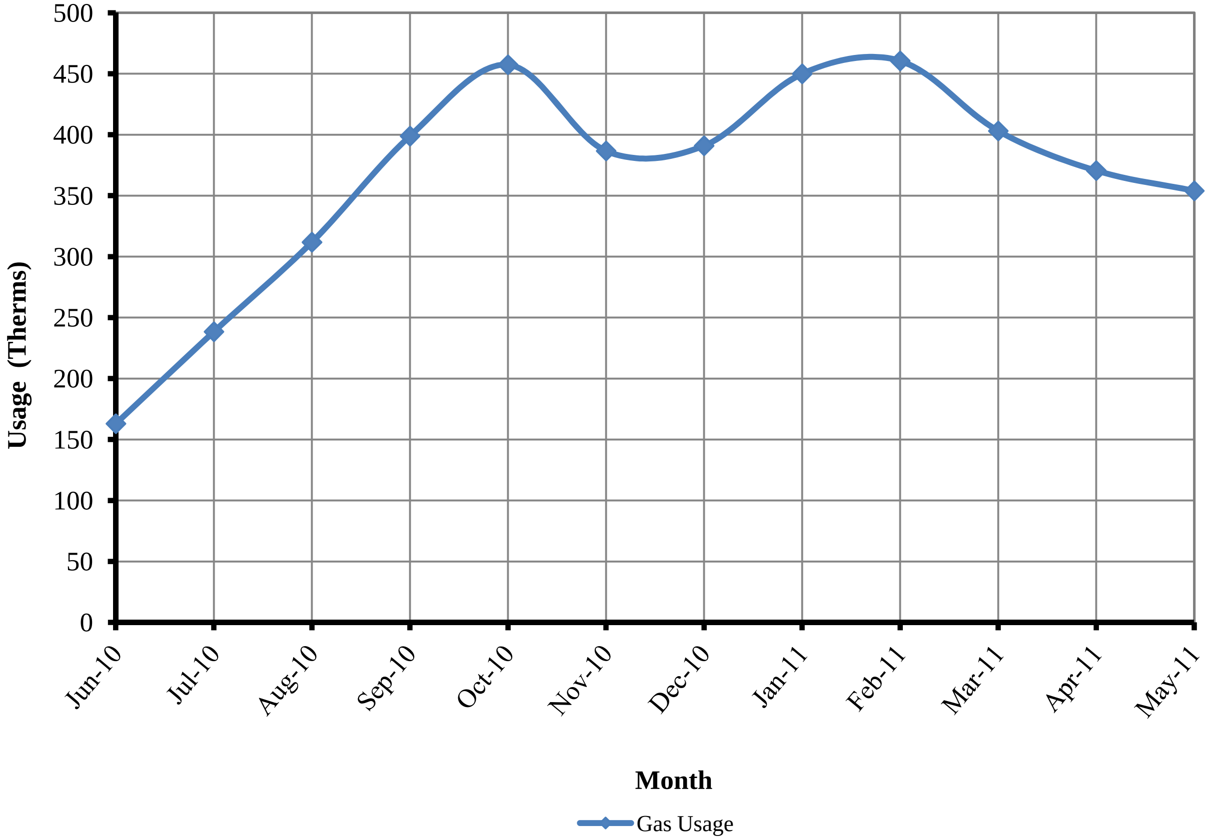


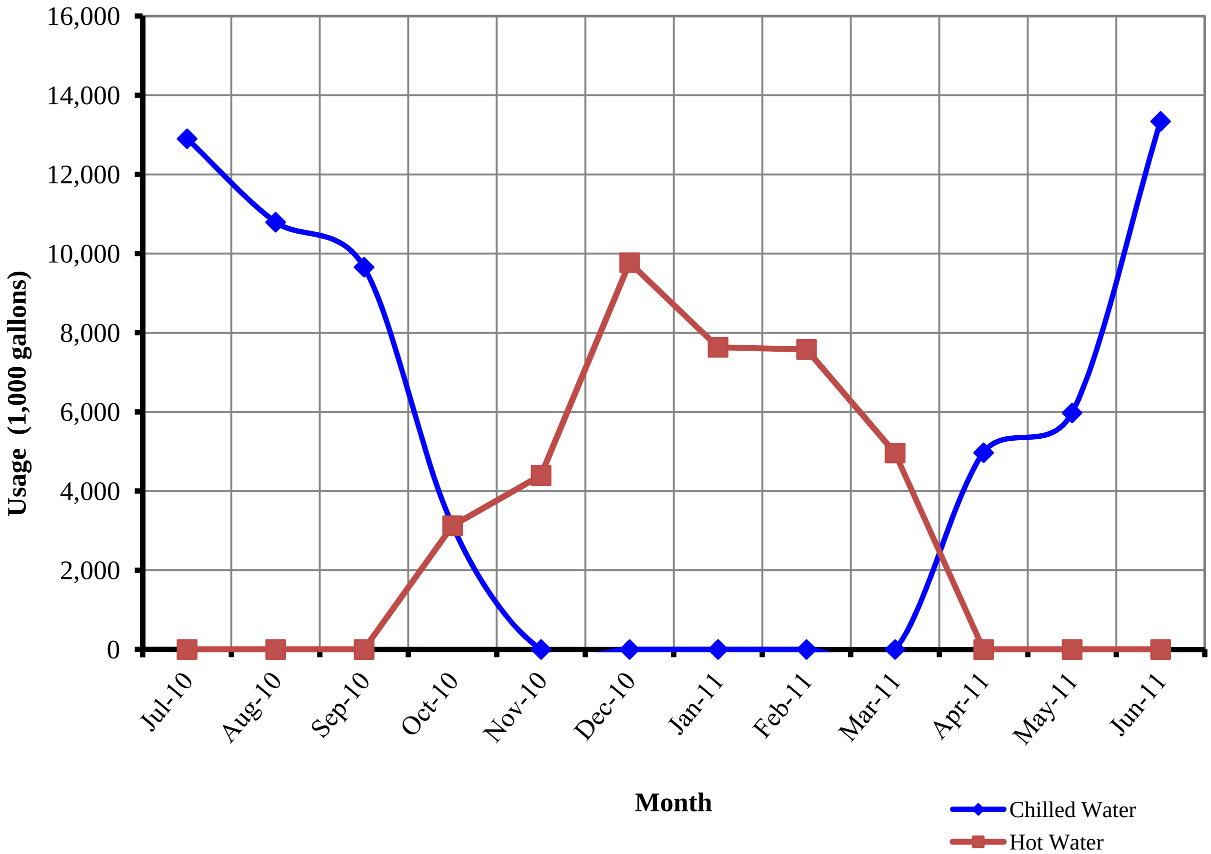
Table 3
Hot & Chilled Water Usage Data

HOT WATER / CHILLED WATER USAGE SUMMARY			
Utility Provider:	Central Energy Plant		
Estimated Average ΔT	15°F (Hot Water)		
Estimated Average ΔT	8°F (Chilled Water)		
MONTH OF USE	**CHILLED WATER CONSUMPTION (1,000 GALLONS)**	**HOT WATER CONSUMPTION (1,000 GALLONS)**	**TOTAL BILL**
Jul-10	*12,902*	-	-
Aug-10	*10,795*	-	-
Sep-10	9,657	-	-
Oct-10	*3,126*	3,126	-
Nov-10		4,398	-
Dec-10	-	9,772	-
Jan-11	-	7,634	-
Feb-11	-	7,578	-
Mar-11	-	4,962	-
Apr-11	4,971	-	-
May-11	5,976	-	-
Jun-11	13,342	-	-
TOTALS	**60,768**	**37,470**	**-**

Usage estimated for Jul-Aug 2010 based on monthly electricity consumption

October chilled water usages assumed to be 50% of total hot/chilled water usage

Figure 3
BCC Mount Laurel - Enterprise Center
Hot & Chilled Water Usage Profile
July-10 through June-11



II. FACILITY DESCRIPTION

The 62,150 SF Enterprise Center was built in 2002 with no additions or renovations. The building is a two story facility with a penthouse. The building is primarily a conference center with meeting rooms, auditorium, offices, classrooms, kitchen and dining room. Major HVAC equipments are located in the penthouse of this building.

The Enterprise Center houses a kitchen with gas cooking stoves and warmers, a commercial dishwasher, reach-in refrigerators and a walk-in freezer.

Occupancy Profile

The Enterprise Center is a conference center with meeting spaces rented exclusively to private and public entities on a daily basis. The Center is typically open Monday through Friday between 8:00 am and 6:00 pm. The facility operates for scheduled events on weekends as well. The Enterprise Center occupancy varies during the day depending on events.

Building Envelope

Exterior walls for the Enterprise Center are brick faced with a concrete block construction. The amount of insulation within the walls couldn't be verified. The windows throughout the Building are in excellent condition and appear to be well maintained. Typical windows throughout the building are double pane, non-operable, ¼" tinted glass with aluminum frames. Blinds are utilized in some areas for occupancy comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The building has a pitched, standing seam metal roof. The HVAC equipment is located in the mechanical rooms in the 1st floor and penthouse floor. The roof is spray insulated from beneath.

Pumping System

The HVAC systems in the Enterprise Center use hot and chilled water supplied by the campus Central Energy Plant. Circulation pumps at the 1st floor mechanical room delivers hot and chilled water to the Air Handling Units in the penthouse mechanical room.

Heating water and chilled water are independently circulated via independent pumps. The hot water heating loop circulates water through the air handlers via two (2) 15 HP Taco pumps (one pump for standby). The chilled water loop circulates water through the air handlers and a plate-frame type heat exchanger via two (2) 20HP Taco pumps (one pump for standby). The pumps are driven with standard efficiency motors. Both pumping sub-systems within the Enterprise Center are constant volume systems with constant volume pumps. Utilization of variable speed drives is recommended for this building.

HVAC Systems

The Enterprise Center houses many meeting rooms with variable occupancy. Majority of the air conditioning systems are normally at unoccupied mode. The units are scheduled to run based on request.

HVAC is provided to the Enterprise Center via nine (9) Air Handling Units (AHU) located in the penthouse mechanical room and fan powered VAV (Variable Air Volume) boxes in the spaces. All of the AHUs are equipped with hot and chilled water coils with 2-way control valves. Conditioned air is delivered to fan powered VAV boxes for space zoning.

AHU-7, 8, 9, 10 and 11 are variable speed mixed air units providing heating and air conditioning to the various meeting rooms in the building. Similarly, AHU-12 provides air conditioning to the auditorium, AHU-13 conditions administrative offices in the second floor and AHU-13 conditions the promenade and the common areas. Finally, AHU-15 is a constant volume unit feeding the kitchen and cafeteria area.

Variable Frequency Drives

The Air Handling Units in the Enterprise Center sends conditioned are to fan powered VAV boxes and they are fitted with variable frequency drives to maintain static air pressure in the supply air system.

During the survey, it was found that four (4) of the VFDs were running at "Bypass" mode due to malfunction. It is recommended to repair or replace all the faulty VFDs and restore system operation at full modulation.

Exhaust System

Air is exhausted from the toilet rooms through roof mounted exhaust fans. The exhaust fans are interlocked with the air handling units and controlled via building management system. The kitchen utilizes two exhaust hoods, which are connected to two exhaust fans located on the side of the building. The exhaust fans serve the main cooking range hood and the dishwasher. The kitchen exhaust fans are controlled via manual switches. The exhaust equipments are in good condition.

HVAC System Controls

The pumps, Air Handling Units, fan powered VAV boxes and the exhaust fans in the Enterprise Center building are controlled via the Siemens central DDC system. The AHUs serving the meeting rooms remain normally at unoccupied mode. These units are set to occupied mode when requested by the Enterprise Center personnel due to scheduled events. The units serving the offices and the common areas are scheduled to run during normal business days.

AHU-7, 8 and 12 serve Mt. Holly and Willingboro meeting rooms and the Auditorium. These single zone spaces are suitable for demand controlled ventilation, which utilize carbon-dioxide sensors to modulate and reduce outside air introduced.

Fan powered VAV boxes and the reheat valves are also monitored and controlled by the Siemens central DDC control system. Each space within the building is equipped with a remote temperature sensor with override capability.

Domestic Hot Water

Domestic hot water is provided by a 250 gallon gas fired domestic hot water heater made by PVI. The hot water heater provides domestic hot water for the kitchen and bathrooms throughout the building. The domestic hot water is distributed throughout the building by small circulation pumps. The hot water heater, piping, and insulation are in good condition.

Lighting

The lighting throughout the Building is provided with modern fixtures with T8 lamps and electronic ballasts. 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 4
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	$22,630	$3,094	7.3	105%
ECM #2	Repair or Replace Faulty VFDs	$13,320	$3,505	3.8	295%
ECM #3	VFD on HW and CW pumps	$33,470	$1,720	19	-23%
ECM #4	Demand Controlled Ventilation	$73,000	$10,343	7.1	113%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	28 KW PV Array	$197,444	$25,489	7.7	94%

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

Table 5
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	14.8	21,049	-
ECM #2	Repair or Replace Faulty VFDs	-	23,844	-
ECM #3	VFD on HW and CW pumps	-	11,704	-
ECM #4	Demand Controlled Ventilation	-	33,168	4,633
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	28 KW PV Array	28.0	44,473	-

Table 6
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	$3,094	$22,630	$0	$22,630	7.3
Repair or Replace Faulty VFDs	$3,505	$13,320	$0	$13,320	3.8
VFD on HW and CW pumps	$1,720	$35,870	$2,400	$33,470	19.5
Demand Controlled Ventilation	$10,343	$73,000	$0	$73,000	7.1
Design / Construction Extras (15%)	-	$21,723	-	$21,363	-
Total Project	**$18,662**	**$166,543**	**$2,400**	**$163,783**	**8.8**

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 Lighting & Re-Lamping

Description:

Majority of the interior lighting throughout the Enterprise Center building is provided with fluorescent fixtures with older generation, 700 series 32W T8 lamps and electronic ballasts. Although 700 series T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output.

This ECM includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. 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.

This ECM includes replacement of each of the high bay metal halide light fixtures with T5HO fixtures with reflective lenses. The retrofit for the metal halide fixtures includes a one for one fixture replacement. The fluorescent fixtures selected will provide equivalent light compared to the average light output of the existing metal halide fixtures.

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 your existing fixtures, or hardwired into your 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 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:

There are no Smart Start incentives for the prescribed retrofits in this ECM.

Replacement and Maintenance Savings:

Maintenance savings is negligible for this ECM and has not been included in the energy savings summary

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$22,630
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$22,630
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,094
Total Yearly Savings ($/Yr):	$3,094
Estimated ECM Lifetime (Yr):	15
Simple Payback	7.3
Simple Lifetime ROI	105.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$46,414
Internal Rate of Return (IRR)	11%
Net Present Value (NPV)	$14,308.92

ECM #2: Replace Faulty VFD's

Description:

This ECM replaces the existing 2, 5, 7.5, and 15 HP fan VFD's located in the enterprise building on AHU-8, 11, and 14. These fans currently contain a VFD's but are not being used (set to bypass) due to a faulty VFD that needs to be replaced. AHU-8 contains a 2 HP motor return with an efficiency of 84%. AHU-11's return is powered by a 5 HP motor with an efficiency of 87.5%. AHU-14 contains two faulty VFD's the 15 HP supply with a 91% efficiency motor, and 7.5 HP motor operating at 88.5%.

A new variable frequency drive can be installed to replace the faulty units to vary the fan speed based on the static pressure of the supply air.

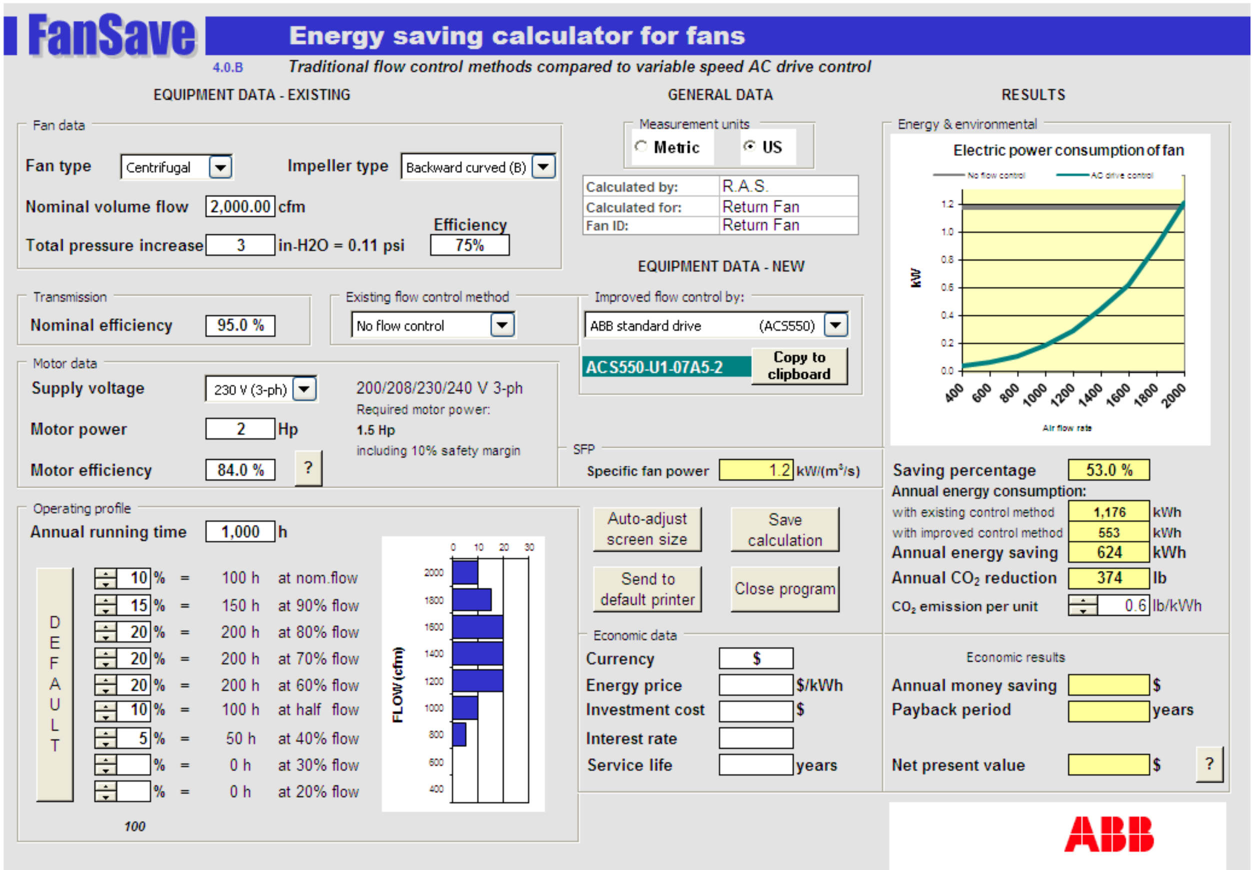
Energy and cost savings calculations are based on calculation software "FanSave v4.0" provided by ABB. Existing equipment information where available was used to estimate the decrease in energy use with an installed VFD. Through the use of FanSave an estimated energy usage for the existing system and the system with a VFD installed.

Energy Savings Calculations:

$$\text{Energy Cons.}\ (\text{kWh}) = \text{Power}\ (\text{HP}) \times 0.746 \left(\frac{\text{KW}}{\text{HP}}\right) \times \text{Operation}\ (\text{Hrs.})$$

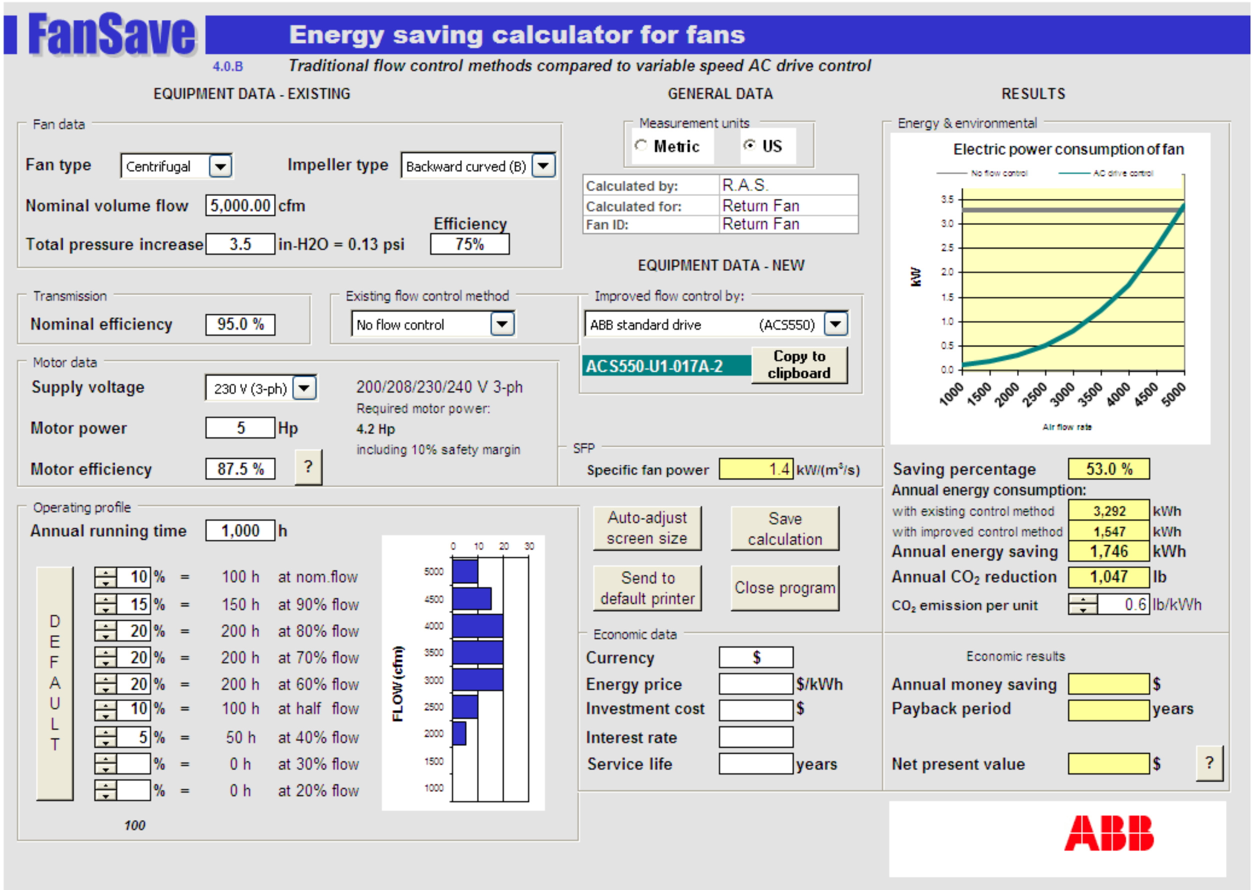
$$\text{Energy Cost} = \text{Energy Usage}\ (\text{kWh}) \times \text{Ave Electric Cost}\ \left(\frac{\$}{\text{kWh}}\right)$$

2 HP Return Fan VFD Energy:



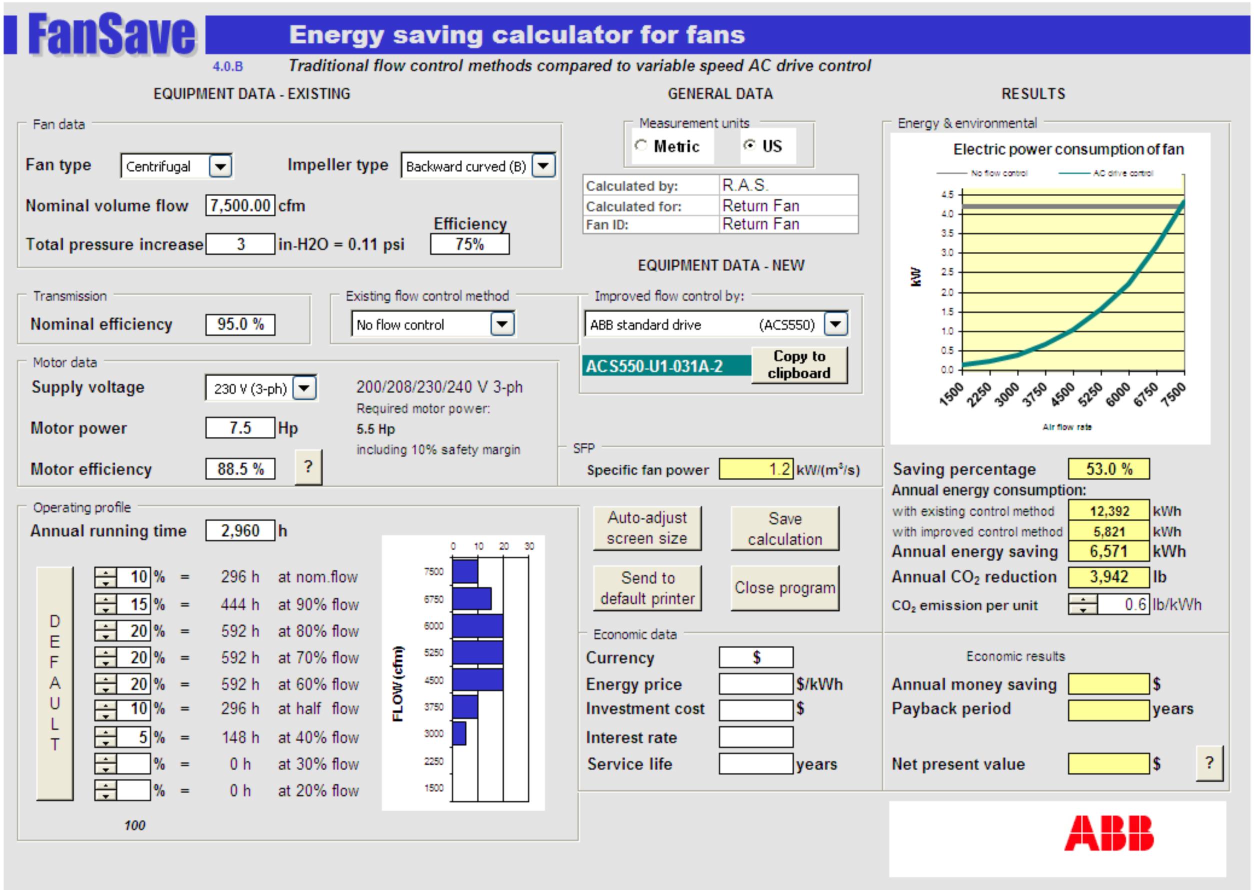
RETURN FAN VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Return Fan	VFD Return Fan	
Flow Control	Bypass VFD	VFD	-
Ave. Motor Efficiency (%)	84%	84%	0%
Operating Hrs	1,000	1,000	-
Estimated Total Horse Power	2	2	0
Elec Cost ($/kWh)	0.147	0.147	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	1,176	553	623
Electric Energy Cost ($)	$173	$81	$92
COMMENTS:	- VFD Fan energy is based on ABB energy savings calculator for fans "Fan Save," version 4.0.		

5 HP Return Fan VFD Energy:



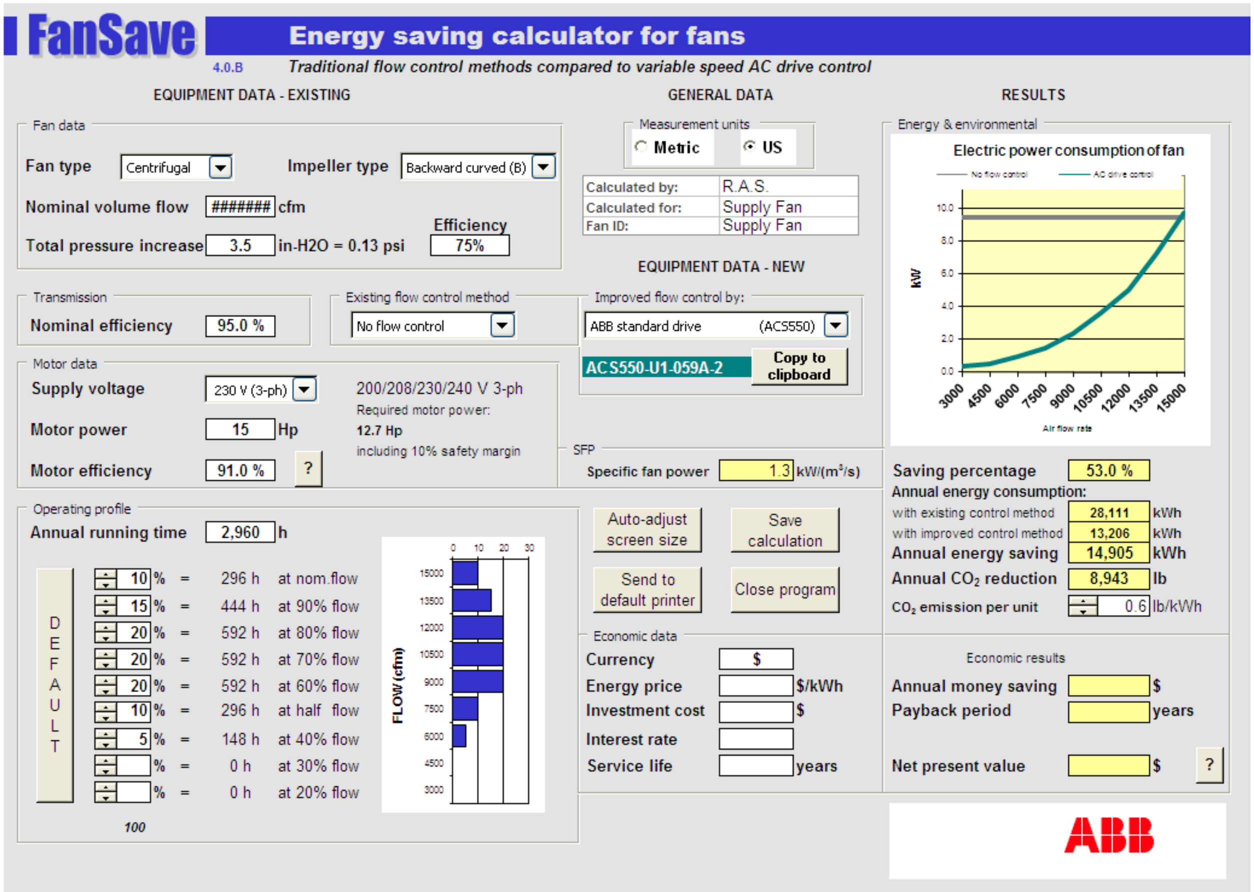
RETURN FAN VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Return Fan	VFD Return Fan	
Flow Control	Bypass VFD	VFD	-
Ave. Motor Efficiency (%)	87.5%	87.5%	0%
Operating Hrs	1,000	1,000	-
Estimated Total Horse Power	5	5	0
Elec Cost ($/kWh)	0.147	0.147	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	3,292	1,547	1,745
Electric Energy Cost ($)	$484	$227	$257
COMMENTS:	- VFD Fan energy is based on ABB energy savings calculator for fans "Fan Save," version 4.0.		

7.5 HP Return Fan VFD Energy:



RETURN FAN VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Return Fan	VFD Return Fan	
Flow Control	Bypass VFD	VFD	-
Ave. Motor Efficiency (%)	88.5%	88.5%	0%
Operating Hrs	2,960	2,960	-
Estimated Total Horse Power	7.5	7.5	0
Elec Cost ($/kWh)	0.147	0.147	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	12,392	5,821	6,571
Electric Energy Cost ($)	$1,822	$856	$966
COMMENTS:	- VFD Fan energy is based on ABB energy savings calculator for fans "Fan Save," version 4.0.		

15 HP Supply Fan VFD Energy:



SUPPLY FAN VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Supply Fan	VFD Supply Fan	
Flow Control	Bypass VFD	VFD	-
Ave. Motor Efficiency (%)	91%	91%	0%
Operating Hrs	2,960	2,960	-
Estimated Total Horse Power	15	15	0
Elec Cost ($/kWh)	0.147	0.147	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	28,111	13,206	14,905
Electric Energy Cost ($)	$4,132	$1,941	$2,191
COMMENTS:	- VFD Fan energy is based on ABB energy savings calculator for fans "Fan Save," version 4.0.		

Installation cost for a 2 HP, 5 HP, 7.5 HP, and 15 HP VFD, removal of existing equipment, and labor comes to an estimated total of $13,020. Control points and sensors were not included due to this being a replacement and not a new installation.

Currently there are no **NJ Smart Start® Program Incentives** for this ECM.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$13,320
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$13,320
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,505
Total Yearly Savings ($/Yr):	$3,505
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.8
Simple Lifetime ROI	294.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$52,575
Internal Rate of Return (IRR)	25%
Net Present Value (NPV)	$28,522.46

ECM #3: Install Hot and Chilled Water Pump VFD's

Description:

When an Air Handling Unit is not calling for heating or cooling, the control valve closes reducing overall flow of the system. Variable frequency drives allow the pumps to slow down in response to a reduction in overall system flow and static pressure increase. The reduction in operating flow allows the pumps to reduce energy consumption exponentially for all hours that the heating or cooling system is not at its peak load.

This ECM includes the installation of Variable Frequency Drives on two hot water and two chilled water pumps. This ECM assumed that the NEMA premium motors suggested in a prior ECM were not installed. Installing these motors in addition to the VFD's would increase energy savings, but the combined savings and cost of installation are not reflected in this ECM.

Energy and cost savings calculations are based on calculation software "PumpSave v4.2," provided by ABB. The PumpSave calculation software is used to estimate the pumping energy for variable speed pump systems. The hot water loop pumps operate approximately 1,060 Hrs per year and the cooling loop pumps approximately 1,200 Hrs per year. This was estimated based on building use and occupancy. The pump flow, HD, and resultant energy are calculated based on the existing pump horse power installed. The operation of all equipment control valves should be verified before implementing this ECM.

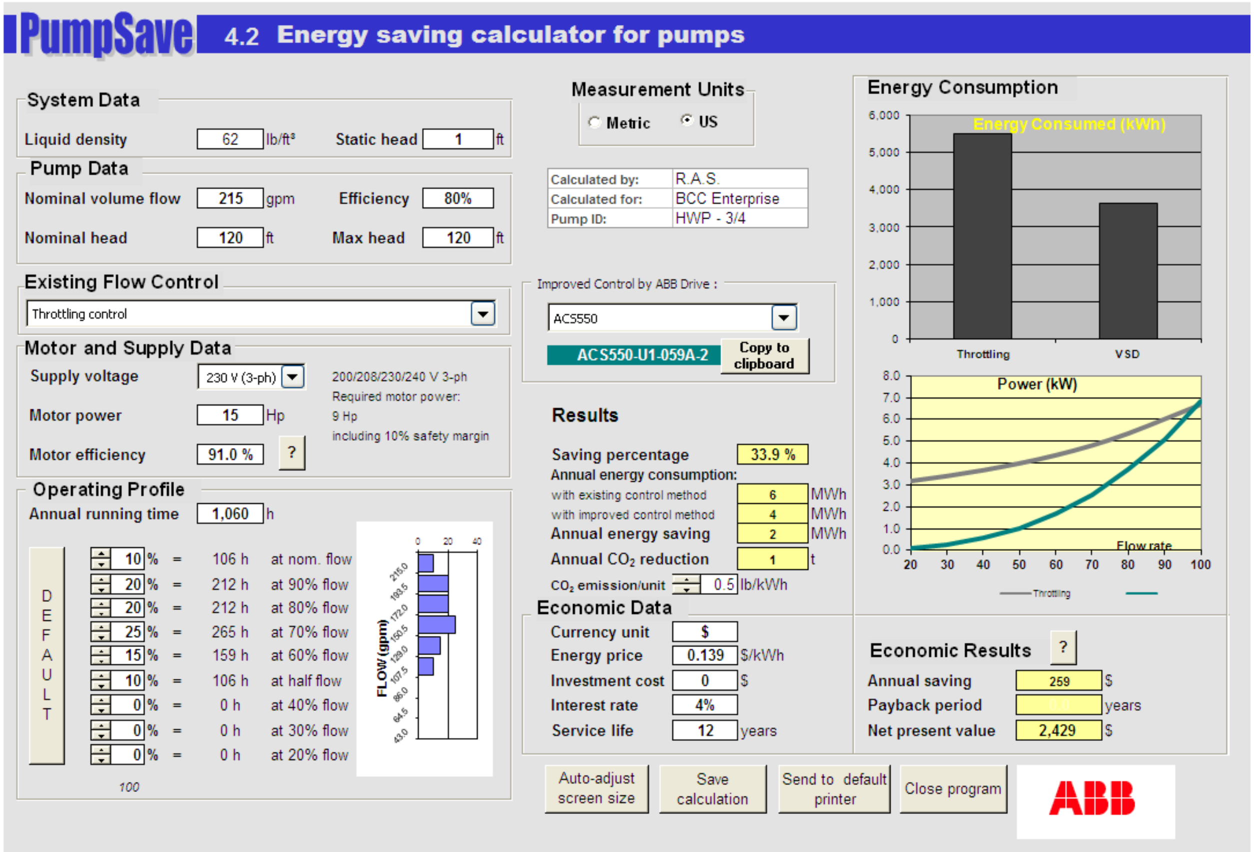
Energy Savings Calculations:

$$\text{Cons. Volume Power}\left(\text{HP}\right) = \frac{\text{Specific Gravity} \times \text{Flow Rate}\left(\frac{\text{Gal}}{\text{min}}\right) \times \text{Head}\left(\text{Ft}\right)}{3960 \times \text{Pump Efficiency}\left(\%\right) \times \text{Motor Efficiency}\left(\%\right)}$$

$$\text{Energy Cons.}\left(\text{kWh}\right) = \text{Power}\left(\text{HP}\right) \times 0.746\left(\frac{\text{KW}}{\text{HP}}\right) \times \text{Operation}\left(\text{Hrs.}\right)$$

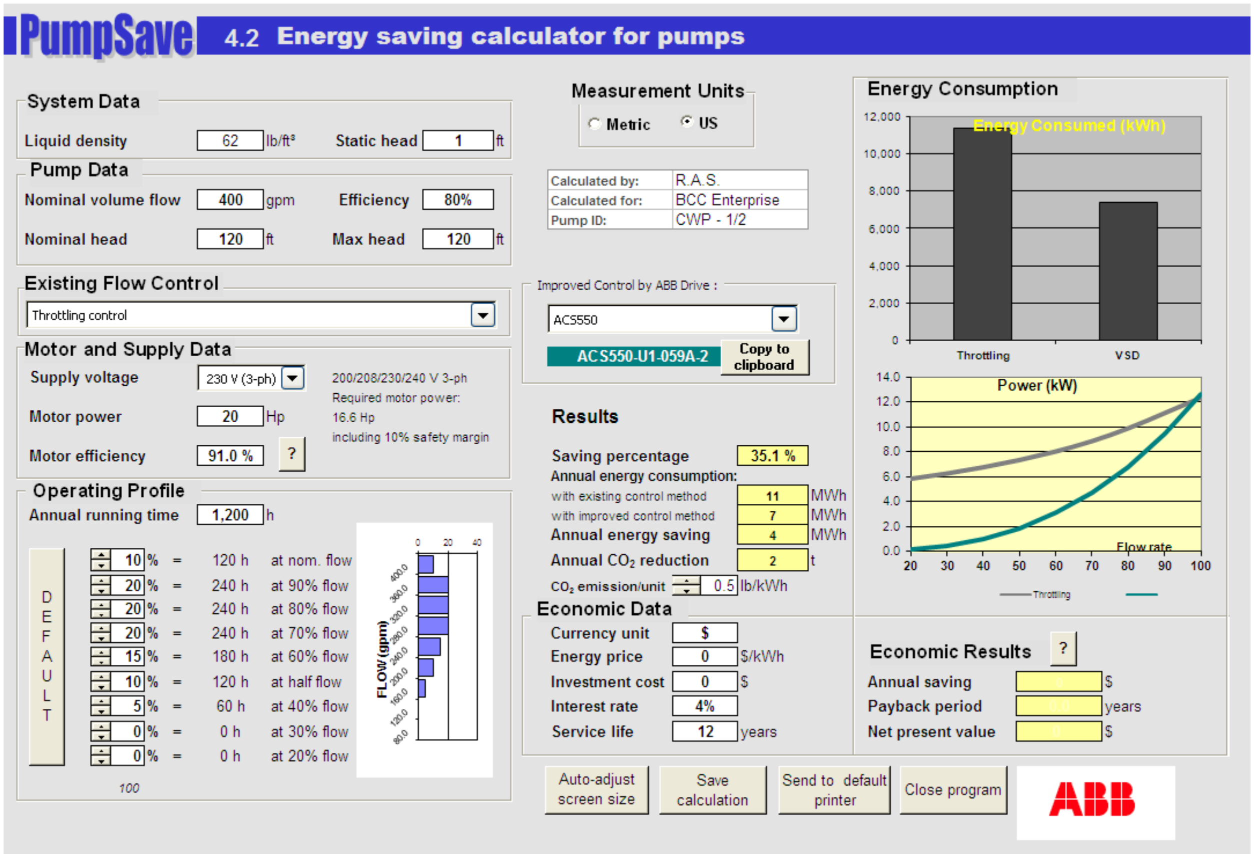
$$\text{Energy Cost} = \text{Energy Usage}\left(\text{kWh}\right) \times \text{Ave Electric Cost}\left(\frac{\$}{\text{kWh}}\right)$$

Hot Water VFD Pumping Energy:



HOT WATER PUMPS VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Pumps	VFD Pumps	
Number of Pumps	2	2	-
Pump Power (HP)	15	15	-
Estimated Total Horse Power	30	30	-
Flow Control	Throttle	VFD	-
Total Flow (GPM)	215	215	-
Head (Ft)	120	120	-
Ave. Motor Efficiency (%)	91%	91%	-
Operating Hrs	1060	1060	-
Elec Cost ($/kWh)	0.147	0.147	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	11,002	7,278	3,724
Electric Energy Cost ($)	$1,617	$1,070	$548
COMMENTS:	- VFD pump energy is based on ABB energy savings calculator for pumps, "Pump Save," version 4.2. Flow rate for VFD Pump calculation is summarized in the operating profile shown in the Pump Save output.		

Chilled Water VFD Pumping Energy:



CHILLED WATER PUMPS VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Pumps	VFD Pumps	
Flow Control	Throttle	VFD	-
Number of Pumps	2	2	-
Pump Power (HP)	20	20	-
Estimated Total Horse Power	40	40	-
Total Flow (GPM)	400	400	-
Head (Ft)	120	120	-
Pump Efficiency (%)	80%	80%	-
Ave. Motor Efficiency (%)	91%	91%	-
Operating Hrs	1200	1200	-
Elec Cost ($/kWh)	0.147	0.147	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	22,761	14,782	7,980
Electric Energy Cost ($)	$3,346	$2,173	$1,173
COMMENTS:	- VFD pump energy is based on ABB energy savings calculator for pumps, "Pump Save," version 4.2. Flow rate for VFD Pump calculation is summarized in the operating profile shown in the Pump Save output.		

Installation cost for two (2) 20 HP chilled water VFDs, two (2) 15 HP hot water VFD's, labor, pressure sensors, and controls is estimated to be $35,870.

Currently there are no **NJ Smart Start® Program Incentives** for installation of hot water pump Variable Frequency Drives.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$35,870
NJ Smart Start Equipment Incentive ($):	$2,400
Net Installation Cost ($):	$33,470
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,720
Total Yearly Savings ($/Yr):	$1,720
Estimated ECM Lifetime (Yr):	15
Simple Payback	19.5
Simple Lifetime ROI	-22.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$25,800
Internal Rate of Return (IRR)	-3%
Net Present Value (NPV)	($12,936.75)

ECM #4: Demand Controlled Ventilation

Demand Controlled Ventilation (DCV) is a means to provide active, zone level control of ventilation for spaces within a facility. The basic premise behind DCV is monitoring indoor CO2 levels versus outdoor CO2 levels in order to provide proper ventilation to the spaces within the facility as well as savings derived from treating unconditioned ventilation air. Carbon dioxide ventilation control or demand controlled ventilation (DCV) allows for the measurement and control of outside air ventilation levels to a target cfm/person ventilation rate in the space (i.e., 15 cfm/person) based on the number of people in the space. It is a direct measure of ventilation effectiveness and is a method whereby buildings can regain active and automatic zone level ventilation control, without having to open windows. The fixed ventilation approach depends on a set-it-and-forget-it methodology that is completely unresponsive to changes in the way spaces are utilized/occupied or how equipment is maintained. A DCV system utilizes various control algorithms to maintain a base ventilation rate. The system monitors space CO2 levels and the algorithm automatically adjusts the outdoor and return air dampers to provide the quantity of outdoor air to maintain the required CO2 level in the space. System designs are normally designed for maximum occupancy and the ventilation rates are designed for this (maximum) occupancy. In areas where occupancy swings are prevalent there is ample opportunity to reduce outdoor air quantity to satisfy the needs of the actual number of occupants present. By installing the DCV controls, energy savings are realized by the reduced quantities of outdoor air that do not require heating and cooling energy from the steam and chilled water plants.

