SUSSEX BOROUGH
TRI-STATE ACTORS THEATER
ENERGY ASSESSMENT

for

NEW JERSEY
BOARD OF PUBLIC UTILITIES

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CHA PROJECT NO. 21181

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TABLE OF CONTENTS

1.0 INTRODUCTION & BACKGROUND

The Sussex Borough Theater, at 74 Fountain Square, was constructed in 1917. The building is a three story, masonry brick, 7,200 square foot facility. The first floor serves as a meeting space, dressing room, and rehearsal area. The second floor has a 99 seat theater with 25 foot ceilings, and a small storage and workshop area behind the stage. The small third floor area houses the lighting and sound crew during performances.

New Jersey's Clean Energy Program, funded by the New Jersey Board of Public Utilities, supports energy efficiency and sustainability for Municipal and Local Government Energy Audits. Through the support of a utility trust fund, New Jersey is able to assist state and local authorities in reducing energy consumption while increasing comfort.

2.0 EXECUTIVE SUMMARY

This report details the results of the Sussex Borough Theater, a three story, masonry brick, 7,200 square foot facility. The facility consists of a meeting space, dressing room, rehearsal area; and 99 seat theater, storage, and workshop area. The following areas were evaluated for energy conservation measures:

- Exit sign replacement
- Lighting upgrades
- Restroom fixture upgrades
- Insulation upgrades
- Window upgrades

Various potential Energy Conservation Measures (ECMs) were identified for the above categories. Potential annual savings of $4,400 for the recommended ECMs may be realized with a payback of 1.6 years.

The ECMs identified in this report will allow for the building to reduce its energy usage and if pursued has the opportunity to qualify for the New Jersey SmartStart Buildings Program. A summary of the costs, savings, and paybacks for the recommended ECMs follows:

ECM-4 Replace Exit Signs with LED type

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
800	0.2	1,690	0	200	3.5	100	4.0	3.5

* Incentive shown is per the 2010 New Jersey Smart Start Program's Prescriptive Lighting Application

ECM-5 Work Lighting Addition

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
3,200	17.8	18,690	0	3,500	15.0	NA	0.9	NA

* There is no incentive available through the New Jersey Smart Start program for this ECM.

ECM-6 Light Replacement

Budgetary Cost	Annual Utility Savings					Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total	ROI			
$	kW	kWh	Therms	$		$	Years	Years
4,800	1.0	3,550	0	600	0.7	1,100	8.0	6.2

* Incentive shown is per the 2010 New Jersey Smart Start Program's Prescriptive Lighting Application.

ECM-7 Replace Faucets with Low Flow

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Water	Total				
$	kW	kWh	Kgals	$		$	Years	Years
600	0	0	5.1	100	3.2	NA	6.0	NA

* There is no incentive available through the New Jersey Smart Start program for this ECM.

3.0 EXISTING CONDITIONS

3.1 Building General

The Sussex Borough Theater originally opened as a vaudeville theater and has remained a theater since construction. It is currently leased to a small, non-profit company called the Tri-State Actors Theater Inc. (Tri-State), which presents about one show per month, and also disassembles old sets and erects new ones. The only major renovation in recent years was implementation of a rooftop heating and cooling unit (RTU) for the theater area. This unit was installed shortly after the Tri-State Actors Theater assumed building operations in 2003.

The building is constructed of the original masonry brick. The walls consist of brick, and plaster board with wire mesh sandwiched in between. There is also acoustical paneling on the inside of the theater. The roof is a shingled sloped roof in the front, with a flat roof section in back housing the RTU. The roof is anchored by four large support trusses, and the attic space above the ceiling is insulated with a minimal amount of rock wool insulation.

The first floor of the building contains a small entrance and reception area for guests, and two large restrooms located toward the front of the building. The middle of the first floor is called the "black box space" and is essentially an open area used for rehearsals, makeup, and various other activities required for performances. There is also a small restroom and shower connected to this area. The back of the first floor has a small kitchen area which is also used as a makeup room during performances. A hydraulic lift elevator connects the first and second floors.

The second floor is mainly the 99 seat theater with stadium seating; therefore the seats are tiered from the stage floor up to the area where the sound and lighting crews are housed during a show. Directly behind the main stage is a storage area and space to build sets. There is a loft above this area used primarily for set storage.

The building is operated from about 10:00 AM to 6:00 PM five days a week when there are no shows, and about 10:00 AM to 11:00 PM during performances.

3.2 Utility Usage

The Tri-State Actors Theater uses electricity, water, and natural gas. Electricity is purchased from Jersey Central Power and Light (JCP&L), natural gas from Elizabethtown Gas, and water from the Borough of Sussex. Electricity data was available from February 2009 through March 2010. Over the most recent year, the theater consumed about 38,840 kWh of electricity at a cost of approximately $7,700, and average kWh of about $0.20. A graph of electrical use can be seen in Appendix A and shows a spike in the summer months indicating the use of air conditioning.

Natural gas data for the theater was available from May 2009 through April 2010. During this time period, the theater consumed about 3,460 therms of natural gas at an annual cost of approximately $3,700, or $1.08 per therm. Natural gas is used for heating the building; therefore, a noticeable spike in natural gas usage can be seen in the winter months. A graph of usage is provided in Appendix A.

Water usage for the building was available for 2008 and 2009. During this timeframe, the theater used about 114,000 gallons of water or 57,000 gallons per year. There was a large spike in water usage for February 2009 at 37,550 gallons. The reason for this spike was not able to be determined, but it significantly affected the annual usage numbers. Over the two years data was available, the county charged the building about $3,000 for water use, or about $26.60 per thousand gallons.

3.3 HVAC Systems

The first floor of the building is heated by a 137 MBTU Weil-McLain boiler located in the basement. This unit is about 15 years' old, but has had recently refurbished. The boiler's efficiency is approximately 80%. Most of the first floor does not have cooling; however, there is a 2.75 ton window air conditioning unit that serves the front reception area. The window unit is manufactured by Friedrich and has an energy efficiency ratio (EER) rating of 9.0.

The theater is heated and cooled by a Rheem RTU capable of producing 15 tons of cooling capacity, and 250 Mbtus of heat. The unit, which is approximately 7 years old, has a nameplate heating efficiency of about 81%. However, due to age efficiency degradation, a conservative estimate of 80% efficient was used for heating calculations. The cooling section of the RTU has an EER of 9.0.

A small exhaust fan located in the kitchen is rarely used, and there is no ventilation except what is provided by the RTU.

3.4 Lighting/Electrical Systems

The building is lit by a large variety of lights. The main entrance area, backstage, and side entrance areas are lit primarily with 4 bulb T12 fluorescent fixtures. There are some T8 fluorescent fixtures throughout the building, as well as compact fluorescent (CFL) and incandescent lights. All of the fluorescent T12 and T8 bulbs have magnetic ballasts. In total, there are (38) 4-lamp T12 fixtures with magnetic ballasts. The main entrance and elevator have (4) 2 lamp T8 fixtures. There are about (8) 10 watt CFLs, (2) 25 watt CFLs, and (3) 75 watt incandescent bulbs in the building. There are also (20) 40 watt incandescent bulbs in the kitchen in front of a mirror used for applying makeup.

The black box area on the first floor and the theater space on the second floor have special theatrical lights used for performances. There are two types of can lights in these areas. The larger of the two cans are Par 64 lights, and the smaller cans are Source 4 Par lights. Other specialty lights in the area are Leko lights each drawing 575 W of power. The Par 64s draw 500 W of power and the Source 4 Par lights draw 575 W of power. There are a total of (13) Par 64 lights, (2) Source 4 Par lights, and (25) Leko lights. There is also an additional (7) 65 watt House lights used as general lighting for intermissions. All lights are used during shows, and it was estimated by the building operator that half the specialty stage lighting is used for work between shows.

The building has eight exit lights. Four lights are newer, more efficient LED signs, and four use incandescent bulbs. The bulbs burn continually and are considered inefficient compared to LEDs.

All lights are controlled by switches, or in the case of the theater and black box area, special theatrical control systems.

3.5 Control Systems

The RTU that serves the second floor of the building is controlled by a programmable thermostat located backstage. The first floor heating is controlled by a mechanical thermostat without setback capability. There is no central cooling on the first floor; therefore, all air conditioning is controlled manually on the window unit. The building thermostat is set at 55°F during the majority of the heating season. For only about eight hours per week when performances are scheduled is the temperature turned up to about 70°F in the winter. There is no temperature setpoint for the majority of the summer, and temperature is allowed to fluctuate based on outside air temperature. However, during scheduled, the building is cooled to about 70°F.

3.6 Plumbing Systems

Domestic hot water is produced by a Bradford White gas fired water heater located in the basement. The unit has a 50 gallon tank and requires 40 Mbtuh of natural gas to operate. Hot water is only used for washing hands in the restrooms. Hot water usage increases on show nights due to the number of people in the building.

There are two main restrooms in the theater and a smaller restroom located off the black box area. The main men's restroom has a toilet and urinal, both considered low flow by today's standards. There are two sinks in the restroom that are high flow. The main women's restroom has two low flow toilets and two high flow sinks. The smaller restroom off the black box room has a low flow toilet, shower, and sink fixture.

4.0 ENERGY CONSERVATION MEASURES

4.1 ECM-1 Increase Roof Insulation

The roof of the theater is pitched with an attic space underneath it. The attic space has four large trusses supporting the roof, and the ceiling is supported by rafters spaced about every 16 inches. In between these rafters is a minimal amount of rock wool insulation that has settled from years of use. There is currently only about 1 to 2 inches of insulation in the attic. This ECM proposes adding a 7.5" layer of fiberglass insulation. This would add a thermal resistance, or R-value, of about 25. In total, the building's roof would have an R-value of about 38.