When operating the selected units, these units provide minimum amount of outside air to each corresponding space. The outside air volume is typically based on the maximum occupancy of the space conditioned. When a given space is not fully occupied the outside air quantity delivered to the space is greater than the amount needed for adequate ventilation.

This ECM includes the installation of CO_2 sensors integrated into a demand control ventilation system, for the units mentioned above. This system allows the air handling unit to respond to changes in occupancy and therefore reduce the amount of outside air that has to be conditioned. Outside air accounts for a large portion of the energy consumption in the HVAC system, especially in high occupancy spaces.

The components required for the demand control ventilation system installation include damper actuators, Variable Frequency Drives, CO2 sensors, wiring, Energy Management System equipment expansion and programming. Each occupied zone would require minimum one CO_2 sensor installed to monitor occupancy levels, with larger zones requiring additional sensors.

Often heating and air conditioning units switch to occupied mode several hours before the actual occupancy in order to provide pre-heating or pre-cooling of the space. Energy savings achieved through “Demand Control Ventilation” is calculated based on actual occupancy of the spaces and the hours the units are in occupied mode.

Energy Savings Calculations:

Following table summarizes the estimated occupancy characteristics of the spaces and the HVAC equipment at this school.

ENERGY SAVINGS	
ECM INPUTS	**DCV**
Average Full Occupancy Hours	8:00 AM - 6:00 PM
Full Occupancy Hours per Day	10.0
HVAC Eqp. On Occupied Mode	7:00 AM - 7:00 PM
Occupied Hours per day	12
HVAC occupied / spaces not occupied	5.5
Est. Conditioned outside air savings	46%

Following is a list of HVAC equipment and corresponding spaces identified for Demand Controlled Ventilation.

IMPLEMENTATION SUMMARY						
INPUTS	**Service**	**# of CO2 SENSORS**	**HVAC Unit**	**Outside Air Flow, CFM**	**Est. Outside Air Cooling Capaity, Tons**	**Est. Outside Air Heating Capacity, MBH**
DCV-7	Mt. Holly	1	AHU-7	1100	6	77
DCV-8	Willingboro	1	AHU-8	930	5	65
DCV-12	Auditorium	4	AHU-12	8800	44	618
DCV-14	Promonade	4	AHU-14	3900	20	274
DCV-15	Kitchen Area	2	AHU-15	6000	30	421
Total					**104**	**1,455**

Estimated outside air heating capacity = 1.08 x Fresh Air CFM x design day ΔT

$$\text{Cooling Energy Usage} = \frac{\text{Cooling}(\text{Tons}) \times 12{,}000\left(\frac{\text{Btu}}{\text{Ton hr}}\right) \times \text{Annual Full Load Cooling Hrs.}}{1000\left(\frac{\text{Wh}}{\text{kWh}}\right) \times \text{EER}\left(\frac{\text{Btu}}{\text{Wh}}\right)}$$

$$\text{Energy Savings} = \text{Cooling Energy}(\text{kwh}) \times \text{Estimated Energy Savings}(\%)$$

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

$$\text{Heating Energy}(\text{Therms}) = \frac{\text{Outside Air Heating Capacity}\left(\frac{\text{Btu}}{\text{Hr.}}\right) \times \text{HDD}(\text{Day }^\circ\text{F}) \times 12\left(\frac{\text{Hr.}}{\text{Day}}\right) \times (0.60)}{65(^\circ\text{F}) \times \text{Fuel Heat Value}\left(\frac{\text{Btu}}{\text{Therms}}\right) \times \text{Heating Efficiency}(\%)}$$

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

DEMAND CONTROLLED VENTILATION	
ECM INPUTS	**DCV- 7, 8, 12, 14, 15**
Equipment	AHU - 7, 8, 12, 14, 15
Total Cooling Capacity, Tons	104
Efficiency (EER)	15.0
Annual Full Load Cooling Hours	800
Total Heating Capacity, MBh	1455
Heating Efficiency (Gas)	80%
Heating Degree Days (65°F)	4599
Energy Savings	50%
Elec Cost ($/kWh)	$0.147
Natural Gas Cost ($/Therm)	$1.18
ENERGY SAVINGS	
ECM RESULTS	**DCV- 7, 8, 12, 14, 15**
Cooling Energy Cnsmption, kWh	66,336
Heating Energy (Therms)	9,267
Cooling Energy Savings kWh	33,168
Heating Energy Savings (Therms)	4,633
Electric Energy Cost Savings ($)	$4,876
Total Gas Cost Savings ($)	$5,467
Total Cost Savings ($)	$10,343
COMMENTS:	HDD estimated based on Newark,NJ.

Cost and Incentives:

Estimated installed cost for demand controlled ventilation for the Cafeteria Areas is $73,000. Estimated cost includes CO2 sensors, control wiring, electrical wiring, control system equipment expansion and programming.

There are currently no Smart Start ® incentives available for a Demand Control Ventilation System.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$73,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$73,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$10,343
Total Yearly Savings ($/Yr):	$10,343
Estimated ECM Lifetime (Yr):	15
Simple Payback	7.1
Simple Lifetime ROI	112.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$155,145
Internal Rate of Return (IRR)	11%
Net Present Value (NPV)	$50,474.06

REM #1: Rooftop Solar Array

Description:

The Enterprise Center has approximately 2,800 square-feet of available roof space that can accommodate a 28.0 kilowatt solar array, assuming the existing roof structure is capable of supporting an array.

The array will produce approximately 44,473 kilowatt-hours annually that will reduce the overall electric usage of the facility 5.55%.

Energy Savings Calculations:

See **LGEA Solar Financials Appendix F** for detailed financial summary and proposed solar layout areas.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW_{DC}):	34.55
Electric Generation (KWH/Yr):	44,473
Installation Cost ($):	$197,444
SREC Revenue ($/Yr):	$18,952
Energy Savings ($/Yr):	$6,538
Total Yearly Savings ($/Yr):	$25,489
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	7.7
Analysis Period Electric Savings ($):	$59,177
Analysis Period SREC Revenue ($):	$221,272
Net Present Value (NPV)	$2,104.19

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. Maintain all weather stripping on windows and doors.

B. Clean all light fixtures to maximize light output.

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

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Burlington County College - Mt. Laurel Campus Enterprise Center

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	$22,630	$0	$0	$22,630	$3,094	$0	$3,094	15	$46,414	$0	105.1%	7.3	10.7%	$14,308.92
ECM #2	Repair or Replace Faulty VFDs	$13,320	$0	$0	$13,320	$3,505	$0	$3,505	15	$52,575	$0	294.7%	3.8	25.4%	$28,522.46
ECM #3	VFD on HW and CW pumps	$21,100	$14,770	$2,400	$33,470	$1,720	$0	$1,720	15	$25,800	$0	-22.9%	19.5	-3.1%	($12,936.75)
ECM #4	Demand Controlled Ventilation	$38,000	$35,000	$0	$73,000	$10,343	$0	$10,343	15	$155,145	$0	112.5%	7.1	11.3%	$50,474.06
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	28 KW PV Array	$197,444	$0	$0	$197,444	$6,538	$18,952	$25,489	15	$382,342	$284,279	93.6%	7.7	9.7%	$106,847.62

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.

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

SmartStart Building Incentives

The NJ SmartStart Buildings Program offers financial incentives on a wide variety of building system equipment. The incentives were developed to help offset the initial cost of energy-efficient equipment. The following tables show the current available incentives as of 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 $\geq$ 16 \$600 per ton, EER $\geq$ 18 \$750 per ton, EER $\geq$ 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%

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Enterprise Center

Building ID: 2846451
For 12-month Period Ending: June 30, 2011[1]
Date SEP becomes ineligible: N/A
Date SEP Generated: August 29, 2011

Facility
Enterprise Center
500 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Year Built: 2000
Gross Floor Area (ft²): 62,150

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	2,733,510
Natural Gas (kBtu)[4]	438,537
Total Energy (kBtu)	3,172,047

Energy Intensity[5]	
Site (kBtu/ft²/yr)	51
Source (kBtu/ft²/yr)	154

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	410

Electric Distribution Utility
Public Service Electric & Gas Co

National Average Comparison	
National Average Site EUI	120
National Average Source EUI	280
% Difference from National Average Source EUI	-45%
Building Type	College/University (Campus-Level)

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[6] **for Indoor Environmental Conditions:**	
Ventilation for Acceptable Indoor Air Quality	**N/A**
Acceptable Thermal Environmental Conditions	**N/A**
Adequate Illumination	**N/A**

Certifying Professional
Mike 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	Enterprise Center	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	College/University (Campus-Level)	Is this an accurate description of the space in question?		☐
Location	500 College Circle, Mount Laurel, NJ 08054	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 acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐

Enterprise Center (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	62,150 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.		☐
Number of PCs	N/A(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	N/A(Optional)	Is this the total number of hours per week that the 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	N/A(Optional)	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.		☐

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))**
06/01/2011	06/30/2011	67,093.00
05/01/2011	05/31/2011	58,414.00
04/01/2011	04/30/2011	66,729.00
03/01/2011	03/31/2011	74,897.00
02/01/2011	02/28/2011	59,993.00
01/01/2011	01/31/2011	63,666.00
12/01/2010	12/31/2010	63,313.00
11/01/2010	11/30/2010	67,638.00
10/01/2010	10/31/2010	59,968.00
09/01/2010	09/30/2010	63,764.00
08/01/2010	08/31/2010	67,435.00
07/01/2010	07/31/2010	88,236.00
Electric Consumption (kWh (thousand Watt-hours))		**801,146.00**
Electric Consumption (kBtu (thousand Btu))		**2,733,510.15**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**2,733,510.15**
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)**
06/01/2011	06/30/2011	353.98
05/01/2011	05/31/2011	370.55
04/01/2011	04/30/2011	403.10
03/01/2011	03/31/2011	460.54
02/01/2011	02/28/2011	449.95
01/01/2011	01/31/2011	390.96
12/01/2010	12/31/2010	386.73
11/01/2010	11/30/2010	457.36
10/01/2010	10/31/2010	398.85
09/01/2010	09/30/2010	311.87

08/01/2010	08/31/2010	238.44
07/01/2010	07/31/2010	163.04
Gas Consumption (therms)		**4,385.37**
Gas Consumption (kBtu (thousand Btu))		**438,537.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**438,537.00**
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
Enterprise Center
500 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

General Information

Enterprise Center	
Gross Floor Area Excluding Parking: (ft^2)	62,150
Year Built	2000
For 12-month Evaluation Period Ending Date:	June 30, 2011

Facility Space Use Summary

Enterprise Center	
Space Type	Other - College/University (Campus-Level)
Gross Floor Area(ft^2)	62,150
Number of PCs°	N/A
Weekly operating hours°	N/A
Workers on Main Shift°	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 06/30/2011)	**Baseline** (Ending Date 06/30/2011)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	51	51	0	N/A	120
Source (kBtu/ft²)	154	154	0	N/A	280
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/ft²/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	410	410	0	N/A	964
$kgCO_2e/ft^2$/year	7	7	0	N/A	16

More than 50% of your building is defined as College/University (Campus-Level). This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for College/University (Campus-Level). This building uses X% less energy per square foot than the CBECS national average for College/University (Campus-Level).

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Enterprise Center

Air Handling Units

Tag	**AHU-7**	**AHU-8**	**AHU-9**
Unit Type	VAV AHU with Hot and Chilled Water	VAV AHU with Hot and Chilled Water	VAV AHU with Hot and Chilled Water
Qty	1	1	1
Location	3rd Floor MER	3rd Floor MER	3rd Floor MER
Area Served	Mt. Holly	Willingboro	Meeting Rooms
Manufacturer	York	York	York
Model #	-	P340449	P340449
Serial #	-	-	DEJM-0400B
Cooling Type	Chilled Water Coil	Chilled Water Coil	Chilled Water Coil
Cooling Capacity (MBH)	107	98	381
Flow Capacity, CFM	2,500	2,400	7,300
Min. Outside Air, CFM	1,100	930	4,700
Heating Type	Hot Water Coil	Hot Water Coil	Hot Water Coil
Heating Input (MBH)	25.4	18.2	182
Supply Fan HP **Motor Efficiency**	7.5 HP 88.5%	5 HP 87.5%	5 HP 87.5%
Return Fan HP **Motor Efficiency**	3 HP 86.5 %	2 HP 84 %	3 HP 86.5 %
Approx Age	10	10	10
ASHRAE Service Life	15	15	15
Remaining Life	5	5	5
Comments	2 VFD's	2 VFD's Return VFD on Bypass	2 VFD's

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Enterprise Center

Air Handling Units

Tag	AHU-10	AHU-11	AHU-12
Unit Type	VAV AHU with Hot and Chilled Water	VAV AHU with Hot and Chilled Water	AHU with Hot and Chilled Water
Qty	1	1	1
Location	3rd Floor MER	3rd Floor MER	3rd Floor MER
Area Served	Burlington, Evasham, add'l smaller rooms	Board rooms, Pemberton Room	Auditorium
Manufacturer	York	York	York
Model #	-	P340449	-
Serial #	-	DEJM-04022B	-
Cooling Type	Chilled Water Coil	Chilled Water Coil	Chilled Water Coil
Cooling Capacity (Tons)	236	182	781
Flow Capacity, CFM	9,000	4,800	16,900
Min. Outside Air, CFM	800	1,500	8,800
Heating Type	Hot Water Coil	Hot Water Coil	Hot Water Coil
Heating Input (MBH)	-	21	660
Supply Fan HP Motor Efficiency	15 HP 91%	7.5 HP 88.5%	25 HP 91.7%
Return Fan HP Motor Efficiency	7.5 HP 88.5%	5 HP 87.5%	10 HP 89.5%
Approx Age	10	10	10
ASHRAE Service Life	15	15	15
Remaining Life	5	5	5
Comments	2 VFD's	2 VFD's Return VFD on Bypass	Operates seldom

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Enterprise Center

Air Handling Units

Tag	**AHU-13**	**AHU-14**	**AHU-15**
Unit Type	VAV AHU with Hot and Chilled Water	VAV AHU with Hot and Chilled Water	VAV AHU with Hot and Chilled Water
Qty	1	1	1
Location	3rd Floor MER	3rd Floor MER	3rd Floor MER
Area Served	2nd Floor Offices	Promonade and common areas	Kitchen Area
Manufacturer	York	York	York
Model #	-	-	-
Serial #	-	-	-
Cooling Type	Chilled Water Coil	Chilled Water Coil	Chilled Water Coil
Cooling Capacity (Tons)	125	479	312
Flow Capacity, CFM	4,200	13,500	6,000
Min. Outside Air, CFM	700	3,900	6,000
Heating Type	Hot Water Coil	Hot Water Coil	Hot Water Coil
Heating Input (MBH)	-	44	416.8
Supply Fan HP **Motor Efficiency**	7.5 HP 88.5%	15 HP 91%	5 HP 87.5%
Return Fan HP **Motor Efficiency**	1.5 HP 84 %	7.5 HP 88.5%	3 HP 86.5 %
Approx Age	10	10	10
ASHRAE Service Life	15	15	15
Remaining Life	5	5	5
Comments	2 VFD's	2 VFD's Both VFDs on Bypass	Constant Volume

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Enterprise Center

Pumps

Tag	P3, P4	P1, P2	Circulators
Unit Type	Base Mtd. End Suction	Base Mtd. End Suction	Pipe Mtd. Circulation Pumps
Qty	2	2	2
Location	1st Floor MER	1st Floor MER	1st Floor MER
Area Served	Heating Hot Water Loop	Chilled Water Loop	Domestic Hot Water Loop
Manufacturer	Taco	Taco	B&G
Model #	L2513E2H1G2L0A, FE2513E2H1G2L0	FE3013E2J1G2L07	-
Serial #	-	-	-
Horse Power	15	20	1/4
Flow	215 GPM @ 120 ft	400 GPM @ 120 ft	-
Motor / Frame Info	Baldor 254T	Baldor 256T	B&G
Electrical Power	230/460/3/60	230/460/3/60	115/1/60
RPM	1760	1760	1725
Motor Efficiency %	91.0%	91.0%	-
Approx Age	11	11	11
ASHRAE Service Life	20	20	20
Remaining Life	9	9	9
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Enterprise Center

Domestic Water Heaters

Tag	**HWH**		
Unit Type	Gas fired hot water heater		
Qty	1		
Location	1st Floor MER		
Area Served	Domestic Hot Water		
Manufacturer	PVI		
Model #	80N 250A MX		
Serial #	0800101968		
Size (Gallons)	250		
Input Capacity (MBH/KW)	800 MBH		
Recovery (Gal/Hr)	1000 GPH (40-120°F)		
Efficiency %	80%		
Fuel	Natural Gas		
Approx Age	10		
ASHRAE Service Life	12		
Remaining Life	2		
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Enterprise Center

Heat Exchanger

Tag	**HE**		
Unit Type	Plate/Frame Heat Exchanger		
Qty	1		
Location	1st Floor MER		
Area Served	Campus CW Loop / Building CW Loop		
Manufacturer	Taco		
Model #	AT80 B20		
Serial #	249853.1		
Max Pressure	150 psi		
Capacity	5424 MBH / 900 GPM		
Primary / Secondary Temperatures	40 - 52 °F 54 - 42 °F		
Approx Age	11		
ASHRAE Service Life	20		
Remaining Life	9		
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Enterprise Center

Fume Hoods / Exhaust Fans

Tag	EF-5	Kitchen Hood / Exhaust	
Unit Type	Exhaust Fan	Exhaust Fan	
Qty	1	1	
Location	Roof	Side	
Area Served	Toilet Rooms	Kitchen Fume Hood	
Manufacturer	-	-	
Model / Serial #	-	-	
Air Flow Capacity	3,700 CFM @ 1.4 inWG	6,000 CFM @ 2.1 inWG	
Supply Fan Motor HP & Efficiency	2	5	
Approx Age	10	10	
ASHRAE Service Life	15	15	
Remaining Life	5	5	
Comments			

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

Investment Grade Lighting Audit

CEG Job #: 9C11023

Project: Enterprise Center

Enterprise Center

KWH COST: $0.147

Bldg. Sq. Ft. 62,150

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
221.33	Board Room	1000	12	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/ Indirect	58	0.70	696.0	$102.31	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	600	$88.20	$30.00	$360.00	0.10	96	$14.11	25.51
558		1000	15	1	Recessed Down Light, 90w R30 Lamp	90	1.35	1,350.0	$198.45	15	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	0.39	390	$57.33	$20.00	$300.00	0.96	960	$141.12	2.13
221.33	1st Floor Corridor	2600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/ Indirect	58	0.23	603.2	$88.67	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	520	$76.44	$30.00	$120.00	0.03	83.2	$12.23	9.81
563		2600	30	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	1.56	4,056.0	$596.23	30	0	No Change	0	0.00	0	$0.00	$40.00	$1,200.00	0.00	0	$0.00	0.00
558	Auditorium	500	58	1	Recessed Down Light, 90w R30 Lamp	90	5.22	2,610.0	$383.67	58	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	1.51	754	$110.84	$20.00	$1,160.00	3.71	1856	$272.83	4.25
558	Control Room	750	4	1	Recessed Down Light, 90w R30 Lamp	90	0.36	270.0	$39.69	4	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	0.10	78	$11.47	$20.00	$80.00	0.26	192	$28.22	2.83
558	Room 138	2600	32	1	Recessed Down Light, 90w R30 Lamp	90	2.88	7,488.0	$1,100.74	32	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	0.83	2163.2	$317.99	$20.00	$640.00	2.05	5324.8	$782.75	0.82
221.33	Room 130	1850	56	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/ Indirect	58	3.25	6,008.8	$883.29	56	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.80	5180	$761.46	$30.00	$1,680.00	0.45	828.8	$121.83	13.79
221.21	Storage/Pantry	1000	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	186.0	$27.34	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	150	$22.05	$30.00	$90.00	0.04	36	$5.29	17.01
221.34	Room 158	1200	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.23	278.4	$40.92	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	240	$35.28	$30.00	$120.00	0.03	38.4	$5.64	21.26
221.34	155 Comms	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	139.2	$20.46	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$17.64	$30.00	$60.00	0.02	19.2	$2.82	21.26
221.21	Women's Restroom	2600	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	806.0	$118.48	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	650	$95.55	$30.00	$150.00	0.06	156	$22.93	6.54
221.21	Men's Restroom	2600	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	806.0	$118.48	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	650	$95.55	$30.00	$150.00	0.06	156	$22.93	6.54
221.34	Custodial Closet	1200	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	69.6	$10.23	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	60	$8.82	$30.00	$30.00	0.01	9.6	$1.41	21.26
221.34	Electrical Closet	1200	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.35	417.6	$61.39	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	360	$52.92	$30.00	$180.00	0.05	57.6	$8.47	21.26
242.21	150 Kitchen	2100	10	4	2x4, 4 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	107	1.07	2,247.0	$330.31	10	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.98	2058	$302.53	$60.00	$600.00	0.09	189	$27.78	21.60
221.21	Kitchen Hood	2100	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	520.8	$76.56	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	420	$61.74	$30.00	$120.00	0.05	100.8	$14.82	8.10

Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
221.21	163 Restroom	2600	1	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.06	161.2	$23.70	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	130	$19.11	$30.00	$30.00	0.01	31.2	$4.59	6.54
221.34	151 Mech Room	800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	46.4	$6.82	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	40	$5.88	$30.00	$30.00	0.01	6.4	$0.94	31.89
221.34	140 Storage	1200	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	69.6	$10.23	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	60	$8.82	$30.00	$30.00	0.01	9.6	$1.41	21.26
558	Dining Room B	1600	34	1	Recessed Down Light, 90w R30 Lamp	90	3.06	4,896.0	$719.71	34	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	0.88	1414.4	$207.92	$20.00	$680.00	2.18	3481.6	$511.80	1.33
612		1600	12	4	Pendant Mnt. Light, 26w CFL Lamp	104	1.25	1,996.8	$293.53	12	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
558	Dining Room A	1600	30	1	Recessed Down Light, 90w R30 Lamp	90	2.70	4,320.0	$635.04	30	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	0.78	1248	$183.46	$20.00	$600.00	1.92	3072	$451.58	1.33
612		1600	10	4	Pendant Mnt. Light, 26w CFL Lamp	104	1.04	1,664.0	$244.61	10	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.21	145 Storage	1000	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.26	258.0	$37.93	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	216	$31.75	$45.00	$135.00	0.04	42	$6.17	21.87
231.34	143 Storage	1000	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Direct/ Indirect	86	0.17	172.0	$25.28	2	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Side Offices/Rooms 229-335	1850	14	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.20	2,227.4	$327.43	14	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.01	1864.8	$274.13	$45.00	$630.00	0.20	362.6	$53.30	11.82
232.21	Hall - 229-335	2600	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.43	1,118.0	$164.35	5	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.36	936	$137.59	$45.00	$225.00	0.07	182	$26.75	8.41
232.22	Master Control	1850	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	636.4	$93.55	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	532.8	$78.32	$45.00	$180.00	0.06	103.6	$15.23	11.82
232.22	Room 225 Production	1850	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	636.4	$93.55	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	532.8	$78.32	$45.00	$180.00	0.06	103.6	$15.23	11.82
221.34	222 Production	1850	15	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.87	1,609.5	$236.60	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1387.5	$203.96	$30.00	$450.00	0.12	222	$32.63	13.79
563	275 Business Center	1850	37	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	1.92	3,559.4	$523.23	37	0	No Change	0	0.00	0	$0.00	$40.00	$1,480.00	0.00	0	$0.00	0.00
232.22	Open Offices	1850	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	636.4	$93.55	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	532.8	$78.32	$45.00	$180.00	0.06	103.6	$15.23	11.82
232.22	Side Offices (7)	1850	18	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.55	2,863.8	$420.98	18	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.30	2397.6	$352.45	$45.00	$810.00	0.25	466.2	$68.53	11.82
241.33	Conference Room	1200	3	4	1x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	104	0.31	374.4	$55.04	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	352.8	$51.86	$60.00	$180.00	0.02	21.6	$3.18	56.69
563		1200	8	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	0.42	499.2	$73.38	8	0	No Change	0	0.00	0	$0.00	$40.00	$320.00	0.00	0	$0.00	0.00
232.22	262 Viewing Room	1000	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.26	258.0	$37.93	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	216	$31.75	$45.00	$135.00	0.04	42	$6.17	21.87
232.21	Kitchenette	1850	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.09	159.1	$23.39	1	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.07	133.2	$19.58	$45.00	$45.00	0.01	25.9	$3.81	11.82
241.33	Board Room	1000	3	4	1x4, 4 Lamp, 32w T8, Elect. Ballast, Surface Mnt., Prismatic Lens	104	0.31	312.0	$45.86	3	4	Relamp - Sylvania Lamp FO28/841/SS/ECO	98	0.29	294	$43.22	$60.00	$180.00	0.02	18	$2.65	68.03

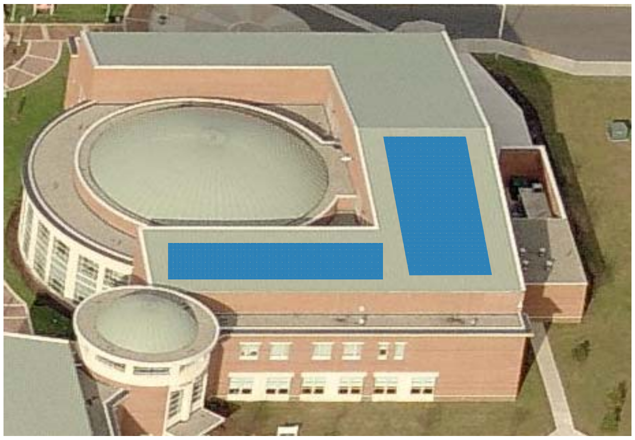
Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
563		1000	8	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	0.42	416.0	$61.15	8	0	No Change	0	0.00	0	$0.00	$40.00	$320.00	0.00	0	$0.00	0.00
221.22	Willingboro Room	1000	36	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.23	2,232.0	$328.10	36	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.80	1800	$264.60	$30.00	$1,080.00	0.43	432	$63.50	17.01
563	Men's Restroom	2600	6	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	0.31	811.2	$119.25	6	0	No Change	0	0.00	0	$0.00	$40.00	$240.00	0.00	0	$0.00	0.00
563	Women's Restroom	2600	6	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	0.31	811.2	$119.25	6	0	No Change	0	0.00	0	$0.00	$40.00	$240.00	0.00	0	$0.00	0.00
221.34	277 Storage	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	139.2	$20.46	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$17.64	$30.00	$60.00	0.02	19.2	$2.82	21.26
221.34	232 Storage	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	139.2	$20.46	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$17.64	$30.00	$60.00	0.02	19.2	$2.82	21.26
221.34	265 Comms	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	139.2	$20.46	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$17.64	$30.00	$60.00	0.02	19.2	$2.82	21.26
221.34	223 Elec Room	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	139.2	$20.46	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$17.64	$30.00	$60.00	0.02	19.2	$2.82	21.26
221.34	246 A/V Control	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	139.2	$20.46	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$17.64	$30.00	$60.00	0.02	19.2	$2.82	21.26
221.22	245 Mnt Holly Room	1000	45	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.79	2,790.0	$410.13	45	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.25	2250	$330.75	$30.00	$1,350.00	0.54	540	$79.38	17.01
563	2nd Floor Hall	2600	82	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	4.26	11,086.4	$1,629.70	82	0	No Change	0	0.00	0	$0.00	$40.00	$3,280.00	0.00	0	$0.00	0.00
221.22	Burlington Room	1000	20	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.24	1,240.0	$182.28	20	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.00	1000	$147.00	$30.00	$600.00	0.24	240	$35.28	17.01
221.34	311 Mech Room	3000	18	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	1.04	3,132.0	$460.40	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	2700	$396.90	$30.00	$540.00	0.14	432	$63.50	8.50
221.34	313 Mech Room	3000	38	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	2.20	6,612.0	$971.96	38	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.90	5700	$837.90	$30.00	$1,140.00	0.30	912	$134.06	8.50
			372	66				86,853	$12,767	733	95			24.4	40,732	$5,988		$22,630	14.8	21,049	$3,094	7.31

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Lamp totals only include T-12 tube replacement calculations

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
Enterprise Center	2800	SHARP NU-U235F2	147	17.5	2,578	34.55	44,473	28.0	6,159	13.40



.= Proposed PV Layout

Notes:

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

PVWatts Program Data Output - Pitched Roof Panels

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	34.5 kW
DC to AC Derate Factor:	0.810
AC Rating:	28.0 kW
Array Type:	Fixed Tilt
Array Tilt:	20.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	14.7 ¢/kWh

Results			
Month	Solar Radiation (kWh/m^2/day)	AC Energy (kWh)	Energy Value ($)
1	3.00	2670	392.49
2	3.71	2982	438.35
3	4.57	3927	577.27
4	5.33	4309	633.42
5	5.84	4792	704.42
6	6.04	4610	677.67
7	6.01	4692	689.72
8	5.62	4401	646.95
9	5.10	3931	577.86
10	4.15	3386	497.74
11	3.05	2514	369.56
12	2.62	2260	332.22
Year	4.59	44473	6537.53

Project Name: BCC - Mount Laurel
Location: Enterprise Center
Description: Photovoltaic System 100% Financing - 15 year

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$197,444
Annual kWh Production	44,473
Annual Energy Cost Reduction	$6,538
Average Annual SREC Revenue	$18,952

Simple Payback:	**7.75**	Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.147**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value ($/kWh)	$0.426

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	44,473	$6,538	$0	$24,460	$11,619	$8,375	$11,004	$11,004
2	$0	44,251	$6,734	$0	$24,338	$11,102	$8,891	$11,078	$22,082
3	$0	44,029	$6,936	$0	$22,015	$10,554	$9,440	$8,957	$31,038
4	$0	43,809	$7,144	$0	$19,714	$9,972	$10,022	$6,864	$37,902
5	$0	43,590	$7,358	$449	$19,616	$9,354	$10,640	$6,531	$44,433
6	$0	43,372	$7,579	$447	$19,518	$8,697	$11,297	$6,656	$51,089
7	$0	43,155	$7,806	$445	$17,262	$8,000	$11,993	$4,630	$55,719
8	$0	42,940	$8,040	$442	$17,176	$7,261	$12,733	$4,780	$60,499
9	$0	42,725	$8,282	$440	$14,954	$6,475	$13,518	$2,801	$63,301
10	$0	42,511	$8,530	$438	$14,879	$5,642	$14,352	$2,977	$66,278
11	$0	42,299	$8,786	$436	$12,690	$4,756	$15,237	$1,046	$67,324
12	$0	42,087	$9,049	$433	$12,626	$3,817	$16,177	$1,248	$68,573
PVWatts	1,248	0	1,248	19,994	1,577		18,417	-17,169	
#VALUE!	-17,169	0	-17,169	16,661	449		16,212	-33,381	
#VALUE!	$0	0	($17,684)	$0	$0	$635	$19,359	($37,677)	($37,677)
	Totals:	519,242	$59,177	$40,185	$221,272	$97,884	$196,664	($19,654)	$541,566
						Net Present Value (NPV)	**$2,104**		

Burlington County College
Mount Laurel Campus

Technology and Engineering Center

500 College Circle
Mt. Laurel, NJ 08054

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 (PSEG)
Electric Utility Rate Structure:	Large Power and Light Service (LPLS)
Third Party Supplier:	HESS Energy
Natural Gas Utility Provider:	Public Service Electric & Gas (PSEG)
Utility Rate Structure:	Large Volume Gas (LVG)
Third Party Supplier:	Pepco Energy Services
Chilled Water:	Central Energy Plant
Heating Hot Water:	Central Energy Plant

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.

Hot water and chilled water are measured using a combined meter. The hot and chilled water usage within each report shows the actual hot water and chilled water usages for the facility. The consumption is measured in Gallon x 1000, and converted the quantity into kBTU (1,000 BTU) of energy.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider: Public Service Electric and Gas (PSEG)
Rate: Large Power and Light Service (LPLS)
Meter No: 2808790
Account # 42-004-711-08
Third Party Utility HESS Energy
TPS Meter / Acct No: -

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Jul-10	126,985	259.1	$19,152
Aug-10	119,849	119.8	$18,113
Sep-10	123,775	275.9	$18,989
Oct-10	108,685	274.8	$14,858
Nov-10	113,506	259.6	$14,732
Dec-10	109,409	267.0	$14,275
Jan-11	97,654	255.0	$12,672
Feb-11	111,295	272.0	$14,279
Mar-11	100,142	255.0	$12,955
Apr-11	106,653	272.0	$13,952
May-11	101,479	277.0	$13,400
Jun-11	107,082	256.0	$16,926
Totals	**1,326,514**	**277.0 Max**	**$184,303**

AVERAGE DEMAND **253.6 KW average**

AVERAGE RATE **$0.139 $/kWh**

Figure 1

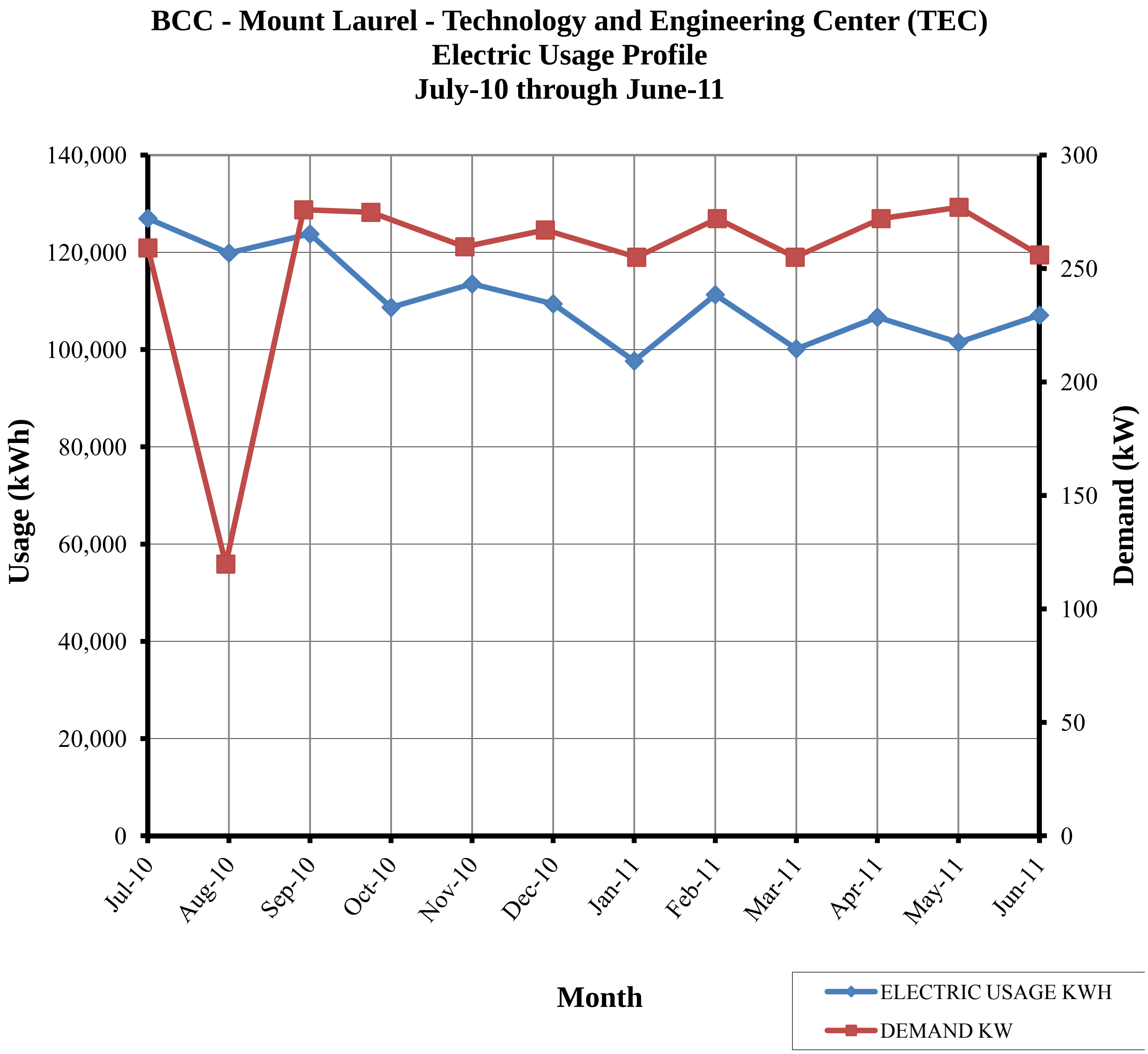

BCC - Mount Laurel - Technology and Engineering Center (TEC)
Electric Usage Profile
July-10 through June-11
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Usage (kWh)
300
250
200
150
100
50
0
Demand (kW)
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Month
ELECTRIC USAGE KWH
DEMAND KW

Table 2
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	PSEG	
Rate:	LVG	
Meter No:	2808790	
Point of Delivery ID:	PG000009052497679214	
Third Party Utility Provider:	Pepco	
TPS Meter No:	-	

MONTH OF USE	CONSUMPTION (THERMS)	TOTAL BILL
May-10	163.46	$113.21
Jun-10	170.45	$118.99
Jul-10	155.78	$120.21
Aug-10	268.38	$137.19
Sep-10	353.24	$149.80
Oct-10	2,439.28	$3,028.73
Nov-10	5,604.45	$7,120.13
Dec-10	6,447.65	$7,550.87
Jan-11	6,701.66	$8,657.08
Feb-11	4,164.98	$5,366.60
Mar-11	2,399.49	$1,163.46
Apr-11	236.09	$288.04
TOTALS	**29,104.91**	**$33,814.31**
AVERAGE RATE:	**$1.16**	**$/THERM**

Figure 2

BCC Mount Laurel - Technology and Engineering Center (TEC)
Gas Usage Profile
May-10 through April-11

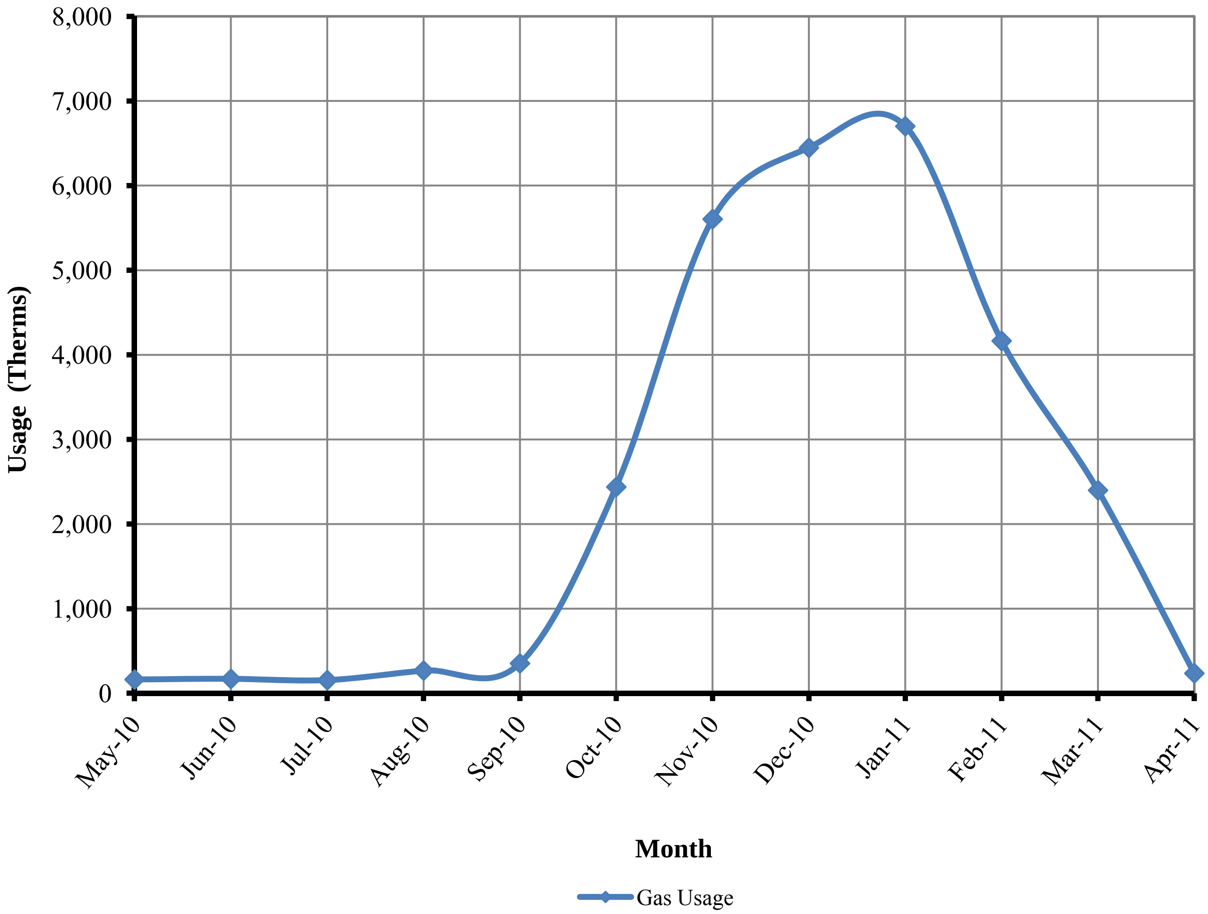
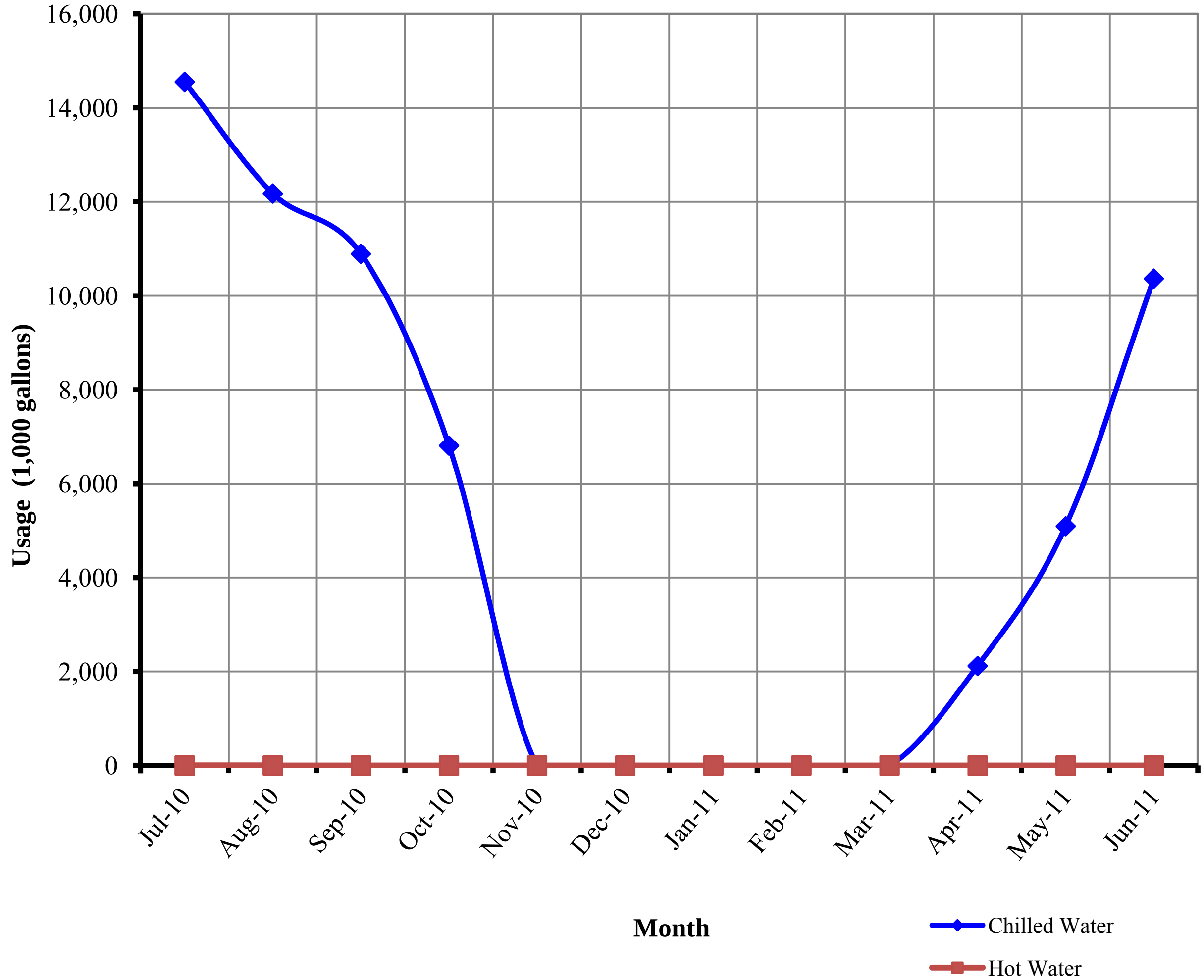


Table 3
Hot & Chilled Water Usage Data

HOT WATER / CHILLED WATER USAGE SUMMARY			
Utility Provider: Central Energy Plant			
Estimated Average ΔT 15°F (Hot Water)			
Estimated Average ΔT 8°F (Chilled Water)			
MONTH OF USE	**CHILLED WATER CONSUMPTION (1,000 GALLONS)**	**HOT WATER CONSUMPTION (1,000 GALLONS)**	**TOTAL BILL**
Jul-10	*14,554*	-	-
Aug-10	*12,177*	-	-
Sep-10	10,894	-	-
Oct-10	6,810	-	-
Nov-10	-	-	-
Dec-10	-	-	-
Jan-11	-	-	-
Feb-11	-	-	-
Mar-11	-	-	-
Apr-11	2,120	-	-
May-11	5,094	-	-
Jun-11	10,366	-	-
TOTALS	**62,016**	**-**	**-**

Usage estimated for Jul-Aug 2010 based on monthly electricity consumption

Figure 3
BCC Mount Laurel - Technology & Education Center (TEC)
Water Usage Profile
July-10 through June-11



II. FACILITY DESCRIPTION

The 67,000 SF Technology and Engineering Center was built in 1995 with no additions or renovations. The building has three occupied floors and mechanical penthouse. The building is comprised of classrooms, science laboratories, computer laboratories, student lounge, offices, a small kitchen and a dining area. Major HVAC equipments are located in the 4th (penthouse) floor of this building. The HVAC systems in the Technology and Engineering Building include hot water boilers, hot water pumps, chilled water pumps, a plate frame heat exchanger, Air Handling Units, fan powered VAV boxes and supplemental computer room air conditioning systems.

Occupancy Profile

The typical hours of operation for the Building are Monday through Friday between 8:00 am and 10:00 pm. The facility is open on Saturday between 8:00 am and 12:00 pm. The Science Building occupancy varies during the day.

Building Envelope

Exterior walls for the Technology and Engineering Center are brick faced with a concrete block construction. The amount of insulation within the walls couldn't be verified. The windows throughout the Building are in excellent condition and appear to be well maintained. Typical windows throughout the building are double pane, operable, ¼" tinted glass with aluminum frames. Blinds are utilized in some areas for occupancy comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The building has a pitched, standing seam metal roof. The HVAC equipment is located in the penthouse floor. Insulation within the roof couldn't be verified.

Hot Water and Chilled Water Systems

The HVAC systems in the Technology and Engineering Center use chilled water supplied by the campus Central Energy Plant. However, heating hot water for the building is produced on site via two (2) Bryan gas fired water tube hot water boilers located in the mechanical penthouse. The rated input capacity of each boiler is 2,700 MBH with approximately 80% thermal efficiency. The boilers are 17 years old and they are in fair condition. The space heating is achieved via preheat coils in the roof top air handling units; reheat coils in the fan powered VAV boxes and baseboard heaters in some of the perimeter offices.

Chilled water and hot water are independently circulated via independent pumps. The chilled water loop circulates water through the air handlers and a plate-frame type heat exchanger via three (3) 10 HP B&G chilled water circulation pumps (one pump for standby). The pumps are driven with standard efficiency motors. The hot water heating loop circulates water through the air handlers via three (3) 5 HP B&G pumps (one pump for standby). Both pumping sub-systems within the building are constant volume systems with constant volume pumps while the Air Handling Units in the facility are equipped with hot and chilled water coils with 2-way control valves. Variable speed pumping is recommended for this building.

HVAC Systems

The Technology and Engineering Center is conditioned by two (2) central VAV air handling units made by McQuay. These units include hot water coils for primary supply air pre-heat and chilled water coils for cooling and dehumidification. The HVAC distribution system includes fan powered terminal variable air volume (VAV) boxes with hot water re-heat coils for space zoning. Local thermostats control each VAV box's airflow to regulate space temperature.

The Air Handling Units AHU-1 & AHU-2 are equipped with 75 HP supply fans and 30 HP return fans. The AHUs utilize inlet vortex dampers for static air pressure control. It is recommended to remove vortex dampers and install Variable Frequency Drives to control supply air static pressure for energy savings. A separate 20 HP fan provides outside air to the AHUs. Return fans and the outside air supply fan utilize standard efficiency motors.

During the survey it was noted that the outside air damper actuator for the air handling unit #2 was missing. It is recommended to replace the actuator so that introduction of outside air during unoccupied periods is eliminated.

The Technology and Engineering Center houses a small kitchen and a cafeteria in the first floor. A dedicated make up air unit (MUA) is utilized to provide make up air for the kitchen. The MUA is interlocked with the kitchen exhaust hood.

Supplemental System

A packaged air conditioning unit provides supplemental air conditioning for one of the laboratories. The unit is located in the penthouse MER and ducted directly to the space without mixing with the central systems. The unit made by Carrier. It is a 5 ton cooling only unit with a 3 HP supply fan.

The building houses a small data server with two (2) water cooled CRACs (Computer room air conditioners). The CRAC unit condensers are connected to two glycol loops, which are cooled by two (2) Heatcraft dry-coolers located near the building. Each dry-cooler is equipped with two (2) small circulation pumps with fractional horse power.

Exhaust System

Air is exhausted from the toilet rooms through an exhaust fan located in the Penthouse floor mechanical room. The exhaust fans are interlocked with the air handling units and controlled via building management system.

The kitchen utilizes two exhaust hoods, which are connected to two exhaust fans located on the side of the building. The exhaust fans serve the main cooking range hood and the dishwasher. The kitchen exhaust fans are controlled via manual switches. The exhaust equipments are in good condition.

HVAC System Controls

The pumps, boilers, air handling units, fan powered VAV boxes and the exhaust fans in the Technology and Engineering Center building are controlled via the Siemens central DDC system. These equipments are controlled, scheduled and monitored by the system.

Fan powered VAV boxes and the reheat valves are also monitored and controlled by the Siemens central DDC control system. Each space within the building is equipped with a remote temperature sensor with override capability.

Domestic Hot Water

Domestic hot water is generated two hot water heaters located in the penthouse mechanical room. One of the units is an 85 gallon AO Smith hot water heater installed in 2009. The unit is in excellent condition. Second unit is also made by AO Smith and installed in 1995. The unit is approximately 75% efficient and misses some of the modern energy efficiency features such as flue gas dampers.

The domestic hot water is circulated throughout the building by two hot water circulation pumps. The circulation pumps are controlled by aqua stat. The domestic hot water piping insulation appeared to be in good condition.

Lighting

The lighting throughout the Building is provided with modern fixtures with T8 lamps and electronic ballasts. 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 4
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	$25,353	$2,274	11.2	34.5%
ECM #2	Install High Eff. Condensing Boilers	$256,500	$5,636	45.5	-34.1%
ECM #3	VFD on AHU Return Fans	$26,020	$7,421	3.5	327.8%
ECM #4	VFD on AHU Supply Fans	$37,770	$9,926	3.8	294.2%
ECM #5	VFD on Hot and Chilled Water Pumps	$71,400	$2,287	31.2	-52.0%
ECM #6	Nema Premium Efficiency Motors	$10,669	$327	32.6	-54.0%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	161 KW PV Array	$1,271,069	$126,871	10.0	49.7%
Notes:	A. Cost takes into consideration applicable NJ Smart StartTM incentives. B. Savings takes into consideration applicable maintenance savings.				

Table 5
ECM Energy Summary

ENERGY CONSERVATION MEASURES (ECM's)				
		ANNUAL UTILITY REDUCTION		
ECM NO.	DESCRIPTION	ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Equipment Upgrade	9.6	16,356	-
ECM #2	Install High Eff. Condensing Boilers	-	-	4,521
ECM #3	VFD on AHU Return Fans	-	53,391	-
ECM #4	VFD on AHU Supply Fans	-	71,409	-
ECM #5	VFD on Hot and Chilled Water Pumps	-	17,037	-
ECM #6	Nema Premium Efficiency Motors	1.5	2,354	-

RENEWABLE ENERGY MEASURES (REM's)				
		ANNUAL UTILITY REDUCTION		
ECM NO.	DESCRIPTION	ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	161 KW PV Array	161.2	241,841	-

Table 6
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	$2,274	$25,353	$0	$25,353	11.2
Install High Eff. Condensing Boilers	$5,636	$262,500	$6,000	$256,500	45.5
VFD on AHU Return Fans	$7,421	$29,920	$3,900	$26,020	3.5
VFD on AHU Supply Fans	$9,926	$47,520	$9,750	$37,770	3.8
VFD on Hot and Chilled Water Pumps	$2,287	$71,400	$0	$71,400	31.2
Nema Premium Efficiency Motors	$327	$11,109	$440	$10,669	32.6
Design / Construction Extras (15%)	-	$56,460	-	$53,447	-
Total Project	**$19,621**	**$159,253**	**$13,650**	**$142,590**	**7.3**

*Items highlighted in yellow are not included in the final project totals.

*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 Lighting & Re-Lamping

Description:

Majority of the interior lighting throughout the Technology and Engineering Center is provided with fluorescent fixtures with older generation, 700 series 32W T8 lamps and electronic ballasts. Although 700 series T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output.

This ECM includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. 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.

This ECM includes replacement of each of the high bay metal halide light fixtures with T5HO fixtures with reflective lenses. The retrofit for the metal halide fixtures includes a one for one fixture replacement. The fluorescent fixtures selected will provide equivalent light compared to the average light output of the existing metal halide fixtures.

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 your existing fixtures, or hardwired into your 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 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:

There are no Smart Start incentives for the prescribed retrofits in this ECM.

Replacement and Maintenance Savings:

Maintenance savings is negligible for this ECM and has not been included in the energy savings summary

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$25,353
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$25,353
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,274
Total Yearly Savings ($/Yr):	$2,274
Estimated ECM Lifetime (Yr):	15
Simple Payback	11.2
Simple Lifetime ROI	34.5%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$34,103
Internal Rate of Return (IRR)	4%
Net Present Value (NPV)	$1,787.90

ECM #2: Install High Efficiency Condensing Boilers

Description:

Space heating for the building is provided by a heating hot water loop provided by the combustion of natural gas. The source of hot water for the building is from two gas fired water tube boilers located in the 3rd floor MER.

The two boilers are Bryan gas fired water tube boilers which heat water that feeds the heating hot water loop of the building. The boilers which are model CL270W have a factory input capacity of 2700 MBH and an output of 2,160 MBH. These capacities may be reduced due to the age and condition of the boilers. The boilers are an estimated 17 years old; they are still within their ASHRAE defined service life of 24 years. Due to the age and condition the boilers should be replaced within a reasonable timeframe to a more efficient and newer unit.

Typically, standard (non-condensing) boilers provide lower than nominal efficiency compared to condensing boilers. Standard boilers suffer further efficiency losses at part load operating conditions mainly due to limitations in the reduction of the flue gas temperature. Current average combustion efficiency of the boilers is estimated to be 75% due to standard non-condensing boiler technology, limited turn down ratio, cycling losses and outdated design and controls. 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, but for the purposes of this ECM a conservative average of 90% efficiency was used.

CE recommends replacing the two Bryan boilers with high efficiency condensing hot water boilers to provide building with heating throughout the year. The annual average operating efficiency of the proposed boiler set is expected to be 90%, which gives the heating system a 15% increase in efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature. The returning supply temperature has a direct impact on the overall boiler efficiency.

The following is a summary of the boiler replacement recommendations.

BOILER REPLACEMENT SUMMARY		
EXISTING UNIT	**LOCATION**	**PROPOSED UNITS**
(2) Bryan Gas Fired Hot Water Boilers	Boiler Room	(2) Aerco Benchmark 3.0

The basis for this ECM is Aerco Benchmark 3.0, 3000 MBH Input condensing hot water boilers or an equivalent model. New boilers shall be setup and programmed to be the primary source of heating for the building during entire year. The owner is recommended to retain a professional engineer to confirm equipment sizing and finalize design.

Energy Savings Calculations:

Annual gas consumption of the two existing boiler can be estimated by finding the usage of the domestic hot water heater and subtracting from total annual gas usage of the building. This was done by averaging the gas usage from May – August, when the boilers are not running and primary gas usage is from the domestic hot water. The total domestic usage was then removed from the annual gas usage to determine usage for the boilers only.

$$Average\ Gas\ Usage\ DHW\ (May - August) = 165\ Therms * 12\ months = 1{,}980\ Therms$$

$$29{,}150\ Therms - 1{,}980\ Therms = Total\ Usage\ of\ Boilers$$

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

ANNUAL GAS USAGE				
MONTH	**TOTAL USAGE**	**DOMESTIC**	**HEATING ONLY**	**COST**
May-10	163	165	0	$113
Jun-10	170	165	0	$119
Jul-10	156	165	0	$120
Aug-10	268	165	103	$137
Sep-10	353	165	188	$150
Oct-10	2,439	165	2,274	$3,029
Nov-10	5,604	165	5,439	$7,120
Dec-10	6,448	165	6,283	$7,551
Jan-11	6,702	165	6,537	$8,657
Feb-11	4,165	165	4,000	$5,367
Mar-11	2,399	165	2,234	$1,163
Apr-11	236	165	71	$288
TOTAL	**29,105**	**1,980**	**27,130**	**$33,814**

Energy savings calculations are summarized in the table below:

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Hot Water Boilers	New Condensing Boilers	-
Existing Nat Gas (Therms)	27,125	-	-
Boiler Efficiency (%)	75%	90%	15%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	-
Equivalent Building Heat Usage (MMBTUs)	2,034	2,034	-
Ave. Gas Cost ($/Therm) (Heating season only)	1.16	1.16	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	27,125	22,604	4,521
Energy Cost ($)	$33,814	$28,179	$5,636
COMMENTS:			

Project Cost, Incentives and Maintenance Savings

Estimated cost for removing the existing boilers, labor, materials, and installing (2) Aerco Benchmark 3.0, 3000 MBH boilers is $262,500.

From the **New Jersey Smart Start® Program Incentives Appendix**, installation of a high efficiency hot water boiler falls under the category "Gas Heating" and warrants an incentive based on efficiency at or above 84% for this type of equipment. The program incentives are calculated as follows:

BOILER REBATE SUMMARY					
UNIT DESCRIPTION	**UNIT EFFICIENCY**	**REBATE $/MBH**	**PROPOSED CAPACITY, MBH**	**NUMBER OF UNITS**	**TOTAL REBATE, $**
≥ 300 MBH - 1500 MBH	84% AFUE for Hot Water boilers	$1.75	-	-	$0
>1500 - ≤ 4000 MBH	84% AFUE for Hot Water boilers	$1	3,000	2	$6,000
TOTAL					**$6,000**

Maintenance savings associated with this ECM are estimated to be minimal and are not included in the calculation.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$262,500
NJ Smart Start Equipment Incentive ($):	$6,000
Net Installation Cost ($):	$256,500
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$5,636
Total Yearly Savings ($/Yr):	$5,636
Estimated ECM Lifetime (Yr):	30
Simple Payback	45.5
Simple Lifetime ROI	-34.1%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$169,080
Internal Rate of Return (IRR)	-3%
Net Present Value (NPV)	($146,031.91)

ECM #3: Install VFD's for AHU Return Fan Motor's

Description:

This ECM includes installation of Variable Frequency Drives on the two existing 30 HP air handling units return fan motors. Air is provided through two AHU units serving the east and west sections of the building. Currently, the return fans are equipped with inlet vortex dampers; a VFD will be able to vary the load more efficiently. A variable frequency drive can be installed on each AHU fan in order to vary the speed based on the the Air Handling Unit supply air static pressure.

Energy and cost savings calculations are based on calculation software "FanSave v4.0" provided by ABB. Existing equipment information where available was used to estimate the decrease in energy use with an installed VFD. Through the use of FanSave an estimated energy usage for the existing system and the system with a VFD installed.

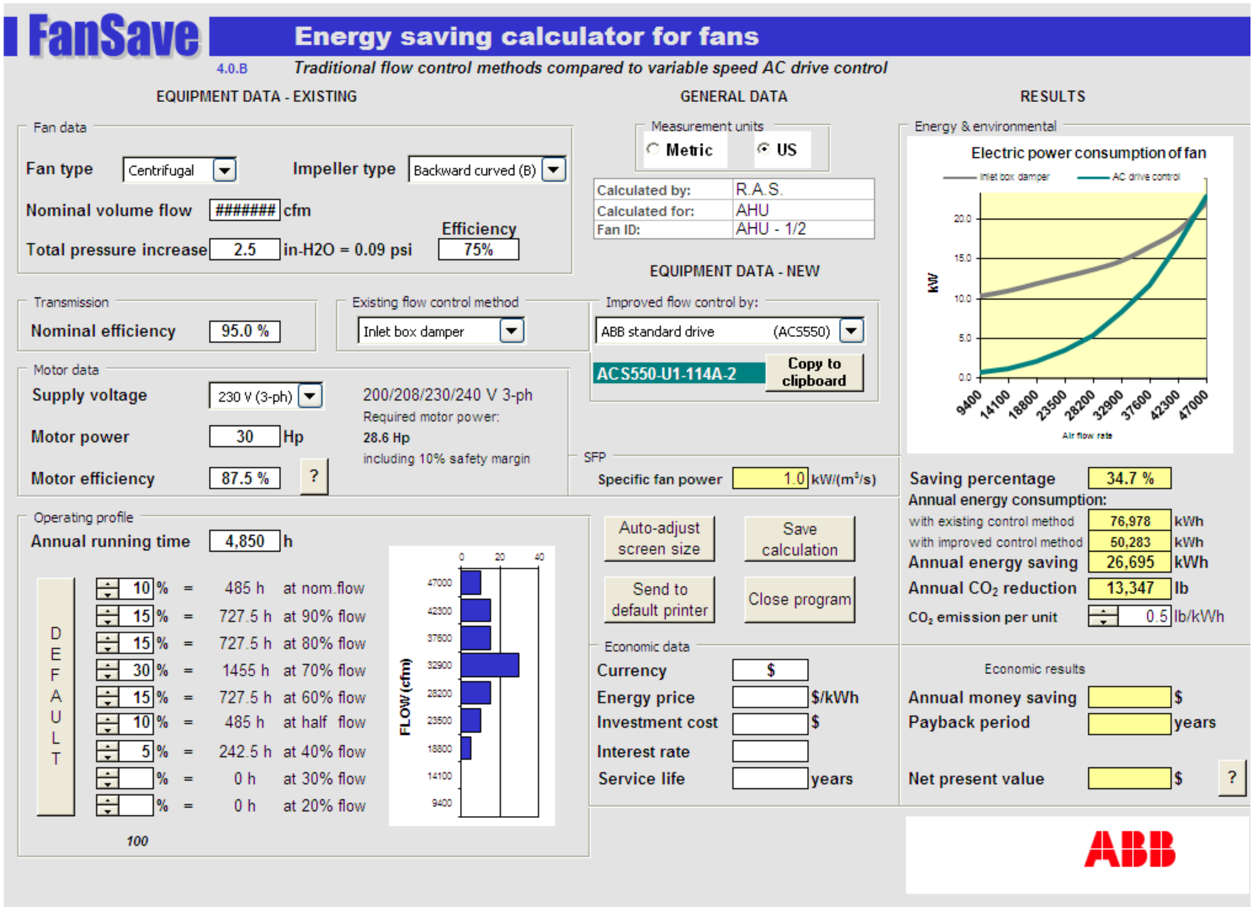
The motors currently in use are not high efficiency and have passed their useful service life. The motor recommendations are outlined in the NEMA premium motor's ECM. The cost and installation of high efficiency motors was not included in this ECM. Though upgrading the motor's and including a VFD on those motors would yield the greatest overall energy savings, at the highest installation costs.

Energy Savings Calculations:

$$\text{Energy Cons.}\left(\text{kWh}\right)=\text{Power}\left(\text{HP}\right)\times 0.746\left(\frac{\text{KW}}{\text{HP}}\right)\times\text{Operation}\left(\text{Hrs.}\right)$$

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

AHU Fan VFD Energy:



AHU VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Return	VFD Return	
Flow Control	Inlet Damper	VFD	-
Ave. Motor Efficiency (%)	87.5%	87.5%	-
Operating Hrs	4,850	4,850	-
Estimated Total Horse Power	60	60	-
Elec Cost ($/kWh)	0.139	0.139	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	153,956	100,565	53,391
Electric Energy Cost ($)	$21,400	$13,979	$7,421
COMMENTS:	- VFD AHU energy is based on ABB energy savings calculator for fans, "Fan Save," version 4.0.		

Installation cost for two 30 HP VFDs, removal of existing equipment, pressure sensors, controls points, and labor comes to an estimated total of $29,920.

NJ Smart Start® Program Incentives for installation Variable Frequency Drives for this application is $65 x 60 = $3900

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$29,920
NJ Smart Start Equipment Incentive ($):	$3,900
Net Installation Cost ($):	$26,020
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$7,421
Total Yearly Savings ($/Yr):	$7,421
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.5
Simple Lifetime ROI	327.8%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$111,315
Internal Rate of Return (IRR)	28%
Net Present Value (NPV)	$62,571.42

ECM #4: Install VFD's for 75 HP AHU Supply Fan Motor's

Description:

This ECM includes installation of Variable Frequency Drives on the two existing 75 HP air handling unit supply air fan motors. Conditioned air is provided through two AHU units serving the east and west sections of the building. Each unit currently has a vortex damper for supply static control, while these do provide energy savings over a simple ON/OFF setup, a VFD will be able to vary the load more efficiently. A variable frequency drive can be installed on each AHU fan in order to vary the speed based on the temperature of the ambient air and required CFM for the space.

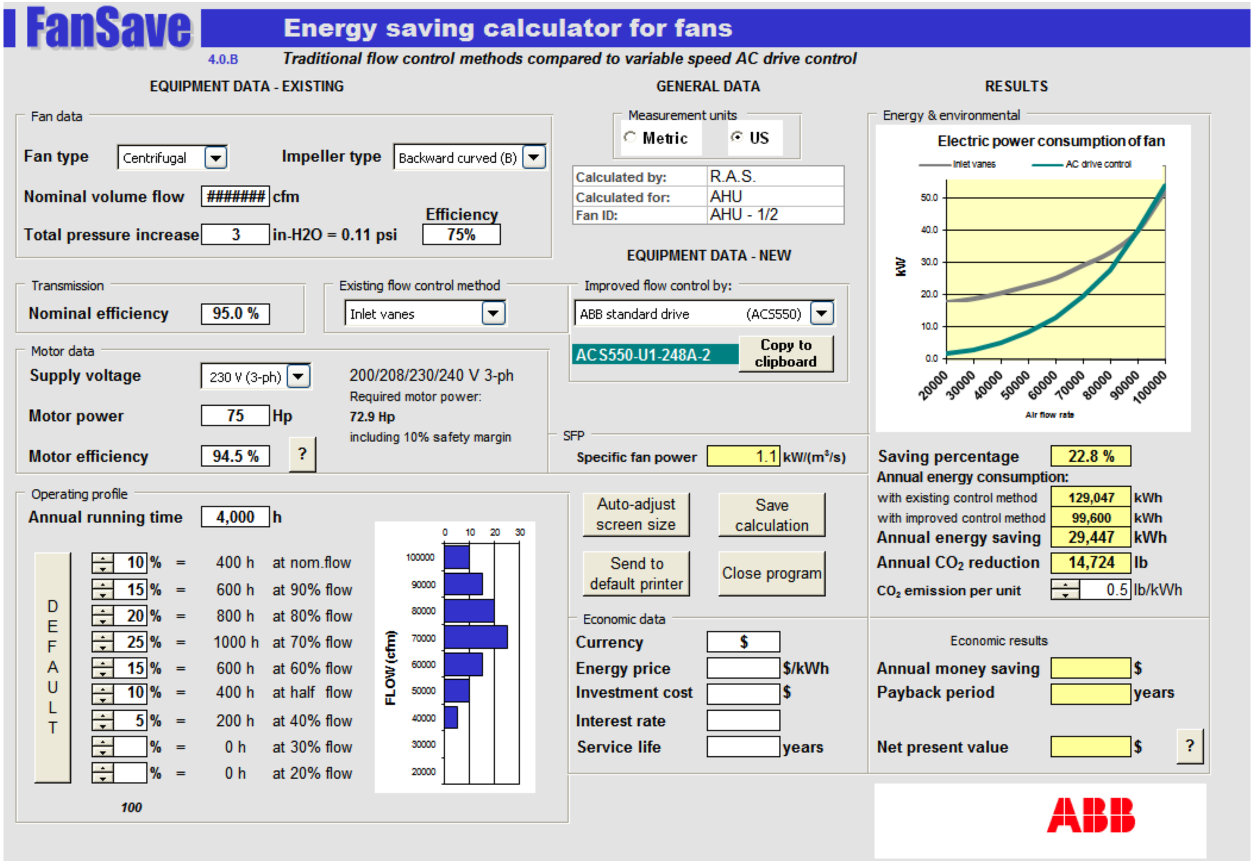
Energy and cost savings calculations are based on calculation software "FanSave v4.0" provided by ABB. Existing equipment information where available was used to estimate the decrease in energy use with an installed VFD. Through the use of FanSave an estimated energy usage for the existing system and the system with a VFD installed. The motors currently in use are already highly efficient; a replacement of these motors was not included in the cost of this ECM. They have passed their service life so if they need to be replaced in the near future it should be with a similar efficiency motor to achieve the cost savings estimated in this ECM.

Energy Savings Calculations:

$$\text{Energy Cons.}\left(\text{kWh}\right) = \text{Power}\left(\text{HP}\right) \times 0.746\left(\frac{\text{KW}}{\text{HP}}\right) \times \text{Operation}\left(\text{Hrs.}\right)$$

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

AHU 1 Fan VFD Energy:



AHU VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Supply	VFD Supply	
Flow Control	CV	VFD	-
Ave. Motor Efficiency (%)	94.5%	94.5%	0.0%
Operating Hrs	4850	4850	-
Estimated Total Horse Power	150.0	150.0	0.00
Elec Cost ($/kWh)	0.139	0.139	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	312,940	241,531	71,409
Electric Energy Cost ($)	$43,499	$33,573	$9,926
COMMENTS:	- VFD AHU energy is based on ABB energy savings calculator for fans "Fan Save," version 4.0.		

Installation cost for two 75 HP VFDs, removal of existing equipment, pressure sensors, controls points, and labor comes to an estimated total of $36,720.

NJ Smart Start® Program Incentives for installation of Variable Frequency Drives for this application is $65 x 150 = $9750.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$47,520
NJ Smart Start Equipment Incentive ($):	$9,750
Net Installation Cost ($):	$37,770
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$9,926
Total Yearly Savings ($/Yr):	$9,926
Estimated ECM Lifetime (Yr):	15
Simple Payback	3.8
Simple Lifetime ROI	294.2%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$148,890
Internal Rate of Return (IRR)	25%
Net Present Value (NPV)	$80,725.94

ECM #5: Install Hot and Chilled Water Pump VFD's

Description:

2-way control valves provide flow through the heat exchanger equipment only when there is a call for heating or cooling, unlike 3-way control valves that allow constant flow of the water loop. 3-way control valves require full pumping energy continuously, while 2-way control valves allow the system to reduce flow when it is not needed. When the unit is not calling for heating, the control valve closes reducing overall flow of the system. Variable frequency drives allow the pumps to slow down in response to a reduction in overall system flow. The reduction in operating flow allows the pumps to reduce energy consumption for all hours that the heating system is not at its peak load.

This ECM includes the installation of Variable Frequency Drives on three hot water and three chilled water pumps. The VFD's would be controlled by a differential pressure sensor in the water loop to measure demand for water (typical for each of the three pump sets). The furthest unit from the loop pumps would remain as 3-way control valves (constant flow) to eliminate dead heading potential. This ECM assumed that the NEMA premium motors suggested were in installed, it does not factor in the cost of these motors with this ECM.

Energy and cost savings calculations are based on calculation software "PumpSave v4.2," provided by ABB. The PumpSave calculation software is used to estimate the pumping energy for variable speed pump systems. The boiler water loop pumps operate approximately 1060 Hrs per year. The pump flow, HD, and resultant energy are calculated based on the existing pump horse power installed. The calculation is based on all existing equipment to be modified to operate as 2-way control valves. Where control valves are already 2-way style, these control valves shall remain. The exact quantity of equipment with hot water coils is unknown. The operation of all equipment control valves should be verified before implementing this ECM.

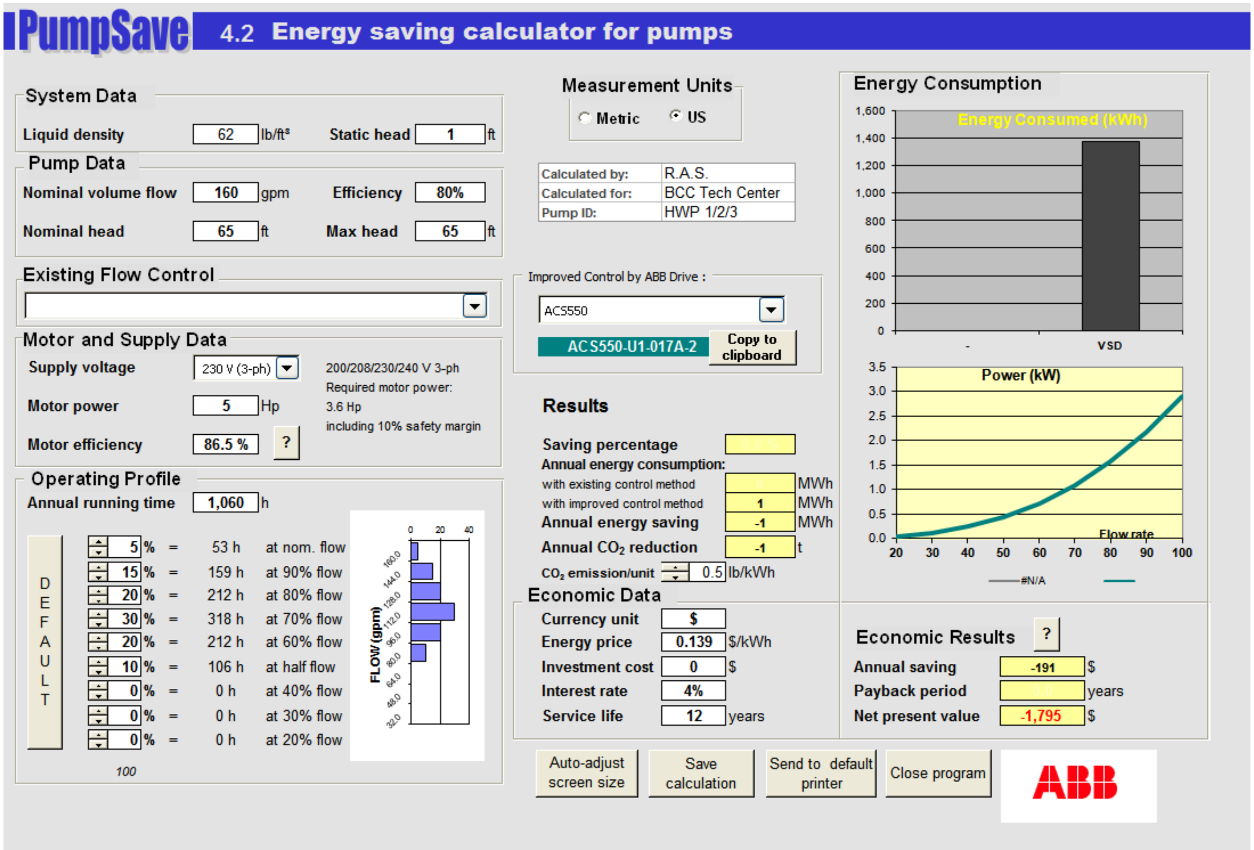
Energy Savings Calculations:

$$\text{Cons. Volume Power}\left(\text{HP}\right)=\frac{\text{Specific Gravity}\times\text{Flow Rate}\left(\frac{\text{Gal}}{\text{min}}\right)\times\text{Head}\left(\text{Ft}\right)}{3960\times\text{Pump Efficiency}\left(\%\right)\times\text{Motor Efficiency}\left(\%\right)}$$

$$\text{Energy Cons.}\left(\text{kWh}\right)=\text{Power}\left(\text{HP}\right)\times 0.746\left(\frac{\text{KW}}{\text{HP}}\right)\times\text{Operation}\left(\text{Hrs.}\right)$$

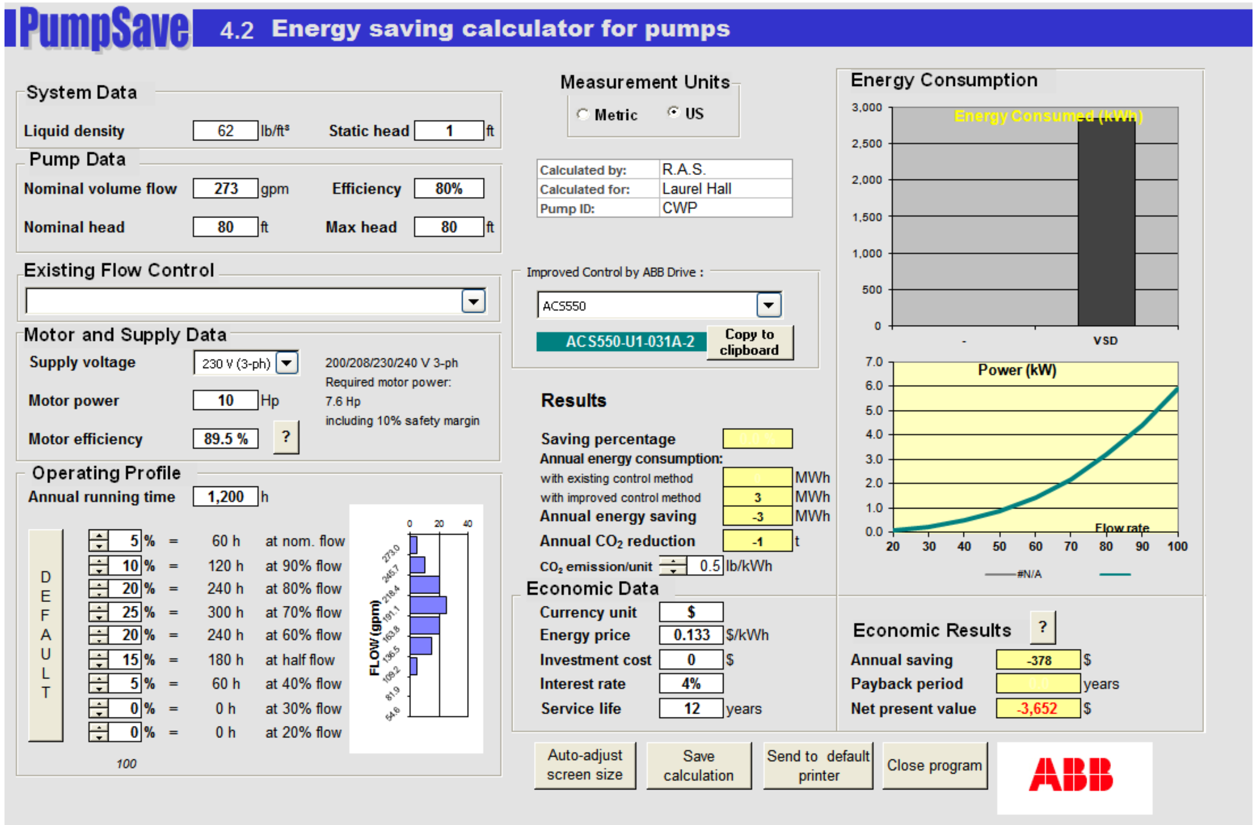
$$\text{Energy Cost}=\text{Energy Usage}\left(\text{kWh}\right)\times\text{Ave Electric Cost}\left(\frac{\$}{\text{kWh}}\right)$$

Hot Water VFD Pumping Energy:



HOT WATER PUMPS VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Pumps	VFD Pumps	
Flow Control	CV	VFD	-
Total Flow (GPM)	160	160	-
Head (Ft)	65	65	-
Pump Efficiency (%)	80%	80%	-
Ave. Motor Efficiency (%)	86.5%	91.1%	4.6%
Operating Hrs	1060	1060	-
Estimated Total Horse Power	5.0	3.6	1.40
Elec Cost ($/kWh)	0.139	0.139	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	9,003	4,128	4,875
Electric Energy Cost ($)	$1,251	$574	$678
COMMENTS:	- VFD pump energy is based on ABB energy savings calculator for pumps, "Pump Save," version 4.2. Flow rate for VFD Pump calculation is summarized in the operating profile shown in the Pump Save output.		

Chilled Water VFD Pumping Energy:



CHILLED WATER PUMPS VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Pumps	VFD Pumps	
Flow Control	CV	VFD	-
Total Flow (GPM)	273	273	-
Head (Ft)	80	80	-
Pump Efficiency (%)	80%	80%	-
Ave. Motor Efficiency (%)	89.5%	92.4%	2.9%
Operating Hrs	1200	1200	-
Estimated Total Horse Power	10.0	7.5	2.54
Elec Cost ($/kWh)	0.139	0.139	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	20,686	8,525	12,162
Electric Energy Cost ($)	$2,875	$1,185	$1,690
COMMENTS:	- VFD pump energy is based on ABB energy savings calculator for pumps, "Pump Save," version 4.2. Flow rate for VFD Pump calculation is summarized in the operating profile shown in the Pump Save output.		

Installation cost for six VFDs, labor, pressure sensors, and controls is $71,400.

Currently there are no **NJ Smart Start® Program Incentives** for installation of these size chilled water pump Variable Frequency Drives.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$71,400
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$71,400
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,287
Total Yearly Savings ($/Yr):	$2,287
Estimated ECM Lifetime (Yr):	15
Simple Payback	31.2
Simple Lifetime ROI	-52.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$34,305
Internal Rate of Return (IRR)	-8%
Net Present Value (NPV)	($44,097.94)

ECM #6: Install NEMA Premium® Efficiency Motors

Description:

The improved efficiency of the NEMA Premium® efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95% of its total lifetime operating cost. Due to the fact that many motors operate continuously 24 hours a day, even small increases in efficiency can yield substantial energy and dollar savings.

The electric motors driving the hot water pumps and supply fans in some of the HVAC equipment are candidates for replacing with premium efficiency motors. These standard efficiency motors run considerable amount of time over a year.

This energy conservation measure replaces existing inefficient electric motors with NEMA Premium® efficiency motors. NEMA Premium® is the most efficient motor designation in the marketplace today.

IMPLEMENTATION SUMMARY					
EQMT ID	FUNCTION	MOTOR HP	HOURS OF OPERATION	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY
HWP	Hot Water Pumps	5	700	86.5%	90.2%
HWP	Hot Water Pumps	5	700	86.5%	90.2%
HWP	Hot Water Pumps	5	700	86.5%	90.2%
CWP	Chilled Water Loop	10	1,200	89.5%	92.4%
CWP	Chilled Water Loop	10	1,200	89.5%	92.4%
CWP	Chilled Water Loop Standby	10	1,200	89.5%	92.4%
DHW	Domestic Water Pressure Boosting	5	5,200	85.5%	92.0%

Energy Savings Calculations:

$$\text{Electric usage, kWh} = \frac{\text{HP} \times \text{LF} \times 0.746 \times \text{Hours of Operation}}{\text{Motor Efficiency}}$$

where, HP = Motor Nameplate Horsepower Rating

LF = Load Factor Motor Efficiency = Motor Nameplate Efficiency

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric cost savings} = \text{Electric Usage Savings} \times \text{Electric Rate} \left(\frac{\$}{\text{kWh}}\right)$$

The calculations were carried out and the results are tabulated in the table below:

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWH	COST SAVINGS
HWP	5	90%	86.5%	90.2%	0.16	112	$16
HWP	5	90%	86.5%	90.2%	0.16	112	$16
HWP	5	90%	86.5%	90.2%	0.16	112	$16
CWP	10	90%	89.5%	92.4%	0.24	284	$39
CWP	10	90%	89.5%	92.4%	0.24	284	$39
CWP	10	90%	89.5%	92.4%	0.24	0	$0
DHW	5	90%	85.5%	92.0%	0.28	1,450	$202
TOTAL					**1.5**	**2,354**	**$327**

Equipment Cost and Incentives

Below is a summary of SmartStart Building® incentives for premium efficiency motors:

INCENTIVES	
HORSE POWER	NJ SMART START INCENTIVE
1	$50
1.5	$50
2	$60
3	$60
5	$60
7.5	$90
10	$100
15	$115
20	$125
25	$130
30	$150
40	$180

The following table outlines the summary of motor replacement costs and incentives:

MOTOR REPLACEMENT SUMMARY						
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK
HWP	5	$1,519	$60	$1,459	$16	93.7
HWP	5	$1,519	$60	$1,459	$16	93.7
HWP	5	$1,519	$60	$1,459	$16	93.7
CWP	10	$2,560	$100	$2,460	$39	62.3
CWP	10	$2,560	$100	$2,460	$39	62.3
CWP	10	$0	$0	$0	$0	0.0
DHW	5	$1,432	$60	$1,372	$202	6.8
TOTAL		**$11,109**	**$440**	**$10,669**	**$327**	**32.6**

Energy Savings Summary:

ECM #6 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$11,109
NJ Smart Start Equipment Incentive ($):	$440
Net Installation Cost ($):	$10,669
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$327
Total Yearly Savings ($/Yr):	$327
Estimated ECM Lifetime (Yr):	15
Simple Payback	32.6
Simple Lifetime ROI	-54.0%
Simple Lifetime Maintenance Savings	0
Simple Lifetime Savings	$4,905
Internal Rate of Return (IRR)	-8%
Net Present Value (NPV)	($6,765.30)

REM #1: Rooftop Solar Photovoltaic Array

Description:

The Technology and Engineering Building has approximately 25,100 square-feet of available roof space that can accommodate a 161.2 kilowatt solar array, assuming the existing roof structure is capable of supporting an array.

The array will produce approximately 241,841 kilowatt-hours annually that will reduce the overall electric usage of the facility 18.23%.

Energy Savings Calculations:

See **LGEA Solar Financials Appendix** for detailed financial summary and proposed solar layout areas.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW_{DC}):	199.05
Electric Generation (KWH/Yr):	241,841
Installation Cost ($):	$1,271,069
SREC Revenue ($/Yr):	$93,255
Energy Savings ($/Yr):	$33,616
Total Yearly Savings ($/Yr):	$126,871
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	10.0
Analysis Period Electric Savings ($):	$625,219
Analysis Period SREC Revenue ($):	$1,350,913
Net Present Value (NPV)	$45,950.97

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. Maintain all weather stripping on windows and doors.

B. Clean all light fixtures to maximize light output.

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

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

E. During the survey it was noted that the outside air damper actuator for the air handling unit #2 was missing. It is recommended to replace the actuator so that introduction of outside air during unoccupied periods is eliminated.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Burlington County College, Mt. Laurel Campus - Technology and Engineering Center

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	$25,353	$0	$0	$25,353	$2,274	$0	$2,274	15	$34,103	$0	34.5%	11.2	4.0%	$1,787.90
ECM #2	Install High Eff. Condensing Boilers	$262,500	$0	$6,000	$256,500	$5,636	$0	$5,636	30	$169,080	$0	-34.1%	45.5	-2.5%	($146,031.91)
ECM #3	VFD on AHU Return Fans	$29,920	$0	$3,900	$26,020	$7,421	$0	$7,421	15	$111,315	$0	327.8%	3.5	27.8%	$62,571.42
ECM #4	VFD on AHU Supply Fans	$47,520	$0	$9,750	$37,770	$9,926	$0	$9,926	15	$148,890	$0	294.2%	3.8	25.4%	$80,725.94
ECM #5	VFD on Hot and Chilled Water Pumps	$42,000	$29,400	$0	$71,400	$2,287	$0	$2,287	15	$34,305	$0	-52.0%	31.2	-8.0%	($44,097.94)
ECM #6	Nema Premium Efficiency Motors	$11,109	$0	$440	$10,669	$327	$0	$327	15	$4,905	$0	-54.0%	32.6	-8.4%	($6,765.30)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	161 KW PV Array	$1,271,069	$0	$0	$1,271,069	$33,616	$93,255	$126,871	15	$1,903,065	$1,398,825	49.7%	10.0	5.5%	$243,508.76

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.