To calculate the savings associated with adding additional insulation to the roof, the existing thermal losses through the roof (heating and cooling) were compared with the proposed thermal losses with added insulation. Losses were calculated by analyzing the existing and proposed thermal resistances with temperature bin data from Newark, NJ. The existing amount of thermal loss was then subtracted from the proposed amount of thermal loss. This difference corresponds to a savings of about 120 therms and 40 kWh per year, or about $100 annually. This savings number is very low due to the heating and cooling setpoints of the building. The building is only heated to 55°F most of the time and is rarely cooled.

Roof insulation has a life expectancy of about 20 years according to the manufacturer, and the total energy savings would be about 2,400 therms, 800 kWh, and $2,000.

The implementation cost and savings related to this ECM are presented in Appendix B and summarized below:

ECM-1 Increase Roof Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
2,900	0	40	120	100	(0.1)	NA	>25	NA

* There is no incentive available through the New Jersey Smart Start program for this ECM.

This measure is not recommended.

4.2 ECM-2 Increase Wall Insulation

The theater walls are the original brick from the 1917 construction. There is interior plaster board with a wire mesh for stability. The theater has acoustic paneling to enhance sound quality. All of the wall materials combined have an R value of about 5. This ECM proposes adding 2" polyisocyanurate board to the walls which would result in a thermal resistance of 19. An additional implementation cost has been added to the cost estimation to account for miscellaneous dry-wall and finishing costs.

To calculate the savings associated with adding the 2" of insulation, the existing wall R values were compared with the proposed wall R values with the added insulation. Thermal losses were calculated between the two scenarios by using temperature bin data from Newark, NJ. The difference between the thermal losses resulted in a savings of about 420 therms and 330 kWh per year.

Wall insulation has a life expectancy of about 20 years according to the manufacturer, and the total energy savings would be about 8,400 therms and 6,600 kWh, and $10,000.

The implementation cost and savings related to this ECM are presented in Appendix C and summarized below:

ECM-2 Increase Wall Insulation

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
7,400	0	330	420	500	0.4	NA	14.8	NA

* There is no incentive available through the New Jersey Smart Start program for this ECM.

This measure is not recommended.

4.3 ECM-Storm Windows

The theater has very few windows. The majority are on the north facing wall in the front of the building. These windows are double hung and single paned. North facing windows generally have a negative heat gain, losing more heat than they allow in from the sun. The windows, which appear deteriorated, still seal well. This ECM assessed installation of storm windows to provide an additional thermal barrier to the existing windows.

To calculate the savings associated with implementing new storm windows, a window survey was performed to determine the window area and perimeter. The thermal resistance of the windows and infiltration were then compared with the temperature bin data from Newark, NJ to determine the thermal losses through the windows. The losses were then compared with the proposed thermal loss conditions of adding storm windows. By implementing storm windows, the theater could expect to save about 60 therms annually, and about 5 kWh per year.

Storm windows have an expected life of about 20 years according to the manufacturer, and total energy savings over the life of the project is estimated at 1,200 therms, 200 kWh, and $2,000.

The implementation cost and savings related to this ECM are presented in Appendix D and summarized below:

ECM-3 Storm Windows

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
1,800	0	10	60	100	(0.1)	NA	18.0	NA

* There is no incentive available through the New Jersey Smart Start program for this ECM.

This measure is not recommended.

4.4 ECM-4 Replace Exit Signs with LED Type

There are eight exit signs in various locations operating year round. Despite their small size, exit signs can be significant energy users. Four of the signs are LEDs, and four are incandescent bulbs. LEDs are a more efficient source of light and can save energy. This ECM proposes replacing the remaining four incandescent bulb exit signs with LEDs.

To calculate the savings associated with implementing LED exit signs, the four existing wattages of the incandescent bulbs were compared with the proposed wattages of the LED fixtures. Single sided incandescent exit signs each use about 50 watts per fixture; LEDs use about 1.7 watts per fixture. Annual savings of approximately 1690 kWh per year would result.

Exit signs have an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project is estimated at 25,400 kWh and about $3,000.

The implementation cost and savings related to this ECM are presented in Appendix E and summarized below:

ECM-4 Replace Exit Signs with LED Type

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
800	0.2	1,690	0	200	3.5	100	4.0	3.5

* Incentive shown is per the 2010 New Jersey Smart Start Program's Prescriptive Lighting Application

This measure is recommended.

4.5 ECM-5 Work Lighting Addition

During show intervals, old sets are disassembled and sets for upcoming shows created. The theater does not have natural day lighting; therefore, the space is illuminated only through use of the theatrical lights above the stage. These lights are specialized for the theater, draw significant amounts of power, and are not intended for everyday use. The director noted that about half of the theater lights (Par 64, House, Leko, and Source Par 4) are used during set building. This ECM proposes adding a new set of lights above the stage area that can be used between shows. These lights would be much more efficient than those currently used, and will save energy.

To calculate the savings that could be realized with this ECM, the total wattage of the specialty lights was summed. The number was halved to represent the lights utilized between performances for set building. Based on the occupancy of the building and frequency of shows, it was assumed that these lights were on about 6 hours per day, or 2,190 hours per year. The replacement lights used for calculation were (12) standard 4-lamp T8, with electronic ballasts. The energy savings associated with adding work lights and turning off the existing stage lights would be about 18,690 kWh per year.

It is important to note that the T8 fixtures utilized for this ECM are not aesthetically pleasing and would be a distraction during performances. Therefore, an additional 20% has been included in the cost estimate for enhancing the appearance of the fixtures. Further analysis is necessary to determine the amount of light required for set building.

Lighting has an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 280,350 kWh, and $52,500.

The implementation cost and savings related to this ECM are presented in Appendix F and summarized below:

ECM-5 Work Lighting Addition

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
3,200	17.8	18,690	0	3,500	15.0	NA	0.9	NA

* There is no incentive available through the New Jersey Smart Start program for this ECM.

This measure is recommended.

4.6 ECM-6 Light Replacement

The lights used in general building applications are mostly T12 4-lamp fluorescent fixtures with magnetic ballasts. T12 lights are considered inefficient by today's standards and should be replaced with higher efficient T8 4-lamp fixtures with electronic ballasts. These fixtures use less energy, produce similar lighting levels, and can provide better quality lighting for the building. This ECM proposes replacing all (38) T12 fixtures in the building with T8s, including new electronic ballasts.

To calculate the savings for this ECM, the current lighting wattage of the lights to be replaced was compared to the proposed lighting wattage (15,980 vs. 12,420). The difference was then multiplied by the estimated time of operation for the fixtures. Using this method, it was determined that this ECM could save about 3,550 kWh annually.

Lighting has an expected life of 15 years, according to the manufacturer, and total energy savings over the life of the project are estimated at 53,250 kWh and $9,000.

The implementation cost and savings related to this ECM are presented in Appendix G and summarized below:

ECM-6 Light Replacement

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
4,800	1.0	3,550	0	600	0.7	1,100	8.0	6.2

* Incentive shown is per the 2010 New Jersey Smart Start Program's Prescriptive Lighting Application.

This measure is recommended.

4.7 ECM-7 Replace Faucets with Low Flow

The restrooms have a total of four high flow sinks. As previously noted, the theater pays about $26.6 per thousand gallons of water. This ECM proposes replacing the old high flow fixtures with new, low flow models to realize water savings.

To calculate the potential savings for replacing the four fixtures, the existing water usage was compared to the proposed water usage with new, low flow fixtures. Based on the occupancy schedule of the building, it was calculated that each faucet is used about seven times per day. This is a conservative estimate based on the variability of use, dependent on performance and non-performance schedules. Calculations are provided in Appendix H. It was assumed that with the current fixtures 0.75 gallons of water is used per use, and with the proposed fixtures 0.25 gallons of water would be used. This correlates to a savings of about 5,100 gallons of water savings per year.

Plumbing fixtures have an expected life of about 15 years, according to the manufacturer. The total water savings over the life of the project is estimated at 76,500 gallons of water, totaling $1,500.

The implementation cost and savings related to this ECM are presented in Appendix F and summarized below:

ECM-7 Replace Faucets with Low Flow

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Water	Total				
$	kW	kWh	Kgals	$		$	Years	Years
600	0	0	5.1	100	3.2	NA	6.0	NA

* There is no incentive available through the New Jersey Smart Start program for this ECM.

This measure is recommended.

5.0 PROJECT INCENTIVES

5.1 Incentives Overview

5.1.1 New Jersey Pay For Performance Program

The building will be eligible for incentives from the New Jersey Office of Clean Energy. The most significant incentives will be from the New Jersey Pay for Performance (P4P) Program. The P4P program is designed for qualified energy conservation projects in facilities whose demand in any of the preceding 12 months exceeds 200 kW. However, the 200 kW/month average minimum has been waived for buildings owned by local governments or municipalities and non-profit organizations. Facilities that meet this criterion must also achieve a minimum performance target of 15% energy reduction by using the EPA Portfolio Manager benchmarking tool before and after implementation of the measure(s). If the participant is a municipal electric company customer, and a customer of a regulated gas New Jersey Utility, only gas measures will be eligible under the Program. American Recovery and Reinvestment Act (ARRA) funding, when available, may allow oil, propane and municipal electric customers to be eligible for the P4P Program. Available incentives are as follows:

Incentive #1: Energy Reduction Plan – This incentive is designed to offset the cost of services associated with the development of the Energy Reduction Plan (ERP). The standard incentive pays $0.10 per square foot, up to a maximum of $50,000, not to exceed 50% of facility annual energy cost, paid after approval of application. For building audits funded by the New Jersey Board of Public Utilities, which receive an initial 75% incentive toward performance of the energy audit, facilities are only eligible for an additional $0.05 per square foot, up to a maximum of $25,000, rather than the standard incentive noted above.

Incentive #2: Installation of Recommended Measures – This incentive is based on projected energy saving and designed to pay approximately 60% of the total performance-based incentive. Base incentives deliver $0.11/kWh and $1.10/therm not to exceed 30% of total project cost.

Incentive #3: Post-Construction Benchmarking Report – This incentive is paid after acceptance of a report proving energy savings over one year utilizing the Environmental Protection Agency (EPA) Portfolio Manager benchmarking tool. Incentive #3 base incentives deliver $0.07/kWh and $0.70/therm not to exceed 20% of total project cost.

Combining incentives #2 and #3 will provide a total of $0.18/ kWh and $1.8/therm not to exceed 50% of total project cost. Additional incentives for #2 and #3 are increased by $0.005/kWh and $0.05/therm for each percentage increase above the 15% minimum target to 20%, calculated with the EPA Portfolio Manager benchmarking tool, not to exceed 50% of total project cost.

5.1.2 New Jersey Smart Start Program

For this program, specific incentives for energy conservation measures are calculated on an individual basis utilizing the 2010 New Jersey Smart Start incentive program. This program provides incentives dependent upon mechanical and electrical equipment. If applicable, incentives from this program are reflected in the ECM summaries and attached appendices.

If the building qualifies and enters into the New Jersey Pay for Performance Program, all energy savings will be included in the total building energy reduction, and savings will be applied towards the Pay for Performance incentive. A project is not applicable for both New Jersey incentive programs.

5.1.3 Energy Efficient and Conservation Block Grant

Following is a brief summary of the Energy Efficient and Conservation Block Grant (EECBG) program. The Energy Efficiency and Conservation Block Grant Complete Program Application Package should be consulted for rules and regulations.

Additional funding is available to local government entities through the EECBG, a part of New Jersey's Clean Energy program (NJCEP). The grant is for local government entities only, and can offset the cost of energy reduction implementation to a maximum of $20,000 per building.

This program is provided in conjunction with NJCEP funding and any utility incentive programs; the total amount of the three incentives combined cannot exceed 100% of project cost. Funds shall first be provided by NJCEP, followed by the EECBG and any utility incentives available to the customer. The total amount of the incentive shall be determined TRC Solutions, a third party technical consulting firm for the NJCEP.

In order to receive EECBG incentives, local governments must not have received a Direct Block Grant from the US Department of Energy. A list of the 512 qualifying municipalities and counties is provided on the NJCEP website. Qualifying municipalities must participate in at least one eligible Commercial & Industrial component of the NJCEP, utility incentive programs, or install building shell measures recommended by the Local Government Energy Audit Program. Eligible conservation programs through NJCEP include:

- Direct Install
- Pay for Performance
- NJ SmartStart Buildings for measures recommended by a Local Government Energy Audit (LGEA) or an equivalent audit completed within the last 12 months
- Applicants may propose to independently install building shell measures recommended by a LGEA or an equivalent audit. The audit must have been completed within the past 12 months.
- Any eligible utility energy efficiency incentive program

Most facilities owned or leased by an eligible local government within the State of New Jersey are eligible for this grant. Ineligible facilities include casinos or other gambling establishments, aquariums, zoos, golf courses, swimming pools, and any building owned or leased by the United States Federal Government. New construction is also ineligible.

5.1.4 ARRA Initiative "Energy Efficiency Programs through the Clean Energy Program"

The American Recovery and Reinvestment Act (ARRA) Initiative is available to New Jersey oil, propane, cooperative and municipal electric customers who do not pay the Societal Benefits Charge. This charge can be seen on any electric bill as the line item "SBC Charge." Applicants can participate in this program in conjunction with other New Jersey Clean Energy Program initiatives including Pay for Performance, Local Government Energy Audits, and Direct Install programs.

Funding for this program is dispersed on a first come, first serve basis until all funds are exhausted. The program does not limit the municipality to a minimum or maximum incentive, and the availability of funding cannot be determined prior to application. If the municipality meets all qualifications, the application must be submitted to TRC Energy Solutions for review. TRC will then determine the amount of the incentive based on projected energy savings of the project. It is important to note that all applications for this incentive must be submitted before implementation of energy conservation measures.

Additional information is available on New Jersey's Clean Energy Program website.

5.2 Building Incentives

5.2.1 New Jersey Pay For Performance Program

The building is eligible for all three incentives available from the New Jersey P4P program. Incentive #1 is for the development of an energy reduction plan and will pay $.05/ square foot of the building footprint, which equates to about $400. Implementation of the energy conservation measures discussed in this report is expected to reduce the building's energy usage by over 15% which qualifies it for both incentives #2 and #3. Combining incentives #2 and #3 will provide the maximum savings of $0.18/ kWh and $1.80/ therm. It is projected that the building will save about 23,930 kWh and 600 therms, which amounts to approximately $5,400 in incentives through incentives #2 and #3 of the P4P program. See appendix I for calculations.

5.2.2 New Jersey Smart Start Program

The lighting replacement ECM and LED exit light ECM are both eligible for incentive money from the Smart Start Program.

ECM 4, replacing exit signs, is eligible for a $100 incentive ($20 per fixture). When combined with the savings of replacing four incandescent exit signs, the simple payback would be reduced from 4 years to 3.5 years. ECM 6, which in involves replacing existing T12 fixtures with more efficient T8 fixtures, is eligible for $1,100 in incentive money. When combined with the savings associated with implementing new lighting, the simple payback for this measure would be reduced from 8 years to 6.1 years.

5.2.3 Energy Efficient and Conservation Block Grant

The Sussex Borough theater building is owned by local government which makes it eligible for this incentive. The incentive amount is determined by TRC Solutions and is not calculable at this time. Further information about this incentive, including the application, can be found at:
http://www.njcleanenergy.com/commercial-industrial/programs/energy-efficiency-and-conservation-block-grants

5.2.4 ARRA Initiative "Energy Efficiency Programs through the Clean Energy Program"

Based on the utility information that was provided by the borough for the theater building, it could not be determined whether the building pays for the societal benefits charge. Jersey Central Power and Light should be contacted to determine if this charge is being paid. If not, then the theater building could be eligible for additional funding through this program.

6.0 ALTERNATIVE ENERGY SCREENING EVALUATION

6.1 Geothermal

Geothermal heat pumps (GHP) transfer heat between the constant temperature of the earth and the building to maintain the building's interior space conditions. Below the surface of the earth throughout New Jersey the temperature remains in the low 50°F range throughout the year. This stable temperature provides a source for heat in the winter and a means to reject excess heat in the summer. With GHP systems, water is circulated between the building and the piping buried in the ground. The ground heat exchanger in a GHP system is made up of a closed or open loop pipe system. Most common is the closed loop in which high density polyethylene pipe is buried horizontally at 4-6 feet deep or vertically at 100 to 400 feet deep. These pipes are filled with an environmentally friendly antifreeze/water solution that acts as a heat exchanger. In the summer, the water picks up heat from the building and moves it to the ground. In the winter the system reverses and fluid picks up heat from the ground and moves it to the building. Heat pumps make collection and transfer of this heat to and from the building possible.

The building uses a gas-fired boiler to heat the first floor, and a packaged rooftop unit to heat and cool the theater and second floor. This existing equipment is not compatible with a geothermal energy source. Therefore, to take advantage of a GHP system, the existing mechanical equipment would have to be completely removed and a low temperature closed loop water source heat pump system would have to be installed to realize the benefit of the consistent temperature of the ground.

This measure is not recommended due to the extent of HVAC system renovation needed for implementation. Additionally, the building's minimal heating requirements do not justify such an extensive renovation and the project would not payback within the useful life of the equipment.

6.2 Solar

6.2.1 Photovoltaic Rooftop Solar Power Generation

The Sussex Borough Theater was evaluated for the potential to install rooftop photovoltaic (PV) solar panels for power generation. Present technology incorporates the use of solar cell arrays that produce direct current (DC) electricity. This DC current is converted to alternating current (AC) with the use of an electrical device known as an inverter. The building's roof has sufficient room to install a large solar cell array. A structural analysis would be required to determine if the roof framing could support a cell array.

The PVWATTS solar power generation model was utilized to calculate PV power generation. The New Jersey Clean Power Estimator provided by the New Jersey Clean Energy Program is presently being updated; therefore, the site recommended use of the PVWATT solar grid analyzer version 1. The closest city available in the model is Newark, New Jersey and a fixed tilt array type was utilized to calculate energy production. The PVWATT solar power generation model is provided in Appendix H.

The State of New Jersey incentives for non-residential PV applications is $1.00/watt up to 50 kW of installed PV array. Federal tax credits are also available for renewable energy projects up to 30% of installation cost. Municipalities do not pay federal taxes; therefore, would not be able to utilize the federal tax credit incentive.

Installation of (PV) arrays in the state New Jersey will allow the owner to participate in the New Jersey solar renewable energy certificates program (SREC). This is a program that has been set up to allow entities with large amounts of environmentally unfriendly emissions to purchase credits from zero emission (PV) solar-producers. An alternative compliance penalty (ACP) is paid for by the high emission producers and is set each year on a declining scale of 3% per year. One SREC credit is equivalent to 1000 kilowatt hours of PV electrical production; these credits can be traded for period of 15 years from the date of installation. The cost of the ACP penalty for 2009 is $700; this is the amount that must be paid per SERC by the high emission producers. The expected dollar amount that will be paid to the PV producer for 2010 is expected to be $600/SREC credit. Payments that will be received from the PV producer will change from year to year dependent upon supply and demand. Renewable Energy Consultants is a third party SREC broker that has been approved by the New Jersey Clean Energy Program. As stated above there is no definitive way to calculate an exact price that will be received by the PV producer per SREC over the next 15 years. Renewable Energy Consultants estimated an average of $487/ SERC per year and this number was utilized in the cash flow for this report.

The building had a maximum electricity demand of 32.1 kW and a minimum of 14.8 kW, over the previous 12 months. The monthly average over the observed 12 month period was 23.8 kW. The existing load does not justify the use of the maximum incentive cap of 50 kW of installed PV solar array; therefore, a 24 kW system size was selected for the calculations. The system costs for PV installations were derived from the most recent NYSERDA (New York State Energy Research and Development Agency) estimates of total cost of system installation. It should be noted that the cost of installation is approximately 8,192000 per kW of installed system. This has increased in the past few years due to the rise in national demand for PV power generator systems. Other cost considerations will also need to be considered. PV panels have an approximate 20 year life span; however, the inverter device that converts DC electricity to AC has a life span of 10 to 12 years and will need to be replaced multiple times during the useful life of the PV system.