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

SmartStart Building Incentives

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

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Technology and Engineering Center

Building ID: 2846453
For 12-month Period Ending: June 30, 2011[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 29, 2011

Facility
Technology and Engineering Center
500 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Year Built: 2000
Gross Floor Area (ft²): 67,000

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	4,526,066
Natural Gas (kBtu)[4]	2,910,491
Total Energy (kBtu)	7,436,557
Energy Intensity[5]	
Site (kBtu/ft²/yr)	111
Source (kBtu/ft²/yr)	271
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	796
Electric Distribution Utility	
Public Service Electric & Gas Co	
National Average Comparison	
National Average Site EUI	120
National Average Source EUI	280
% Difference from National Average Source EUI	-3%
Building Type	College/University (Campus-Level)

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[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
Mike 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	Technology and Engineering Center	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	College/University (Campus-Level)	Is this an accurate description of the space in question?		☐
Location	500 College Circle, Mount Laurel, NJ 08054	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 acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐
Tech and Engineering Center (Other)				
CRITERION	**VALUE AS ENTERED IN PORTFOLIO MANAGER**	**VERIFICATION QUESTIONS**	**NOTES**	☑
Gross Floor Area	67,000 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.		☐
Number of PCs	N/A(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	N/A(Optional)	Is this the total number of hours per week that the 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	N/A(Optional)	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.		☐

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))**
06/01/2011	06/30/2011	107,082.00
05/01/2011	05/31/2011	101,479.00
04/01/2011	04/30/2011	106,653.00
03/01/2011	03/31/2011	100,142.00
02/01/2011	02/28/2011	111,295.00
01/01/2011	01/31/2011	97,654.00
12/01/2010	12/31/2010	109,409.00
11/01/2010	11/30/2010	113,506.00
10/01/2010	10/31/2010	108,685.00
09/01/2010	09/30/2010	123,775.00
08/01/2010	08/31/2010	119,849.00
07/01/2010	07/31/2010	126,985.00
Electric Consumption (kWh (thousand Watt-hours))		**1,326,514.00**
Electric Consumption (kBtu (thousand Btu))		**4,526,065.77**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**4,526,065.77**
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)**
06/01/2011	06/30/2011	236.09
05/01/2011	05/31/2011	2,399.49
04/01/2011	04/30/2011	4,164.98
03/01/2011	03/31/2011	6,701.66
02/01/2011	02/28/2011	6,447.65
01/01/2011	01/31/2011	5,604.45
12/01/2010	12/31/2010	2,439.28
11/01/2010	11/30/2010	353.24
10/01/2010	10/31/2010	268.38
09/01/2010	09/30/2010	155.78

08/01/2010	08/31/2010	170.45
07/01/2010	07/31/2010	163.46
Gas Consumption (therms)		**29,104.91**
Gas Consumption (kBtu (thousand Btu))		**2,910,491.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**2,910,491.00**
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
Technology and Engineering Center
500 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

General Information

Technology and Engineering Center	
Gross Floor Area Excluding Parking: (ft^2)	67,000
Year Built	2000
For 12-month Evaluation Period Ending Date:	June 30, 2011

Facility Space Use Summary

Tech and Engineering Center	
Space Type	Other - College/University (Campus-Level)
Gross Floor Area(ft^2)	67,000
Number of PCs°	N/A
Weekly operating hours°	N/A
Workers on Main Shift°	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 06/30/2011)	**Baseline** (Ending Date 06/30/2011)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	111	111	0	N/A	120
Source (kBtu/ft²)	271	271	0	N/A	280
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/ft²/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	796	796	0	N/A	861
$kgCO_2e/ft^2$/year	12	12	0	N/A	13

More than 50% of your building is defined as College/University (Campus-Level). This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for College/University (Campus-Level). This building uses X% less energy per square foot than the CBECS national average for College/University (Campus-Level).

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

Air Handling Units and Fans

Tag	AHU	MUA	RF-1 & RF-2
Unit Type	Ventilation Only	Kitchen Makeup Air Unit	Centrifugal Return Fans
Qty	1	1	2
Location	1st Floor MER	1st Floor MER	3rd Floor MER
Area Served	Mechanical Room	Kitchen	AHU-1 & AHU-2
Manufacturer	-	McQuay	Bayley
Model #	-	LsL1220H	AFCSW 542
Serial #	-	32G01363-04	368770-00
Cooling Type	N/A	N/A	N/A
Cooling Capacity (Tons)	-	-	-
Heating Type	N/A	Hot Water Coil	N/A
Heating Input (MBH)	-	-	-
Supply Fan HP Motor Efficiency	-	-	30 HP 87.5%
Return Fan HP Motor Efficiency	N/A	N/A	N/A
Approx Age	16	16	16
ASHRAE Service Life	15	15	15
Remaining Life	(1)	(1)	(1)
Comments	-	-	Constant Volume

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

Air Handling Units and Fans

Tag	AHU-1	AHU-2	SF-3
Unit Type	VAV AHU with Hot and Chilled Water	VAV AHU with Hot and Chilled Water	Outside Air Supply Axial Fan for AHUs
Qty	1	1	1
Location	3rd Floor MER	3rd Floor MER	3rd Floor MER
Area Served	West	East	AHUs
Manufacturer	McQuay	McQuay	Bailey
Model #	-	-	SL402AF
Serial #	-	-	368770-20
Cooling Type	Chilled Water Coil	Chilled Water Coil	N/A
Cooling Capacity (Tons)	-	-	-
Heating Type	Hot Water Coil	Hot Water Coil	N/A
Heating Input (MBH)	-	-	-
Supply Fan HP Motor Efficiency	75 HP 94.5%	75 HP 94.5%	20 HP 87.5%
Return Fan HP Motor Efficiency	N/A	N/A	N/A
Approx Age	16	16	16
ASHRAE Service Life	15	15	15
Remaining Life	(1)	(1)	(1)
Comments	Outisde air damper actuator missing. Unit have vortex dampers for supply static control		-

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

Boilers

Tag	B1 & 2		
Unit Type	Gas Fired Water Tube Hot Water Boiler		
Qty	2		
Location	3rd Floor MER		
Area Served	Entire building		
Manufacturer	Bryan		
Model #	CL270 W 125 G1		
Serial #	75733, 75737		
Input Capacity (Btu/Hr)	2,700 / 1350		
Rated Output Capacity (Btu/Hr)	2,160		
Approx. Efficiency %	80.0%		
Fuel	Natural Gas		
Approx Age	17		
ASHRAE Service Life	24		
Remaining Life	7		
Comments	-		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

Pumps

Tag	HW Pumps	CW Pumps	Circulators
Unit Type	Base Mtd. End Suction	Base Mtd. End Suction	Pipe Mtd. Circulation Pumps
Qty	3	3 (2 + standby)	2
Location	3rd Floor MER	1st Floor MER	1st Floor MER
Area Served	Heating Hot Water Loop	Chilled Water Loop	Domestic Hot Water Loop
Manufacturer	B&G	B&G	B&G
Model #	2BC 8.375 BF	1510	-
Serial #	1880111	1876162, 1876163, 1876164	-
Horse Power	5	10	1/4
Flow	160 GPM @ 65 ft	273 GPM @ 80 ft	-
Motor / Frame Info	Marathon 194T	Magnatek S215T	B&G
Electrical Power	230/460/3/60	230/460/3/60	115/1/60
RPM	1760	1750	1725
Motor Efficiency %	86.5%	89.5%	-
Approx Age	16	10	10
ASHRAE Service Life	20	20	20
Remaining Life	4	10	10
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

Pumps

Tag	**DHW**		
Unit Type	Domestic Water Booster Pump-Set		
Qty	1 set (2 pumps)		
Location	1st Floor MER		
Area Served	Domestic Water Pressure Boosting		
Manufacturer	Caraniis		
Model #	-		
Serial #	-		
Horse Power	2 x 5 HP		
Flow	-		
Motor / Frame Info	Baldor 182JM		
Electrical Power	230/460/3/60		
RPM	3450		
Motor Efficiency %	85.5%		
Approx Age	5		
ASHRAE Service Life	20		
Remaining Life	15		
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

AC Units

Tag	AC		
Unit Type	Packaged AC Unit		
Qty	1		
Location	3rd Floor MER		
Area Served	Laboratory X		
Manufacturer	Carrier		
Model #	50AH060620		
Serial #	3694G50003		
Cooling Type	Direct expansion		
Cooling Capacity (Tons)	5		
Heating Type	N/A		
Heating Input (MBH)	-		
Supply Fan HP Motor Efficiency	3 HP		
Return Fan HP Motor Efficiency	N/A		
Approx Age	16		
ASHRAE Service Life	15		
Remaining Life	(1)		
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

Domestic Water Heaters

Tag	HWH	HWH	
Unit Type	Gas fired hot water heater	Gas fired hot water heater	
Qty	1	1	
Location	Penthouse MER	Penthouse MER	
Area Served	Domestic Hot Water	Domestic Hot Water	
Manufacturer	AO Smith	AO Smith	
Model #	BTR 500A 110	BT500A 880	
Serial #	0913M001472	LL93-0306735-880	
Size (Gallons)	85	69	
Input Capacity (MBH/KW)	500 MBH	500 MBH	
Recovery (Gal/Hr)	484.84	454	
Efficiency %	80%	75%	
Fuel	Natural Gas	Natural Gas	
Approx Age	2	16	
ASHRAE Service Life	12	12	
Remaining Life	10	(4)	
Comments		Missing or no flue gas damper	

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

Chiller

Tag	CH-1 & CH-2		
Unit Type	Ari cooled Screw		
Qty	2		
Location	Technology and Engineering Center		
Area Served	None		
Manufacturer	McQuay		
Model #	ALR1450-X		
Serial #	5ZH8182401		
Refrigerant	R22		
Cooling Capacity (Tons)	-		
Cooling Efficiency (KW/Ton)	-		
Volts / Phase / Hz	460/3/60		
Fuel	Electricity		
Chilled Water GPM / ΔT	-		
Condenser Water GPM / ΔT	N/A		
Approx Age	15		
ASHRAE Service Life	20		
Remaining Life	5		
Comments	Units are decomissioned.		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

Computer Room Air Conditioners

Tag	CRACs		
Unit Type	Packaged Units with Outdoor Drycoolers		
Qty	3		
Location	Server rooms (Ground Mtd. Drycoolers)		
Area Served	Data server rooms		
Manufacturer	Airflow		
Condensing Unit Model / Serial #	Drycooler MN PFG8 SN T94H03031		
Air Handler Model / Serial #	CG-6G		
Cooling Capacity (Tons)	5.5		
Cooling Efficiency (SEER/EER)	-		
Heating Type	Electric Reheat		
Heating Input (MBH)	38		
Efficiency	-		
Approx Age	10 Est		
ASHRAE Service Life	15		
Remaining Life	5		
Comments	-		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

Heat Exchanger

Tag	HE-2		
Unit Type	Plate/Frame Heat Exchanger		
Qty	1		
Location	1st Floor MER		
Area Served	Campus CW Loop / Building CW Loop		
Manufacturer	APV		
Model #	A085 MGS-10		
Serial #	2.0003E+13		
Max Pressure	150 psi		
Capacity	-		
Approx Age	10		
ASHRAE Service Life	20		
Remaining Life	10		
Comments	-		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Technology and Engineering Center

Air Compressor

Tag	Air Compressor		
Unit Type	Reciprocating, Air Cooled		
Qty	1		
Location	Penthouse MER		
Area Served	Laboratory		
Manufacturer	Quincy Compressor		
Model #	QRD 7.5ST8N		
Serial #	5046116		
Tank Capacity	100 Est		
Voltage / Phase	208/1		
Motor HP	7.5 HP		
Approx Age	10		
Ashrae Service Life	15		
Remaining Life	5		
Comments	Unit is rarely used. It is in good condition		

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

Investment Grade Lighting Audit

CEG Job #: 9C11023

Project: Technology and Engineering Center

Technology and Engineering Center

KWH COST: $0.139

Bldg. Sq. Ft. 67,000

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
221.34	4th Floor Mech Room	520	64	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	3.71	1,930.2	$268.30	64	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	3.20	1664	$231.30	$30.00	$1,920.00	0.51	266.24	$37.01	51.88
221.22	Room 301	1242	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	308.0	$42.81	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	248.4	$34.53	$30.00	$120.00	0.05	59.616	$8.29	14.48
221.22	Room 303	192	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.93	178.6	$24.82	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	144	$20.02	$30.00	$450.00	0.18	34.56	$4.80	93.68
221.21	Men's Restroom	1600	16	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.99	1,587.2	$220.62	16	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.80	1280	$177.92	$30.00	$480.00	0.19	307.2	$42.70	11.24
221.22	Room 300	1500	19	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.18	1,767.0	$245.61	19	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.95	1425	$198.08	$30.00	$570.00	0.23	342	$47.54	11.99
221.22	Room 302	1300	24	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.49	1,934.4	$268.88	24	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.20	1560	$216.84	$30.00	$720.00	0.29	374.4	$52.04	13.84
221.22	Room 309	1500	19	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.18	1,767.0	$245.61	19	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.95	1425	$198.08	$30.00	$570.00	0.23	342	$47.54	11.99
221.22	Room 311 Hall	2600	9	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.56	1,450.8	$201.66	9	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.45	1170	$162.63	$30.00	$270.00	0.11	280.8	$39.03	6.92
221.22	Side Offices	1500	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.37	558.0	$77.56	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	450	$62.55	$30.00	$180.00	0.07	108	$15.01	11.99
221.22	Side Offices (4)	1500	10	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.62	930.0	$129.27	10	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.50	750	$104.25	$30.00	$300.00	0.12	180	$25.02	11.99
221.34	313 Comms	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	139.2	$19.35	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$16.68	$30.00	$60.00	0.02	19.2	$2.67	22.48
221.22	Room 315	750	24	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.49	1,116.0	$155.12	24	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.20	900	$125.10	$30.00	$720.00	0.29	216	$30.02	23.98
221.22	Room 304	1600	24	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.49	2,380.8	$330.93	24	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.20	1920	$266.88	$30.00	$720.00	0.29	460.8	$64.05	11.24
221.22	Room 317	625	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.12	697.5	$96.95	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	562.5	$78.19	$30.00	$540.00	0.22	135	$18.77	28.78

Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
221.22	Room 306	1250	26	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.61	2,015.0	$280.09	26	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.30	1625	$225.88	$30.00	$780.00	0.31	390	$54.21	14.39
211.11	3rd Floor Corridor	2000	68	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Cove Lighting	33	2.24	4,488.0	$623.83	68	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	1.70	3400	$472.60	$7.00	$476.00	0.54	1088	$151.23	3.15
221.22	Room 212	2000	11	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.68	1,364.0	$189.60	11	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.55	1100	$152.90	$30.00	$330.00	0.13	264	$36.70	8.99
221.22	Room 210	1512	15	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.93	1,406.2	$195.46	15	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.75	1134	$157.63	$30.00	$450.00	0.18	272.16	$37.83	11.90
221.22	Room 219	0	23	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.43	0.0	$0.00	23	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.15	0	$0.00	$30.00	$690.00	0.28	0	$0.00	0.00
221.22	Room 217	1978	17	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.05	2,084.8	$289.79	17	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.85	1681.3	$233.70	$30.00	$510.00	0.20	403.512	$56.09	9.09
221.22	Room 208	812	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.74	604.1	$83.97	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	487.2	$67.72	$30.00	$360.00	0.14	116.928	$16.25	22.15
221.22	Room 206	1395	13	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.81	1,124.4	$156.29	13	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.65	906.75	$126.04	$30.00	$390.00	0.16	217.62	$30.25	12.89
221.22	Room 215	1568	13	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.81	1,263.8	$175.67	13	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.65	1019.2	$141.67	$30.00	$390.00	0.16	244.608	$34.00	11.47
221.34	Room 213 Comms	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	139.2	$19.35	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$16.68	$30.00	$60.00	0.02	19.2	$2.67	22.48
221.22	211 Hall	1800	7	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.43	781.2	$108.59	7	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.35	630	$87.57	$30.00	$210.00	0.08	151.2	$21.02	9.99
601		8760	2	2	(2) 7w CFL Exit Sign	16	0.03	280.3	$38.96	2	1	LED Exit Sign	2	0.00	35.04	$4.87	$65.00	$130.00	0.03	245.28	$34.09	3.81
221.22	211 Offices (6)	1800	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.12	2,008.8	$279.22	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	1620	$225.18	$30.00	$540.00	0.22	388.8	$54.04	9.99
221.22	Room 204	1363	13	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.81	1,098.6	$152.70	13	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.65	885.95	$123.15	$30.00	$390.00	0.16	212.628	$29.56	13.20
221.22	Room 202	1660	13	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.81	1,338.0	$185.98	13	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.65	1079	$149.98	$30.00	$390.00	0.16	258.96	$36.00	10.83
221.22	Roomm 209	1414	28	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.74	2,454.7	$341.20	28	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.40	1979.6	$275.16	$30.00	$840.00	0.34	475.104	$66.04	12.72

Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
221.21	Women's Restroom	2000	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	620.0	$86.18	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	500	$69.50	$30.00	$150.00	0.06	120	$16.68	8.99
222.21	Men's Restroom	2000	5	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	620.0	$86.18	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	500	$69.50	$30.00	$150.00	0.06	120	$16.68	8.99
221.22	Room 200	1620	19	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.18	1,908.4	$265.26	19	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.95	1539	$213.92	$30.00	$570.00	0.23	369.36	$51.34	11.10
221.22	Room 201	1000	4	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.25	248.0	$34.47	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	200	$27.80	$30.00	$120.00	0.05	48	$6.67	17.99
221.22	Room 203	1870	12	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.74	1,391.3	$193.39	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1122	$155.96	$30.00	$360.00	0.14	269.28	$37.43	9.62
211.11	2nd Floor Corridor	2000	68	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Cove Lighting	33	2.24	4,488.0	$623.83	68	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	1.70	3400	$472.60	$7.00	$476.00	0.54	1088	$151.23	3.15
221.22	Room 101	300	18	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.12	334.8	$46.54	18	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.90	270	$37.53	$30.00	$540.00	0.22	64.8	$9.01	59.95
563	Room 100	300	28	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	1.46	436.8	$60.72	28	0	No Change	0	0.00	0	$0.00	$40.00	$1,120.00	0.00	0	$0.00	0.00
221.21	Women's Restroom	3000	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	930.0	$129.27	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	750	$104.25	$30.00	$150.00	0.06	180	$25.02	6.00
222.21	Men's Restroom	3000	5	2	2x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	930.0	$129.27	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	750	$104.25	$30.00	$150.00	0.06	180	$25.02	6.00
221.22	Tec 107	1440	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	267.8	$37.23	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	216	$30.02	$30.00	$90.00	0.04	51.84	$7.21	12.49
221.37	Library	2600	66	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Indirect	58	3.83	9,952.8	$1,383.44	66	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	3.30	8580	$1,192.62	$30.00	$1,980.00	0.53	1372.8	$190.82	10.38
601		8760	1	2	(2) 7w CFL Exit Sign	16	0.02	140.2	$19.48	1	1	LED Exit Sign	2	0.00	17.52	$2.44	$65.00	$65.00	0.01	122.64	$17.05	3.81
221.22	111C Work Room	1200	6	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.37	446.4	$62.05	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	360	$50.04	$30.00	$180.00	0.07	86.4	$12.01	14.99
221.22	111 AV Room	2600	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	806.0	$112.03	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	650	$90.35	$30.00	$150.00	0.06	156	$21.68	6.92
221.22	111A	2600	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	322.4	$44.81	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$36.14	$30.00	$60.00	0.02	62.4	$8.67	6.92
221.37	110 Work Room	1800	12	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Indirect	58	0.70	1,252.8	$174.14	12	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.60	1080	$150.12	$30.00	$360.00	0.10	172.8	$24.02	14.99

Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
221.22	Training Center	1800	26	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.61	2,901.6	$403.32	26	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.30	2340	$325.26	$30.00	$780.00	0.31	561.6	$78.06	9.99
601		8760	1	2	(2) 7w CFL Exit Sign	16	0.02	140.2	$19.48	1	1	LED Exit Sign	2	0.00	17.52	$2.44	$65.00	$65.00	0.01	122.64	$17.05	3.81
221.22	Room 112	1664	23	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.43	2,372.9	$329.83	23	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.15	1913.6	$265.99	$30.00	$690.00	0.28	459.264	$63.84	10.81
221.34	113 Comms	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	139.2	$19.35	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$16.68	$30.00	$60.00	0.02	19.2	$2.67	22.48
221.34	115 Comp Repair	1200	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	139.2	$19.35	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	120	$16.68	$30.00	$60.00	0.02	19.2	$2.67	22.48
563	114 Dining	1200	28	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	1.46	1,747.2	$242.86	28	0	No Change	0	0.00	0	$0.00	$40.00	$1,120.00	0.00	0	$0.00	0.00
221.22	121 Maintenance	3000	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.50	1,488.0	$206.83	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	1200	$166.80	$30.00	$240.00	0.10	288	$40.03	6.00
221.34	117 Mech Room	1200	6	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.35	417.6	$58.05	6	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.30	360	$50.04	$30.00	$180.00	0.05	57.6	$8.01	22.48
211.11	1st Floor Corridor	3000	68	1	1x4, 1 Lamp, 32w 700 Series T8, Elect. Ballast, Surface Mnt., Cove Lighting	33	2.24	6,732.0	$935.75	68	1	Relamp - Sylvania Lamp FO28/841/SS/ECO	25	1.70	5100	$708.90	$7.00	$476.00	0.54	1632	$226.85	2.10
601		8760	7	2	(2) 7w CFL Exit Sign	16	0.11	981.1	$136.38	7	1	LED Exit Sign	2	0.01	122.64	$17.05	$65.00	$455.00	0.10	858.48	$119.33	3.81
			970	55				81,350	$11,308	970	103			40.1	62,810	$8,731		$25,353	9.6	16,356	$2,274	11.15

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.

2. Lamp totals only include T-12 tube replacement calculations

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
Technology and Engineering Center	25100	SHARP NU-U235F2	847	17.5	14,857	199.05	241,841	161.2	35,489	13.40

.= Proposed PV Layout

Notes:

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

PVWatts Program Data Output - Pitched Roof Panels

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	34.5 kW
DC to AC Derate Factor:	0.810
AC Rating:	28.0 kW
Array Type:	Fixed Tilt
Array Tilt:	30.0°
Array Azimuth:	150.0°
Energy Specifications	
Cost of Electricity:	13.9 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	3.18	2852	396.43
2	3.83	3072	427.01
3	4.61	3949	548.91
4	5.23	4236	588.80
5	5.62	4581	636.76
6	5.81	4398	611.32
7	5.80	4481	622.86
8	5.51	4307	598.67
9	5.10	3935	546.96
10	4.29	3507	487.47
11	3.23	2692	374.19
12	2.79	2436	338.60
Year	4.59	44444	6177.72

PVWatts Program Data Output - Parking Canopy Panels

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	164.5 kW
DC to AC Derate Factor:	0.810
AC Rating:	133.2 kW
Array Type:	Fixed Tilt
Array Tilt:	7.5°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	13.9 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.46	10117	1406.26
2	3.22	12152	1689.13
3	4.23	17282	2402.20
4	5.15	19884	2763.88
5	5.83	22864	3178.10
6	6.14	22328	3103.59
7	6.05	22510	3128.89
8	5.50	20574	2859.79
9	4.76	17513	2434.31
10	3.65	14079	1956.98
11	2.55	9688	1346.63
12	2.13	8406	1168.43
Year	4.31	197397	27438.18

Project Name: BCC Mount Laurel Campus
Location: Technology and Engineering Center
Description: Photovoltaic System 100% Financing - 15 year

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$1,271,069
Annual kWh Production	241,841
Annual Energy Cost Reduction	$33,616
Average Annual SREC Revenue	$93,255

Simple Payback: **10.02** Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.139**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value ($/kWh)	$0.386

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	241,841	$33,616	$0	$133,013	$74,798	$53,915	$37,916	$37,916
2	$0	240,632	$34,624	$0	$132,347	$71,472	$57,240	$38,260	$76,176
3	$0	239,429	$35,663	$0	$119,714	$67,942	$60,770	$26,665	$102,842
4	$0	238,231	$36,733	$0	$107,204	$64,194	$64,518	$15,225	$118,067
5	$0	237,040	$37,835	$2,442	$106,668	$60,214	$68,498	$13,350	$131,416
6	$0	235,855	$38,970	$2,429	$106,135	$55,989	$72,723	$13,964	$145,380
7	$0	234,676	$40,139	$2,417	$93,870	$51,504	$77,208	$2,880	$148,260
8	$0	233,502	$41,343	$2,405	$93,401	$46,742	$81,970	$3,627	$151,887
9	$0	232,335	$42,584	$2,393	$81,317	$41,686	$87,026	($7,204)	$144,683
10	$0	231,173	$43,861	$2,381	$80,911	$36,319	$92,393	($6,321)	$138,362
11	$0	230,017	$45,177	$2,369	$69,005	$30,620	$98,092	($16,899)	$121,463
12	$0	228,867	$46,532	$2,357	$68,660	$24,570	$104,142	($15,877)	$105,586
13	$0	227,723	$47,928	$2,346	$56,931	$18,147	$110,565	($26,199)	$79,387
14	$0	226,584	$49,366	$2,334	$56,646	$11,327	$117,385	($25,034)	$54,354
15	$0	225,451	$50,847	$2,322	$45,090	$4,087	$124,625	($35,097)	$19,257
	Totals:	3,503,359	$625,219	$26,195	$1,350,913	$659,611	$1,271,069	$19,257	$1,575,036

Net Present Value (NPV) **$45,951**

BURLINGTON COUNTY COLLEGE
MOUNT LAUREL CAMPUS

LAUREL HALL

500 COLLEGE CIRCLE
MT. LAUREL, NJ 08054

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 (PSEG)
Electric Utility Rate Structure:	Large Power and Light Service (LPLP)
Third Party Supplier:	HESS Energy
Natural Gas Utility Provider:	Public Service Electric & Gas (PSEG)
Utility Rate Structure:	Large Volume Gas (LVG)
Third Party Supplier:	Pepco Energy Services
Chilled Water:	Central Energy Plant
Heating Hot Water:	Central Energy Plant

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.

Hot water and chilled water are measured using a combined meter. The hot and chilled water usage within each report shows the actual hot water and chilled water usages for the facility. The consumption is measured in Gallon x 1000, and converted the quantity into kBTU (1,000 BTU) of energy.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY				
Utility Provider:	Public Service Energy & Gas (PSEG)			
Rate:	Large Power and Light Service (LPLS)			
Meter No:	-			
Account #	-			
Third Party Utility Provider:	HESS Energy			
TPS Meter / Acct No:	-			
MONTH OF USE	**CONSUMPTION KWH**	**DEMAND KW**		**TOTAL BILL**
Jul-10	55,902	92.0		$8,721
Aug-10	52,082	112.0		$8,073
Sep-10	57,810	144.0		$8,787
Oct-10	53,949	140.0		$7,337
Nov-10	58,327	140.0		$7,816
Dec-10	54,928	148.0		$7,470
Jan-11	42,974	140.0		$5,758
Feb-11	54,527	152.0		$7,143
Mar-11	52,267	152.0		$7,004
Apr-11	59,063	148.0		$7,974
May-11	47,001	132.0		$6,345
Jun-11	52,613	132.0		$8,313
Totals	**641,442**	**152.0**	**Max**	**$90,740**
	AVERAGE DEMAND	**136.0**	**KW average**	
	AVERAGE RATE	**$0.141**	**$/kWh**	

Figure 1
BCC - Mount Laurel - Mount Laurel Hall
Electric Usage Profile
July-10 through June-11

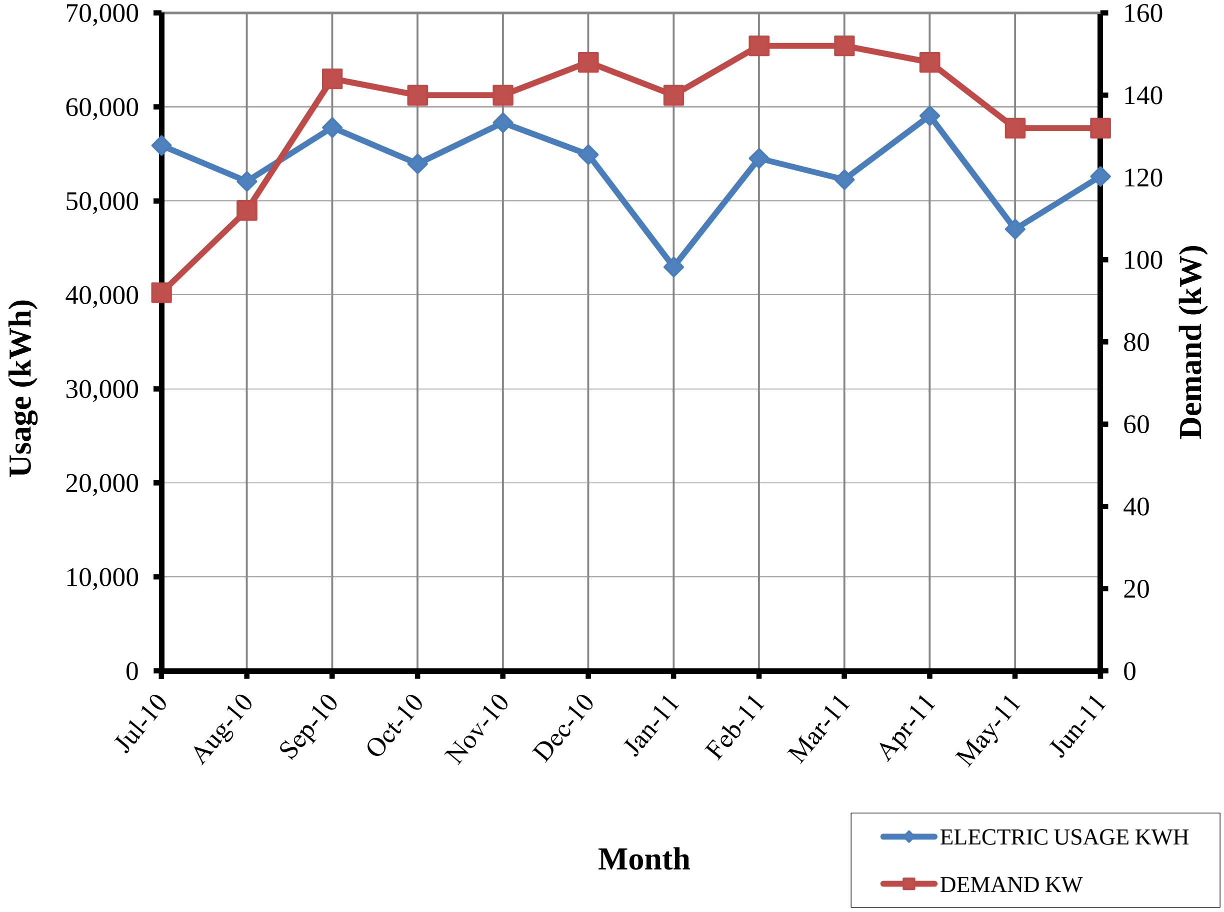


Table 2
Hot & Chilled Water Usage Data

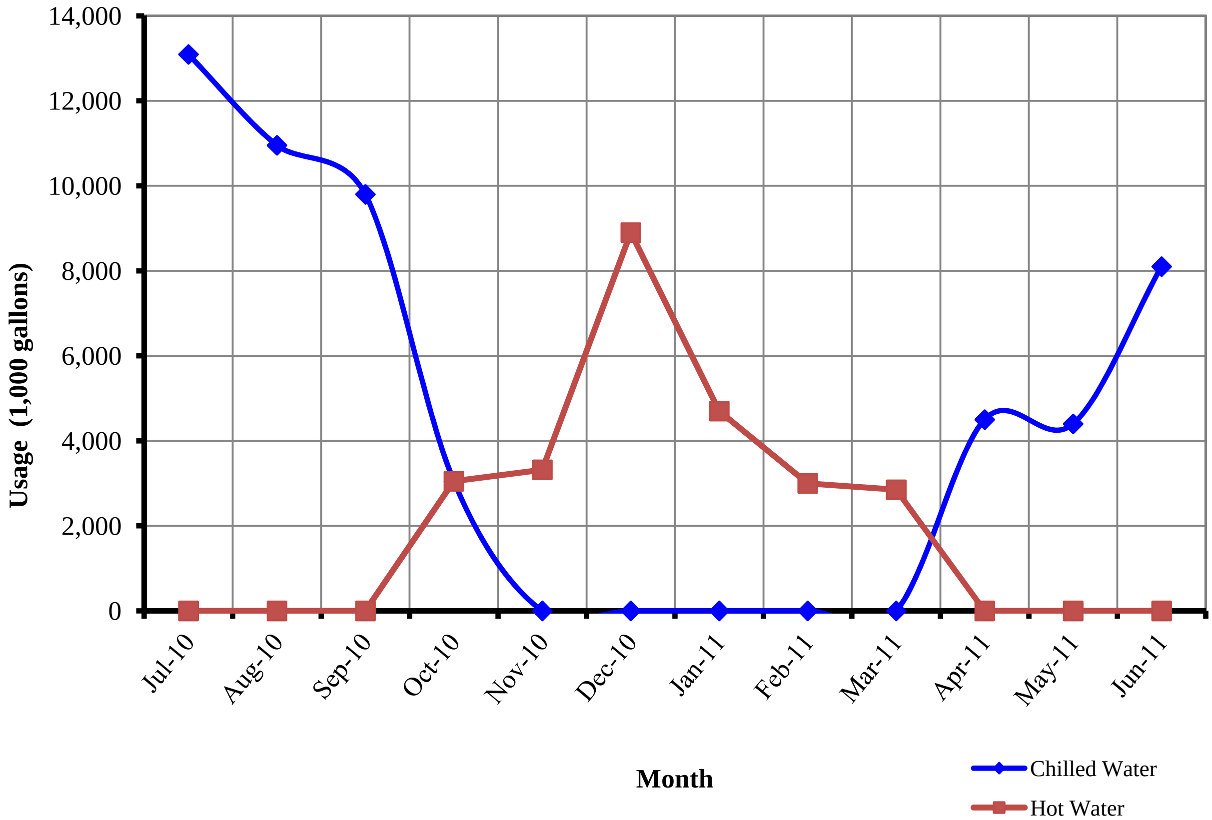
HOT WATER / CHILLED WATER USAGE SUMMARY			
Utility Provider:	Central Energy Plant		
Estimated Average ΔT	15°F (Hot Water)		
Estimated Average ΔT	8°F (Chilled Water)		
MONTH OF USE	**CHILLED WATER CONSUMPTION (1,000 GALLONS)**	**HOT WATER CONSUMPTION (1,000 GALLONS)**	**TOTAL BILL**
Jul-10	*13,093*	-	-
Aug-10	*10,954*	-	-
Sep-10	9,800	-	-
Oct-10	*3,050*	3,050	-
Nov-10		3,320	-
Dec-10	-	8,900	-
Jan-11	-	4,700	-
Feb-11	-	3,000	-
Mar-11	-	2,850	-
Apr-11	4,500	-	-
May-11	4,400	-	-
Jun-11	8,100	-	-
TOTALS	**53,897**	**25,820**	**-**

Usage estimated for Jul-Aug 2010 based on monthly electricity consumption

October chilled water usages assumed to be 50% of total hot/chilled water usage

Figure 2

BCC Mount Laurel - Mount Laurel Hall
Hot & Chilled Water Usage Profile
July-10 through June-11



II. FACILITY DESCRIPTION

The 53,000 SF Laurel Hall was built in 2001 with no additions or renovations. The building has three occupied floors. The building is comprised of classrooms, computer laboratories and student lounges. Major HVAC equipments are located in the mechanical rooms in each floor. The HVAC systems in the Laurel Hall include hot water pumps, chilled water pumps, a plate frame heat exchanger, Air Handling Units and fan powered VAV boxes.

Occupancy Profile

The typical hours of operation for the Building are Monday through Friday between 7:00 am and 10:00 pm. The facility is open on Saturday between 8:00 am and 12:00 pm. The Laurel Hall occupancy varies each day as well as each season. 800 and 1200 pm. The Laurel Hall occupancy varies each day as well as each season. The Laurel Hall occupancy varies each day as well as each season. The Laurel Hall occupancy varies each day as well as each season. The Laurel Hall occupancy varies each day as well as each season.

Building Envelope

Exterior walls for the Laurel Hall are brick faced with a concrete block construction. The amount of insulation within the walls couldn’t be verified. The windows throughout the Building are in excellent condition and appear to be well maintained. Typical windows throughout the building are double pane, operable, ¼” tinted glass with aluminum frames. Blinds are utilized in some areas for occupancy comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The building has a pitched, standing seam metal roof. Insulation within the roof couldn’t be verified.

Hot Water and Chilled Water Systems

The HVAC systems in the Laurel use chilled water and hot water, which is supplied by the campus Central Energy Plant.

Chilled water and hot water are independently circulated via independent pumps. The chilled water loop circulates water through the air handlers and a plate-frame type heat exchanger via two (2) 10 HP Taco chilled water circulation pumps. The pumps are driven with standard efficiency motors. The hot water heating loop circulates water through the air handlers via two (2) 10 HP Taco pumps. Both pumping sub-systems within the building are constant volume systems with constant volume pumps while the Air Handling Units in the facility are equipped with hot and chilled water coils with 2-way control valves. Utilization of variable speed drives is recommended for this building.

HVAC Systems

Heating Ventilation and Air Conditioning is provided to the Laurel Hall via six (6) Air Handling Units (AHU) and constant volume fan powered boxes. The AHUs are located in three separate mechanical rooms located in each floor. All of the AHUs are equipped with hot and chilled water coils with 2-way control valves. Conditioned air is delivered to fan powered boxes for space zoning.

AHU-1, AHU-3 and AHU-4 send conditioned air to the fan powered boxes in the 1st, 2nd and 3rd floor offices and classrooms respectively. AHU-2 and AHU-6 are smaller units feeding classrooms 132 and 320 respectively. Finally, AHU-5 is feeds the atrium and the adjacent common areas.

The HVAC distribution system includes fan powered terminal air boxes with hot water re-heat coils for space zoning. Local thermostats control two-way hot water and chilled water valves to regulate space temperature. All of the Air Handling Units are constant volume units. The HVAC distribution system includes fan powered terminal air boxes with hot water re-heat coil for space zoning. Local thermostats control two-way hot water and chilled water valves to regulate space temperature. All of the Air Handling Units are constant volume units. The HVAC distribution system includes fan powered terminal air boxes with hot water re-heat coil for space zoning.

Exhaust System

Air is exhausted from the toilet rooms through the roof exhausters. Classroom ventilation is achieved via the air handling units by exhausting a portion of the return air.

HVAC System Controls

The pumps, air handling units and the exhaust fans in the Laurel Hall are controlled, scheduled and monitored via the Siemens central DDC system.

Fan powered boxes and the reheat valves are also monitored and controlled by the Siemens central DDC control system. Each space within the building is equipped with a remote temperature sensor with override capability.

Domestic Hot Water

Domestic hot water for the restrooms is provided by two (2) 120-gallon AO Smith electric hot water heater with a heating capacity of 18 kW. The heater is located in the first floor mechanical room. Domestic hot water is circulated throughout the building via a small circulator pump. Circulator is controlled with an aquastat.

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	$23,831	$3,660	6.5	130.4%
ECM #2	Premium Efficiency Motors	$9,840	$376	26.2	-42.7%
ECM #3	VFDs on Pumps	$34,510	$1,311	26.3	-43.0%
ECM #4	Demand Controlled Ventilation (Atrium, 320, 132)	$59,000	$3,169	18.6	-19.4%
ECM #5	Install Indirect Hot Water Heater	$5,000	$3,850	1.3	1054.9%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	24 KW PV Array	$316,080	$21,072	15.0	0.0%
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)				
		ANNUAL UTILITY REDUCTION		
ECM NO.	DESCRIPTION	ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
ECM #1	Lighting Equipment Upgrade	11.8	25,960	-
ECM #2	Premium Efficiency Motors	2.3	2,665	-
ECM #3	VFDs on Pumps	-	9,296	-
ECM #4	Demand Controlled Ventilation (Atrium, 320, 132)	-	16,933	1,419
ECM #5	Install Indirect Hot Water Heater	-	40,687	-1,857
RENEWABLE ENERGY MEASURES (REM's)				
		ANNUAL UTILITY REDUCTION		
ECM NO.	**DESCRIPTION**	**ELECTRIC DEMAND (KW)**	**ELECTRIC CONSUMPTION (KWH)**	**NATURAL GAS (THERMS)**
REM #1	24 KW PV Array	24.0	39,050	-

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	$3,660	$24,605	$774	$23,831	6.5
Premium Efficiency Motors	$376	$10,240	$400	$9,840	26.2
VFDs on Pumps	$1,311	$34,510	$0	$34,510	26.3
Demand Controlled Ventilation (Atrium, 320, 132)	$3,169	$59,000	$0	$59,000	18.6
Install Indirect Hot Water Heater	$3,850	$5,000	$0	$5,000	1.3
Design / Construction Extras (15%)	-	$20,003	-	*$19,827*	-
Total Project	**$10,679**	**$108,608**	**$774**	**$107,658**	**10.1**

*Items highlighted in yellow are not included in the final project totals.

*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 Lighting & Re-Lamping

Description:

Majority of the interior lighting throughout the Laurel Hall is provided with fluorescent fixtures with older generation, 700 series 32W T8 lamps and electronic ballasts. Although 700 series T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output.

This ECM includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. 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.

This ECM includes replacement of each of the high bay metal halide light fixtures with T5HO fixtures with reflective lenses. The retrofit for the metal halide fixtures includes a one for one fixture replacement. The fluorescent fixtures selected will provide equivalent light compared to the average light output of the existing metal halide fixtures.

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 your existing fixtures, or hardwired into your 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 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:

Smart Start Incentive

$$= \# \ 175W - 249W \ MH \ Fixtures \ Replaced \times \$43 \ Incentive \ per \ Fixture$$

Smart Start Incentive = #175W – 249W MH Fixtures Replaced x $43 Incentive per Fixture

Replacement and Maintenance Savings:

Maintenance savings is negligible for this ECM and has not been included in the energy savings summary.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$24,605
NJ Smart Start Equipment Incentive ($):	$774
Net Installation Cost ($):	$23,831
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,660
Total Yearly Savings ($/Yr):	$3,660
Estimated ECM Lifetime (Yr):	15
Simple Payback	6.5
Simple Lifetime ROI	130.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$54,906
Internal Rate of Return (IRR)	13%
Net Present Value (NPV)	$19,866.94

ECM #2: Install NEMA Premium® Efficiency Motors

Description:

The improved efficiency of the NEMA Premium® efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95% of its total lifetime operating cost. Due to the fact that many motors operate continuously 24 hours a day, even small increases in efficiency can yield substantial energy and dollar savings.

The electric motors driving the hot water pumps and supply fans in some of the HVAC equipment are candidates for replacing with premium efficiency motors. These standard efficiency motors run considerable amount of time over a year.

This energy conservation measure replaces existing inefficient electric motors with NEMA Premium® efficiency motors. NEMA Premium® is the most efficient motor designation in the marketplace today.

IMPLEMENTATION SUMMARY					
EQMT ID	**FUNCTION**	**MOTOR HP**	**HOURS OF OPERATION**	**EXISTING EFFICIENCY**	**NEMA PREMIUM EFFICIENCY**
HWP	Heating Hot Water Loop	10	1,060	85.5%	92.4%
HWP	Heating Hot Water Loop	10	1,060	85.5%	92.4%
CWP	Chilled Water Loop	10	1,200	85.5%	92.4%
CWP	Chilled Water Loop	10	1,200	85.5%	92.4%

Energy Savings Calculations:

$$\text{Electric usage, kWh} = \frac{\text{HP} \times \text{LF} \times 0.746 \times \text{Hours of Operation}}{\text{Motor Efficiency}}$$

where, HP = Motor Nameplate Horsepower Rating

LF = Load Factor Motor Efficiency = Motor Nameplate Efficiency

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric cost savings} = \text{Electric Usage Savings} \times \text{Electric Rate}\left(\frac{\$}{\text{kWh}}\right)$$

The calculations were carried out and the results are tabulated in the table below:

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWH	COST SAVINGS
HWP	10	90%	85.5%	92.4%	0.59	625	$88
HWP	10	90%	85.5%	92.4%	0.59	625	$88
CWP	10	90%	85.5%	92.4%	0.59	707	$100
CWP	10	90%	85.5%	92.4%	0.59	707	$100
TOTAL					**2.3**	**2,665**	**$376**

Equipment Cost and Incentives

Below is a summary of SmartStart Building® incentives for premium efficiency motors:

INCENTIVES	
HORSE POWER	NJ SMART START INCENTIVE
1	$50
1.5	$50
2	$60
3	$60
5	$60
7.5	$90
10	$100
15	$115
20	$125
25	$130
30	$150
40	$180

The following table outlines the summary of motor replacement costs and incentives:

MOTOR REPLACEMENT SUMMARY						
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK
HWP	10	$2,560	$100	$2,460	$88	27.9
HWP	10	$2,560	$100	$2,460	$88	27.9
CWP	10	$2,560	$100	$2,460	$100	24.7
CWP	10	$2,560	$100	$2,460	$100	24.7
TOTAL		**$10,240**	**$400**	**$9,840**	**$376**	**26.2**

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$10,240
NJ Smart Start Equipment Incentive ($):	$400
Net Installation Cost ($):	$9,840
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$376
Total Yearly Savings ($/Yr):	$376
Estimated ECM Lifetime (Yr):	15
Simple Payback	26.2
Simple Lifetime ROI	-42.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$5,640
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	($5,351.34)

ECM #3: Install Hot and Chilled Water Pump VFD's

Description:

When the unit is not calling for heating or cooling, the control valve closes reducing overall flow of the system. Variable frequency drives allow the pumps to slow down in response to a reduction in overall system flow. The reduction in operating flow allows the pumps to reduce energy consumption for all hours that the heating or cooling system is not at its peak load.