The implementation cost and savings related to this ECM are presented in Appendix H and summarized below:

Photovoltaic (PV) Rooftop Solar Power Generation – 24 kW System

Budgetary Cost	Annual Utility Savings				Total Savings	New Jersey Renewable Energy Incentive*	New Jersey Renewable SREC**	Payback (without incentive)	Payback (with incentives)
	Electricity		Natural Gas	Total					
$	kW	kWh	Therms	$	$	$	$	Years	Years
192,000	0	28,392	0	5,600	5,600	24,000	13,800	>25	8.7

*Incentive based on New Jersey Renewable Energy Program for non-residential applications of $1.00 per Watt of installed capacity
** Estimated Solar Renewable Energy Certificate Program (SREC) for 15 years at $487/1000 kWh

The Sussex theater roof has two sections: one has a north south ridgeline and the other is flat where the rooftop HVAC unit sits. Solar panels work best when they are south facing and do not have any tall objects such as trees and buildings in the near vicinity. The flat section of the theater roof would work well for solar panels, but there is not sufficient space for the entire array. Mounting devices do exist, but they add to the price of installation.

While the payback period justifies recommendation of the measure, further investigation of possible installation locations, required system maintenance, and local installation costs are suggested prior to implementation.

6.2.2 Solar Thermal Hot Water Plant

Active solar thermal systems use solar collectors to gather the sun's energy to heat water, other fluids, or air. An absorber in the collector converts the sun's energy into heat. The heat is then transferred by circulating water, antifreeze, or sometimes air to another location for immediate use or storage for later utilization. Applications for active solar thermal energy include providing hot water, heating swimming pools, space heating, and preheating air in residential and commercial buildings.

A standard solar hot water system is typically composed of solar collectors, a heat storage vessel, piping, circulators, and controls. Systems are typically integrated to work alongside a conventional heating system that provides heat when solar resources are not sufficient. The solar collectors are usually placed on the roof of the building, oriented south, and tilted around the site's latitude, to maximize the amount of radiation collected on a yearly basis.

Several options exist for using active solar thermal systems for space heating. The most common method involves using glazed collectors to heat a liquid held in a storage tank (similar to an active solar hot water system). The most practical system would transfer the heat from the panels to thermal storage tanks and transfer solar produced thermal energy to use for domestic hot water production. DHW is presently produced by an electric water heater and would save site electricity.

Currently, an incentive is not available for installation of thermal solar systems. A Federal tax credit of 30% of installation cost for the thermal applications is available; however, the Borough of Sussex does not pay Federal taxes and, therefore, would not benefit from this program.

The implementation cost and savings related to this ECM are presented in Appendix J and summarized as follows:

Solar Thermal Domestic Hot Water Plant

Budgetary Cost	Annual Utility Savings				Total Savings	New Jersey Renewable Energy Incentive	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$	$	$	Years	Years
27,100	0	1,160	0	200	200	NA	>25	NA

* No incentive is available in New Jersey at this time.

This measure is not recommended.

6.3 Wind

Small wind turbines use a horizontal axis propeller, or rotor, to capture the kinetic energy of the wind and convert it into rotary motion to drive a generator which usually is designed specifically for the wind turbine. The rotor consists of two or three blades, usually made from wood or fiberglass. These materials give the turbine the needed strength and flexibility, and have the added advantage of not interfering with television signals. The structural backbone of the wind turbine is the mainframe, and includes the slip-rings that connect the wind turbine, which rotates as it points into changing wind directions, and the fixed tower wiring. The tail aligns the rotor into the wind.

To avoid turbulence and capture greater wind energy, turbines are mounted on towers. Turbines should be mounted at least 30 feet above any structure or natural feature within 300 feet of the installation. Smaller turbines can utilize shorter towers. For example, a 250-watt turbine may be mounted on a 30-50 foot tower, while a 10 kW turbine will usually need a tower of 80-120 feet. Tower designs include tubular or latticed, guyed or self-supporting. Wind turbine manufacturers also provide towers.

The New Jersey Clean Energy Program for small wind installations has designated numerous pre-approved wind turbines for installation in the State of New Jersey. Incentives for wind turbine installations are based on kilowatt hours saved in the first year. Systems sized under 16,000 kWh per year of production will receive a $3.20 per kWh incentive. Systems producing over 16,000 kWh will receive $51,200 for the first 16,000 kWh of production with an additional $0.50 per kWh up to a maximum cap of 750,000 kWh per year. Federal tax credits are also available for renewable energy projects up to 30% of installation cost for systems less than 100 kW. However, as noted previously, Sussex Borough does not pay federal taxes and is, therefore, not eligible for the tax credit incentive.

The most important part of any small wind generation project is the mean annual wind speed at the height of which the turbine will be installed. In the Sussex Borough area, the map indicates a mean annual wind speed of 10 miles per hour. For the theater, there are site restrictions. Parking lots, roads, trees and other surrounding structures would greatly affect a tower location.

A wind speed map and aerial site photo are included in Appendix L.

This measure is not recommended due to the low mean annual wind speed and site restrictions.

6.4 Combined Heat and Power Generation (CHP)

Combined heat and power, cogeneration, is self-production of electricity on-site with beneficial recovery of the heat byproduct from the electrical generator. Common CHP equipment includes reciprocating engine-driven, micro turbines, steam turbines, and fuel cells. Typical CHP customers include industrial, commercial, institutional, educational institutions, and multifamily residential facilities. CHP systems that are commercially viable at the present time are sized approximately 50 kW and above, with numerous options in blocks grouped around 300 kW, 800 kW, 1,200 kW and larger. Typically, CHP systems are used to produce a portion of the electricity needed by a facility some or all of the time, with the balance of electric needs satisfied by purchase from the grid.

Any proposed CHP project will need to consider many factors, such as existing system load, use of thermal energy produced, system size, natural gas fuel availability, and proposed plant location. While the Sussex Theater does have a sufficient need for electrical generation, it does not have the available heating load to use most of the thermal byproduct. An absorption chiller could be installed to utilize the heat to produce chilled water; however, there is no chilled water distribution system in the building and no need for cooling. The most viable selection for a CHP plant at this location would be a reciprocating engine natural gas-fired unit. Purchasing this system and performing modifications to the existing HVAC and electrical systems would greatly outweigh the savings over the life of the equipment.

This measure is not recommended.

6.5 Biomass Power Generation

Biomass power generation is a process in which waste organic materials are used to produce electricity or thermal energy. These materials would otherwise be sent to the landfill or expelled to the atmosphere. To participate in NJCEP's Customer On-Site Renewable Energy program, participants must install an on-site sustainable biomass or fuel cell energy generation system. Incentives for bio-power installations are available to support up to 1MW-dc of rated capacity.

*Class I organic residues are eligible for funding through the NJCEP CORE program. Class I wastes include the following renewable supply of organic material:

- Wood wastes not adulterated with chemicals, glues or adhesives
- Agricultural residues (corn stover, rice hulls or nut shells, manures, poultry litter, horse manure, etc) and/or methane gases from landfills
- Food wastes
- Municipal tree trimming and grass clipping wastes
- Paper and cardboard wastes
- Non adulterated construction wood wastes, pallets

The NJDEP evaluates biomass resources not identified in the RPS.

Examples of eligible facilities for a CORE incentive include:

- Digestion of sewage sludge
- Landfill gas facilities
- Combustion of wood wastes to steam turbine
- Gasification of wood wastes to reciprocating engine
- Gasification or pyrolysis of bio-solid wastes to generation equipment

* from NJOCE Website

This measure is not recommended due to the extent of HVAC system renovation needed for implementation. Additionally, the building's minimal heating requirements do not justify such an extensive renovation and the project would not payback within the useful life of the equipment.

6.5 Demand Response Curtailment

Utility Curtailment is an agreement with the JCP&L regional transmission organization and an approved Curtailment Service Provider (CSP) to shed electrical load by either turning major equipment off or energizing all or part of a facility utilizing an emergency generator; therefore, reducing the electrical demand on the utility grid. This program is to benefit the utility company during high demand periods and PJM offers incentives to the CSP to participate in this program. Enrolling in the program will require program participants to drop electrical load or turn on emergency generators during high electrical demand conditions or during emergencies. Part of the program also will require that program participants reduce their required load or run emergency generators with notice to test the system.

JCP&L does not currently have a Demand Response Curtailment, or Load shedding program for its customers so this is not an option for the administration building.

7.0 EPA PORTFOLIO MANAGER

The United State Environmental Protection Agency (EPA) is a federal agency in charge of regulating environment waste and policy in the United States. The EPA has released the EPA Portfolio Manager for public use. The program is designed to allow property owners and managers to share, compare and improve upon their facility's energy consumption. Inputting such parameters as electricity, heating fuel, building characteristics and location into the website based program generates a naturalized energy rating score out of 100. Once an account is registered, monthly utility data can be entered to track the savings progress and retrieve an updated energy rating score on a monthly basis.

The Sussex Borough Theater is considered a low energy consumer per the Portfolio Manager with a Site Energy Usage Index (EUI) of 66 kBTU/ft^2/year. The national average for entertainment buildings such as the theater is about 95 kBTU/ft^2/year. The theater does have a favorable rating; however, this does not necessarily mean that the building is energy efficient. The usage of the building, and the limited amount of time the HVAC equipment is on significantly improves the EUI rating. There are many improvements that could be implemented to further reduce this rating such as higher efficiency lighting, storm windows, and added insulation. By implementing the measures discussed in this report, it is expected that the EUI can be reduced to approximately 49 kBTU/ft^2/year. The EPA Portfolio Manager did not generate an energy rating score for this building because the building type is currently not eligible for an energy star rating.