This ECM includes the installation of Variable Frequency Drives on two hot water and two chilled water pumps. This ECM assumed that the NEMA premium motors suggested in a prior ECM were not installed. Installing these motors in addition to the VFD's would increase energy savings, but the combined savings and cost of installation are not reflected in this ECM.

Energy and cost savings calculations are based on calculation software "PumpSave v4.2," provided by ABB. The PumpSave calculation software is used to estimate the pumping energy for variable speed pump systems. The hot water loop pumps operate approximately 1060 Hrs per year and the cooling loop pumps approximately 1200 Hrs per year. This was estimated based on building use and occupancy. The pump flow, HD, and resultant energy are calculated based on the existing pump horse power installed. The operation of all equipment control valves should be verified before implementing this ECM.

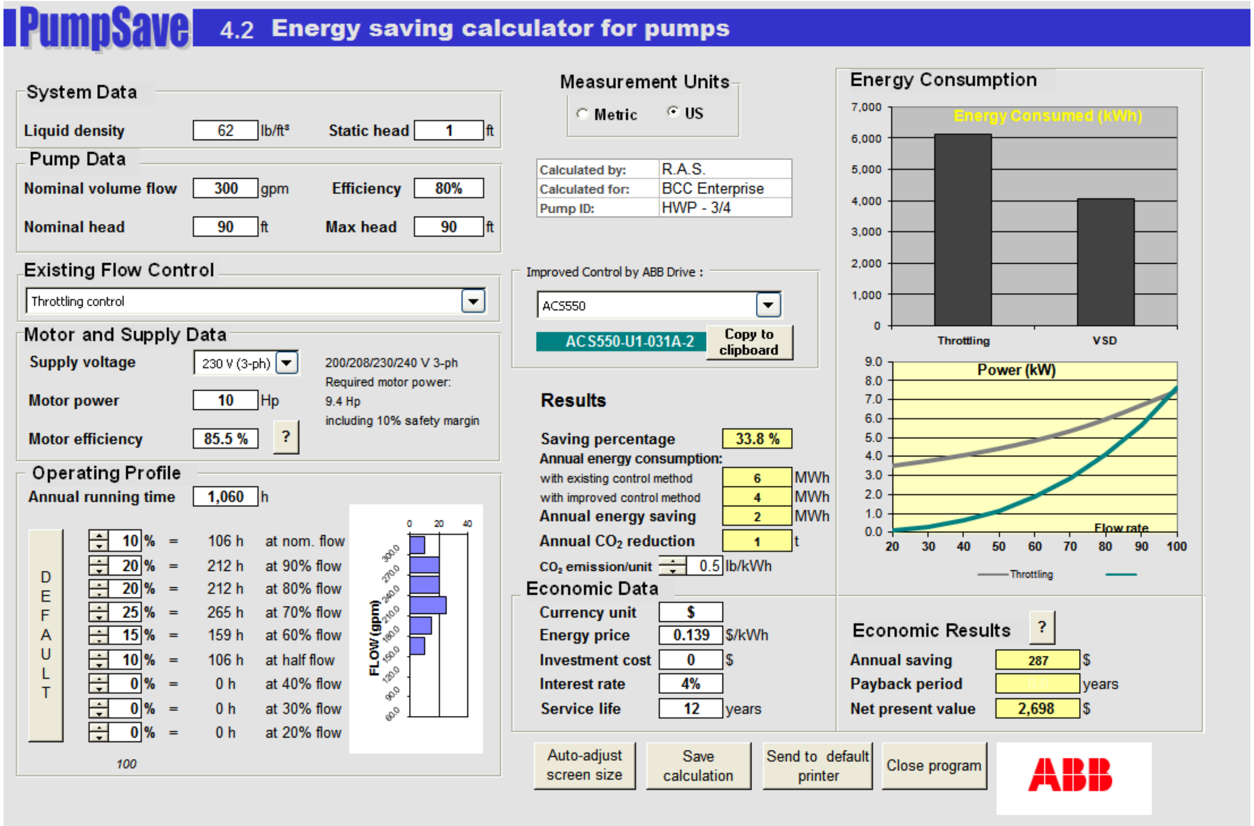
Energy Savings Calculations:

$$\text{Cons. Volume Power}\left(\text{HP}\right)=\frac{\text{Specific Gravity}\times\text{Flow Rate}\left(\frac{\text{Gal}}{\text{min}}\right)\times\text{Head}\left(\text{Ft}\right)}{3960\times\text{Pump Efficiency}\left(\%\right)\times\text{Motor Efficiency}\left(\%\right)}$$

$$\text{Energy Cons.}\left(\text{kWh}\right)=\text{Power}\left(\text{HP}\right)\times 0.746\left(\frac{\text{KW}}{\text{HP}}\right)\times\text{Operation}\left(\text{Hrs.}\right)$$

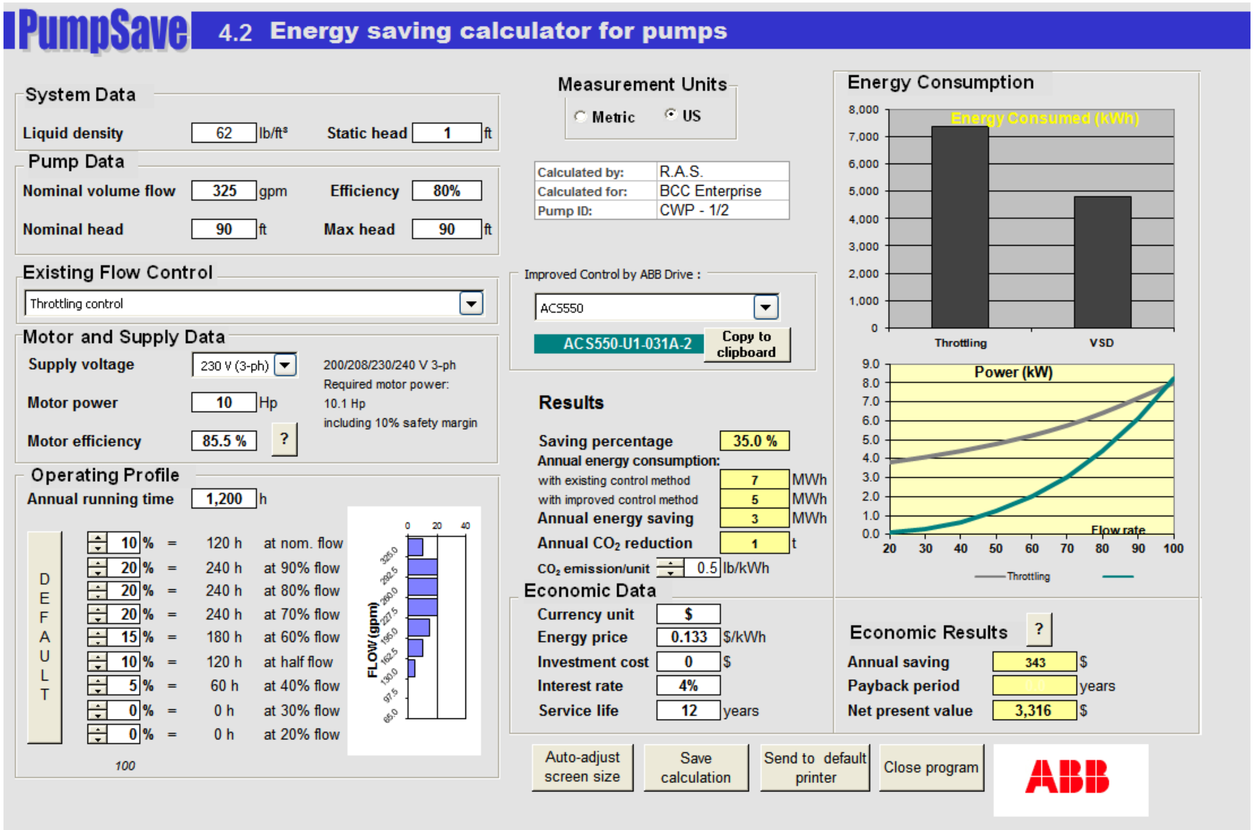
$$\text{Energy Cost}=\text{Energy Usage}\left(\text{kWh}\right)\times\text{Ave Electric Cost}\left(\frac{\$}{\text{kWh}}\right)$$

Hot Water VFD Pumping Energy:



HOT WATER PUMPS VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Pumps	VFD Pumps	
Flow Control	Throttling	VFD	-
Total Flow (GPM)	300	300	-
Head (Ft)	90	90	-
Pump Efficiency (%)	80%	80%	-
Ave. Motor Efficiency (%)	85.5%	85.5%	0.0%
Operating Hrs	1060	1060	-
Estimated Total Horse Power	20.0	20.0	0.00
Elec Cost ($/kWh)	0.141	0.141	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	12,255	8,119	4,136
Electric Energy Cost ($)	$1,728	$1,145	$583
COMMENTS:	- VFD pump energy is based on ABB energy savings calculator for pumps, "Pump Save," version 4.2. Flow rate for VFD Pump calculation is summarized in the operating profile shown in the Pump Save output.		

Chilled Water VFD Pumping Energy:



CHILLED WATER PUMPS VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Pumps	VFD Pumps	
Flow Control	Throttling	VFD	-
Total Flow (GPM)	325	325	-
Head (Ft)	90	90	-
Pump Efficiency (%)	80%	80%	-
Ave. Motor Efficiency (%)	85.5%	85.5%	0.0%
Operating Hrs	1200	1200	-
Estimated Total Horse Power	20.0	20.0	0.00
Elec Cost ($/kWh)	0.141	0.141	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	14,762	9,602	5,160
Electric Energy Cost ($)	$2,081	$1,354	$728
COMMENTS:	- VFD pump energy is based on ABB energy savings calculator for pumps, "Pump Save," version 4.2. Flow rate for VFD Pump calculation is summarized in the operating profile shown in the Pump Save output.		

Installation cost for two 10 HP Chilled water VFDs, two 10 HP hot water VFD's, labor, pressure sensors, and controls is estimated to be $34,510.

Currently there are no **NJ Smart Start® Program Incentives** for installation of Chilled water pump Variable Frequency Drives under 20 HP.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$34,510
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$34,510
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,311
Total Yearly Savings ($/Yr):	$1,311
Estimated ECM Lifetime (Yr):	15
Simple Payback	26.3
Simple Lifetime ROI	-43.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$19,665
Internal Rate of Return (IRR)	-6%
Net Present Value (NPV)	($18,859.37)

ECM #4: Demand Controlled Ventilation

Demand Controlled Ventilation (DCV) is a means to provide active, zone level control of ventilation for spaces within a facility. The basic premise behind DCV is monitoring indoor CO2 levels versus outdoor CO2 levels in order to provide proper ventilation to the spaces within the facility as well as savings derived from treating unconditioned ventilation air. Carbon dioxide ventilation control or demand controlled ventilation (DCV) allows for the measurement and control of outside air ventilation levels to a target cfm/person ventilation rate in the space (i.e., 15 cfm/person) based on the number of people in the space. It is a direct measure of ventilation effectiveness and is a method whereby buildings can regain active and automatic zone level ventilation control, without having to open windows. The fixed ventilation approach depends on a set-it-and-forget-it methodology that is completely unresponsive to changes in the way spaces are utilized/occupied or how equipment is maintained. A DCV system utilizes various control algorithms to maintain a base ventilation rate. The system monitors space CO2 levels and the algorithm automatically adjusts the outdoor and return air dampers to provide the quantity of outdoor air to maintain the required CO2 level in the space. System designs are normally designed for maximum occupancy and the ventilation rates are designed for this (maximum) occupancy. In areas where occupancy swings are prevalent there is ample opportunity to reduce outdoor air quantity to satisfy the needs of the actual number of occupants present. By installing the DCV controls, energy savings are realized by the reduced quantities of outdoor air that do not require heating and cooling energy from the steam and chilled water plants.

When operating the selected units, these units provide minimum amount of outside air to each corresponding space. The outside air volume is typically based on the maximum occupancy of the space conditioned. When a given space is not fully occupied the outside air quantity delivered to the space is greater than the amount needed for adequate ventilation.

This ECM includes the installation of CO_2 sensors integrated into a demand control ventilation system, for the units mentioned above. This system allows the air handling unit to respond to changes in occupancy and therefore reduce the amount of outside air that has to be conditioned. Outside air accounts for a large portion of the energy consumption in the HVAC system, especially in high occupancy spaces.

The components required for the demand control ventilation system installation include damper actuators, Variable Frequency Drives, CO2 sensors, wiring, Energy Management System equipment expansion and programming. Each occupied zone would require minimum one CO_2 sensor installed to monitor occupancy levels, with larger zones requiring additional sensors.

Often heating and air conditioning units switch to occupied mode several hours before the actual occupancy in order to provide pre-heating or pre-cooling of the space. Energy savings achieved through "Demand Control Ventilation" is calculated based on actual occupancy of the spaces and the hours the units are in occupied mode.

Energy Savings Calculations:

Following table summarizes the estimated occupancy characteristics of the spaces and the HVAC equipment at this school.

ENERGY SAVINGS	
ECM INPUTS	**DCV**
Average Full Occupancy Hours	7:00 AM - 10:00 PM
Full Occupancy Hours per Day	15.0
HVAC Eqp. On Occupied Mode	6:00 AM - 11:00 PM
Occupied Hours per day	17
HVAC occupied / spaces not occupied	8.5
Est. Conditioned outside air savings	50%

Following is a list of HVAC equipment and corresponding spaces identified for Demand Controlled Ventilation.

IMPLEMENTATION SUMMARY						
INPUTS	**Service**	**# of CO2 SENSORS**	**HVAC Unit**	**Outside Air Flow, CFM**	**Est. Outside Air Cooling Capaity, Tons**	**Est. Outside Air Heating Capacity, MBH**
DCV-2	Room 132	1	AHU-2	1100	6	77
DCV-5	Atrium	2	AHU-5	3810	19	267
DCV-6	Room 320	1	AHU-6	1440	7	101
Total					**32**	**446**

Estimated outside air heating capacity = 1.08 x Fresh Air CFM x design day ΔT

$$\text{Cooling Energy Usage} = \frac{\text{Cooling}(\text{Tons}) \times 12{,}000\left(\frac{\text{Btu}}{\text{Ton hr}}\right) \times \text{Annual Full Load Cooling Hrs.}}{1000\left(\frac{\text{Wh}}{\text{kWh}}\right) \times \text{EER}\left(\frac{\text{Btu}}{\text{Wh}}\right)}$$

$$\text{Energy Savings} = \text{Cooling Energy}(\text{kwh}) \times \text{Estimated Energy Savings}(\%)$$

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

$$\text{Heating Energy}(\text{Therms}) = \frac{\text{Outside Air Heating Capacity}\left(\frac{\text{Btu}}{\text{Hr.}}\right) \times \text{HDD}(\text{Day °F}) \times 12\left(\frac{\text{Hr.}}{\text{Day}}\right) \times (0.60)}{65(\text{°F}) \times \text{Fuel Heat Value}\left(\frac{\text{Btu}}{\text{Therms}}\right) \times \text{Heating Efficiency}(\%)}$$

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

DEMAND CONTROLLED VENTILATION	
ECM INPUTS	**DCV- 7, 8, 12, 14, 15**
Equipment	AHU - 7, 8, 12, 14, 15
Total Cooling Capacity, Tons	32
Efficiency (EER)	15.0
Annual Full Load Cooling Hours	800
Total Heating Capacity, MBh	446
Heating Efficiency (Gas)	80%
Heating Degree Days (65°F)	4600
Energy Savings	50%
Elec Cost ($/kWh)	$0.147
Natural Gas Cost ($/Therm)	$1.18
ENERGY SAVINGS	
ECM RESULTS	**DCV- 7, 8, 12, 14, 15**
Cooling Energy Cnsmption, kWh	20,320
Heating Energy (Therms)	2,839
Cooling Energy Savings kWh	10,160
Heating Energy Savings (Therms)	1,420
Electric Energy Cost Savings ($)	$1,494
Total Gas Cost Savings ($)	$1,675
Total Cost Savings ($)	$3,169
COMMENTS:	HDD estimated based on Newark,NJ.

Cost and Incentives:

Estimated installed cost for demand controlled ventilation for the selected areas is $59,000. Estimated cost includes CO2 sensors, control wiring, electrical wiring, control system equipment expansion and programming.

There are currently no Smart Start ® incentives available for a Demand Control Ventilation System.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$59,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$59,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,169
Total Yearly Savings ($/Yr):	$3,169
Estimated ECM Lifetime (Yr):	15
Simple Payback	18.6
Simple Lifetime ROI	-19.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$47,535
Internal Rate of Return (IRR)	-3%
Net Present Value (NPV)	($21,168.68)

ECM #5: High Efficiency Indirect Hot Water Heater

Description:

The Laurel Hall has an existing 120 gallon electric hot water heater which is located in the 1st floor mechanical room of the building. The heater is within its useful life and appears to be in good condition.

Hot water heating via electricity is approximately four times more expensive than natural gas. However, the Laurel Hall currently does not have gas feed into the building. An alternative approach would be to use an indirect hot water heater to utilize the campus heating hot water system.

This ECM will install an indirect hot water heater in series with the existing electric domestic water heater tank. The new heater will produce domestic hot water, which will be circulated through the existing tank during the heating season when the heating hot water system is active. During the summer, the new heater can be by-passed or remain connected to serve as an extra storage.

This ECM will upgrade the domestic hot water heating system during the heating season. The basis for this ECM is Weil Mclain Gold Plus 30 Indirect Water Heater.

Energy Savings Calculations:

Energy Density for "Educational" type building = 5.2 kBtu / SF / year

$$\text{DHW Heat Usage} = \text{Energy Density}\left(\frac{\text{kBtu yr}}{\text{SF}}\right) \times \text{Building Square Footage (SF)}$$

$$\text{DHW Total Usage} = \frac{\text{Dom HW Heat Cons.}(\text{Btu})}{\text{Heating Eff.}(\%) \times \text{Fuel Heat Value}\left(\frac{\text{BTU}}{\text{Fuel Unit}}\right)}$$

$$\text{Energy Cost} = \text{Heating Fuel Usage}(\text{Fuel Units}) \times \text{Ave Fuel Cost}\left(\frac{\$}{\text{Fuel Unit}}\right)$$

INSTANT DOM. HOT WATER HEATER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Hot Water Heater	Bradford White High Efficiency	
Building Type	Educational		
Building Square-foot	53,000	53,000	
Domestic Water Usage, kBtu	275,600	275,600	
DHW Heating Fuel Type	Electric	Gas	
Storage Capacity (gallons)	*120*	*150*	
Tank Surface Area (sq-ft)	71	99	
Tank R-Value (h-^oF-ft^2/Btu)	16	16	
Tank Loss (kBtu)	2,129	2,980	
Heating Efficiency	100%	75%	-25%
Total Usage (kBTU)	277,729	371,440	-93,711
Electric Cost ($/kWh)	$ 0.143	$ 0.143	
Nat Gas Cost ($/Therm)	$ 1.060	$ 1.060	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Usage (kWh)	81,374	0	81,374
Natural Gas Usage (Therms)	0	3,714	-3,714
Energy Cost ($)	$11,636	$3,937	$7,699
COMMENTS:	Savings are based on Energy Information Administration Commercial Building Energy Consumption Survey 2003 Information		

Since the system will be utilized during the heating season, only half of the prospected savings will be realized.

ENERGY SAVINGS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
System Utilization	12 mo/year on Electricity	6 mo/year on Electricity	
Electric Usage (kWh)	81,374	40,687	40,687
Natural Gas Usage (Therms)	0	1,857	-1,857
Energy Cost ($)	$5,818	$1,969	$3,850
COMMENTS:	Savings are based on Energy Information Administration Commercial Building Energy Consumption Survey 2003 Information		

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$5,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$3,850
Total Yearly Savings ($/Yr):	$3,850
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.3
Simple Lifetime ROI	1054.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$57,744
Internal Rate of Return (IRR)	77%
Net Present Value (NPV)	$40,956.15

REM #1: Rooftop Solar Photovoltaic Array

Description:

Laurel Hall has approximately 2,400 square-feet of available roof space that can accommodate a 24 kilowatt solar array, assuming the existing roof structure is capable of supporting an array.

The array will produce approximately 39,050 kilowatt-hours annually that will reduce the overall electric usage of the facility 6.09%.

Energy Savings Calculations:

See **LGEA Solar Financials Appendix** for detailed financial summary and proposed solar layout areas.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW_{DC}):	29.61
Electric Generation (KWH/Yr):	39,050
Installation Cost ($):	$170,022
SREC Revenue ($/Yr):	$15,058
Energy Savings ($/Yr):	$6,014
Total Yearly Savings ($/Yr):	$21,072
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	8.1
Analysis Period Electric Savings ($):	$111,848
Analysis Period SREC Revenue ($):	$218,132
Net Present Value (NPV)	$55,373.76

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. Maintain all weather stripping on windows and doors.

B. Clean all light fixtures to maximize light output.

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

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

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Burlington County College, Mt. Laurel Campus - Laurel Hall

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 ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM #1	Lighting Equipment Upgrade	$24,605	$0	$774	$23,831	$3,660	$0	$3,660	15	$54,906	$0	130%	6.5	12.9%	$19,866.94
ECM #2	Premium Efficiency Motors	$10,240	$0	$400	$9,840	$376	$0	$376	15	$5,640	$0	-42.7%	26.2	-6.3%	($5,351.34)
ECM #3	VFDs on Pumps	$20,300	$14,210	$0	$34,510	$1,311	$0	$1,311	15	$19,665	$0	-43.0%	26.3	-6.3%	($18,859.37)
ECM #4	Demand Controlled Ventilation (Atrium, 320, 132)	$34,000	$25,000	$0	$59,000	$3,169	$0	$3,169	15	$47,535	$0	-19.4%	18.6	-2.6%	($21,168.68)
ECM #5	Install Indirect Hot Water Heater	$2,000	$3,000	$0	$5,000	$3,850	$0	$3,850	15	$57,744	$0	1055%	1.3	77.0%	$40,956.15
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	24 KW PV Array	$316,080	$0	$0	$316,080	$6,014	$15,058	$21,072	15	$316,080	$225,870	0.0%	15.0	0%	($64,523.83)

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.

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

SmartStart Building Incentives

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

Building ID: 2846455
For 12-month Period Ending: June 30, 2011[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 29, 2011

Facility
Laurel Hall
500 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Year Built: 2000
Gross Floor Area (ft^2): 53,023

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	2,188,604
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	2,188,604
Energy Intensity[5]	
Site (kBtu/ft^2/yr)	41
Source (kBtu/ft^2/yr)	138
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	310
Electric Distribution Utility	
Public Service Electric & Gas Co	
National Average Comparison	
National Average Site EUI	120
National Average Source EUI	280
% Difference from National Average Source EUI	-51%
Building Type	College/University (Campus-Level)

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[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
Mike 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	Laurel Hall	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	College/University (Campus-Level)	Is this an accurate description of the space in question?		☐
Location	500 College Circle, Mount Laurel, NJ 08054	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 acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐

Laurel Hall (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	53,023 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.		☐
Number of PCs	N/A(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	N/A(Optional)	Is this the total number of hours per week that the 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	N/A(Optional)	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.		☐

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))**
06/01/2011	06/30/2011	52,613.00
05/01/2011	05/31/2011	47,001.00
04/01/2011	04/30/2011	59,063.00
03/01/2011	03/31/2011	52,267.00
02/01/2011	02/28/2011	54,527.00
01/01/2011	01/31/2011	42,974.00
12/01/2010	12/31/2010	54,928.00
11/01/2010	11/30/2010	58,327.00
10/01/2010	10/31/2010	53,949.00
09/01/2010	09/30/2010	57,810.00
08/01/2010	08/31/2010	52,082.00
07/01/2010	07/31/2010	55,902.00
Electric Consumption (kWh (thousand Watt-hours))		**641,443.00**
Electric Consumption (kBtu (thousand Btu))		**2,188,603.52**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**2,188,603.52**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity 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
Laurel Hall
500 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

General Information

Laurel Hall	
Gross Floor Area Excluding Parking: (ft^2)	53,023
Year Built	2000
For 12-month Evaluation Period Ending Date:	June 30, 2011

Facility Space Use Summary

Laurel Hall	
Space Type	Other - College/University (Campus-Level)
Gross Floor Area(ft^2)	53,023
Number of PCs[o]	N/A
Weekly operating hours[o]	N/A
Workers on Main Shift[o]	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 06/30/2011)	**Baseline** (Ending Date 06/30/2011)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	41	41	0	N/A	120
Source (kBtu/ft²)	138	138	0	N/A	280
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/ft²/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	310	310	0	N/A	901
$kgCO_2e/ft^2$/year	6	6	0	N/A	17

More than 50% of your building is defined as College/University (Campus-Level). This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for College/University (Campus-Level). This building uses X% less energy per square foot than the CBECS national average for College/University (Campus-Level).

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Laurel Hall

Air Handling Units and Fans

Tag	AHU-1	AHU-2	AHU-3
Unit Type	VAV AHU with Hot and Chilled Water	VAV AHU with Hot and Chilled Water	VAV AHU with Hot and Chilled Water
Qty	1	1	1
Location	1st Floor MER	Classroom	2nd Floor MER
Area Served	1st floor classrooms	Classroom 132	2nd floor classrooms
Manufacturer	Trane	Trane	Trane
Mode / Serial #	K01H16674C	-	K01H16688C
Flow CFM	5300	1900	5100
Cooling Type	Chilled Water	Chilled Water	Chilled Water
Cooling Capacity (MBH)	261	99	434
Heating Type	Hot Water	Hot Water	Hot Water
Heating Input (MBH)	84	90	390
Supply Fan HP Motor Efficiency	5 HP 87.5%	1 HP (est)	7.5 HP 88.5%
Return Fan HP Motor Efficiency	N/A	N/A	3 HP 86.5%
Approx Age	10	10	10
ASHRAE Service Life	15	15	15
Remaining Life	5	5	5
Comments	Constant Volume Units		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Laurel Hall

Air Handling Units and Fans

Tag	AHU-4	AHU-5	AHU-6
Unit Type	VAV AHU with Hot and Chilled Water	VAV AHU with Hot and Chilled Water	VAV AHU with Hot and Chilled Water
Qty	1	1	2
Location	3rd Floor MER	2nd Floor MER	3rd Floor MER
Area Served	3rd floor classrooms	Atrium	Room 320
Manufacturer	Trane	Trane	Trane
Serial #	K01H16695C	K01H16702C	K01H16709C
Flow CFM	5100	5400	3600
Cooling Type	Chilled Water	Chilled Water	Chilled Water
Cooling Capacity (Tons)	434	214	191
Heating Type	Hot Water	Hot Water	Hot Water
Heating Input (MBH)	390	152	177
Supply Fan HP Motor Efficiency	7.5 HP 88.5%	5 HP 87.5%	3 HP 86.5%
Return Fan HP Motor Efficiency	N/A	3 HP 86.5%	N/A
Approx Age	10	10	10
ASHRAE Service Life	15	15	16
Remaining Life	5	5	6
Comments	Constant Volume Units		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Laurel Hall

Heat Exchanger

Tag	HE / CH-2		
Unit Type	Plate/Frame Heat Exchanger		
Qty	1		
Location	1st Floor MER		
Area Served	Campus CW Loop / Building CW Loop		
Manufacturer	Alfa Laval		
Model #	M6-FG		
Serial #	30104-84204		
Max Pressure	150 psi		
Capacity	2,629		
Primary / Secondary Temperatures	42 - 55 °F 56 - 44 °F		
Approx Age	10		
ASHRAE Service Life	20		
Remaining Life	10		
Comments	-		

Note:

"N/A" = Not Applicable.

"-" = Info Not Available

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Laurel Hall

Pumps

Tag	HW Pumps	CW Pumps	Circulators
Unit Type	Pipe mounted	Pipe mounted	Pipe Mtd. Circulation Pumps
Qty	2	2	1
Location	1st floor MER	1st Floor MER	1st Floor MER
Area Served	Heating Hot Water Loop	Chilled Water Loop	Domestic Hot Water Loop
Manufacturer	Taco	Taco	-
Model #	-	-	-
Serial #	-	-	-
Horse Power	10	10	1/4
Flow	233 GPM @ 90 ft	471 GPM @ 90 ft	-
Motor / Frame Info	Baldor 215JM	Baldor 215JM	-
Electrical Power	230/460/3/60	230/460/3/60	115/1/60
RPM	1725	1725	1725
Motor Efficiency %	85.5%	85.5%	-
Approx Age	10	10	10
ASHRAE Service Life	20	20	20
Remaining Life	10	10	10
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Laurel Hall

Domestic Water Heaters

Tag	**HWH**		
Unit Type	Electric water heater		
Qty	1		
Location	1st Floor MER		
Area Served	Domestic Hot Water		
Manufacturer	AO Smith		
Model #	DSE120-18		
Serial #	SD01-89227		
Size (Gallons)	120		
Input Capacity (MBH/KW)	18 kW		
Recovery (Gal/Hr)	-		
Efficiency %	-		
Fuel	Electricity		
Approx Age	10		
ASHRAE Service Life	12		
Remaining Life	2		
Comments			

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

Investment Grade Lighting Audit

CEG Job #: 9C11023

Project: Laurel Hall

Laurel Hall

KWH COST: $0.141

Bldg. Sq. Ft. 53,023

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
221.34	2nd Floor Comm Closet	600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	34.8	$4.91	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	30	$4.23	$30.00	$30.00	0.01	4.8	$0.68	44.33
232.22	Room 203	2350	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	2,223.1	$313.46	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1861.2	$262.43	$45.00	$495.00	0.15	361.9	$51.03	9.70
232.22	Room 204	2100	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,986.6	$280.11	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1663.2	$234.51	$45.00	$495.00	0.15	323.4	$45.60	10.86
232.22	Room 205	2000	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,892.0	$266.77	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1584	$223.34	$45.00	$495.00	0.15	308	$43.43	11.40
232.22	Room 206	1350	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,277.1	$180.07	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1069.2	$150.76	$45.00	$495.00	0.15	207.9	$29.31	16.89
232.22	Room 207	2200	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	2,081.2	$293.45	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1742.4	$245.68	$45.00	$495.00	0.15	338.8	$47.77	10.36
232.22	Room 208	1700	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,608.2	$226.76	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1346.4	$189.84	$45.00	$495.00	0.15	261.8	$36.91	13.41
232.22	Room 209	1650	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,560.9	$220.09	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1306.8	$184.26	$45.00	$495.00	0.15	254.1	$35.83	13.82
232.22	Room 210	1700	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,608.2	$226.76	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1346.4	$189.84	$45.00	$495.00	0.15	261.8	$36.91	13.41
232.22	Room 211	1500	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,419.0	$200.08	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1188	$167.51	$45.00	$495.00	0.15	231	$32.57	15.20
232.22	Room 212	1640	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,551.4	$218.75	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1298.88	$183.14	$45.00	$495.00	0.15	252.56	$35.61	13.90
221.34	Elevator Closet	400	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	46.4	$6.54	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	40	$5.64	$30.00	$60.00	0.02	6.4	$0.90	66.49
221.34	Storage Closet	400	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	46.4	$6.54	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	40	$5.64	$30.00	$60.00	0.02	6.4	$0.90	66.49
221.34	Custodial Closet	800	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	46.4	$6.54	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	40	$5.64	$30.00	$30.00	0.01	6.4	$0.90	33.24
221.34	Mech Room	600	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.23	139.2	$19.63	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	120	$16.92	$30.00	$120.00	0.03	19.2	$2.71	44.33
221.22	2nd Floor Corridor	3000	46	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.85	8,556.0	$1,206.40	46	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.30	6900	$972.90	$30.00	$1,380.00	0.55	1656	$233.50	5.91
221.21	Men's Restroom	3000	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	930.0	$131.13	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	750	$105.75	$30.00	$150.00	0.06	180	$25.38	5.91

Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
221.21	Women's Restroom	3000	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	930.0	$131.13	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	750	$105.75	$30.00	$150.00	0.06	180	$25.38	5.91
221.34	1st Floor Elect Room	600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	34.8	$4.91	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	30	$4.23	$30.00	$30.00	0.01	4.8	$0.68	44.33
221.34	Service Bay	600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	69.6	$9.81	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	60	$8.46	$30.00	$60.00	0.02	9.6	$1.35	44.33
221.34	Storage Closet	600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	69.6	$9.81	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	60	$8.46	$30.00	$60.00	0.02	9.6	$1.35	44.33
221.34	Custodial Closet	600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	69.6	$9.81	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	60	$8.46	$30.00	$60.00	0.02	9.6	$1.35	44.33
222.23	Room 133	2600	22	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Dirrect/ Indirect	58	1.28	3,317.6	$467.78	22	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.10	2860	$403.26	$30.00	$660.00	0.18	457.6	$64.52	10.23
222.23	Room 134	2000	9	2	2x4, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Dirrect/ Indirect	58	0.52	1,044.0	$147.20	9	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.45	900	$126.90	$30.00	$270.00	0.07	144	$20.30	13.30
221.22	Room 132	2200	16	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.99	2,182.4	$307.72	16	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.80	1760	$248.16	$30.00	$480.00	0.19	422.4	$59.56	8.06
563		2200	10	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	0.52	1,144.0	$161.30	10	0	No Change	0	0.00	0	$0.00	$40.00	$400.00	0.00	0	$0.00	0.00
558		2200	50	1	Recessed Down Light, 90w R30 Lamp	90	4.50	9,900.0	$1,395.90	50	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	1.30	2860	$403.26	$20.00	$1,000.00	3.20	7040	$992.64	1.01
221.21	Men's Restroom	2600	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	806.0	$113.65	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	650	$91.65	$30.00	$150.00	0.06	156	$22.00	6.82
221.21	Women's Restroom	2600	5	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.31	806.0	$113.65	5	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.25	650	$91.65	$30.00	$150.00	0.06	156	$22.00	6.82
221.34	Comm Closet	600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	34.8	$4.91	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	30	$4.23	$30.00	$30.00	0.01	4.8	$0.68	44.33
232.22	Offices 108-117	2100	38	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	3.27	6,862.8	$967.65	38	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	2.74	5745.6	$810.13	$45.00	$1,710.00	0.53	1117.2	$157.53	10.86
221.22		2100	2	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.12	260.4	$36.72	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	210	$29.61	$30.00	$60.00	0.02	50.4	$7.11	8.44
227.22	108-117 Hall	2600	11	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.64	1,658.8	$233.89	11	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Faculty Lounge	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$126.11	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$105.58	$45.00	$180.00	0.06	145.6	$20.53	8.77
232.22	Mail Room	2600	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.09	223.6	$31.53	1	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.07	187.2	$26.40	$45.00	$45.00	0.01	36.4	$5.13	8.77
232.22	Room 127	1500	20	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.72	2,580.0	$363.78	20	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.44	2160	$304.56	$45.00	$900.00	0.28	420	$59.22	15.20

Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
563	Common Area	3000	22	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	1.14	3,432.0	$483.91	22	0	No Change	0	0.00	0	$0.00	$40.00	$880.00	0.00	0	$0.00	0.00
735		3000	18	1	175w MH, 2x2, Recessed Mnt., Prismatic Lens	210	3.78	11,340.0	$1,598.94	18	1	150w MH Energy Master Lamp; Venture Lighting	185	3.33	9990	$1,408.59	$70.00	$1,260.00	0.45	1350	$190.35	6.62
232.22		3000	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	1,548.0	$218.27	6	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.43	1296	$182.74	$45.00	$270.00	0.08	252	$35.53	7.60
221.22	1st Floor Corridor	3000	38	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.36	7,068.0	$996.59	38	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.90	5700	$803.70	$30.00	$1,140.00	0.46	1368	$192.89	5.91
221.34	Comm Closet	600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	34.8	$4.91	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	30	$4.23	$30.00	$30.00	0.01	4.8	$0.68	44.33
221.22	Room 302	2600	32	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	1.98	5,158.4	$727.33	32	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	1.60	4160	$586.56	$30.00	$960.00	0.38	998.4	$140.77	6.82
563		2600	14	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	0.73	1,892.8	$266.88	14	0	No Change	0	0.00	0	$0.00	$40.00	$560.00	0.00	0	$0.00	0.00
558		2600	24	1	Recessed Down Light, 90w R30 Lamp	90	2.16	5,616.0	$791.86	24	1	Energy Star Rated, Dimmable 26w CFL Lamp	26	0.62	1622.4	$228.76	$20.00	$480.00	1.54	3993.6	$563.10	0.85
232.22	302 Storage	600	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.09	51.6	$7.28	1	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.07	43.2	$6.09	$45.00	$45.00	0.01	8.4	$1.18	37.99
232.22	Prep Room	600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	206.4	$29.10	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	172.8	$24.36	$45.00	$180.00	0.06	33.6	$4.74	37.99
232.22	Room 303	1700	12	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.03	1,754.4	$247.37	12	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.86	1468.8	$207.10	$45.00	$540.00	0.17	285.6	$40.27	13.41
232.22	Room 304	1500	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,419.0	$200.08	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1188	$167.51	$45.00	$495.00	0.15	231	$32.57	15.20
232.22	Room 305	1700	12	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.03	1,754.4	$247.37	12	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.86	1468.8	$207.10	$45.00	$540.00	0.17	285.6	$40.27	13.41
232.22	Room 306	1700	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,608.2	$226.76	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1346.4	$189.84	$45.00	$495.00	0.15	261.8	$36.91	13.41
232.22	Room 307	1640	12	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.03	1,692.5	$238.64	12	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.86	1416.96	$199.79	$45.00	$540.00	0.17	275.52	$38.85	13.90
221.22	Women's Restroom	2000	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.50	992.0	$139.87	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	800	$112.80	$30.00	$240.00	0.10	192	$27.07	8.87
221.21	Men's Restroom	2000	8	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.50	992.0	$139.87	8	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.40	800	$112.80	$30.00	$240.00	0.10	192	$27.07	8.87
232.22	Room 308	1700	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,608.2	$226.76	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1346.4	$189.84	$45.00	$495.00	0.15	261.8	$36.91	13.41
232.22	Room 309	1550	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,466.3	$206.75	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1227.6	$173.09	$45.00	$495.00	0.15	238.7	$33.66	14.71
232.22	Room 310	2012	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,903.4	$268.37	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	1593.5	$224.68	$45.00	$495.00	0.15	309.848	$43.69	11.33

Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
232.22	Room 311	1240	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,173.0	$165.40	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	982.08	$138.47	$45.00	$495.00	0.15	190.96	$26.93	18.38
232.22	Room 312	1122	11	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.95	1,061.4	$149.66	11	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.79	888.624	$125.30	$45.00	$495.00	0.15	172.788	$24.36	20.32
221.34	Storage Closet	600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	69.6	$9.81	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	60	$8.46	$30.00	$60.00	0.02	9.6	$1.35	44.33
221.22	3rd Floor Corridor	3000	46	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	2.85	8,556.0	$1,206.40	46	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	2.30	6900	$972.90	$30.00	$1,380.00	0.55	1656	$233.50	5.91
			714	65				113,738	$16,037	668	134			37.7	79,650	$11,231		$24,605	11.8	25,960	$3,660	6.72

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.
2. Lamp totals only include T-12 tube replacement calculations

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
Laurel Hall	2400	SHARP NU-U235F2	126	17.5	2,210	29.61	39,050	24.0	5,279	13.40

.= Proposed PV Layout

Notes:

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

PVWatts Program Data Output - Pitched Roof Panels

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	29.6 kW
DC to AC Derate Factor:	0.810
AC Rating:	24.0 kW
Array Type:	Fixed Tilt
Array Tilt:	30.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	14.1 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	3.35	2580	363.78
2	4.01	2770	390.57
3	4.73	3476	490.12
4	5.34	3686	519.73
5	5.69	3985	561.89
6	5.81	3790	534.39
7	5.84	3883	547.50
8	5.58	3725	525.23
9	5.23	3449	486.31
10	4.43	3106	437.95
11	3.36	2397	337.98
12	2.94	2202	310.48
Year	4.70	39050	5506.05

Project Name: BCC Mount Laurel Campus
Location: Laurel Hall
Description: Photovoltaic System 100% Financing - 15 year

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$170,222
Annual kWh Production	39,050
Annual Energy Cost Reduction	$6,014
Average Annual SREC Revenue	$15,058
Simple Payback:	**8.08** Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.154**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value ($/kWh)	$0.386

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	39,050	$6,014	$0	$21,478	$10,017	$7,220	$10,254	$10,254
2	$0	38,855	$6,194	$0	$21,370	$9,572	$7,666	$10,327	$20,581
3	$0	38,660	$6,380	$0	$19,330	$9,099	$8,138	$8,473	$29,054
4	$0	38,467	$6,571	$0	$17,310	$8,597	$8,640	$6,644	$35,699
5	$0	38,275	$6,768	$394	$17,224	$8,064	$9,173	$6,361	$42,059
6	$0	38,083	$6,972	$392	$17,138	$7,498	$9,739	$6,480	$48,539
7	$0	37,893	$7,181	$390	$15,157	$6,897	$10,340	$4,710	$53,249
8	$0	37,704	$7,396	$388	$15,081	$6,260	$10,977	$4,852	$58,101
9	$0	37,515	$7,618	$386	$13,130	$5,583	$11,655	$3,125	$61,226
10	$0	37,327	$7,847	$384	$13,065	$4,864	$12,373	$3,290	$64,516
11	$0	37,141	$8,082	$383	$11,142	$4,101	$13,137	$1,604	$66,120
12	$0	36,955	$8,324	$381	$11,087	$3,290	$13,947	$1,793	$67,913
13	$0	36,770	$8,574	$379	$9,193	$2,430	$14,807	$151	$68,064
14	$0	36,587	$8,831	$377	$9,147	$1,517	$15,720	$364	$68,428
15	$0	36,404	$9,096	$375	$7,281	$547	$16,690	($1,235)	$67,193
	Totals:	565,686	$111,848	$4,230	$218,132	$88,335	$170,222	$67,193	$760,996
						Net Present Value (NPV)	**$55,374**		

BURLINGTON COUNTY COLLEGE
MOUNT LAUREL CAMPUS

CENTRAL ENERGY PLANT

500 COLLEGE CIRCLE
MT. LAUREL, NJ 08054

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:	Large Power and Light Service (LPLP)
Third Party Supplier:	Liberty Power

Natural Gas Utility Provider:	Public Service Electric & Gas
Utility Rate Structure:	Large Volume Gas (LVG)
Third Party Supplier:	Pepco Energy Services

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.

Annual hot and chilled water production profile shows the actual hot and chilled water usage of the campus. Hot and chilled water production is measured in gallons.

Table 1
Electricity Billing Data

ELECTRIC USAGE SUMMARY

Utility Provider:	Public Service Electric & Gas (PSEG)
Rate:	Large Power and Lighting Service (LPLP)
Meter No:	778020642
Account #	42 099 221 18 / PE000011000111279214
Third Party Utility Provider:	Libery Power
TPS Meter / Acct No:	-

MONTH OF USE	CONSUMPTION KWH	DEMAND KW		TOTAL BILL
Jul-10	184,411	548		$28,768
Aug-10	143,095	340		$22,180
Sep-10	108,646	360		$16,514
Oct-10	67,146	364		$9,132
Nov-10	57,099	300		$7,651
Dec-10	54,967	208		$7,476
Jan-11	51,848	100		$6,948
Feb-11	50,037	148		$6,555
Mar-11	29,518	120		$3,955
Apr-11	33,573	328		$4,532
May-11	55,445	292		$7,485
Jun-11	118,594	364		$18,738
Totals	**954,379**	**548**	**Max**	**$139,934**

AVERAGE DEMAND **289.3 KW average**

AVERAGE RATE **$0.147 $/kWh**

Figure 1
BCC- Mount Laurel Campus - Central Energy Plant
Electric Usage Profile
July-10 through June-11

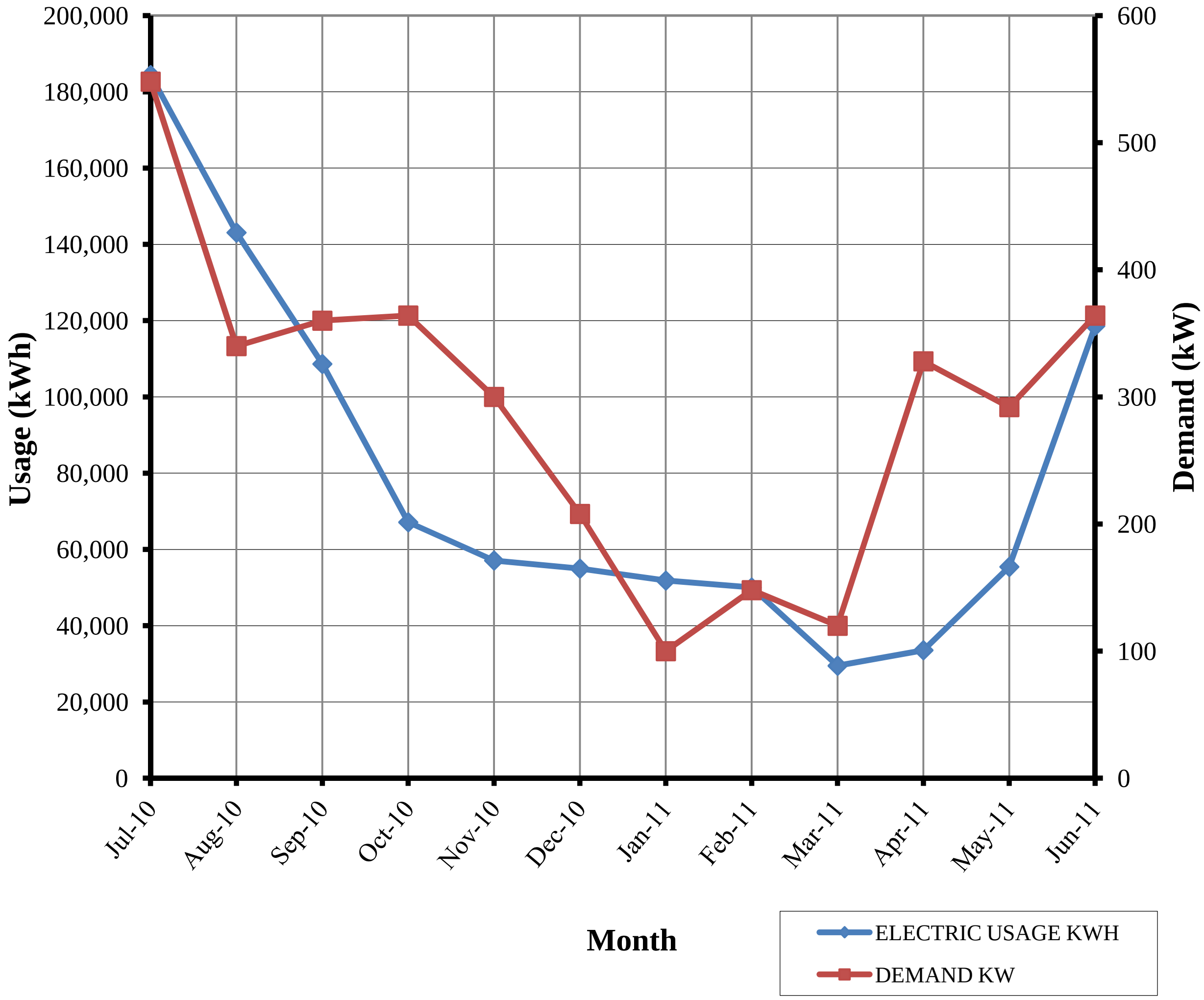


Table 2
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	PSEG	
Rate:	LVG	
Meter No:	3010534	
Point of Delivery ID:	42 009 221 18 / PG000011000110479214	
Third Party Utility Provider:	Pepco	
TPS Meter No:	-	
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
May-10	291.00	$150.00
Jun-10	0.00	$96.06
Jul-10	0.00	$97.29
Aug-10	0.00	$97.29
Sep-10	264.50	$136.61
Oct-10	6,221.04	$3,748.06
Nov-10	14,868.19	$18,131.39
Dec-10	18,563.88	$19,287.71
Jan-11	15,358.22	$18,038.60
Feb-11	11,531.48	$13,544.00
Mar-11	5,288.86	$3,374.48
Apr-11	337.19	$145.47
TOTALS	**72,724.34**	**$76,846.96**
AVERAGE RATE:	**$1.06**	**$/THERM**

Figure 2
BCC - Mt. Laurel Campus - Central Energy Plant
Gas Usage Profile
May-10 through April-11

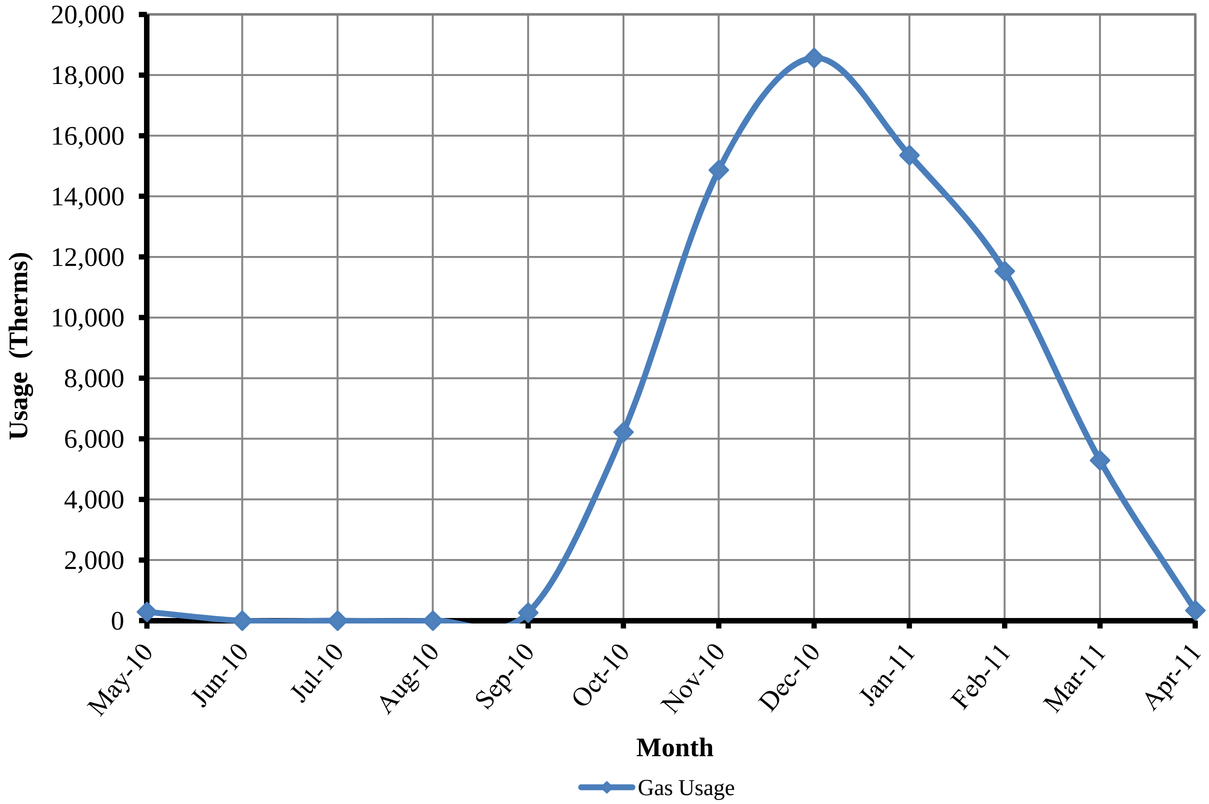


Table 3
Hot and Chilled Water Production Profile

HOT WATER / CHILLED WATER PRODUCTION							
Utility Provider: Central Energy Plant							
Estimated 15°F (Hot Water)							
Estimated 8°F (Chilled Water)							
MONTH OF USE	**CHILLED WATER PRODUCTION (1,000 GALLONS)**	**HOT WATER PRODUCTION (1,000 GALLONS)**	**TOTAL ELECTRIC BILL**	**TOTAL GAS BILL**	**TOTAL BILL**	**CHILLED WATER COST**	**HOT WATER COST**
Jul-10	*41,546*	-	$28,768	$97	$28,918	28,768	$97
Aug-10	*34,760*	-	$22,180	$97	$22,276	22,180	$97
Sep-10	31,097	-	$16,514	$137	$16,611	16,514	$137
Oct-10	10,048	10,048	$9,132	$3,748	$9,229	*9,132*	*$3,748*
Nov-10		12,684	$7,651	$18,131	$7,788	-	$18,131
Dec-10	-	25,278	$7,476	$19,288	$11,224	-	$19,288
Jan-11	-	15,021	$6,948	$18,039	$25,079	-	$18,039
Feb-11	-	10,962	$6,555	$13,544	$25,843	-	$13,544
Mar-11	-	8,545	$3,955	$3,374	$21,994	-	$3,374
Apr-11	12,062		$4,532	$145	$18,076	4,532	$145
May-11	16,121		$7,485	*$100*	*$10,860*	7,485	$100
Jun-11	32,876	-	$18,738	*$100*	*$18,883*	18,738	$100
TOTALS	**178,509**	**82,538**	**$139,934**	**$76,801**	**$216,781**	**107,349**	**$76,801**

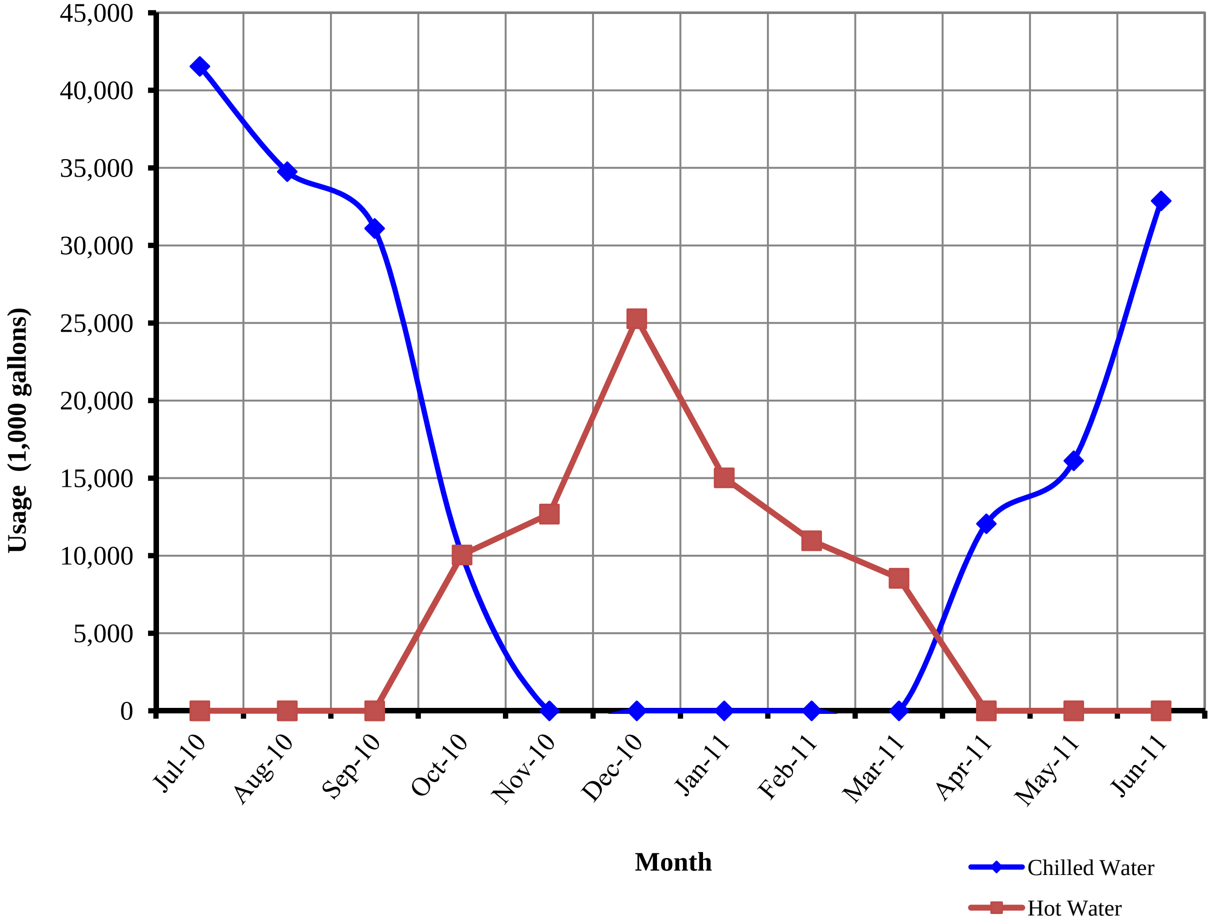
Average Chilled Water Cost: **$0.6/1000 Gal**

Average Hot Water Cost: **$0.93/1000 Gal**

Usage estimated for Jul-Aug 2010 based on monthly electricity consumption

October chilled water usages assumed to be 50% of total hot/chilled water usage

Figure 3
BCC Mount Laurel - Central Energy Plant
Hot & Chilled Water Production Profile
July-10 through June-11



II. FACILITY DESCRIPTION

The BCC Mount Laurel Campus Central Energy Plant is a 10,253 SF standalone facility housing the central heating and cooling systems for the campus. The Plant was built in 2002. The Central Energy Plant houses two (2) large water cooled chillers, (2) large hot water boilers, associated hot water and chilled water pumps, condenser pumps, electrical switchgear and cooling towers.

Building Profile

The Central Energy Plant operates 24 hours per day housing the plant operators, campus maintenance team and campus security office. Estimated average occupancy is 10.

The Central Energy Plant is a single story facility with a mezzanine. Exterior walls are brick faced with a concrete block construction with estimated 1” insulation. The facility has a standing seam metal roof.

Heating Systems

Heating for the campus is provided by two (2) water tube boilers made by Bryan. Each boiler has 10,500 MBH input capacity with 80% thermal efficiency. The boilers are coupled with PowerFlame modulating burners with approximately 1/3 turn-down ratio. The boilers were built in 2001 and appear to be in good condition. The boilers utilize natural gas for fuel and have the capability to operate on heating oil in emergency mode. The units were not able to be visually inspected internally during the survey. The hot water is circulated throughout the campus via a primary/secondary hot water pumping system.

Cooling System

The cooling for the campus is provided by two (2), 450 Ton, York YT series variable speed water cooled centrifugal chillers. The chillers are in excellent condition and are cooled by two (2) cross flow cooling towers made by Evapco. The cooling towers are in good condition and include variable speed fans.

The chillers are designed for 94°F return and 85°F supply condenser water temperature. However, the condenser water supply temperature set-point is set to 70°F. During the survey both cooling towers were running at 100% speed and making 76°F condenser water. Cooling towers cannot produce supply water with a temperature below wet-bulb temperature of the ambient air. Since the set-point is beyond theoretical limits, the cooling tower fans will run at 100% speed during majority of the cooling season. An efficient practice is to vary the condenser water supply temperature based on outside air wet-bulb temperature. Concord recommends configuring the condenser water supply temperature set-point such that the control system varies supply temperature to stay 6-8°F above wet-bulb temperature.

It is also recommended to vary chilled water supply temperature based on outside air temperature. Raising the chilled water supply temperature will result in higher chiller efficiency.

Pumping System

The heating and cooling pumping system in the Mt. Laurel Campus is a 4-pipe system. Heating water and chilled water are independently circulated via independent pumps. Separate chilled water and heating water is supplied to each building simultaneously. This allows Central Plant to supply chilled water and heating water at the same time for the “swing” months as well as buildings with hot water reheat systems.

Hot water heating system utilizes a primary/secondary system within the Central Energy Plant. The primary hot water loop circulates water through the boilers and a common header via three (3) 7.5 HP operational B&G pumps (one pump for standby). Secondary loop circulates hot water throughout the campus loop via two (2) 40 HP secondary loop pumps. The pumps are driven with standard efficiency motors.

Similarly, chilled water system utilizes primary/secondary loops. The primary chilled water loop circulates water through each chiller heat exchanger via three (3) 15 HP operational B&G pumps (one pump for standby). Secondary loop circulates chilled water through the campus loop via two (2) 60 HP secondary loop pumps. The pumps are driven with standard efficiency motors.

Condenser water loop for the chillers are provided with three (3) 25 HP pumps (one pump standby). The pumps are driven with standard efficiency motors. A plate & frame heat exchanger is utilized to enable water side economizer functionality by circulating cooling tower water through a the heat exchanger to obtain free cooling effect without chillers during shoulder months.

Both chilled water and hot water primary pumping loops within the central energy plant are constant volume systems with constant volume pumps. Secondary chilled water and hot water loops are variable flow loops. The secondary loop pumps motors are driven with Variable Frequency Drives.

HVAC Systems

Central Energy Plant heating and cooling are provided with two air handlers located in the mezzanine. HV-1 is a constant volume heating and ventilation unit serving the plant area. The unit is equipped with hot water coils and provides heating for the main equipment area within the plant. HV-1 is driven with a 15 HP supply fan with standard efficiency motor.

Office area heating and air conditioning is provided with AHU-1, which is a small air handling unit with hot and chilled water coils. AHU-1 supply conditioned air to the offices in the Plant via a 3 HP supply fan.

HVAC System Controls

The building utilizes a DDC central energy management system (EMS) made by Siemens. The Siemens EMS allow for operations personnel to monitor and control all functions of the HVAC systems in the Central Energy Plant and the buildings throughout the campus.

Domestic Hot Water

Currently there is no central domestic hot water heating system for the campus. Domestic hot water for the restrooms in the Central Energy Plant is provided by an 80 gallon A. O. Smith electric hot water heater, with a 15,000 Watt heating capacity.

Lighting

Lighting throughout the Energy Plant is provided with modern fluorescent fixtures with T8 lamps. 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 Equipment Upgrade	$1,671	$285	5.9	156%
ECM #2	NEMA Premium Efficiency Motors	$70,286	$729	96	-84%
ECM #3	Reset Condenser Water Based on OA Wet-Bulb	$5,000	$4,616	1.1	1285%
ECM #4	Variable Primary Pumping Systems	$191,000	$7,971	24	-17%
ECM #5	Combined Heat and Power	$581,000	$40,542	14.3	4.7%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	258 KW PV Array	$2,035,400	$202,293	10.1	49%
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 Equipment Upgrade	0.8	1,996	-
ECM #2	NEMA Premium Efficiency Motors	4.9	4,501	-
ECM #3	Reset Condenser Water Based on OA Wet-Bulb	0	32,340	-
ECM #4	Variable Primary Pumping Systems	0	28,568	-
ECM #5	Combined Heat and Power	198.8	1,276,018	-98,699
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	258 KW PV Array	257.9	377,690	-

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 Equipment Upgrade	$285	$2,445	$774	$1,671	5.9
NEMA Premium Efficiency Motors	$729	$72,011	$1,725	$70,286	96.4
Reset Condenser Water Based on OA Wet-Bulb	$4,616	$5,000	$0	$5,000	1.1
Variable Primary Pumping Systems	$7,509	$200,000	$9,000	$191,000	25.4
Combined Heat and Power	$39,562	$830,000	$249,000	$581,000	14.7
Design / Construction Extras (15%)	-	$1,117	-	$1,001	-
Total Project	**$12,411**	**$208,562**	**$9,774**	**$198,672**	**16.0**

*Items highlighted in yellow are not included in the final project totals.

*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 Lighting & Re-Lamping

Description:

Majority of the interior lighting throughout the Central Energy Plant is provided with fluorescent fixtures with older generation, 700 series 32W T8 lamps and electronic ballasts. Although 700 series T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output. This ECM includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. 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.

This ECM includes replacement of each of the high bay metal halide light fixtures with T5HO fixtures with reflective lenses. The retrofit for the metal halide fixtures includes a one for one fixture replacement. The fluorescent fixtures selected will provide equivalent light compared to the average light output of the existing metal halide fixtures.

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:

$$\text{Smart Start Incentive} \\ = \#\ 175\text{W} - 249\text{W MH Fixtures Replaced} \times \$43\ \text{Incentive per Fixture}$$

Smart Start Incentive = #175W – 249W MH Fixtures Replaced x $43 Incentive per Fixture

Smart Start Incentive = 18 x $43 = $774

Replacement and Maintenance Savings:

Maintenance savings is negligible for this ECM and has not been included in the energy savings summary.

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$2,445
NJ Smart Start Equipment Incentive ($):	$774
Net Installation Cost ($):	$1,671
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$285
Total Yearly Savings ($/Yr):	$285
Estimated ECM Lifetime (Yr):	15
Simple Payback	5.9
Simple Lifetime ROI	156.3%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$4,282
Internal Rate of Return (IRR)	15%
Net Present Value (NPV)	$1,737.17

ECM #2: Install NEMA Premium® Efficiency Motors

Description:

The improved efficiency of the NEMA Premium® efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95% of its total lifetime operating cost. Due to the fact that many motors operate continuously 24 hours a day, even small increases in efficiency can yield substantial energy and dollar savings.

The electric motors driving the hot/chilled water pumps and supply fans in some of the HVAC equipment are candidates for replacing with premium efficiency motors. These standard efficiency motors run considerable amount of time over a year.

This energy conservation measure replaces existing inefficient electric motors with NEMA Premium® efficiency motors. NEMA Premium® is the most efficient motor designation in the marketplace today.

IMPLEMENTATION SUMMARY					
EQMT ID	FUNCTION	MOTOR HP	HOURS OF OPERATION	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY
P1	Chiller Condenser Water	25	800	91.7%	93.6%
P2	Chiller Condenser Water	25	800	91.7%	93.6%
P3	Chiller Condenser Water	25	800	91.7%	93.6%
P4	Primary Chilled Water Loop	15	800	88.5%	92.4%
P5	Primary Chilled Water Loop	15	800	88.5%	92.4%
P6	Primary Chilled Water Loop	15	800	88.5%	92.4%
P7	Secondary (Campus) Chilled Water Loop	60	1,200	93.6%	94.5%
P8	Secondary (Campus) Chilled Water Loop	60	1,200	93.6%	94.5%
P9	Secondary (Campus) Hot Water Loop	40	1,060	93.0%	94.5%
P10	Secondary (Campus) Hot Water Loop	40	1,060	93.0%	94.5%
P11	Boiler Primary Hot Water Loop	7.5	800	88.5%	91.7%
P12	Boiler Primary Hot Water Loop	7.5	800	88.5%	91.7%
P13	Boiler Primary Hot Water Loop	7.5	800	88.5%	91.7%

Energy Savings Calculations:

$$\text{Electric usage, kWh} = \frac{\text{HP} \times \text{LF} \times 0.746 \times \text{Hours of Operation}}{\text{Motor Efficiency}}$$

$\text{where, HP} = \text{Motor Nameplate Horsepower Rating}$

$\text{LF} = \text{Load Factor}$ $\text{Motor Efficiency} = \text{Motor Nameplate Efficiency}$

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric cost savings} = \text{Electric Usage Savings} \times \text{Electric Rate}\left(\frac{\$}{\text{kWh}}\right)$$

The calculations were carried out and the results are tabulated in the table below:

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWH	COST SAVINGS
P1	25	90%	91.7%	93.6%	0.37	299	$48
P2	25	90%	91.7%	93.6%	0.37	299	$48
P3	25	90%	91.7%	93.6%	0.37	299	$48
P4	15	90%	88.5%	92.4%	0.48	386	$63
P5	15	90%	88.5%	92.4%	0.48	386	$63
P6	15	90%	88.5%	92.4%	0.48	386	$63
P7	60	90%	93.6%	94.5%	0.41	495	$80
P8	60	90%	93.6%	94.5%	0.41	495	$80
P9	40	90%	93.0%	94.5%	0.46	488	$79
P10	40	90%	93.0%	94.5%	0.46	488	$79
P11	7.5	90%	88.5%	91.7%	0.20	160	$26
P12	7.5	90%	88.5%	91.7%	0.20	160	$26
P13	7.5	90%	88.5%	91.7%	0.20	160	$26
TOTAL					**4.9**	**4,501**	**$729**

Equipment Cost and Incentives

Below is a summary of SmartStart Building® incentives for premium efficiency motors:

INCENTIVES	
HORSE POWER	NJ SMART START INCENTIVE
1	$50
1.5	$50
2	$60
3	$60
5	$60
7.5	$90
10	$100
15	$115
20	$125
25	$130
30	$150
40	$180

The following table outlines the summary of motor replacement costs and incentives:

MOTOR REPLACEMENT SUMMARY						
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK
P1	25	$5,930	$130	$5,800	$48	119.8
P2	25	$5,930	$130	$5,800	$48	119.8
P3	25	$5,930	$130	$5,800	$48	119.8
P4	15	$3,652	$115	$3,537	$63	56.5
P5	15	$3,652	$115	$3,537	$63	56.5
P6	15	$3,652	$115	$3,537	$63	56.5
P7	60	$9,338	$180	$9,158	$80	114.3
P8	60	$9,338	$180	$9,158	$80	114.3
P9	40	$9,338	$180	$9,158	$79	115.7
P10	40	$9,338	$180	$9,158	$79	115.7
P11	7.5	$1,971	$90	$1,881	$26	72.7
P12	7.5	$1,971	$90	$1,881	$26	72.7
P13	7.5	$1,971	$90	$1,881	$26	72.7
TOTAL	**Totals:**	**$72,011**	**$1,725**	**$70,286**	**$729**	**96.4**

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$72,011
NJ Smart Start Equipment Incentive ($):	$1,725
Net Installation Cost ($):	$70,286
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$729
Total Yearly Savings ($/Yr):	$729
Estimated ECM Lifetime (Yr):	15
Simple Payback	96.4
Simple Lifetime ROI	-84.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$10,935
Internal Rate of Return (IRR)	1%
Net Present Value (NPV)	($61,583.25)

ECM #3: Reset Condenser Water Based on OA Wet-Bulb

Description:

The main cooling towers serving condenser water cooling for the York chillers are single cell cooling towers with variable speed fans. Currently, the condenser water supply temperature for the chillers is set to a constant temperature, which was 70°F during the time of survey. It is recommended to vary condenser water supply temperature to the chillers based on outside air wet-bulb temperature.

Decreasing the condenser water supply temperature will result in higher system COP (coefficient of process) and improve system efficiency, similar to increasing the chilled water supply temperature. However, cooling tower performance is limited with ambient conditions namely the wet-bulb temperature. The ambient air wet-bulb temperature is related to the ambient air humidity and it limits the amount of evaporative cooling, which is the main cooling mechanism for the cooling towers. At lower wet-bulb temperatures, more moisture will be absorbed by the air going through the cooling towers. Similarly, at higher wet-bulb temperatures cooling tower performance will be limited because the air will absorb less moisture. Due to this phenomenon below certain temperature conditions, decreasing the set-point will not produce more condenser water cooling. In other words, condenser water temperature will never reach a set point below the wet bulb temperature due to theoretical limitations no matter how fast the fans are driven.

To operate the cooling tower at highest efficiency, it is recommended to reset condenser water set-point based on outside air wet bulb temperature. Typical methodology is to set the condenser water supply temperature 6-8°F above ambient air wet-bulb temperature. This prevents excessive cooling tower fan power operation. The cooling tower water return temperature should not be set lower than 65°F for chillers made before 1999 and should not be lower than 55°F for newer chillers. It is recommended to consult the chiller manufacturer’s manual for more information.

Varying the fan speed based on condenser water supply temperature and the ambient air wet bulb temperature will allow system to modulate fan speed to the optimum speed required for the load conditions and minimize high speed / full speed operation while allowing chillers to operate at the highest efficiency possible for the given conditions.

This ECM includes programming changes to the plant Energy Management System. The VFDs shall be programmed to modulate fan speed based on condenser water supply temperature. In addition, a sub-routine should be added to the control algorithm to reset condenser water supply temperature set-point based on the wet-bulb temperature of the ambient air.

Energy and cost savings calculations are based on basic engineering principles along with a VFD savings calculation software “FanSave Version 4.0.B,” provided by ABB.

Energy Savings Calculations:

Energy savings calculations are based on reduced speed on cooling tower fans. Chiller compressor energy savings are neglected since the existing operation already keeps condenser water temperature at a low constant value most of the time.

FanSave software calculates fan energy consumption savings based on the principles below.

$$\text{Fan Electric HP} = \frac{Q_{CFM} \times \text{Total Pressure}_{\text{in WG}}}{6356 \times \eta_{Fan} \times \eta_{motor} \times \eta_{transmission}}$$

$$\text{Fan Energy Consumption (kWh)} = \text{Motor HP} \times 0.746\,\frac{\text{kW}}{\text{HP}} \times \text{Hours of operation (Hr)}$$

$$\text{Total Fan Energy Consumption (kWh)} = \sum \text{Energy Consumption of Each Motor}$$

$$\text{Fan Energy Cost (\$)} = \text{Total Comsumption(kWh)} \times \text{Average Cost of Electric}\left(\frac{\$}{\text{kWh}}\right)$$

FanSave uses Affinity Laws in order to calculate energy savings by reducing fan speed. Affinity laws, also known as Fan Laws are as following:

Q = Flow, n = Fan Speed, p = total pressure

$$\frac{Q_2}{Q_1} = \frac{n_2}{n_1} \qquad \frac{p_2}{p_1} = \left(\frac{n_2}{n_1}\right)^2 \qquad \frac{HP_2}{HP_1} = \left(\frac{n_2}{n_1}\right)^3$$

<u>Fan Save Input:</u>

$\eta_{Fan} = 70\%$ $\eta_{motor} = 93\%$ $\eta_{transmission} = 95\%$

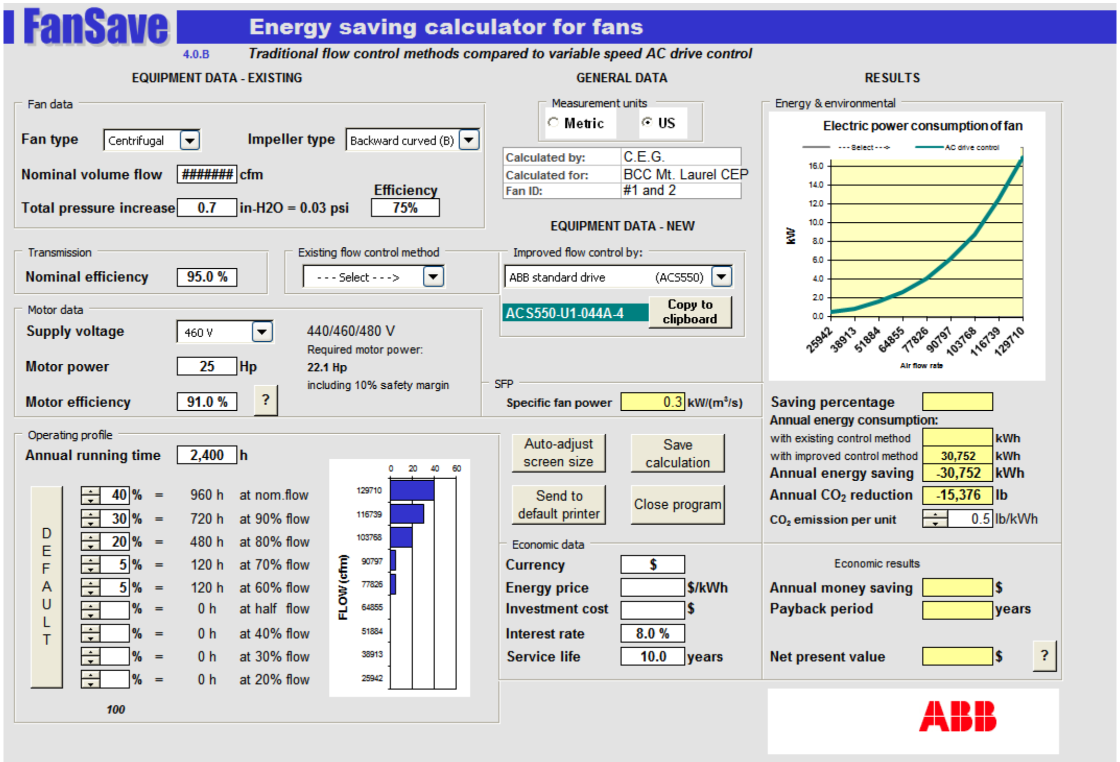
Existing Flow Control Method is selected as Two-speed Flow Control. Other input values for each cooling tower can be seen in the screenshot below from the software.

<u>Cooling Tower:</u>

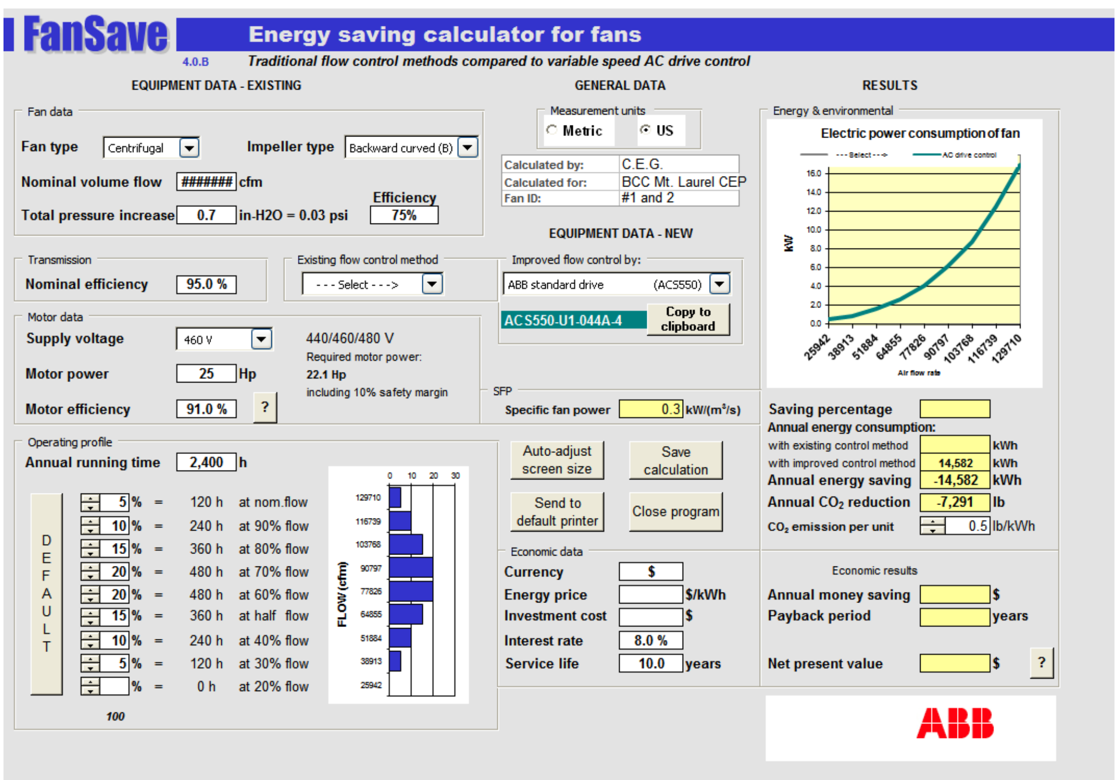
Fan #1 Motor = 25 HP (VFD)
Fan #2 Motor = 25 HP (VFD)

Hours of operation for each cooling tower: 2400 Hours/year
(Based on supplied owner information)

Cooling towers with condenser water temperature set-point constant at 70°F



Cooling towers with condenser water temperature reset based on outside air:



FanSave 4.0.B calculates approximately 53% fan energy savings for each cooling tower by modulating the condenser water temperature and fan speed throughout the day. The results for the fan are as follows:

CONDENSER WATER RESET			
ECM INPUTS	**CONDENSER WATER CONSTANT**	**CONDENSER WATER RESET per WET BULB**	**SAVINGS**
Equipment	Cooling Tower Fan	Cooling Tower Fan	-
Quantity	2	2	-
Motor HP	25	25	-
Hours od Operation	2400	2400	-
Elec Cost ($/kWh)	$0.14	$0.14	-
ENERGY SAVINGS			
Fan Energy Consumption, kWh	30,752	14,582	16,170
Fan Energy Consumption, %	100%	47%	53%
Total Electric Energy	61,504	29,164	32,340
Total Cost ($)	$8,779	$4,163	$4,616
COMMENTS:			

Cost and Incentives

This ECM includes programming changes to the plant Energy Management System. Estimated cost of implementation for this ECM is $5,000.

This ECM does not qualify for an incentive from the NJ Smart Start program.

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$5,000
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$5,000
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$4,616
Total Yearly Savings ($/Yr):	$4,616
Estimated ECM Lifetime (Yr):	15
Simple Payback	1.1
Simple Lifetime ROI	1284.9%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$69,243
Internal Rate of Return (IRR)	92%
Net Present Value (NPV)	$50,107.60

ECM #4: Variable Primary Pumping Systems

Description:

The pumping system at the Burlington County College, Mount Laurel Campus utilizes primary / secondary style pumping systems for hot and chilled water.

The primary pumping system consists of large constant volume pumps that distribute the hot and chilled water through main distribution piping loops within the Central Energy Plant. The loops do not directly feed the HVAC equipment cooling / heating coils in the Campus. The primary supply lines connect directly to the return lines. The primary pumps operate at constant speed and constant volume. The secondary pumping system consists of a variable flow pumps supplying hot and chilled water to the buildings in the campus. The secondary pumps operate at variable speed as the volume is controlled by the 2-way control valves in each building, which throttle the water flow based on load.

The intent for a primary / secondary configuration is to allow for the chillers and boilers to see a continuous volume of water at all times to stabilize the operation. This allows constant speed chillers or constant fire boilers to more easily adjust to changes in the load. The main centrifugal chillers are fitted with variable speed drives providing more precise and stable control of the chiller operation to match the campus load. In addition, the boilers are fitted with 35% turn down ratio, which also allows modulating the firing rate to match with the flow. This along with control system programming allows for efficient and reliable operation of variable primary flow through the chillers and boilers.

Variable primary pumping permits the use of only one set of pumps to distribute hot / chilled water throughout the facility. VFDs retrofitted on the primary pumps controls the pump speed and therefore the flow-rate based on the buildings' load. This system eliminates the need for secondary pumps and associated maintenance. The removal of the secondary pumping system in combination with efficient operation of the primary pumps allows for a substantial reduction in pumping energy use.

This ECM includes the installation of four (4) new variable frequency drives (VFDs) and four (4) new primary hot / chilled water pumps. The existing pumps are two (2) 60 HP pump and two 40 HP pumps. These pumps would be replaced with approximately two (2) 75 HP pump and two (2) 50 HP pumps with variable frequency drives. The primary piping system would have to be altered to eliminate the connection between the main supply and return line. In place of the bypass would be a modulating minimum flow control valve to ensure adequate flow through the chiller. Each secondary distribution pump would be eliminated and replaced with straight piping. This ECM also includes the replacement of the existing pump motors with NEMA premium efficiency motors. A small increase in motor efficiency on a VFD will further increase savings for every hour of pump runtime.

Energy and cost savings calculations are based on calculation software "PumpSave v4.2," provided by ABB. The PumpSave calculation software is used to estimate the pumping energy for non constant volume flow pump systems. The heating pump operation is estimated to be

1060 Hrs per year and cooling pump operation is estimated to be 1200 Hrs per year. The sizing of the proposed pumping system is based on totaling the static head of the primary pumps with the secondary pumps. The flow is established based on the existing primary pump flows. This approach is conservative one for one style approach for estimating the pumping requirement needed for the system. The owner should have a professional engineer verify the flow requirements of the building before proceeding with implementation to take advantage of possible additional energy savings.