A full EPA Energy Star Portfolio Manager Report is located in Appendix M.

The user name and password for the Theater's EPA Portfolio Manager Account has been provided to Cathy Gleason of Sussex Borough.

8.0 CONCLUSIONS & RECOMMENDATIONS

The energy audit conducted by CHA at the Sussex Borough Theater, identified energy saving opportunities for exit sign replacement, lighting upgrades, and restroom fixture upgrades. Potential annual savings of $4,400 may be realized for the recommended ECMs, with a summary of the costs, savings, and paybacks as follows:

ECM-4 Replace Exit Signs with LED type

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
800	0.2	1,690	0	200	3.5	100	4.0	3.5

* Incentive shown is per the 2010 New Jersey Smart Start Program's Prescriptive Lighting Application

ECM-5 Work Lighting Addition

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
3,200	17.8	18,690	0	3,500	15.0	NA	0.9	NA

* There is no incentive available through the New Jersey Smart Start program for this ECM.

ECM-6 Light Replacement

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Natural Gas	Total				
$	kW	kWh	Therms	$		$	Years	Years
4,800	1.0	3,550	0	600	0.7	1,100	8.0	6.2

* Incentive shown is per the 2010 New Jersey Smart Start Program's Prescriptive Lighting Application.

ECM-7 Replace Faucets with Low Flow

Budgetary Cost	Annual Utility Savings				ROI	Potential Incentive*	Payback (without incentive)	Payback (with incentive)
	Electricity		Water	Total				
$	kW	kWh	Kgals	$		$	Years	Years
600	0	0	5.1	100	3.2	NA	6.0	NA

* There is no incentive available through the New Jersey Smart Start program for this ECM.

APPENDICES

A	Utility Usage Analysis
B	ECM-1 Install Roof Insulation
C	ECM-2 Increase Wall Insulation
D	ECM-3 Storm Windows
E	ECM-4 Replace Exit Signs with LED Type
F	ECM-5 Work Lighting Addition
G	ECM-6 Light Replacement
H	ECM-7 Replace Faucets with Low Flow
I	New Jersey Pay For Performance Incentive Program
J	Photovoltaic (PV) Rooftop Solar Power Generation
K	Solar Thermal Domestic Hot Water Plant
L	Wind
M	EPA Portfolio Manager
N	Equipment Inventory
O	Return on Investment

APPENDIX A

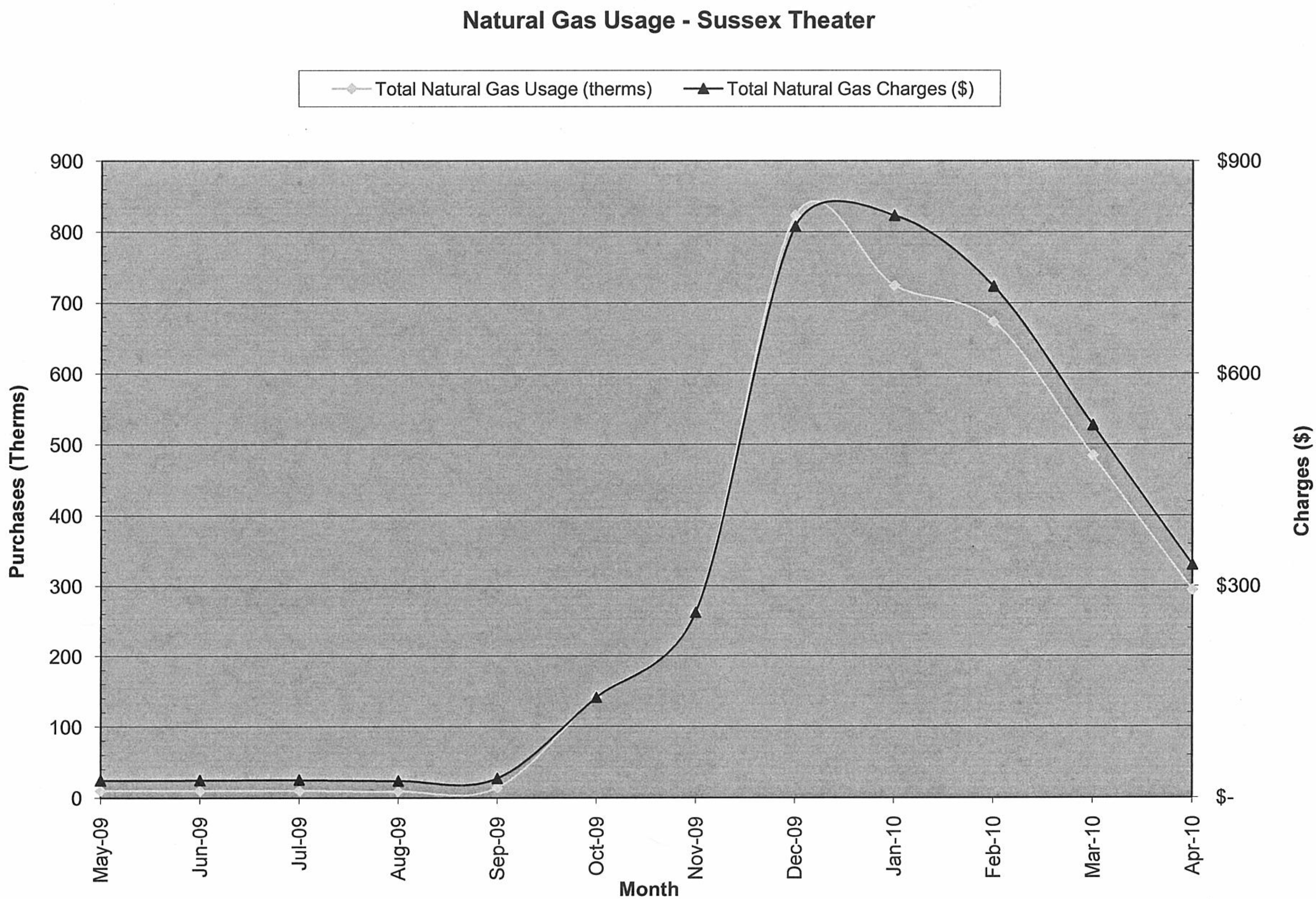
Utility Usage Analysis

New Jersey BPU Energy Audit Program
CHA Project Number: 21181
Borough of Sussex Theater
Elizabethtown Gas

74 Fountain Square
Account Number: 6377673086

Month	Therms	Charges ($)	($/therm)
May-09	10	$ 24.46	$ 2.35
June-09	10	$ 24.77	$ 2.38
July-09	10	$ 25.17	$ 2.42
August-09	9	$ 23.85	$ 2.54
September-09	15	$ 27.22	$ 1.86
October-09	142	$ 141.39	$ 0.99
November-09	263	$ 262.16	$ 1.00
December-09	823	$ 807.98	$ 0.98
January-10	724	$ 823.28	$ 1.14
February-10	673	$ 723.31	$ 1.07
March-10	484	$ 526.76	$ 1.09
April-10	295	$ 330.21	$ 1.12

Total	3,460	$ 3,741	$ 1.08
Most Recent Yr	3,460	$ 3,741	$ 1.08



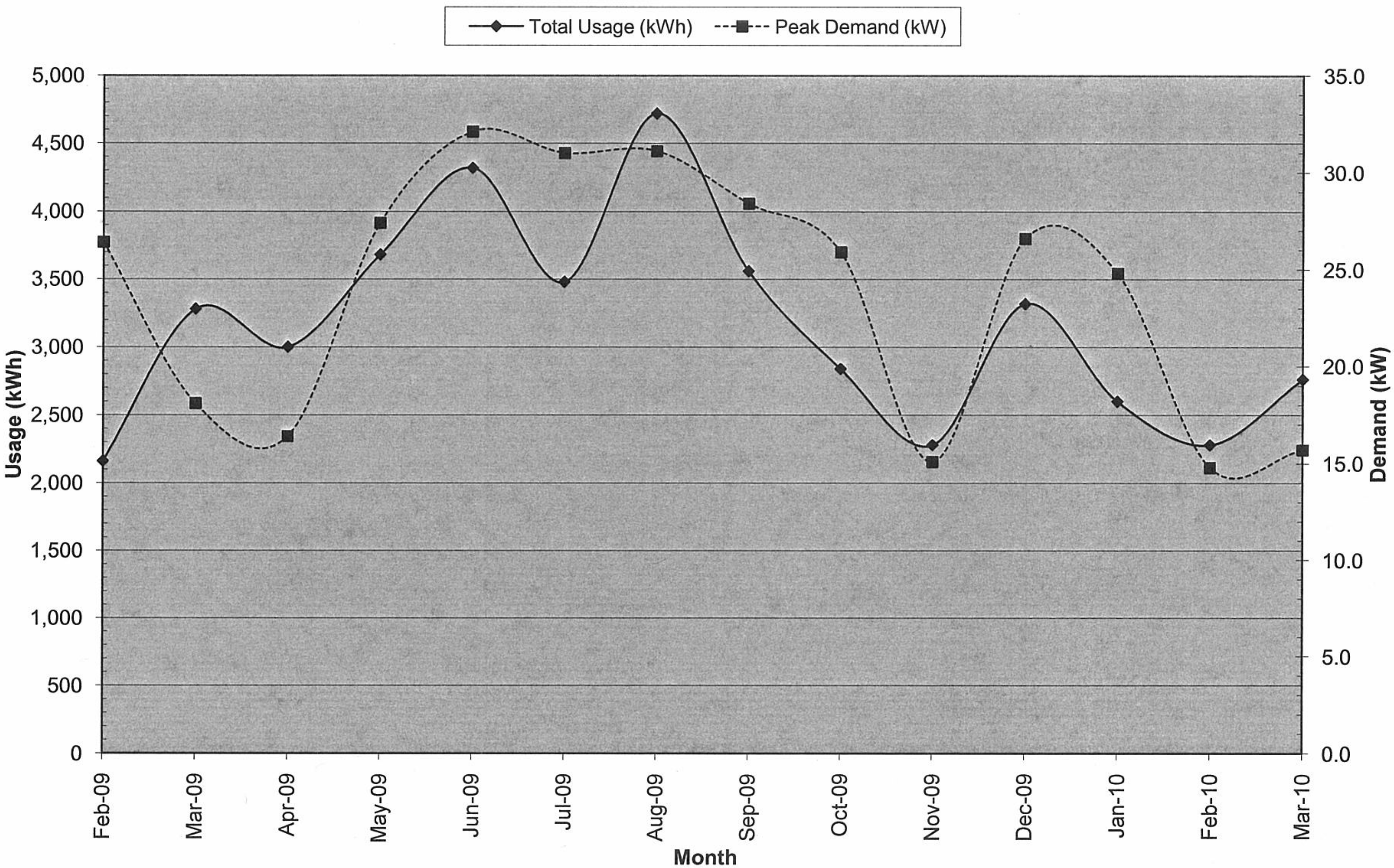
Utility Data - Sussex Theater
Natural Gas Chart

New Jersey BPU Energy Audit Program
CHA Project Number: 21181
Borough of Sussex Theater
JCP&L - Electric Service

74 Fountain Square
Account Number: 100051044095

			Charges			Unit Costs		
Month	Consumption (kWh)	Demand (kW)	Total ($)	Demand ($)	Consumption ($)	Blended Rate ($/kWh)	Consumption ($/kWh)	Demand ($/kW)
February-09	2,160	26.4	$483.86	$0.00	$483.86	0.2240	0.2240	-
March-09	3,280	18.1	$586.63	$0.00	$586.63	0.1789	0.1789	-
April-09	3,000	16.4	$529.56	$0.00	$529.56	0.1765	0.1765	-
May-09	3,680	27.4	$696.96	$0.00	$696.96	0.1894	0.1894	-
June-09	4,320	32.1	$906.84	$0.00	$906.84	0.2099	0.2099	-
July-09	3,480	31.0	$761.11	$0.00	$761.11	0.2187	0.2187	-
August-09	4,720	31.1	$956.58	$0.00	$956.58	0.2027	0.2027	-
September-09	3,560	28.4	$746.27	$0.00	$746.27	0.2096	0.2096	-
October-09	2,840	25.9	$565.57	$0.00	$565.57	0.1991	0.1991	-
November-09	2,280	15.1	$416.80	$0.00	$416.80	0.1828	0.1828	-
December-09	3,320	26.6	$646.86	$0.00	$646.86	0.1948	0.1948	-
January-10	2,600	24.8	$538.25	$0.00	$538.25	0.2070	0.2070	-
February-10	2,280	14.8	$427.15	$0.00	$427.15	0.1873	0.1873	-
March-10	2,760	15.7	$500.70	$0.00	$500.70	0.1814	0.1814	-
Total	44,280	32.1	$8,763.14	$0.00	$8,763.14	0.1979	0.1979	-
Most Recent Yr	38,840	32.1	$7,692.65	$0.00	$7,692.65	0.1981	0.1981	-

Electric Usage - Sussex Borough Theater



New Jersey BPU Energy Audit Program
CHA Project Number: 21181
Borough of Sussex Theater

74 Fountain Square
Account A3-30-0

Date	Usage (gals)	Cost ($)	Cost($)/gal
January-08	9,510	$ 232.50	$ 0.0244
February-08	8,420	$ 234.82	$ 0.0279
March-08	12,580	$ 295.96	$ 0.0235
April-08	12,860	$ 331.91	$ 0.0258
January-09	11,340	$ 299.35	$ 0.0264
February-09	37,550	$ 994.46	$ 0.0265
March-09	13,400	$ 342.52	$ 0.0256
April-09	8,390	$ 303.92	$ 0.0362
Total	114,050	$ 3,035.44	$ 0.0266
Yearly Average	57,025	$ 1,517.72	$ 0.0266

26.615 $/Kgal

APPENDIX B

ECM-1 Install Roof Insulation

Borough of Sussex
CHA #21181
Building: Tri State Actors Theater

ECM 1 Install Roof Insulation

Existing Roof Area	2,400	sf
Existing R-Value	13	
Existing U-value	0.08	Btu/hr/(sf*F)
Proposed R-value	38.0	
Proposed U-value	0.03	Btu/hr/(sf*F)
Heating System Efficiency	80%	
Cooling System Efficiency	1.20	kW/ton

Existing Cooling

Existing Cooling Load Temp Diff.	73	F
Existing Max. Roof Cooling Load	13,795	Btu/hr

Proposed Cooling

Proposed Cooling Load	4,611	Btu/hr
Occupied Cooling Setpoint	72	F
Unoccupied Cooling Setpoint	80	F

Existing Heating

Existing Heating Load Temp Diff.	57	F
Existing Max. Roof Heating Load	10,772	Btu/hr

Proposed Heating

Proposed Heating Load	3,600	Btu/hr
Occupied Heating Setpoint	70	F
Unoccupied Heating Setpoint	55	F

Existing Heating Total	14,827,942	Btu/yr
Proposed Heating Total	4,955,654	Btu/yr
Savings	9,872,287	Btu/yr
Input	123	**therms**
Existing Cooling Total	59	kWh/yr
Proposed Cooling Total	20	kWh/yr
Savings	40	**kWh/yr**

				Occupied				Unoccupied							
Avg Outdoor Air Temp. Bins °F	**Existing Equipment Bin Hours**	**Occupied Equipment Bin Hours**	**Unoccupied Equipment Bin Hours**	**Existing Heat Gain**	**Proposed Heat Gain**	**Existing Heat Loss**	**Proposed Heat Loss**	**Existing Heat Gain**	**Proposed Heat Gain**	**Existing Heat Loss**	**Proposed Heat Loss**	**Existing Cooling Load**	**Existing Heating Load**	**Proposed Cooling Load**	**Proposed Heating Load**
				(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(Btu/hr)	(kWh/yr)	(Btu/yr)	(kWh/yr)	(Btu/yr)
102.5	0	0	0	5,764	1,926	-	-	4,252	1,421	-	-	-	-	-	-
97.5	3	0	3	4,819	1,611	-	-	3,307	1,105	-	-	1	-	0	-
92.5	34	2	32	3,874	1,295	-	-	2,362	789	-	-	8	-	3	-
87.5	131	6	125	2,929	979	-	-	1,417	474	-	-	20	-	7	-
82.5	500	24	476	1,984	663	-	-	472	158	-	-	27	-	9	-
77.5	620	30	590	1,039	347	-	-	-	-	-	-	3	-	1	-
72.5	664	32	632	94	32	-	-	-	-	-	-	0	-	0	-
67.5	854	41	813	-	-	472	158	-	-	-	-	-	19,213	-	6,421
62.5	927	44	883	-	-	1,417	474	-	-	-	-	-	62,565	-	20,910
57.5	600	29	571	-	-	2,362	789	-	-	-	-	-	67,492	-	22,556
52.5	610	29	581	-	-	3,307	1,105	-	-	472	158	-	370,529	-	123,835
47.5	611	29	582	-	-	4,252	1,421	-	-	1,417	474	-	948,459	-	316,985
42.5	656	31	625	-	-	5,197	1,737	-	-	2,362	789	-	1,638,155	-	547,489
37.5	1,023	49	974	-	-	6,142	2,053	-	-	3,307	1,105	-	3,521,237	-	1,176,835
32.5	734	35	699	-	-	7,087	2,368	-	-	4,252	1,421	-	3,220,022	-	1,076,165
27.5	334	16	318	-	-	8,031	2,684	-	-	5,197	1,737	-	1,780,832	-	595,173
22.5	252	12	240	-	-	8,976	3,000	-	-	6,142	2,053	-	1,581,732	-	528,632
17.5	125	6	119	-	-	9,921	3,316	-	-	7,087	2,368	-	902,700	-	301,692
12.5	47	2	45	-	-	10,866	3,632	-	-	8,031	2,684	-	383,825	-	128,278
7.5	22	1	21	-	-	11,811	3,947	-	-	8,976	3,000	-	200,450	-	66,992
2.5	13	1	12	-	-	12,756	4,263	-	-	9,921	3,316	-	130,731	-	43,692
-2.5	0	0	0	-	-	13,701	4,579	-	-	10,866	3,632	-	-	-	-
-7.5	0	0	0	-	-	14,646	4,895	-	-	11,811	3,947	-	-	-	-
TOTALS	**8,760**	**417**	**8,343**									**59**	**14,827,942**	**20**	**4,955,654**

Borough of Sussex
CHA #21181
Building: Tri State Actors Theater

ECM 1 Install Roof Insulation

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
7.5" thick Blown in Insulation (R-25)	2,400	ft^2	$ 0.48	$ 0.28	$ 0.11	$ 1,129	$ 813	$ 288	$ 2,230	Easily Accesible attic space
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 2,230	Subtotal
$ 334	15% Contingency
$ 385	Contractor 15% O&P
$ -	Engineering
$ 2,949	**Total**

APPENDIX C

ECM-2 Increase Wall Insulation

Borough of Sussex
CHA #21181
Building: Tri State Actors Theater

ECM 2 Increase Wall Insulation

Only back stage of the theater and 40' of the sides are accessible for adding insulation.
Ceilings are 25' tall.