Energy Savings Calculations:

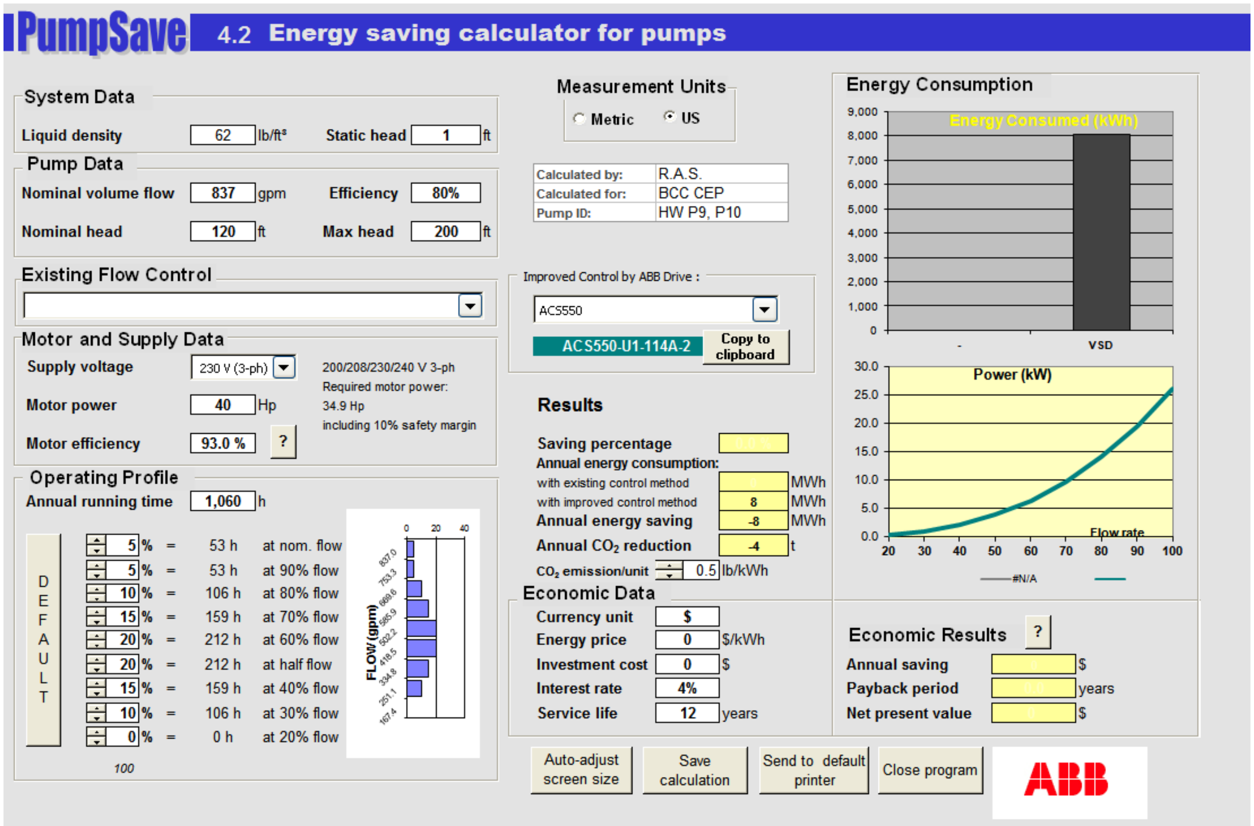
$$\text{Cons. Volume Power}(\text{HP}) = \frac{\text{Specific Gravity} \times \text{Flow Rate}\left(\frac{\text{Gal}}{\text{min}}\right) \times \text{Head}(\text{Ft})}{3{,}960 \times \text{Pump Efficiency}(\%) \times \text{Motor Efficiency}(\%)}$$

$$\text{Energy Cons.}(\text{kWh}) = \text{Power}(\text{HP}) \times 0.746\left(\frac{\text{KW}}{\text{HP}}\right) \times \text{Operation}(\text{Hrs.})$$

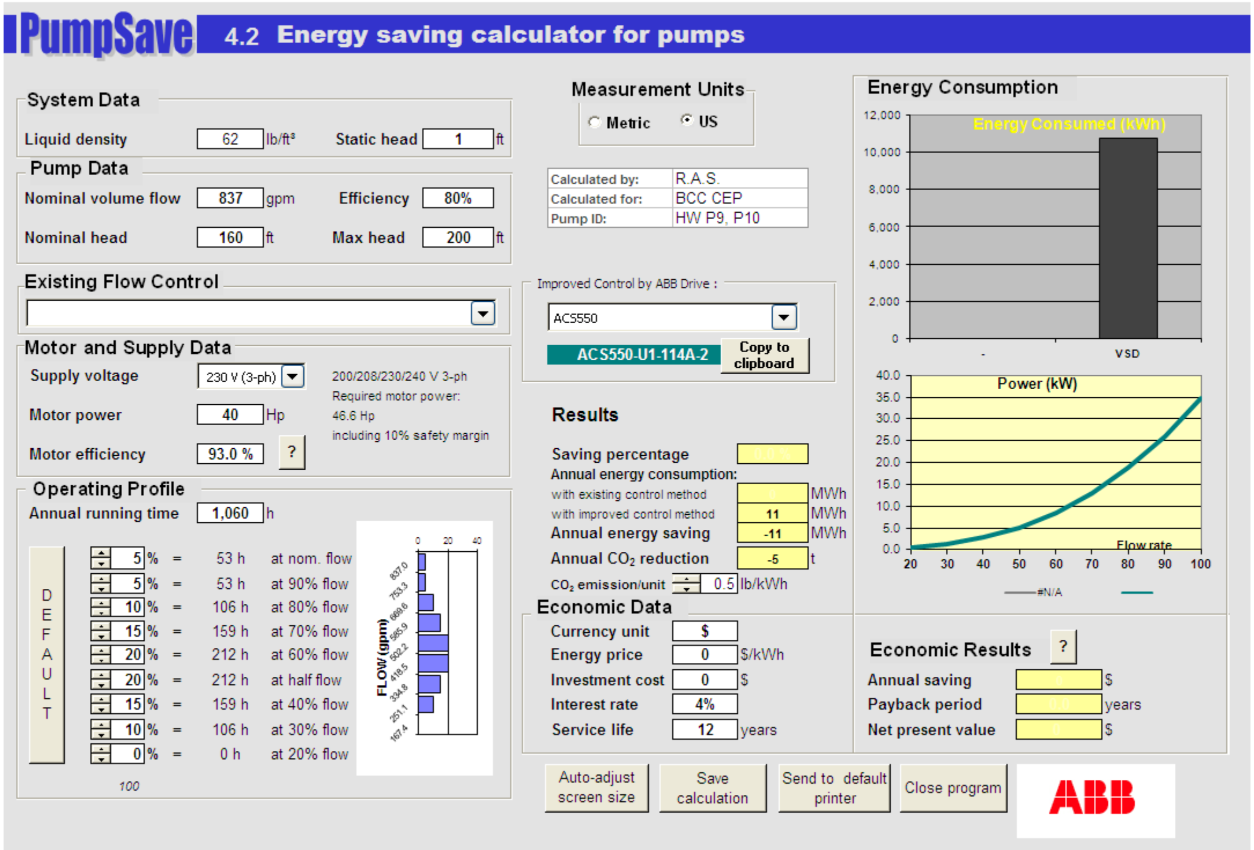
$$\text{Energy Cost} = \text{Energy Usage}(\text{kWh}) \times \text{Ave Electric Cost}\left(\frac{\$}{\text{kWh}}\right)$$

<u>Heating Season Pumping Energy:</u>

Existing Secondary System:



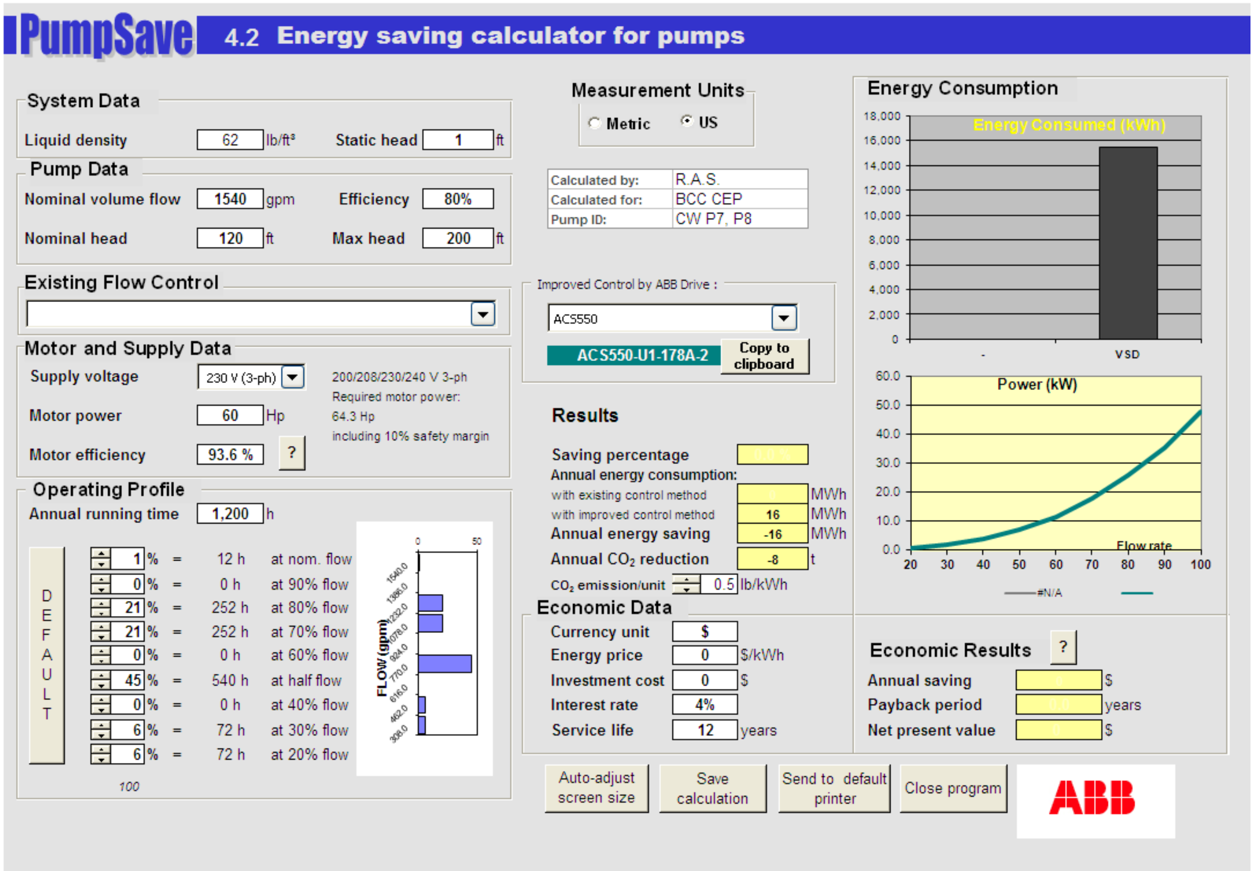
New Variable Primary System:



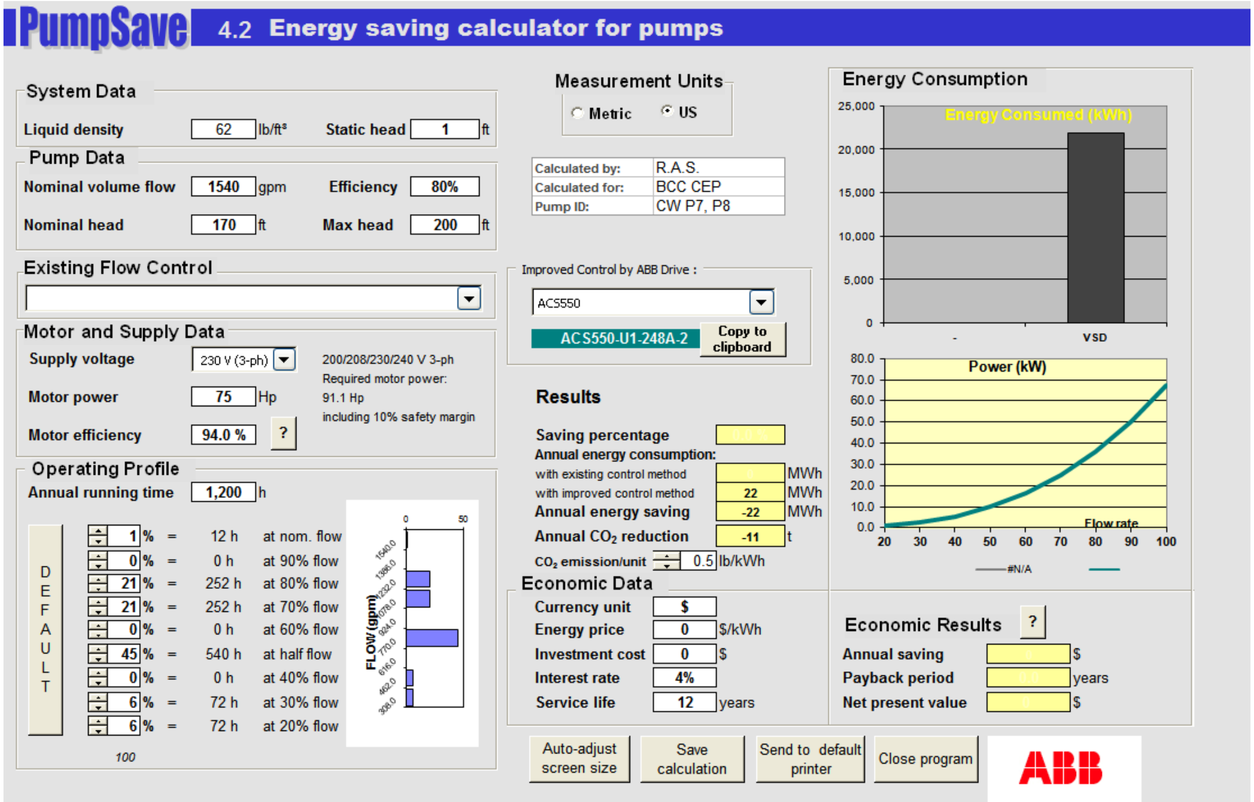
PRIMARY HEATING PUMP VFD CALCULATIONS				
ECM INPUTS	**EXISTING**		**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Primary Pump	Secondary Pumps	VFD Variable Primary Pumps Only	
Quantity	2	1	1	-
Flow Control	CV	VFD	VFD	-
Flow (GPM)	418	837	837	-
Head (Ft)	40	120	160	-
Pump Efficiency (%)	80%	80%	80%	-
Motor Efficiency (%)	88.5%	93%	93%	-
Heating Operating Hrs	1060	1060	1060	-
KW per HP (KW/HP)	0.746	0.746	0.746	-
HP Equation Constant	3960	3960	3960	-
Elec Cost ($/kWh)	0.143	0.143	0.143	-
ENERGY SAVINGS CALCULATIONS				
ECM RESULTS	**EXISTING**	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	9,432	8,060	10,720	6,771
Electric Demand (KW)	-	-	-	-
Electric Energy Cost ($)	$1,349	$1,153	$1,533	$968
COMMENTS:	VFD pump energy is based on ABB energy savings calculator for pumps, "Pump Save," version 4.2. Flow rate for VFD Pump calculation is summarized in the operating profile shown in the Pump Save output.			

Cooling Season Pumping Energy:

Existing Secondary System:



New Variable Primary System:



PRIMARY COOLING PUMP VFD CALCULATIONS				
ECM INPUTS	**EXISTING**		**PROPOSED**	**SAVINGS**
ECM INPUTS	CV Primary Pump	Secondary Pumps	VFD Pumps	
	2	1	1	
Flow Control	CV	VFD	VFD	
Flow (GPM)	770	1540	1540	
Head (Ft)	50	120	170	
Pump Efficiency (%)	80%	80%	80%	
Motor Efficiency (%)	88.5%	93.6%	93.6%	
Heating Operating Hrs	1200	1200	1200	
KW per HP (KW/HP)	0.746	0.746	0.746	
HP Equation Constant	3960	3960	3960	
Elec Cost ($/kWh)	0.143	0.143	0.143	
ENERGY SAVINGS CALCULATIONS				
ECM RESULTS	**EXISTING**	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	24,586	15,502	21,797	18,290
Electric Demand (KW)	-	-	-	-
Electric Energy Cost ($)	$3,516	$2,217	$3,117	$2,616
COMMENTS:	VFD pump energy is based on ABB energy savings calculator for pumps, "Pump Save," version 4.2. Flow rate for VFD Pump calculation is summarized in the operating profile shown in the Pump Save output.			

<u>Installation Cost</u>

Installation cost for the four (4) new pumps, VFDs, piping modification, installation of premium efficiency motors, re-balancing, and controls is estimated to be $200,000. Further analysis should be carried out to investigate whether some of the existing pumps and VFDs can be re-utilized.

Rebates and Incentives

NJ Smart Start® Program Incentives are calculated as follows:

From the Smart Start Incentive appendix, installation of variable frequency drives warrants the following incentive:

$$SmartStart® \ Incentive = (Chilled Water Pump Motor VFD HP \times \$60/HP)$$

$$Smart \ Start® \ Incentive = (150 \times \$60) = \underline{\$9,000}$$

Maintenance Savings

This ECM warrants maintenance savings due to reduced number of pumps in the Central Energy Plant. By implementing this ECM, a total of six (6) pumps will be eliminated along with the associated maintenance and replacement costs. Estimated maintenance savings for this ECM is $3,925 per year based on avoided cost of purchasing 6 pumps over the course of ECM lifetime, which is 20 years.

Energy Savings Summary:

ECM #4 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$200,000
NJ Smart Start Equipment Incentive ($):	$9,000
Net Installation Cost ($):	$191,000
Maintenance Savings ($/Yr):	$3,925
Energy Savings ($/Yr):	$3,584
Total Yearly Savings ($/Yr):	$7,509
Estimated ECM Lifetime (Yr):	20
Simple Payback	25.4
Simple Lifetime ROI	-21.4%
Simple Lifetime Maintenance Savings	$78,500
Simple Lifetime Savings	$150,180
Internal Rate of Return (IRR)	-2%
Net Present Value (NPV)	($79,285.04)

ECM #5: Combined Heat and Power System (CHP)

Description:

Burlington County College Mount Laurel Campus is a facility with significant energy needs. The Campus has a Central Energy Plant with gas fired hot water boilers and electric driven centrifugal chillers.

Typically the limitation for implementing a combined heat and power plant is the lack of year round heat requirement. Currently, the utility bills do not show a significant baseline gas usage year round for this campus. This limits the annual hours of operation of a possible CHP system. An absorption chiller may be installed in order to utilize waste heat energy during summer months.

A combined heat and power plant utilizes the rejected heat from an electric generator. The heat is used for the facility's heating loads such as HVAC system heating, domestic hot water, and kitchen cooking appliances. The electric production is used for the facility's electrical loads. EPA has determined the typical range of "total system efficiency," for typical CHP systems. The efficiency range is as follows:

Natural Gas Engine: 70%-80%

CE conducted a review of the applicability of a combined heat and power (CHP) plant installation. Since, the base line heating load for the facility is limited, installation of an Absorption Chiller is proposed to increase thermal load of the campus. Based on typical output values of CHP systems the averaged energy production from a CHP is 30% electric production and 35% heat production. Since the baseline heating load is the limiting factor, the system size is based on the minimum continuous heat load. The remaining electric production potential is provided to offset the purchase of electric energy from the electric grid. The runtime factor is estimated to be 93% based on the EPA "Combined Heat and Power Partnership" Incentive grant reduction for maintenance due to downtime.

This ECM includes installation of a natural gas driven micro-turbine for electrical power and heat production and an absorption chiller for producing chilled water during cooling season.

This plant would be located in the Central Energy Plant and feed hot and chilled water directly to the campus hot and chilled water loops.

Since the summer heat load is not 24/7, the CHP would be turned off at night during low heat demands.

Existing Baseline Heating Season Parameters (6 Months):

Minimum Heat Load (During heating season) = 6,221 Therms / Month (October)

Baseline Heat Load – established based on limiting factor of the minimum monthly heat load

$$\text{Baseline Heat} = \frac{\text{Ave Gas Use}\left(\frac{\text{Therms}}{\text{Month}}\right) \times \text{Heat Value}\ \left(\frac{\text{Btu}}{\text{Therm}}\right) \times \text{Boiler Eff\%}}{30.12\ \left(\frac{\text{Day}}{\text{Month}}\right) \times \text{Summer Use}\ \left(\frac{\text{Hr}}{\text{Day}}\right)}$$

Existing Gas Usage – total baseline heat plus offset winter heat provided by CHP.

$$\text{Existing Fuel Cons} = \frac{\text{CHP Fuel Cons}(\text{Therms}) \times \text{CHP Heat Eff\%}}{\text{Boiler Heat Eff\%}}$$

Existing Baseline Cooling Season Parameters (6 Months):

Applicable Absorption Chiller Capacity = 66 Ton

Absorption Chiller COP = 1.0

Absorption Chiller Heat Input = 792,000 BTU/Hr

Minimum Heat Load (For cooling system) = 792,000 BTU/Hr

Natural gas equivalent = 4,294 Therms / Month

Baseline Heat Load – established based on limiting factor of the summertime heat load and smallest available absorption system.

$$\text{Current Electricity Consumption} = \text{Cooling Capacity (RT)} \times \text{Average COP} \times \text{Hours of Operation(6 Months)}$$

$$\text{Proposed System Heat Requirement (kBTU)}$$
$$= \text{Cooling Capacity (RT)} \times 12\,\frac{\text{kBTU}}{\text{RT}} \times \text{Average COP} \times \frac{\text{Hours}}{\text{Day}} \times 30.12\,\frac{\text{Days}}{\text{Mo}} \times 6 \text{ Months}$$

<u>Generator Sizing</u> – sizing based on baseline heat load:

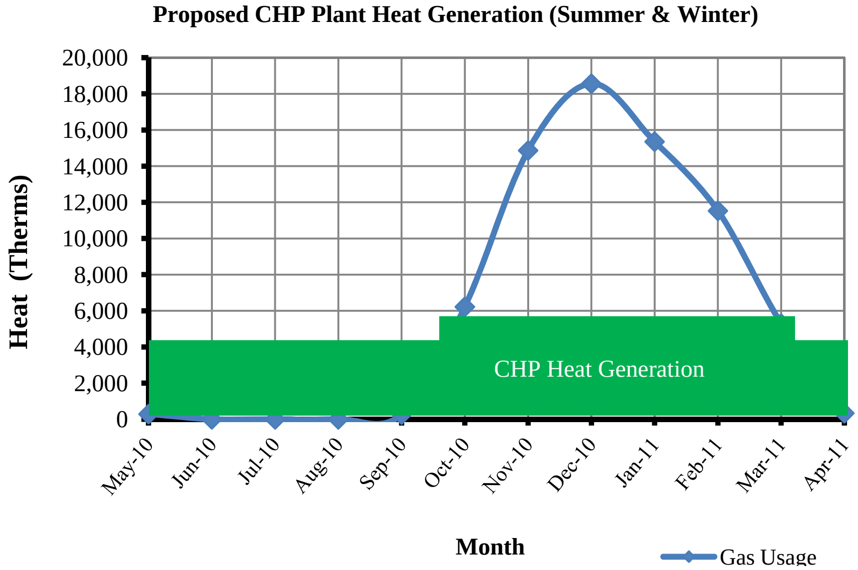
$$\text{Sys Elec Size} = \frac{\text{Base Heat Load}\left(\frac{\text{Btu}}{\text{Hr.}}\right)}{\text{Heat Production Eff\%}} \times \text{Electric Production Eff\%} \times \left(\frac{1(\text{KWH})}{3{,}414(\text{BTU})}\right)$$

<u>CHP Fuel Consumption</u> – natural gas usage based on total run time of the CHP plant at full load.

$$\text{CHP Fuel Cons} = \frac{\text{Baseline Heat}\left(\frac{\text{Btu}}{\text{Hr.}}\right) \times \text{Runtime } 93\%}{\text{HeatValue}\left(\frac{\text{Btu}}{\text{Therm}}\right) \times \text{Heat Eff\%}} \times$$
$$\ldots\left(\text{Summer Use}\left(\frac{\text{Hr.}}{\text{Day}}\right) \times 180\left(\frac{\text{Day}}{\text{Yr.}}\right) + \text{Winter Use}\left(\frac{\text{Hr.}}{\text{Day}}\right) \times 180\left(\frac{\text{Day}}{\text{Yr.}}\right)\right)$$

<u>CHP Power Generation</u> – kWh production based on total run time of the CHP plant at full load.

$$\text{Reduced CHP Elec Cons} = \text{Elec Demand}(\text{KW}) \times 93\% \times$$
$$\ldots\left(\text{Summer Use}\left(\frac{\text{Hr.}}{\text{Day}}\right) \times 180\left(\frac{\text{Day}}{\text{Yr.}}\right) + \text{Winter Use}\left(\frac{\text{Hr.}}{\text{Day}}\right) \times 180\left(\frac{\text{Day}}{\text{Yr.}}\right)\right)$$



Cost Calculations

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

$$\text{Natural Gas Cost} = \text{Gas Usage} \times \text{Ave Cost}\left(\frac{\$}{\text{Therm}}\right)$$

COMBINED HEAT AND POWER CALCULATIONS - WINTER			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Heating System	Combined Heat and Power Plant	
Baseline (Heat) Gas Usage Per Utility Bills (Therms/Month)	6,221	N/A	
System Elec Production Efficiency (%)	N/A	30%	
Ave System Heat Efficiency (%)	77%	35%	
Winter Operating Hrs per Day (6 Months)	24	24	
Runtime Factor (%)	N/A	93%	
Electric Heat Value (Btu/kWh)	N/A	3414	
Gas Heat Value (BTU/Therm)	100,000	100,000	
Baseline Heat Load - (BTU/HR)	662,651	662,651	
CHP Sys Elec Size (KW)	0	166	
Gas Cost ($/Therm)	1.06	1.06	
Elec Cost ($/kWh)	0.143	0.143	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Gas Usage (Therms)	34,709	76,361	-41,651
Electric Energy (kWh)	0	-671,007	671,007
Gas Energy Cost ($)	$36,677	$80,689	-$44,012
Electric Energy Cost ($)	$0	-$95,778	$95,778
Total Energy Cost ($)	$36,677	-$15,089	$51,766
COMMENTS:			

COMBINED HEAT AND POWER CALCULATIONS - SUMMER			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing System with Centrifugal Chiller	CHP Plant with Absorption Cooling	
Electric Chiller Cooling, RT	66	-	
Absorption Chiller Cooling, RT	-	66	
Cooling COP	0.58 kW/Ton	1	
Chiller Operating Hrs per Day (6 Months, 30.12 day/mo)	15	15	
Baseline Heat Requirement, kBTU/Month	N/A	357,826	
System Elec Production Efficiency (%)	N/A	30%	
Ave System Heat Efficiency (%)	N/A	35%	
Runtime Factor (%)	N/A	93%	
Baseline (Heat) Gas Usage Per Utility Bills (Therms/Month)	N/A	N/A	
Summer Operating Hrs per Day (6 Months)	15	15	
Electric Heat Value (Btu/kWh)	N/A	3414	
Baseline Heat Load - (BTU/HR)	N/A	792,000	
CHP Sys Elec Size (KW)	N/A	199	
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Gas Usage (Therms)	0	57,048	-57,048
Electric Energy Usage (kWh)	103,769	-501,242	605,011
Gas Energy Cost ($)	$0	$60,282	-$60,282
Electric Energy Cost ($)	$14,812	-$71,546	$86,358
Total Energy Cost ($)	$14,812	-$11,265	$26,077
COMMENTS			

Design Basis

Based on estimated CHP system power generation capacity and the absorption system cooling capacity, the basis for the ECM is Capstone C200LP (200 kW) packaged Microturbine Generator and Broad BYE-20 (66 ton cooling) turbine exhaust gas driven packaged absorption chiller.

The system will generate 1,397,020 kWh Annually and provide heating (662 MBTU/Hr) and cooling (66 Ton).

Cost and Incentives

The cost of a natural gas driven CHP system, including installation and all components, is approximately $3,000 per KW rated capacity.

Cost of CHP System =	= $600,000
Piping Modifications	= $60,000
Absorption Chiller (66 Ton)	= $170,000
Total Cost	= $830,000

Typical cost of maintenance for a combined heat and power system is $0.02/KWH production. Since the proposed CHP system for this facility is required to periodically shut down and restarted, the maintenance requirements are estimate to be $0.03/KWH production.

Annual Maintenance = ($0.03/KWH x 1,276,018 KWH) = $38,280

NJ Clean Energy Program – Pay 4 Performance program provides considerable incentives for the installation of a combined heat and power plant. The incentives include $1.00 per Watt of system size up to a maximum of 30% of the total project costs. The incentives are calculated as follows.

$$\text{P4P Incentive} = \left(\text{CHP System Size} \left(\text{KW}\right) \times 1000 \left(\frac{\text{W}}{\text{kW}} \right) \times\ 1.00 \left(\frac{\$}{\text{Watt}} \right) \right)$$

$$\text{P4P Incentive} = \left(200 \left(\text{KW}\right) \times 1000 \left(\frac{\text{W}}{\text{kW}} \right) \times \left(\frac{\$1.00}{\text{Watt}} \right) \right) = \$200{,}000$$

$$\%\ \text{of Total System Cost} = \frac{\text{Incentive Cost}}{\text{Total Project Cost}} = \frac{\$200{,}000}{\$830{,}000} = 24\%$$

$$\text{P4P Incentive Max} = 30\% \times \text{Total Project Cost}$$

$$\text{P4P Incentive Max} = 30\% \times \$830{,}000 = \$249{,}000$$

Note:

A typical Combined Heat and Power System requires nearly constant load operation 24 hours per day. Since the majority of the HVAC systems in this facility are scheduled to set-back or shut down during nights and weekends, the proposed system is required to shut down and restarted daily. This requires further unpredictable and costly maintenance problems which will quickly offset the annual energy savings, especially due to utilization of absorption chillers. Therefore, a Combined Heat and Power System is not recommended for this facility.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$830,000
NJ Smart Start Equipment Incentive ($):	$249,000
Net Installation Cost ($):	$581,000
Maintenance Savings ($/Yr):	($38,281)
Energy Savings ($/Yr):	$77,843
Total Yearly Savings ($/Yr):	$39,562
Estimated ECM Lifetime (Yr):	15
Simple Payback	14.7
Simple Lifetime ROI	2.1%
Simple Lifetime Maintenance Savings	($574,208)
Simple Lifetime Savings	$593,437
Internal Rate of Return (IRR)	0%
Net Present Value (NPV)	($108,705.82)

REM #1: Install Solar Photovoltaic Arrays

Description:

The Central Energy Plant has approximately 47,010 square-feet of available parking space that can accommodate a 257.9 kilowatt solar array, assuming the existing roof structure is capable of supporting an array.

The array will produce approximately 377,690 kilowatt-hours annually that will reduce the overall electric usage of the facility 39.6 %.

Energy Savings Calculations:

See **LGEA Solar Financials Appendix F** for detailed financial summary and proposed solar layout areas.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW_{DC}):	318.43
Electric Generation (KWH/Yr):	377,690
Installation Cost ($):	$2,035,400
SREC Revenue ($/Yr):	$145,639
Energy Savings ($/Yr):	$56,654
Total Yearly Savings ($/Yr):	$202,293
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	10.1
Analysis Period Electric Savings ($):	$1,053,694
Analysis Period SREC Revenue ($):	$2,109,760
Net Present Value (NPV)	$71,430.24

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. Maintain all weather stripping on windows and doors.

B. Clean all light fixtures to maximize light output.

C. Maintain cooling tower water treatment.

D. Make sure cooling tower sump heaters are controlled properly with thermostats.

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Burlington County College - Mt. Laurel Campus Central Energy Plant

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 ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
ECM #1	Lighting Equipment Upgrade	$2,445	$0	$774	$1,671	$285	$0	$285	15	$4,282	$0	156.3%	5.9	15.0%	$1,737.17
ECM #2	NEMA Premium Efficiency Motors	$72,011	$0	$1,725	$70,286	$729	$0	$729	15	$10,935	$0	-84.4%	96.4	1.0%	($61,583.25)
ECM #3	Reset Condenser Water Based on OA Wet-Bulb	$0	$5,000	$0	$5,000	$4,616	$0	$4,616	15	$69,243	$0	1284.9%	1.1	92%	$50,107.60
ECM #4	Variable Primary Pumping Systems	$200,000	$0	$9,000	$191,000	$3,584	$3,925	$7,509	20	$150,180	$78,500	-21.4%	25.4	-2.2%	($79,285.04)
ECM #5	Combined Heat and Power	$830,000	$0	$249,000	$581,000	$77,843	($38,281)	$39,562	15	$593,437	-$574,208	2.1%	14.7	0.27%	($108,705.82)
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	258 KW PV Array	$2,035,400	$0	$0	$2,035,400	$56,654	$145,639	$202,293	15	$3,034,391	$2,184,588	49.1%	10.1	5.5%	$379,557.89

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.

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

SmartStart Building Incentives

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

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Central Energy Plant

Building ID: 2846466
For 12-month Period Ending: June 30, 2011[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 29, 2011

Facility
Central Energy Plant
500 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Year Built: 2000
Gross Floor Area (ft²): 10,253

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	10,215,204
Natural Gas - (kBtu)[4]	0
Total Energy (kBtu)	10,215,204

Energy Intensity[5]	
Site (kBtu/ft²/yr)	996
Source (kBtu/ft²/yr)	3328

Emissions (based on site energy use)	
Greenhouse Gas Emissions (MtCO$_2$e/year)	1,447

Electric Distribution Utility
Public Service Electric & Gas Co

National Average Comparison	
National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	1462%
Building Type	Other

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[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
Mike 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	Central Energy Plant	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Other	Is this an accurate description of the space in question?		☐
Location	500 College Circle, Mount Laurel, NJ 08054	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 acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐

Central Energy Plant (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	10,253 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.		☐
Number of PCs	N/A(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	N/A(Optional)	Is this the total number of hours per week that the 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	N/A(Optional)	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.		☐

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))**
06/01/2011	06/30/2011	286,794.00
05/01/2011	05/31/2011	208,469.00
04/01/2011	04/30/2011	212,200.00
03/01/2011	03/31/2011	201,789.00
02/01/2011	02/28/2011	221,739.00
01/01/2011	01/31/2011	209,057.00
12/01/2010	12/31/2010	229,436.00
11/01/2010	11/30/2010	238,301.00
10/01/2010	10/31/2010	225,332.00
09/01/2010	09/30/2010	278,180.00
08/01/2010	08/31/2010	310,954.00
07/01/2010	07/31/2010	371,654.00
Electric Consumption (kWh (thousand Watt-hours))		**2,993,905.00**
Electric Consumption (kBtu (thousand Btu))		**10,215,203.86**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**10,215,203.86**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity 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
Central Energy Plant
500 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

General Information

Central Energy Plant	
Gross Floor Area Excluding Parking: (ft^2)	10,253
Year Built	2000
For 12-month Evaluation Period Ending Date:	June 30, 2011

Facility Space Use Summary

Central Energy Plant	
Space Type	Other - Other
Gross Floor Area(ft^2)	10,253
Number of PCs°	N/A
Weekly operating hours°	N/A
Workers on Main Shift°	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 06/30/2011)	**Baseline** (Ending Date 06/30/2011)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft2)	996	996	0	N/A	104
Source (kBtu/ft2)	3328	3328	0	N/A	213
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/ft2/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	1,447	1,447	0	N/A	151
$kgCO_2e/ft^2$/year	141	141	0	N/A	15

More than 50% of your building is defined as Other. This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for Other. This building uses X% less energy per square foot than the CBECS national average for Other.

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Central Energy Plant

Boilers

Tag	**B1 & 2**		
Unit Type	Gas Fired Water Tube Hot Water Boiler		
Qty	2		
Location	Central Energy Plant		
Area Served	Campus		
Manufacturer	Bryan		
Model #	RW1050-W-FDGO-LX		
Serial #	B1: 87167 B2: 87179		
Input Capacity (Btu/Hr)	10,500 / 3888		
Rated Output Capacity (Btu/Hr)	8,400		
Approx. Efficiency %	85%*		
Fuel	Natural Gas		
Approx Age	10		
ASHRAE Service Life	24		
Remaining Life	14		
Comments	Combustion Air Fan Motor: 10 HP 88.5% EFF *Based on a recent combustion analysis		

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

Investment Grade Lighting Audit

CEG Job #: 9C11023

Project: Central Energy Plant **Central Energy Plant** **KWH COST: $0.143**

Bldg. Sq. Ft. 10,253

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
232.22	Control Room	2400	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	825.6	$118.06	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	691.2	$98.84	$45.00	$180.00	0.06	134.4	$19.22	9.37
232.21	Women's Restroom	400	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.09	34.4	$4.92	1	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.07	28.8	$4.12	$45.00	$45.00	0.01	5.6	$0.80	56.19
232.21	Men's Restroom	600	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.09	51.6	$7.38	1	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.07	43.2	$6.18	$45.00	$45.00	0.01	8.4	$1.20	37.46
232.21	Showers	400	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.09	34.4	$4.92	1	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.07	28.8	$4.12	$45.00	$45.00	0.01	5.6	$0.80	56.19
232.21	Copy Room	2600	1	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.09	223.6	$31.97	1	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.07	187.2	$26.77	$45.00	$45.00	0.01	36.4	$5.21	8.65
221.34	Office	2400	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	278.4	$39.81	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	240	$34.32	$30.00	$60.00	0.02	38.4	$5.49	10.93
221.34	Comm Closet	400	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	23.2	$3.32	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	20	$2.86	$30.00	$30.00	0.01	3.2	$0.46	65.56
221.34	Electrical Closet	400	4	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.23	92.8	$13.27	4	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.20	80	$11.44	$30.00	$120.00	0.03	12.8	$1.83	65.56
221.34	Custodial Closet	600	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	34.8	$4.98	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	30	$4.29	$30.00	$30.00	0.01	4.8	$0.69	43.71
232.21	Hall	4000	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.43	1,720.0	$245.96	5	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.36	1440	$205.92	$45.00	$225.00	0.07	280	$40.04	5.62
232.21	First Aid	2000	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	86	0.17	344.0	$49.19	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	288	$41.18	$45.00	$90.00	0.03	56	$8.01	11.24
232.22	Security	8760	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.26	2,260.1	$323.19	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	1892.16	$270.58	$45.00	$135.00	0.04	367.92	$52.61	2.57
232.22	Foyer	8760	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.26	2,260.1	$323.19	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	1892.16	$270.58	$45.00	$135.00	0.04	367.92	$52.61	2.57
735	Boiler Room	1500	18	1	175w MH, 2x2, Recessed Mnt., Prismatic Lens	210	3.78	5,670.0	$810.81	18	1	150w MH Energy Master Lamp; Venture Lighting	185	3.33	4995	$714.29	$70.00	$1,260.00	0.45	675	$96.53	13.05
			47	35				13,853	$1,981	47	36			5.2	11,857	$1,695		$2,445	0.8	1,996	$285	8.56

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.

2. Lamp totals only include T-12 tube replacement calculations

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
Central Energy Plant	47010	SHARP NU-U235F2	1355	17.5	23,768	318.43	377,690	257.9	56,775	13.40

.= Proposed PV Layout

Panels facing east/west are sub-optimal compared to south facing panels. For the same install cost their is an estimated reduction of 20% ouput over south facing panels.

Notes:

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

PVWatts Program Data Output - Pitched Roof Panels

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	24.7 kW
DC to AC Derate Factor:	0.810
AC Rating:	20.0 kW
Array Type:	Fixed Tilt
Array Tilt:	25.0°
Array Azimuth:	90.0°
Energy Specifications	
Cost of Electricity:	15.0 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ^{2}/day)	AC Energy (kWh)	Energy Value ($)
1	2.09	1239	185.85
2	2.79	1556	233.40
3	3.82	2319	347.85
4	4.69	2706	405.90
5	5.38	3138	470.70
6	5.79	3152	472.80
7	5.65	3125	468.75
8	5.08	2826	423.90
9	4.31	2367	355.05
10	3.25	1857	278.55
11	2.22	1252	187.80
12	1.80	1029	154.35
Year	3.91	26565	3984.75

PVWatts Program Data Output - Parking Canopy Panels

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	293.8 kW
DC to AC Derate Factor:	0.810
AC Rating:	237.9 kW
Array Type:	Fixed Tilt
Array Tilt:	7.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	15.0 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ^{2}/day)	AC Energy (kWh)	Energy Value ($)
1	2.44	17857	2678.55
2	3.20	21525	3228.75
3	4.21	30732	4609.80
4	5.14	35434	5315.10
5	5.83	40800	6120.00
6	6.14	39871	5980.65
7	6.05	40178	6026.70
8	5.49	36683	5502.45
9	4.75	31160	4674.00
10	3.62	24967	3745.05
11	2.52	17117	2567.55
12	2.11	14821	2223.15
Year	4.30	351146	52671.90

Project Name: BCC Mount Laurel Campus
Location: Central Energy Plant
Description: Photovoltaic System 100% Financing - 15 year

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$2,035,400
Annual kWh Production	377,690
Annual Energy Cost Reduction	$56,654
Average Annual SREC Revenue	$145,639

Simple Payback: **10.06** Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.150**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value ($/kWh)	$0.386

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	377,690	$56,654	$0	$207,730	$119,775	$86,335	$58,273	$58,273
2	$0	375,802	$58,353	$0	$206,691	$114,450	$91,660	$58,934	$117,206
3	$0	373,923	$60,104	$0	$186,961	$108,797	$97,313	$40,955	$158,161
4	$0	372,053	$61,907	$0	$167,424	$102,795	$103,315	$23,220	$181,381
5	$0	370,193	$63,764	$3,813	$166,587	$96,423	$109,688	$20,427	$201,809
6	$0	368,342	$65,677	$3,794	$165,754	$89,657	$116,453	$21,526	$223,335
7	$0	366,500	$67,647	$3,775	$146,600	$82,475	$123,635	$4,362	$227,697
8	$0	364,667	$69,677	$3,756	$145,867	$74,849	$131,261	$5,677	$233,375
9	$0	362,844	$71,767	$3,737	$126,995	$66,753	$139,357	($11,085)	$222,289
10	$0	361,030	$73,920	$3,719	$126,360	$58,158	$147,952	($9,548)	$212,741
11	$0	359,225	$76,138	$3,700	$107,767	$49,033	$157,077	($25,905)	$186,836
12	$0	357,429	$78,422	$3,682	$107,229	$39,345	$166,766	($24,142)	$162,694
13	$0	355,642	$80,774	$3,663	$88,910	$29,059	$177,051	($40,089)	$122,605
14	$0	353,863	$83,198	$3,645	$88,466	$18,139	$187,971	($38,092)	$84,514
15	$0	352,094	$85,694	$3,627	$70,419	$6,545	$199,565	($53,625)	$30,889
	Totals:	5,471,295	$1,053,694	$40,910	$2,109,760	$1,056,255	$2,035,400	$30,889	$2,423,806

Net Present Value (NPV) **$71,430**

BURLINGTON COUNTY COLLEGE
MOUNT LAUREL CAMPUS

BUSINESS INCUBATOR BUILDING

500 COLLEGE CIRCLE
MT. LAUREL, NJ 08054

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 (PSEG)
Electric Utility Rate Structure:	Large Power and Light Service (LPLS)
Third Party Supplier:	HESS

Natural Gas Utility Provider:	Public Service Electric & Gas (PSEG)
Utility Rate Structure:	Large Volume Gas (LVG)
Third Party Supplier:	Pepco Energy Services

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:	Public Service Electric & Gas (PSE&G)		
Rate:	LPLS		
Meter No:	778018996		
Account #	42-008-217-02		
Third Party Utility Provider:	HESS		
TPS Meter / Acct No:	-		

MONTH OF USE	CONSUMPTION KWH	DEMAND KW	TOTAL BILL
Jul-10	61,600	142	$9,669
Aug-10	53,040	135	$8,543
Sep-10	51,360	134	$8,322
Oct-10	33,360	111	$5,013
Nov-10	33,360	98	$5,137
Dec-10	36,320	94	$5,008
Jan-11	30,400	66	$4,150
Feb-11	33,200	87	$4,545
Mar-11	31,440	65	$4,274
Apr-11	32,720	102	$4,616
May-11	35,920	98	$4,988
Jun-11	50,000	138	$7,919
Totals	**482,720**	**142 Max**	**$72,184**

AVERAGE DEMAND **105.7 KW average**

AVERAGE RATE **$0.150 $/kWh**

Figure 1
Burlington County College
Electric Usage Profile
July-2010 through June-2011

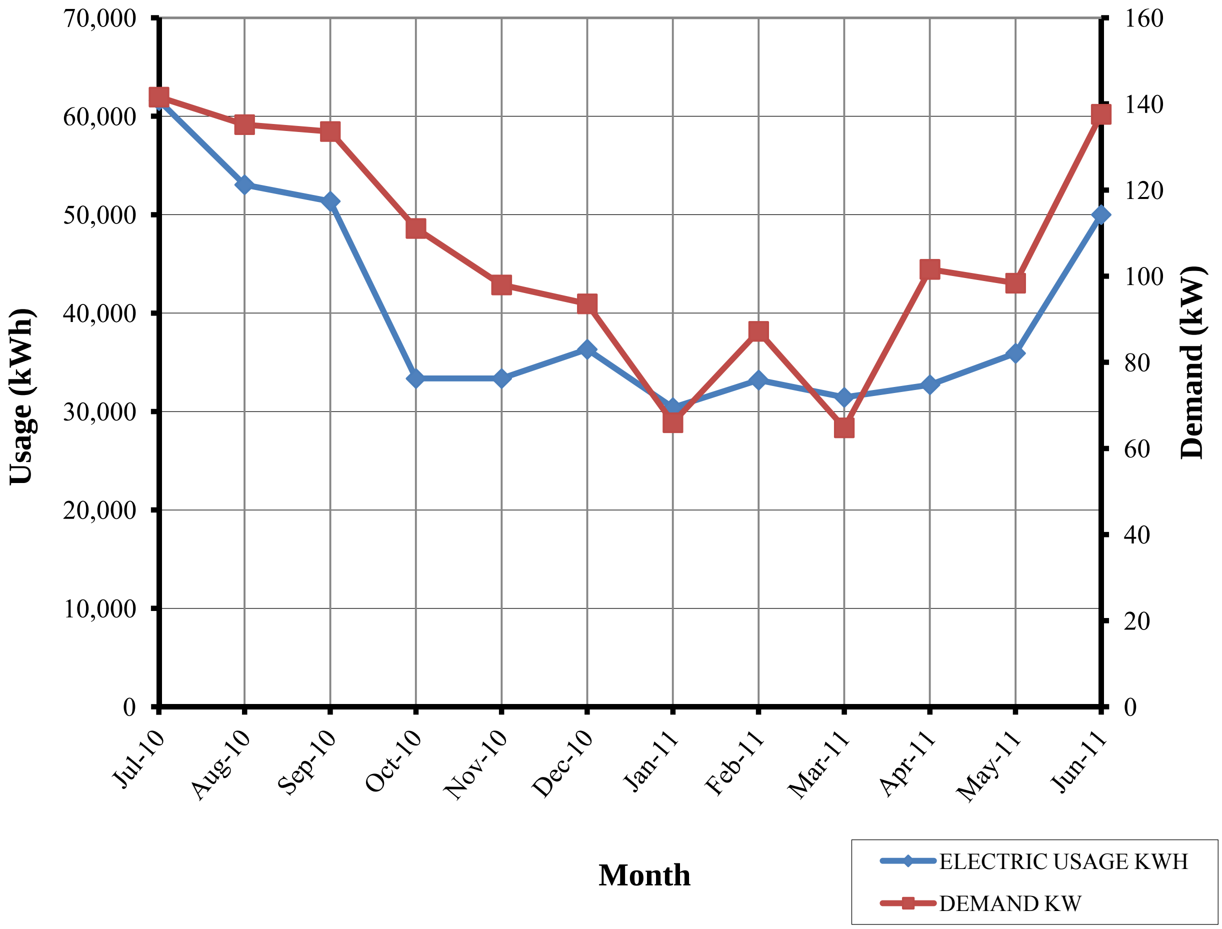
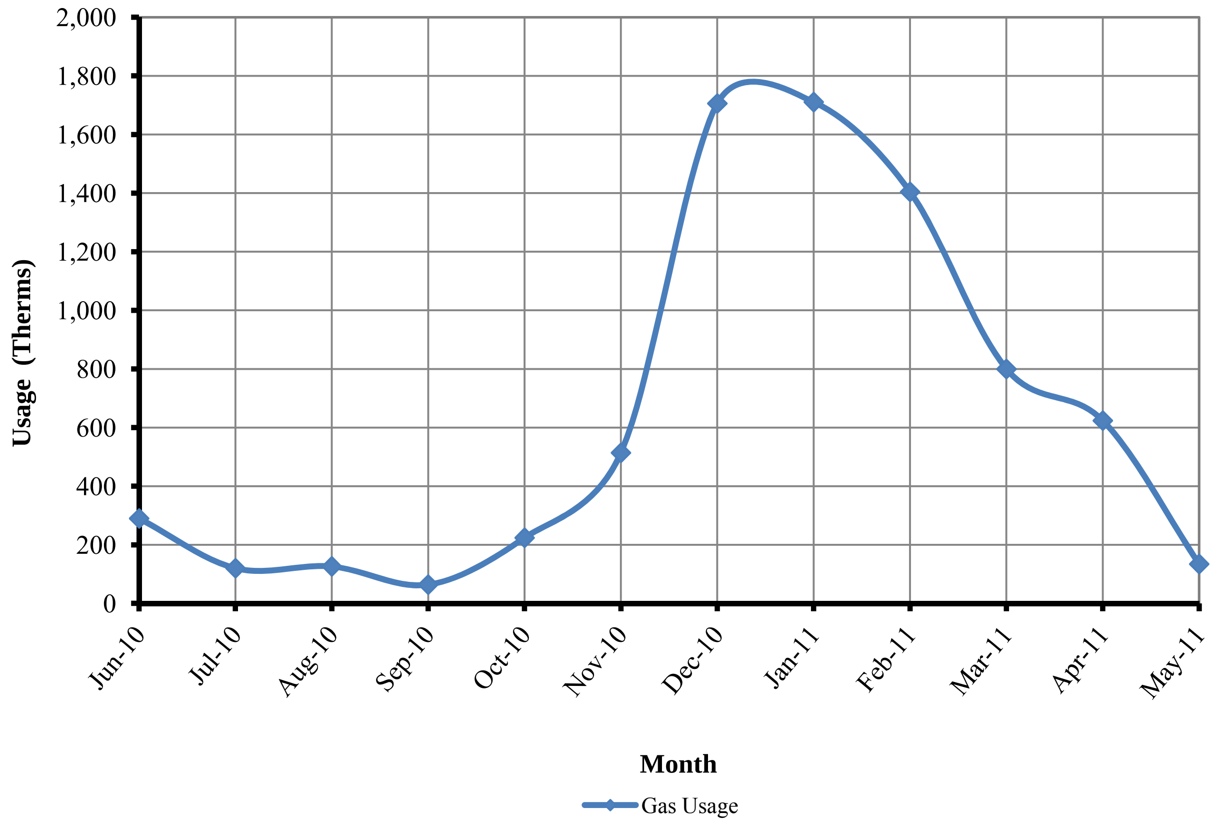


Table 2
Natural Gas Billing Data

NATURAL GAS USAGE SUMMARY		
Utility Provider:	PSEG	
Rate:	LVG	
Meter No:	3228737	
Point of Delivery ID:	PG000011022972179214	
Third Party Utility Provider:	Pepco Energy	
TPS Meter No:	-	
MONTH OF USE	**CONSUMPTION (THERMS)**	**TOTAL BILL**
Jun-10	290	$128
Jul-10	120	$113
Aug-10	127	$116
Sep-10	64	$107
Oct-10	224	$233
Nov-10	514	$638
Dec-10	1,706	$2,289
Jan-11	1,711	$1,515
Feb-11	1,405	$1,556
Mar-11	800	$1,471
Apr-11	624	$553
May-11	135	$117
TOTALS	**7,719**	**$8,835**
AVERAGE RATE:	**$1.14**	**$/THERM**

Meter # 3228737 feeds both Business Incubator (20,000 SF) and Science Incubator (12,000 SF). Above table shows total gas consumption for both Incubators.