Wall Area needing insulation	3,000	sf
Existing U-value	0.20	Btu/hr/(sf*F)
Proposed U-value	0.06	Btu/hr/(sf*F)
Heating Efficiency	80%	
Cooling Efficiency	1.20	kW/ton

<u>Existing Cooling</u>

Max. North Wall Cooling Load	3,697	Btu/hr
Max. East Wall Cooling Load	11,653	Btu/hr
Max. South Wall Cooling Load	5,002	Btu/hr
Max. West Wall Cooling Load	6,390	Btu/hr

<u>Existing Heating</u>

Existing Heating Load Temp Diff.	57	F
Existing Max. Wall Heating Load	54,684	Btu/hr

<u>Proposed Cooling</u>

Max. North Wall Cooling Load	1,031	Btu/hr
Max. East Wall Cooling Load	3,250	Btu/hr
Max. South Wall Cooling Load	1,395	Btu/hr
Max. West Wall Cooling Load	1,782	Btu/hr

<u>Proposed Heating</u>

Proposed Max. Heating Load	15,251	Btu/hr

Occupied Cooling Setpoint	72	F
Unoccupied Cooling Setpoint	80	F

Occupied Heating Setpoint	68	F
Unoccupied Heating Setpoint	55	F

Existing Cooling Total	453	kWh/yr
Proposed Cooling Total	126	kWh/yr
Savings	327	kWh/yr

Existing Heating Total	46,503,671	Btu/yr
Proposed Heating Total	12,969,357	Btu/yr
Savings	33,534,314	Btu/yr
Input	419	therms

Existing Cooling Total	453	kWh/yr
Proposed Cooling Total	126	kWh/yr
Savings	327	**kWh/yr**

				Occupied				Unoccupied							
Avg Outdoor Air Temp. Bins °F	**Existing Equipment Bin Hours**	**Occupied Equipment Bin Hours**	**Unoccupied Equipment Bin Hours**	**Existing Heat Gain** (Btu/hr)	**Proposed Heat Gain** (Btu/hr)	**Existing Heat Loss** (Btu/hr)	**Proposed Heat Loss** (Btu/hr)	**Existing Heat Gain** (Btu/hr)	**Proposed Heat Gain** (Btu/hr)	**Existing Heat Loss** (Btu/hr)	**Proposed Heat Loss** (Btu/hr)	**Existing Cooling Load** (kWh/yr)	**Existing Heating Load** (Btu/yr)	**Proposed Cooling Load** (kWh/yr)	**Proposed Heating Load** (Btu/yr)
97.5	3	0	3	26,742	7,458	-	-	26,742	7,458	-	-	8	-	2	-
92.5	34	2	32	21,499	5,996	-	-	19,102	5,327	-	-	65	-	18	-
87.5	131	6	125	16,255	4,533	-	-	11,461	3,196	-	-	153	-	43	-
82.5	500	24	476	11,012	3,071	-	-	3,820	1,065	-	-	208	-	58	-
77.5	620	30	590	5,768	1,609	-	-	-	-	-	-	17	-	5	-
72.5	664	32	632	524	146	-	-	-	-	-	-	2	-	0	-
67.5	854	41	813	-	-	299	83	-	-	-	-	-	12,151	-	3,389
62.5	927	44	883	-	-	3,287	917	-	-	-	-	-	145,091	-	40,464
57.5	600	29	571	-	-	6,275	1,750	-	-	-	-	-	179,283	-	50,000
52.5	610	29	581	-	-	9,263	2,583	-	-	1,494	417	-	1,137,023	-	317,103
47.5	611	29	582	-	-	12,251	3,417	-	-	4,482	1,250	-	2,964,585	-	826,790
42.5	656	31	625	-	-	15,239	4,250	-	-	7,470	2,083	-	5,143,085	-	1,434,349
37.5	1,023	49	974	-	-	18,227	5,083	-	-	10,458	2,917	-	11,077,163	-	3,089,298
32.5	734	35	699	-	-	21,215	5,917	-	-	13,446	3,750	-	10,141,064	-	2,828,230
27.5	334	16	318	-	-	24,203	6,750	-	-	16,434	4,583	-	5,612,607	-	1,565,294
22.5	252	12	240	-	-	27,191	7,583	-	-	19,422	5,417	-	4,987,649	-	1,391,000
17.5	125	6	119	-	-	30,179	8,417	-	-	22,410	6,250	-	2,847,538	-	794,147
12.5	47	2	45	-	-	33,167	9,250	-	-	25,398	7,083	-	1,211,113	-	337,766
7.5	22	1	21	-	-	36,155	10,083	-	-	28,386	7,917	-	632,641	-	176,437
2.5	13	1	12	-	-	39,143	10,917	-	-	31,375	8,750	-	412,678	-	115,091
-2.5	0	0	0	-	-	42,131	11,750	-	-	34,363	9,583	-	-	-	-
-7.5	0	0	0	-	-	45,120	12,583	-	-	37,351	10,417	-	-	-	-
TOTALS	**8,760**	**417**	**8,343**									**453**	**46,503,671**	**126**	**12,969,357**

Borough of Sussex
CHA #21181
Building: Tri State Actors Theater

ECM 2 Increase Wall Insulation

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
2" Polyisocyanurate (R-14)	3000	ft^2	$ 0.96	$ 0.44		$ 2,814	$ 1,597	$ -	$ 4,411	
Finishng Costs	1	LS		$ 500		$ -	$ 605	$ -	$ 605	
Miscellaneous insulation costs	1	LS		$ 500		$ -	$ 605	$ -	$ 605	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 5,621	Subtotal
$ 843	15% Contingency
$ 970	15% Contractor O&P
$ -	Engineering
$ 7,433	**Total**

APPENDIX D

ECM-3 Storm Windows

Borough of Sussex
CHA #21181
Building: Tri State Actors Theater

*Change U-value and air infiltration rates based on new windows or storm windows
See block load spreadsheet for U-values

ECM 3 Storm Windows

Description

Windows can lead to increased energy consumption due to infiltration/exfiltration and heat gain/loss. Replacing older windows with more panes and low-emissivity coatings and insulated frames can decrease energy usage.

Given

Occupied Cooling Hours per Week	8	Hours		
Occupied Heating Hours per Week	8	Hours		
Heating Energy Cost	$1.08	$/therm		
Cooling Cost	$0.152	$/kWh		
Occupied Cooling Setpoint Temperature	70.0	Degrees F		(Assumption)
Occupied Cooling Avg Space Air Enthalpy	27.5	btu/# air		(Assumption)
Occupied Heating Setpoint Temperature	68.0	Degrees F	Occupied	(Assumption)
Unoccupied Heating Setpoint Temperature	55.0	Degrees F	Unoccupied	(Assumption)
Window Area	96	sq.ft.		(From window survey)
Window Perimeter	142	ft		(From window survey)
Proposed U factor	0.50	Btu/(h*sqft*degf)		(From window vendor)
Proposed Air Infiltration	0.15	cfm/ft		(From window vendor)
Cooling Conversion	12,000	Btu/ton		
Heating Btu Conversion	1,000,000	Btu/MMBtu		

Assumptions

Existing U factor	1.05	Btu/(h*sqft*degf)	(From ASHRAE Fundamentals)
Existing Air Infiltration	0.20	cfm/ft	(From ASHRAE Fundamentals)
Heating System Efficiency	80%		
Cooling System Efficiency	1.20	kW/ton	

Formula

Cooling Energy Conduction = (Existing U x Area x (OA Temp - RA Temp) x Op Hours)

Heating Energy Conduction = (Existing U x Area x (RA Temp - OA Temp) x Op Hours)
Cooling Energy Infiltration = (4.5 x Leakage x Perimeter x (OA Enthalpy - RA Enthalpy) x Op Hours)
Heating Energy Infiltration = 1.08 x Leakage x Perimeter x (RA temp - OA temp) x Op Hours)
Load = (Conduction) + (Infiltration)
Cooling Energy = (Cooling Load) / (12,000 Btu/Ton) x (kw/Ton)
Heating Energy = (Heating Load) / (1,000,000 Btu/MMBtu) / (Boiler Efficiency)
Energy Cost = (Energy) x (Cost/Unit)

Existing

Operation	OA Enthalphy	OA Temp	Total Hours	Cooling Occupied Hours	Heating Occupied Hours	Heating Unoccupied Hours	Cooling Occupied Conduction	Heating Occupied Conduction	Heating Unoccupied Conduction	Cooling Occupied Infiltration	Heating Occupied Infiltration	Heating Unoccupied Infiltration
Cooling	38.3	92.5	37	1.8	0.0	0.0	3,996	0	0	2,432	0	0
Cooling	36.6	87.5	131	6.2	0.0	0.0	11,004	0	0	7,255	0	0
Cooling	33.5	82.5	500	23.8	0.0	0.0	30,000	0	0	18,257	0	0
Cooling	31.6	77.5	620	29.5	0.0	0.0	22,320	0	0	15,470	0	0
Cooling	30.3	72.5	664	31.6	0.0	0.0	7,968	0	0	11,315	0	0
Heating	27.9	67.5	854	0.0	40.7	0.0	0	2,050	0	0	624	0
Heating	24.6	62.5	927	0.0	44.1	0.0	0	24,473	0	0	7,447	0
Heating	21.6	57.5	600	0.0	28.6	0.0	0	30,240	0	0	9,202	0
Heating	18.7	52.5	610	0.0	29.0	581.0	0	45,384	146,400	0	13,810	44,547
Heating	16.2	47.5	611	0.0	29.1	581.9	0	60,122	439,920	0	18,294	133,861
Heating	14.3	42.5	656	0.0	31.2	624.8	0	80,294	787,200	0	24,432	239,534
Heating	12.4	37.5	1,023	0.0	48.7	974.3	0	149,767	1,718,640	0	45,572	522,958
Heating	10.4	32.5	734	0.0	35.0	699.0	0	125,074	1,585,440	0	38,058	482,427
Heating	8.7	27.5	334	0.0	15.9	318.1	0	64,930	881,760	0	19,757	268,307
Heating	7	22.5	252	0.0	12.0	240.0	0	55,037	786,240	0	16,747	239,242
Heating	5.4	17.5	125	0.0	6.0	119.0	0	30,300	450,000	0	9,220	136,929
Heating	3.9	12.5	47	0.0	2.2	44.8	0	12,521	191,760	0	3,810	58,350
Heating	2.5	7.5	22	0.0	1.0	21.0	0	6,389	100,320	0	1,944	30,526
Heating	1.2	2.5	13	0.0	0.6	12.4	0	4,087	65,520	0	1,244	19,937
Heating	-0.2	-2.5	0	0.0	0.0	0.0	0	0	0	0	0	0
Heating	-1.4	-7.5	0	0.0	0.0	0.0	0	0	0	0	0	0
Subtotal =			8,760	93	324	4,216	75,288	690,667	7,153,200 btu	54,728	210,160	2,176,617 btu