Figure 2
Burlington County College -Business Incubator
Gas Usage Profile
June-2010 through May-2011



II. FACILITY DESCRIPTION

The 20,000 SF Business Incubator Building was built in 1998 with no additions or renovations. The building is a single story facility with a loft where the main air handling unit is located. Business Incubator is primarily and office building with the spaces rented to small technology companies.

Occupancy Profile

The typical hours of operation for the Business Incubator are Monday through Friday between 8:00 am and 6:00 pm. The facility is normally closed on weekend expect a small portion of the building. Current occupancy of the Business Incubator is not known.

Building Envelope

Exterior walls for the Building are brick faced with a concrete block construction. The amount of insulation within the walls couldn't be verified. The windows throughout the building are in excellent condition and appear to be well maintained. Typical windows throughout the building are double pane, operable, ¼" tinted glass with aluminum frames. Blinds are utilized in some areas for occupancy comfort. The blinds are valuable because they help to reduce heat loss in the winter and reduce solar heat in the summer. The building has a pitched, standing seam metal roof. The major HVAC equipment is located in the loft. Amount of insulation beneath the roof couldn't be verified.

HVAC Systems

Heating and air conditioning for the Business Incubator building is provided with a central air handling unit coupled with a split condensing unit and two (2) hot water boilers. The air handling unit has hot water coils and direct expansion refrigerant coils for heating and cooling.

The central air handling unit is equipped with a 20 HP supply fan and it utilizes an inlet vortex damper for static air pressure control. It is recommended to remove vortex damper and control static pressure by varying supply fan speed using a Variable Frequency Drive. Supply fan is currently driven with a standard efficiency motor.

Major source of heating for the building is a set of two (2) Weil Mclain gas fired hot water boilers located in the boiler room. The rated input capacity of each boiler is 427 MBH with approximately 80% thermal efficiency. The boilers are 17 years old and they are in fair condition. The hot water is delivered to the air handling unit via two (2) 3 HP pipe mounted circulation pumps. The space heating is achieved via preheat coils in the air handling unit; reheat coils in the fan powered VAV boxes and baseboard heaters in some of the perimeter offices.

The main air handling unit is equipped with direct expansion (DX) cooling coils, which are connected to an 80 ton Trane RAUC condensing unit. The Trane unit is approximately 14 years old and appears to be in fair condition.

Supplemental System

There are two small split air conditioning units providing supplemental air conditioning for two of the offices.

Exhaust System

Air is exhausted from the bathrooms through small exhaust fans located in each bathroom. Office and common area ventilation is achieved via the air handling unit by exhausting a portion of the return air.

HVAC System Controls

The air handling unit, condensing unit and the boilers in the Business Incubator are controlled, scheduled and monitored via the Siemens central DDC system.

Fan powered VAV boxes and the reheat valves are also monitored and controlled by the Siemens central DDC control system. Each space within the building is equipped with a remote temperature sensor with override capability.

Domestic Hot Water

Domestic hot water for the restrooms is provided by a 75-gallon, gas fired Bradford White hot water heater with a heating capacity of 75 MBH. The heater is located in the boiler room. Domestic hot water is circulated throughout the building via a small circulator pump. Circulator is controlled with an aquastat.

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 Equipment Upgrade	$12,405	$1,417	8.8	71%
ECM #2	VFD on AHU Supply Fan	$21,140	$2,805	7.5	99%
ECM #3	Premium Efficiency Motors	$989	$202	4.9	206%
ECM #4	High Efficiency Boilers	$54,011	$1,374	39	-24%
ECM #5	Tie-in Campus HW/CW Loop	$75,000	$6,301	11.9	26%
RENEWABLE ENERGY MEASURES (REM's)					
ECM NO.	**DESCRIPTION**	**NET INSTALLATION COST**	**ANNUAL SAVINGS**	**SIMPLE PAYBACK (Yrs)**	**SIMPLE LIFETIME ROI**
REM #1	20 KW Solar Array	$142,614	$16,436	8.7	73%

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 Equipment Upgrade	3.8	9,448	-
ECM #2	VFD on AHU Supply Fan	-	18,699	-
ECM #3	Premium Efficiency Motors	0.2	1,344	-
ECM #4	High Efficiency Boilers	-	-	1,013
ECM #5	Tie-in Campus HW/CW Loop	32	25,600	-
RENEWABLE ENERGY MEASURES (REM's)				
ECM NO.	DESCRIPTION	ANNUAL UTILITY REDUCTION		
		ELECTRIC DEMAND (KW)	ELECTRIC CONSUMPTION (KWH)	NATURAL GAS (THERMS)
REM #1	20 KW Solar Array	20	30,459	-

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 Equipment Upgrade	$1,417	$12,405	$0	$12,405	8.8
VFD on AHU Supply Fan	$2,805	$22,440	$1,300	$21,140	7.5
Premium Efficiency Motors	$202	$1,049	$60	$989	4.9
High Efficiency Boilers	$1,374	$55,600	$1,589	$54,011	39.3
Tie-in Campus HW/CW Loop	$6,301	$75,000	$0	$75,000	11.9
Design / Construction Extras (15%)	-	$24,974	-	$24,532	-
Total Project	**$10,725**	**$135,868**	**$1,360**	**$134,066**	**12.5**

*Items highlighted in yellow are not included in the final project totals.

*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 Lighting & Re-Lamping

Description:

Majority of the interior lighting throughout the Business Incubator is provided with fluorescent fixtures with older generation, 700 series 32W T8 lamps and electronic ballasts. Although 700 series T8 lamps are considered fairly efficient, further energy savings can be achieved by replacing the existing T8 lamps with new generation, 800 series 28W T8 lamps without compromising light output.

This ECM includes re-lamping of the existing fluorescent fixtures with 800 series, 28W T8 lamps. 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.

This ECM includes replacement of each of the high bay metal halide light fixtures with T5HO fixtures with reflective lenses. The retrofit for the metal halide fixtures includes a one for one fixture replacement. The fluorescent fixtures selected will provide equivalent light compared to the average light output of the existing metal halide fixtures.

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 your existing fixtures, or hardwired into your 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 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:

There are no Smart Start incentives for the prescribed retrofits in this ECM.

Replacement and Maintenance Savings:

Maintenance savings is negligible for this ECM and has not been included in the energy savings summary

Energy Savings Summary:

ECM #1 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$12,405
NJ Smart Start Equipment Incentive ($):	$0
Net Installation Cost ($):	$12,405
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,417
Total Yearly Savings ($/Yr):	$1,417
Estimated ECM Lifetime (Yr):	15
Simple Payback	8.8
Simple Lifetime ROI	71.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$21,257
Internal Rate of Return (IRR)	8%
Net Present Value (NPV)	$4,512.73

ECM #2: Install VFD's for 20 HP AHU Motor

Description:

This ECM includes installation of Variable Frequency Drives on the existing 20 HP air handling unit. Air is provided through the AHU unit located in the loft to the entire building. The unit currently has a vortex damper for supply static control, while it does provide energy savings over a simple ON/OFF setup, a VFD will be able to vary the load more efficiently. A variable frequency drive can be installed on the AHU fan in order to vary the speed based on the temperature of the ambient air and required CFM for the space.

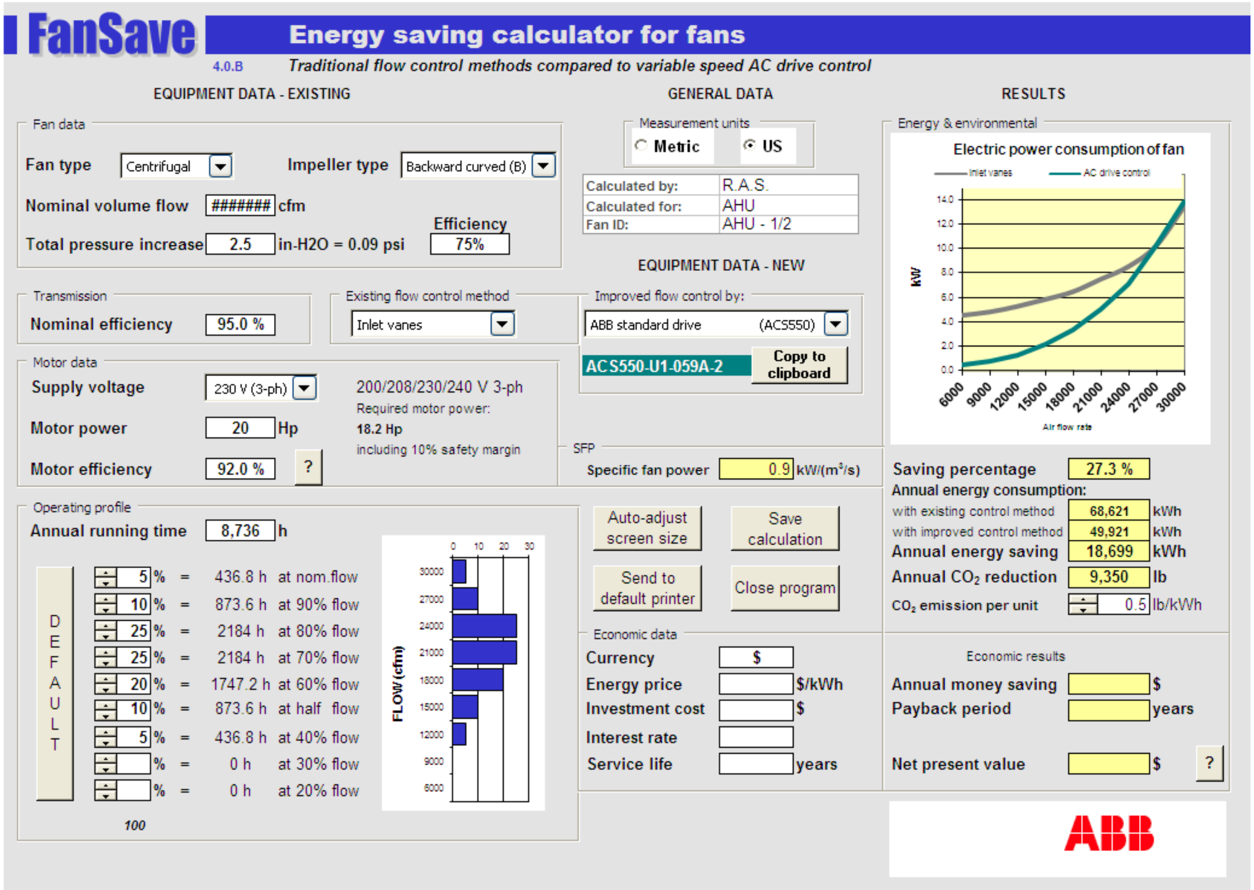
Energy and cost savings calculations are based on calculation software "FanSave v4.0" provided by ABB. Existing equipment information where available was used to estimate the decrease in energy use with an installed VFD. Through the use of FanSave an estimated energy usage for the existing system and the system with a VFD installed was created. The motor currently in use is not a high efficiency motor. A replacement for this motor is recommended and was included in the cost and savings of this ECM. Choosing not to replace the motor would yield a similar payback period; the decrease in yearly savings would be offset by the install cost. It is still recommended to be replace since the motor is within one year of reaching its useful service life.

Energy Savings Calculations:

$$\text{EnergyCons.}(\text{kWh}) = \text{Power}(\text{HP}) \times 0.746\left(\frac{\text{KW}}{\text{HP}}\right) \times \text{Operation}(\text{Hrs.})$$

$$\text{EnergyCost} = \text{EnergyUsage}(\text{kWh}) \times \text{Ave ElectricCost}\left(\frac{\$}{\text{kWh}}\right)$$

AHU Fan VFD Energy:



AHU VFD CALULATION			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Controls	New Controls	
Flow Control	Inlet Guide Vanes	VFD	-
Ave. Motor Efficiency (%)	87.5%	87.5%	-
Operating Hrs	8736	8736	-
Estimated Total Horse Power	20	20	-
Elec Cost ($/kWh)	0.150	0.150	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Electric Energy (kWh)	68,621	49,921	18,699
Electric Energy Cost ($)	$10,293	$7,488	$2,805
COMMENTS:	- VFD AHU energy is based on ABB energy savings calculator for fans, "Fan Save," version 4.0.		

Installation cost for one 20 HP VFDs, removal of existing equipment, pressure sensors, controls points, and labor comes to an estimated total of $22,440.

Currently the **NJ Smart Start® Program Incentives** for installation of Variable Frequency Drives is $65 x 20 = $1300.

Energy Savings Summary:

ECM #2 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$22,440
NJ Smart Start Equipment Incentive ($):	$1,300
Net Installation Cost ($):	$21,140
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$2,805
Total Yearly Savings ($/Yr):	$2,805
Estimated ECM Lifetime (Yr):	15
Simple Payback	7.5
Simple Lifetime ROI	99.0%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$42,073
Internal Rate of Return (IRR)	10%
Net Present Value (NPV)	$12,344.46

ECM #3: Install NEMA Premium® Efficiency Motors

Description:

The improved efficiency of the NEMA Premium® efficient motors is primarily due to better designs with use of better materials to reduce losses. Surprisingly, the electricity used to power a motor represents 95% of its total lifetime operating cost. Due to the fact that many motors operate continuously 24 hours a day, even small increases in efficiency can yield substantial energy and dollar savings.

The electric motors driving the hot water pumps and supply fans in some of the HVAC equipment are candidates for replacing with premium efficiency motors. These standard efficiency motors run considerable amount of time over a year.

This energy conservation measure replaces existing inefficient electric motors with NEMA Premium® efficiency motors. NEMA Premium® is the most efficient motor designation in the marketplace today.

IMPLEMENTATION SUMMARY					
EQMT ID	FUNCTION	MOTOR HP	HOURS OF OPERATION	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY
HWP	Heating Hot Water Loop	3	7,000	82.5%	89.5%

Energy Savings Calculations:

$$\text{Electric usage, kWh} = \frac{\text{HP} \times \text{LF} \times 0.746 \times \text{Hours of Operation}}{\text{Motor Efficiency}}$$

$$\text{where, HP} = \text{Motor Nameplate Horsepower Rating}$$

$$\text{LF} = \text{Load Factor} \qquad \text{Motor Efficiency} = \text{Motor Nameplate Efficiency}$$

$$\text{Electric Usage Savings, kWh} = \text{Electric Usage}_{\text{Existing}} - \text{Electric Usage}_{\text{Proposed}}$$

$$\text{Electric cost savings} = \text{Electric Usage Savings} \times \text{Electric Rate}\left(\frac{\$}{\text{kWh}}\right)$$

The calculations were carried out and the results are tabulated in the table below:

PREMIUM EFFICIENCY MOTOR CALCULATIONS							
EQMT ID	MOTOR HP	LOAD FACTOR	EXISTING EFFICIENCY	NEMA PREMIUM EFFICIENCY	POWER SAVINGS kW	ENERGY SAVINGS kWH	COST SAVINGS
HWP	3	90%	82.5%	89.5%	0.19	1,344	$202
TOTAL					**0.2**	**1,344**	**$202**

Equipment Cost and Incentives

Below is a summary of SmartStart Building® incentives for premium efficiency motors:

INCENTIVES	
HORSE POWER	NJ SMART START INCENTIVE
1	$50
1.5	$50
2	$60
3	$60
5	$60
7.5	$90
10	$100
15	$115
20	$125
25	$130
30	$150
40	$180

The following table outlines the summary of motor replacement costs and incentives:

MOTOR REPLACEMENT SUMMARY						
EQMT ID	MOTOR POWER HP	INSTALLED COST	SMART START INCENTIVE	NET COST	TOTAL SAVINGS	SIMPLE PAYBACK
HWP	3	$1,049	$60	$989	$202	4.9
TOTAL	**Totals:**	**$1,049**	**$60**	**$989**	**$202**	**4.9**

Energy Savings Summary:

ECM #3 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$1,049
NJ Smart Start Equipment Incentive ($):	$60
Net Installation Cost ($):	$989
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$202
Total Yearly Savings ($/Yr):	$202
Estimated ECM Lifetime (Yr):	15
Simple Payback	4.9
Simple Lifetime ROI	206.4%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$3,030
Internal Rate of Return (IRR)	19%
Net Present Value (NPV)	$1,422.46

ECM #4: Condensing Boiler Installation

Description:

Space heating for the building is provided by a heating hot water loop provided by the combustion of natural gas. The source of hot water for the building is from two gas fired boilers located in the boiler room.

The two boilers are Weil Mclain gas fired boilers which heat water that feeds the heating hot water loop of the building. The boilers which are model PFG-8 have a factory input capacity of 427 MBH and an output of 346 MBH. These capacities may be reduced due to the age and condition of the boilers. The boilers are an estimated 17 years old; they are still within their ASHRAE defined service life of 24 years. Due to the age and condition the boilers should be replaced within a reasonable timeframe to a more efficient and newer unit.

Typically, standard (non-condensing) boilers provide lower than nominal efficiency compared to condensing boilers. Standard boilers suffer further efficiency losses at part load operating conditions mainly due to limitations in the reduction of the flue gas temperature. Current average combustion efficiency of the boilers is estimated to be 76% due to standard non-condensing boiler technology, limited turn down ratio, cycling losses and outdated design and controls. 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, but for the purposes of this ECM a conservative average of 90% efficiency was used.

CE recommends replacing the two Weil Mclain boilers with high efficiency condensing hot water boilers to provide building with heating throughout the year. The annual average operating efficiency of the proposed boiler set is expected to be 90%, which gives the heating system a 14% increase in efficiency. This ECM is based on variable supply water temperature adjusted based on outdoor temperature. The returning supply temperature has a direct impact on the overall boiler efficiency.

The following is a summary of the boiler replacement recommendations.

BOILER REPLACEMENT SUMMARY		
EXISTING UNIT	**LOCATION**	**PROPOSED UNITS**
(2) Weil Mclain PFG-8	Boiler Room	(2) Aerco MLX454H

The basis for this ECM is Aerco Modular MLX454H 454 MBH Input condensing hot water boilers or an equivalent model. New boilers shall be setup and programmed to be the primary source of heating for the building during entire year. The owner is recommended to retain a professional engineer to confirm equipment sizing and finalize design.

Energy Savings Calculations:

Annual gas consumption of the two existing boiler can be estimated by finding the usage of the domestic hot water heater and subtracting from total annual gas usage of the building. This was done by averaging the gas usage from July – September, when the boilers are not running and primary gas usage is from the domestic hot water. The total domestic usage was then removed from the annual gas usage to determine usage for the boilers only.

$$7{,}719\ Therms - 1{,}208\ Therms = Total\ Usage\ of\ Boilers$$

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

ANNUAL GAS USAGE				
MONTH	**TOTAL USAGE**	**DOMESTIC**	**HEATING ONLY**	**COST**
Jun-10	290	104	186	$128
Jul-10	120	104	16	$113
Aug-10	127	104	23	$116
Sep-10	64	64	0	$107
Oct-10	224	104	120	$233
Nov-10	514	104	410	$638
Dec-10	1,706	104	1,602	$2,289
Jan-11	1,711	104	1,607	$1,515
Feb-11	1,405	104	1,301	$1,556
Mar-11	800	104	696	$1,471
Apr-11	624	104	520	$553
May-11	135	104	31	$117
TOTAL	**7,719**		**6,511**	**$8,835**

Energy savings calculations are summarized in the table below:

CONDENSING BOILER CALCULATIONS			
ECM INPUTS	**EXISTING**	**PROPOSED**	**SAVINGS**
ECM INPUTS	Existing Hot Water Boilers	New Condensing Boilers	-
Existing Nat Gas (Therms)	6,511	-	-
Boiler Efficiency (%)	76%	90%	14%
Nat Gas Heat Value (BTU/Therm)	100,000	100,000	-
Equivalent Building Heat Usage (MMBTUs)	495	495	-
Ave. Gas Cost ($/Therm) (Heating season only)	1.14	1.14	-
ENERGY SAVINGS CALCULATIONS			
ECM RESULTS	**EXISTING**	**PROPOSED**	**SAVINGS**
Natural Gas Usage (Therms)	6,511	5,498	1,013
Energy Cost ($)	$8,834	$7,460	$1,374
COMMENTS:			

Project Cost, Incentives and Maintenance Savings

Estimated cost for removing the existing boilers, labor, materials, and installing (2) Aerco Modular MLX454H 454 MBH Input boilers is $55,600.

From the **New Jersey Smart Start® Program Incentives Appendix**, installation of a high efficiency hot water boiler falls under the category "Gas Heating" and warrants an incentive based on efficiency at or above 84% for this type of equipment. The program incentives are calculated as follows:

BOILER REBATE SUMMARY					
UNIT DESCRIPTION	UNIT EFFICIENCY	REBATE $/MBH	PROPOSED CAPACITY, MBH	NUMBER OF UNITS	TOTAL REBATE, $
≥ 300 MBH - 1500 MBH	84% AFUE for Hot Water boilers	$1.75	454	2	$1,589
>1500 - ≤ 4000 MBH	84% AFUE for Hot Water boilers	$1	-	-	$0
TOTAL					**$1,589**

Maintenance savings associated with this ECM are estimated to be minimal and are not included in the calculation.

Energy Savings Summary:

ECM #5 - ENERGY SAVINGS SUMMARY	
Installation Cost ($):	$55,600
NJ Smart Start Equipment Incentive ($):	$1,589
Net Installation Cost ($):	$54,011
Maintenance Savings ($/Yr):	$0
Energy Savings ($/Yr):	$1,374
Total Yearly Savings ($/Yr):	$1,374
Estimated ECM Lifetime (Yr):	30
Simple Payback	39.3
Simple Lifetime ROI	-23.7%
Simple Lifetime Maintenance Savings	$0
Simple Lifetime Savings	$41,220
Internal Rate of Return (IRR)	-2%
Net Present Value (NPV)	($27,079.99)

REM #1: Rooftop Solar Photovoltaic Array Installation

Description:

The Science Building has approximately 2000 square-feet of available roof space that can accommodate a 20 kilowatt solar array, assuming the existing roof structure is capable of supporting an array.

The array will produce approximately 30,459 kilowatt-hours annually that will reduce the overall electric usage of the facility 6.31%.

Energy Savings Calculations:

See **LGEA Solar Financials Appendix F** for detailed financial summary and proposed solar layout areas.

Energy Savings Summary:

REM #1 - ENERGY SAVINGS SUMMARY	
System Size (KW_{DC}):	24.68
Electric Generation (KWH/Yr):	30,459
Installation Cost ($):	$142,614
SREC Revenue ($/Yr):	$11,745
Energy Savings ($/Yr):	$4,691
Total Yearly Savings ($/Yr):	$16,436
ECM Analysis Period (Yr):	15
Simple Payback (Yrs):	8.7
Analysis Period Electric Savings ($):	$87,242
Analysis Period SREC Revenue ($):	$170,143
Net Present Value (NPV)	$31,981.34

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. Maintain all weather stripping on windows and doors.

B. Clean all light fixtures to maximize light output.

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

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

ECM COST & SAVINGS BREAKDOWN

CONCORD ENGINEERING GROUP

Burlington County College, Mt. Laurel Campus - Business Incubator

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	$12,405	$0	$0	$12,405	$1,417	$0	$1,417	15	$21,257	$0	71.4%	8.8	7.6%	$4,512.73
ECM #2	VFD on AHU Supply Fan	$13,200	$9,240	$1,300	$21,140	$2,805	$0	$2,805	15	$42,073	$0	99.0%	7.5	10.2%	$12,344.46
ECM #3	Premium Efficiency Motors	$1,049	$0	$60	$989	$202	$0	$202	15	$3,030	$0	206.4%	4.9	18.9%	$1,422.46
ECM #4	High Efficiency Boilers	$55,600	$0	$1,589	$54,011	$1,374	$0	$1,374	30	$41,220	$0	-23.7%	39.3	-1.7%	($27,079.99)
ECM #5	Tie-in Campus HW/CW Loop	$75,000	$0	$0	$75,000	$4,301	$2,000	$6,301	15	$94,512	$30,000	26.0%	11.9	3.0%	$218.54
REM RENEWABLE ENERGY AND FINANCIAL COSTS AND SAVINGS SUMMARY															
REM #1	20 KW Solar Array	$142,614	$0	$0	$142,614	$4,691	$11,745	$16,436	15	$246,538	$176,177	72.9%	8.7	7.8%	$53,595.93

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.

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

SmartStart Building Incentives

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

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Business Incubator Building

Building ID: 2846468
For 12-month Period Ending: June 30, 2011[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: August 29, 2011

Facility
Business Incubator Building
500 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Year Built: 2000
Gross Floor Area (ft²): 20,000

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	1,647,041
Natural Gas (kBtu)[4]	771,942
Total Energy (kBtu)	2,418,983
Energy Intensity[5]	
Site (kBtu/ft²/yr)	121
Source (kBtu/ft²/yr)	315
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	274
Electric Distribution Utility	
Public Service Electric & Gas Co	
National Average Comparison	
National Average Site EUI	120
National Average Source EUI	280
% Difference from National Average Source EUI	13%
Building Type	College/University (Campus-Level)

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[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
Mike 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	Business Incubator Building	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	College/University (Campus-Level)	Is this an accurate description of the space in question?		☐
Location	500 College Circle, Mount Laurel, NJ 08054	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 acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐

Business Incubator Building (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	20,000 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.		☐
Number of PCs	N/A(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	N/A(Optional)	Is this the total number of hours per week that the 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	N/A(Optional)	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.		☐

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))**
06/01/2011	06/30/2011	50,000.00
05/01/2011	05/31/2011	35,920.00
04/01/2011	04/30/2011	32,720.00
03/01/2011	03/31/2011	31,440.00
02/01/2011	02/28/2011	33,200.00
01/01/2011	01/31/2011	30,400.00
12/01/2010	12/31/2010	36,320.00
11/01/2010	11/30/2010	33,360.00
10/01/2010	10/31/2010	33,360.00
09/01/2010	09/30/2010	51,360.00
08/01/2010	08/31/2010	53,040.00
07/01/2010	07/31/2010	61,600.00
Electric Consumption (kWh (thousand Watt-hours))		**482,720.00**
Electric Consumption (kBtu (thousand Btu))		**1,647,040.64**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**1,647,040.64**
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)**
06/01/2011	06/30/2011	134.72
05/01/2011	05/31/2011	624.03
04/01/2011	04/30/2011	800.00
03/01/2011	03/31/2011	1,404.50
02/01/2011	02/28/2011	1,710.67
01/01/2011	01/31/2011	1,705.90
12/01/2010	12/31/2010	514.00
11/01/2010	11/30/2010	224.28
10/01/2010	10/31/2010	64.38
09/01/2010	09/30/2010	126.55

08/01/2010	08/31/2010	120.33
07/01/2010	07/31/2010	290.06
Gas Consumption (therms)		**7,719.42**
Gas Consumption (kBtu (thousand Btu))		**771,942.00**
Total Natural Gas Consumption (kBtu (thousand Btu))		**771,942.00**
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
Business Incubator Building
500 College Circle
Mount Laurel, NJ 08054

Facility Owner
Burlington County College
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

Primary Contact for this Facility
Jay Falkenstein
601 Pemberton Browns Mills Road
Pemberton, NJ 08068

General Information

Business Incubator Building	
Gross Floor Area Excluding Parking: (ft^2)	20,000
Year Built	2000
For 12-month Evaluation Period Ending Date:	June 30, 2011

Facility Space Use Summary

Business Incubator Building	
Space Type	Other - College/University (Campus-Level)
Gross Floor Area(ft^2)	20,000
Number of PCs[o]	N/A
Weekly operating hours[o]	N/A
Workers on Main Shift[o]	N/A

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	**Current** (Ending Date 06/30/2011)	**Baseline** (Ending Date 06/30/2011)	**Rating of 75**	**Target**	**National Average**
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft²)	121	121	0	N/A	120
Source (kBtu/ft²)	315	315	0	N/A	280
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/ft²/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
$MtCO_2e$/year	274	274	0	N/A	272
$kgCO_2e/ft^2$/year	14	14	0	N/A	14

More than 50% of your building is defined as College/University (Campus-Level). This building is currently ineligible for a rating. Please note the National Average column represents the CBECS national average data for College/University (Campus-Level). This building uses X% less energy per square foot than the CBECS national average for College/University (Campus-Level).

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Business Incubator

Boilers

Tag	**B1 & B2**		
Unit Type	Gas Fired Modular Water Boiler		
Qty	2		
Location	Boiler Room		
Area Served	Entire building		
Manufacturer	Weil Mclain		
Model #	PFG-8-PIN		
Serial #	CP3418102		
Input Capacity (Btu/Hr)	427,000		
Rated Output Capacity (Btu/Hr)	346,000		
Approx. Efficiency %	81.0%		
Fuel	Natural Gas		
Approx Age	17		
ASHRAE Service Life	24		
Remaining Life	7		
Comments	-		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Business Incubator

AC Units

Tag	Split AC	Split AC	
Unit Type	Split Condenser Unit	Split Condenser Unit	
Qty	1	1	
Location	Business Incubator	Business Incubator	
Area Served	Business Incubator	Business Incubator	
Manufacturer	Trane	Mitsubishi	
Model #	RAUCC804EG032BD1	PUG24AYB	
Serial #	J97K83685	WFMM004431	
Cooling Type	Direct expansion	Direct expansion	
Cooling Capacity (Tons)	80	2	
Heating Type	N/A	N/A	
Heating Input (MBH)	-	-	
Supply Fan HP Motor Efficiency	-	-	
Return Fan HP Motor Efficiency	N/A	N/A	
Approx Age	14	5	
ASHRAE Service Life	15	15	
Remaining Life	1	10	
Comments	Feed main AHU		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Business Incubator

Air Handling Units and Fans

Tag	AHU-1		
Unit Type	AHU with Hot Water and DX Refrigerant		
Location	Loft		
Area Served	Entire Building		
Manufacturer	Trane		
Model #	MCCA05		
Serial #	K97K24908A		
Cooling Type	DX Refrigerant		
Flow (CFM)	23,000		
Cooling Capacity (Tons)	80		
Heating Type	Hot Water Coil		
Heating Input (MBH)	400		
Supply Fan HP Motor Efficiency	20 HP 87.5%		
Return Fan HP Motor Efficiency	N/A		
Approx Age	14		
ASHRAE Service Life	15		
Remaining Life	1		
Comments	Vortex dampers for supply static control		

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Business Incubator

Domestic Water Heaters

Tag	HWH		
Unit Type	Gas fired hot water heater		
Qty	1		
Location	Boiler Room		
Area Served	Domestic Hot Water		
Manufacturer	Bradford White		
Model #	TW75T753N		
Serial #	PD 9025023		
Size (Gallons)	75		
Input Capacity (MBH/KW)	75 MBH		
Recovery (Gal/Hr)	63.6		
Efficiency %	80%		
Fuel	Natural Gas		
Approx Age	10		
ASHRAE Service Life	12		
Remaining Life	2		
Comments			

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

MAJOR EQUIPMENT LIST

Concord Engineering Group

BCC Mt Laurel Campus - Business Incubator

Pumps

Tag	HW Pumps	Circulators	
Unit Type	Pipe Mounted Circulator	Pipe Mtd. Circulation Pumps	
Qty	2	1	
Location	Boiler Room	1st Floor MER	
Area Served	Heating Hot Water Loop	Domestic Hot Water Loop	
Manufacturer	Taco	-	
Model #	V12508P2J43689D	-	
Serial #	-	-	
Horse Power	3	1/4	
Flow	80 GPM @ 70 ft	-	
Motor / Frame Info	Baldor 182JM	B&G	
Electrical Power	230/460/3/60	115/1/60	
RPM	1725	1725	
Motor Efficiency %	82.5%	-	
Approx Age	14	14	
ASHRAE Service Life	20	20	
Remaining Life	6	6	
Comments			

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

Investment Grade Lighting Audit

CEG Job #: 9C11023

Project: Incubator Building

Incubator Building

KWH COST: **$0.150**

Bldg. Sq. Ft. **20,000**

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
232.22	Office 415	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	447.2	$67.08	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	374.4	$56.16	$45.00	$90.00	0.03	72.8	$10.92	8.24
232.22	Office 425	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	447.2	$67.08	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	374.4	$56.16	$45.00	$90.00	0.03	72.8	$10.92	8.24
232.22	Office 435	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	447.2	$67.08	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	374.4	$56.16	$45.00	$90.00	0.03	72.8	$10.92	8.24
231.32	Office 445	2600	24	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Parabolic	86	2.06	5,366.4	$804.96	24	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.73	4492.8	$673.92	$45.00	$1,080.00	0.34	873.6	$131.04	8.24
232.22		2600	3	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.26	670.8	$100.62	3	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.22	561.6	$84.24	$45.00	$135.00	0.04	109.2	$16.38	8.24
232.22	Office 440	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	1,788.8	$268.32	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	1497.6	$224.64	$45.00	$360.00	0.11	291.2	$43.68	8.24
232.22	Office 430	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 420	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 410	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	1,788.8	$268.32	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	1497.6	$224.64	$45.00	$360.00	0.11	291.2	$43.68	8.24
232.22	Conf. Room 101B	1000	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	172.0	$25.80	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	144	$21.60	$45.00	$90.00	0.03	28	$4.20	21.43
232.22	Conf. Room 101A	1000	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	172.0	$25.80	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	144	$21.60	$45.00	$90.00	0.03	28	$4.20	21.43
232.22	Office 110	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	1,788.8	$268.32	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	1497.6	$224.64	$45.00	$360.00	0.11	291.2	$43.68	8.24
232.22	Office 120	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 130	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 140	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	1,788.8	$268.32	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	1497.6	$224.64	$45.00	$360.00	0.11	291.2	$43.68	8.24
231.32	Office 155	2600	21	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., Parabolic	86	1.81	4,695.6	$704.34	21	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.51	3931.2	$589.68	$45.00	$945.00	0.29	764.4	$114.66	8.24
232.22	Office 145	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 125	2600	22	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.89	4,919.2	$737.88	22	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	1.58	4118.4	$617.76	$45.00	$990.00	0.31	800.8	$120.12	8.24

Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
232.22	Admin Area	1800	5	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.43	774.0	$116.10	5	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.36	648	$97.20	$45.00	$225.00	0.07	126	$18.90	11.90
227.22		1800	4	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	0.23	417.6	$62.64	4	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Office 104	1800	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	309.6	$46.44	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	259.2	$38.88	$45.00	$90.00	0.03	50.4	$7.56	11.90
232.22	Servers 201	2600	2	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.17	447.2	$67.08	2	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.14	374.4	$56.16	$45.00	$90.00	0.03	72.8	$10.92	8.24
232.22	Office 203	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 205	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 207	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Training Room	1500	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	1,032.0	$154.80	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	864	$129.60	$45.00	$360.00	0.11	168	$25.20	14.29
563		1500	6	2	Recessed Down Light, (2)26w Quad CFL Lamp	52	0.31	468.0	$70.20	6	0	No Change	0	0.00	0	$0.00	$40.00	$240.00	0.00	0	$0.00	0.00
232.22	Office 215	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 235	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 245	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 240	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	1,788.8	$268.32	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	1497.6	$224.64	$45.00	$360.00	0.11	291.2	$43.68	8.24
232.22	Office 230	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 220	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 210-2	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 210	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 208	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
221.34	Tech Closet 306	1000	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	58.0	$8.70	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	50	$7.50	$30.00	$30.00	0.01	8	$1.20	25.00
221.34	Mech Room 306	2600	2	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.12	301.6	$45.24	2	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.10	260	$39.00	$30.00	$60.00	0.02	41.6	$6.24	9.62

Investment Grade Lighting Audit

ECM #1 : Lighting Upgrade - General & Re-Lamping

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
221.34	Electrical Closet	500	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	29.0	$4.35	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	25	$3.75	$30.00	$30.00	0.01	4	$0.60	50.00
232.22	Office 301	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 303	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
221.22	Women's Restroom	1500	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	279.0	$41.85	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	225	$33.75	$30.00	$90.00	0.04	54	$8.10	11.11
221.22	Men's Restroom	1500	3	2	1x4, 2 Lamp, 32w 700 Series T8, Elect. Ballast, Recessed Mnt., Prismatic Lens	62	0.19	279.0	$41.85	3	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.15	225	$33.75	$30.00	$90.00	0.04	54	$8.10	11.11
232.22	Lounge 308	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
227.22	Corridors	3000	38	2	2x2, 2 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	58	2.20	6,612.0	$991.80	38	0	No Change	0	0.00	0	$0.00	$0.00	$0.00	0.00	0	$0.00	0.00
232.22	Office 310	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 310-2	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 320	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 325	2600	6	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.52	1,341.6	$201.24	6	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.43	1123.2	$168.48	$45.00	$270.00	0.08	218.4	$32.76	8.24
232.22	Office 330	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 335	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 340	2600	8	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.69	1,788.8	$268.32	8	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.58	1497.6	$224.64	$45.00	$360.00	0.11	291.2	$43.68	8.24
232.22	Office 345	2600	4	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	0.34	894.4	$134.16	4	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.29	748.8	$112.32	$45.00	$180.00	0.06	145.6	$21.84	8.24
232.22	Office 355	2600	12	3	2x4, 3 Lamp, 32w T8, Elect. Ballast, Recessed Mnt., Parabolic Lens	86	1.03	2,683.2	$402.48	12	3	Relamp - Sylvania Lamp FO28/841/SS/ECO	72	0.86	2246.4	$336.96	$45.00	$540.00	0.17	436.8	$65.52	8.24
221.34	Custodial Closet	500	1	2	1x4, 2 Lamp, 32w T8, Elect. Ballast, Pendant Mnt., No Lens	58	0.06	29.0	$4.35	1	2	Relamp - Sylvania Lamp FO28/841/SS/ECO	50	0.05	25	$3.75	$30.00	$30.00	0.01	4	$0.60	50.00
			322	156				65,491	$9,824	322	150			19.5	48,546	$7,282		$12,405	3.8	9,448	$1,417	8.75

NOTES: 1. Simple Payback noted in this spreadsheet does not include Maintenance Savings and NJ Smart Start Incentives.

2. Lamp totals only include T-12 tube replacement calculations

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
Business Incubator	2000	SHARP NU-U235F2	105	17.5	1,842	24.68	30,459	20	4,400	13.40

.= Proposed PV Layout

Notes:

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

PVWatts Program Data Output - Pitched Roof Panels

Station Identification	
City:	Atlantic_City
State:	New_Jersey
Latitude:	39.45° N
Longitude:	74.57° W
Elevation:	20 m
PV System Specifications	
DC Rating:	24.7 kW
DC to AC Derate Factor:	0.810
AC Rating:	20.0 kW
Array Type:	Fixed Tilt
Array Tilt:	25.0°
Array Azimuth:	225.0°
Energy Specifications	
Cost of Electricity:	15.0 ¢/kWh

Results			
Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	2.81	1773	265.95
2	3.54	2018	302.70
3	4.40	2692	403.80
4	5.21	3002	450.30
5	5.76	3361	504.15
6	5.92	3200	480.00
7	5.91	3276	491.40
8	5.46	3048	457.20
9	4.91	2696	404.40
10	3.91	2258	338.70
11	2.83	1650	247.50
12	2.44	1485	222.75
Year	4.43	30459	4568.85

Project Name: BCC Mount Laurel Campus
Location: Business Incubator
Description: Photovoltaic System 100% Financing - 15 year

Simple Payback Analysis

	Photovoltaic System 100% Financing - 15 year
Total Construction Cost	$142,614
Annual kWh Production	30,459
Annual Energy Cost Reduction	$4,691
Average Annual SREC Revenue	$11,745

Simple Payback: **8.68** Years

Life Cycle Cost Analysis

Analysis Period (years):	15	Financing %:	100%
Discount Rate:	3%	Maintenance Escalation Rate:	3.0%
Average Energy Cost ($/kWh)	**$0.154**	Energy Cost Escalation Rate:	3.0%
Financing Rate:	6.00%	Average SREC Value ($/kWh)	$0.386

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	30,459	$4,691	$0	$16,752	$8,392	$6,049	$7,002	$7,002
2	$0	30,307	$4,831	$0	$16,669	$8,019	$6,422	$7,059	$14,060
3	$0	30,155	$4,976	$0	$15,078	$7,623	$6,818	$5,612	$19,673
4	$0	30,004	$5,126	$0	$13,502	$7,203	$7,239	$4,186	$23,859
5	$0	29,854	$5,279	$308	$13,434	$6,756	$7,685	$3,965	$27,824
6	$0	29,705	$5,438	$306	$13,367	$6,282	$8,159	$4,058	$31,881
7	$0	29,557	$5,601	$304	$11,823	$5,779	$8,663	$2,678	$34,559
8	$0	29,409	$5,769	$303	$11,764	$5,244	$9,197	$2,788	$37,347
9	$0	29,262	$5,942	$301	$10,242	$4,677	$9,764	$1,441	$38,788
10	$0	29,115	$6,120	$300	$10,190	$4,075	$10,367	$1,569	$40,357
11	$0	28,970	$6,304	$298	$8,691	$3,436	$11,006	$255	$40,612
12	$0	28,825	$6,493	$297	$8,648	$2,757	$11,685	$402	$41,014
13	$0	28,681	$6,688	$295	$7,170	$2,036	$12,405	($879)	$40,135
14	$0	28,537	$6,888	$294	$7,134	$1,271	$13,171	($713)	$39,423
15	$0	28,395	$7,095	$292	$5,679	$459	$13,983	($1,960)	$37,463
	Totals:	441,235	$87,242	$3,299	$170,143	$74,008	$142,614	$37,463	$473,996

Net Present Value (NPV) **$31,981**