	Conduction / Infiltration		
Cooling Load =	(75288) + (54728) =	130,016	btu
	Cooling Load		
Cooling Energy =	(130016)/(12000) * (1.20) =	13	kWh
	Cooling Energy / Cooling Cost		
Cooling Energy Cost =	(13.00) x ($0.152) =	$ 1.98	
	Conduction / Infiltration		
Heating Load =	(7843867) + (2386777) =	10,230,644	btu
	Heating Load / Heat Content		
Heating Energy =	(10230644)/(80%)/(100000) =	128	therms
	Heating Energy / Heating Cost		
Heating Energy Cost =	(127.88) x ($1.080) =	$ 138	

Operation	OA Enthalphy	OA Temp	Total Hours	Cooling Occupied Hours	Heating Occupied Hours	Heating Unoccupied Hours	Cooling Occupied Conduction	Heating Occupied Conduction	Heating Unoccupied Conduction	Cooling Occupied Infiltration	Heating Occupied Infiltration	Heating Unoccupied Infiltration
Cooling	38.3	92.5	37	1.8	0.0	0.0	1,903	0	0	1,824	0	0
Cooling	36.6	87.5	131	6.2	0.0	0.0	5,240	0	0	5,441	0	0
Cooling	33.5	82.5	500	23.8	0.0	0.0	14,286	0	0	13,693	0	0
Cooling	31.6	77.5	620	29.5	0.0	0.0	10,629	0	0	11,602	0	0
Cooling	30.3	72.5	664	31.6	0.0	0.0	3,794	0	0	8,486	0	0
Heating	27.9	67.5	854	0.0	40.7	0.0	0	976	0	0	468	0
Heating	24.6	62.5	927	0.0	44.1	0.0	0	11,654	0	0	5,585	0
Heating	21.6	57.5	600	0.0	28.6	0.0	0	14,400	0	0	6,901	0
Heating	18.7	52.5	610	0.0	29.0	581.0	0	21,611	69,714	0	10,357	33,411
Heating	16.2	47.5	611	0.0	29.1	581.9	0	28,630	209,486	0	13,721	100,396
Heating	14.3	42.5	656	0.0	31.2	624.8	0	38,235	374,857	0	18,324	179,650
Heating	12.4	37.5	1,023	0.0	48.7	974.3	0	71,318	818,400	0	34,179	392,218
Heating	10.4	32.5	734	0.0	35.0	699.0	0	59,559	754,971	0	28,544	361,820
Heating	8.7	27.5	334	0.0	15.9	318.1	0	30,919	419,886	0	14,818	201,230
Heating	7	22.5	252	0.0	12.0	240.0	0	26,208	374,400	0	12,560	179,431
Heating	5.4	17.5	125	0.0	6.0	119.0	0	14,429	214,286	0	6,915	102,696
Heating	3.9	12.5	47	0.0	2.2	44.8	0	5,962	91,314	0	2,857	43,762
Heating	2.5	7.5	22	0.0	1.0	21.0	0	3,042	47,771	0	1,458	22,894
Heating	1.2	2.5	13	0.0	0.6	12.4	0	1,946	31,200	0	933	14,953
Heating	-0.2	-2.5	0	0.0	0.0	0.0	0	0	0	0	0	0
Heating	-1.4	-7.5	0	0.0	0.0	0.0	0	0	0	0	0	0
Subtotal =			8,760	93	324	4,216	35,851	328,889	3,406,286 btu	41,046	157,620	1,632,462 btu

	Conduction Infiltration	
Cooling Load =	(35851) + (41046) =	76,898 btu
	Cooling Load	
Cooling Energy =	(76898)/(12000) * (1.20) =	8 kWh
	Cooling Energy Cooling Cost	
Cooling Energy Cost =	(7.69) x ($0.152) =	$ 1.17
	Conduction Infiltration	
Heating Load =	(3735175) + (1790083) =	5,525,257 btu
	Heating Load Heat Content	
Heating Energy =	(5525257)/(80%) / (100000) =	69 therms
	Heating Energy Heating Cost	
Heating Energy Cost =	(69.07) x ($1.080) =	$ 75

Summary

EXISTING COOLING ENERGY	13.00	kWh	$	1.98
EXISTING HEATING ENERGY	127.88	therms	$	138.11
EXISTING ENERGY COST			$	140.09

PROPOSED COOLING ENERGY	7.69	kWh	$	1.17
PROPOSED HEATING ENERGY	69.07	therms	$	74.59
PROPOSED ENERGY COST			$	75.76

COOLING ENERGY SAVINGS	5.31	kWh	$	0.81	40.9% of existing
HEATING ENERGY SAVINGS	58.82	therms	$	63.52	46.0% of existing
ENERGY COST SAVINGS			$	64.33	45.9% of existing

Comments

Borough of Sussex
CHA #21181
Building: Tri State Actors Theater

ECM 3 Storm Windows

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
2' x 3' storm window	11	windows	$ 78	$ 20		$ 835	$ 260	$ -	$ 1,096	
3' x 5' storm window	2	windows	$ 98	$ 21		$ 192	$ 51	$ -	$ 243	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 1,339	Subtotal
$ 268	20% Contingency
$ 241	Contractor 15% O&P
$ -	0% Engineering
$ 1,847	**Total**

APPENDIX E

ECM-4 Replace Exit Signs with LED Type

Borough of Sussex
CHA #21181
Building: Tri State Actors Theater

ECM 4 Replace EXIT signs with LED type

Analysis

Referenced Data

Demand Rate	$ 4.19	/kW
Supply Electrical Rate	$ 0.138	/kWh

Inputs

	Material	Labor
Demolition	$ -	$ 5
New Sign Install	$ 73	$ 56

Contingency	10%	of Sub-Total
Contractor O&P	12%	of Sub-Total
Engineering	0%	of Sub-Total

Replacement Power	1.7	watts/sign

Sign Type	Wattage Per Side	Sides	Quantity
A	60	1	0
B	65	1	0
C	50	1	4

Results

Utility Savings		
	Electrical	1,692 kWh
	Demand	0.2 kW
	Steam	- klbs

Savings	**$243**
Implementation Cost	**$808**
Simple Payback (Yrs)	**3.3**

Calculations

Current Power Consumption = [(60 W/side x 1 side x 0 signs) + (65 W/side x 1 side x 0 signs) + (50 W/side x 1 side x 4 sign)] x 8,760 hrs/yr

= 0.2 kW x 8,760 hrs/yr

= 1,752 kWh

Proposed Power Consumption = (1.7 W/sign x 4 signs) x 8,760 hrs/yr

= 0. kW x 8,760 hrs/yr

= 60 kWh

Borough of Sussex
CHA #21181
Building: Tri State Actors Theater

Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

ECM 4 Replace EXIT signs with LED type

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
						$ -	$ -	$ -	$ -	
Demolition	4	Ea	$ -	$ 5		$ -	$ 24	$ -	$ 24	
New Sign Install	4	Ea	$ 73	$ 56		$ 286	$ 271	$ -	$ 557	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	
						$ -	$ -	$ -	$ -	

$ 581	Subtotal
$ 87	15% Contingency
$ 70	Contractor 12% O&P
$ 70	0% Engineering
$ 808	**Total**

APPENDIX F

ECM-5 Work Lighting Addition

Borough of Sussex
CHA #21181
Building: Tri State Actors Theater

ECM 5 Work Lighting Addition

Currently half the theater lights are used for working when there is not a show.
This ECM proposes adding T8 fluorescent lamps near the stage and turning off the theater lights when there is not a production

Building Schedule:
Existing conditions (master switch): hrs/week
Supply Electric Rate $ 0.138 /kWh
Demand Rate $ 4.19 /kW

Instructions and notes:
Input existing fixtures and retrofit fixtures. Use light table

	EXISTING CONDITIONS									RETROFIT CONDITIONS										COST ANALYSIS			
Fixture Type	Number of Fixtures	Watts per Fixture	Number of Non-Operational Fixtures	Watts per Non-Operational Fixtures	kW/Space	Exist Control	Daily Hours	Annual Hours	Annual kWh divided by 2	Number of Fixtures	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Daily Hours	Annual Hours	Annual kWh	kW Saved	Annual kWh Saved	Annual $ Saved	Retrofit Cost	Simple Payback
Leko Lights	25	575	0	586.5	14.375	switch	6	2,190	15,741	3	F42ILL	59	0.177	switch	6	2,190	388	14.2	15,353	$ 2,828	$ 676	0.2
Par 64 Lights	5	500	0	510	2.5	switch	6	2,190	2,738	3	F42ILL	59	0.177	switch	8	2,190	388	2.3	2,350	$ 440	$ 676	1.5
Source 4 Par Lights	2	575	0	586.5	1.15	switch	6	2,190	1,259	3	F42ILL	59	0.177	switch	8	2,190	388	1.0	872	$ 169	$ 676	4.0
House Lights	7	65	0	66.3	0.455	switch	6	2,190	498	3	F42ILL	59	0.177	switch	8	2,190	388	0.3	111	$ 29	$ 676	23.2
TOTALS -	39		0		18.5				20,236	12			0.7				1,551	17.8	18,685	$ 3,467	$ 3,247	0.9

APPENDIX G

ECM - 6 Lighting Replacement

Borough of Sussex
CHA #21181
Building: Tri State Actors Theater

ECM 6 Light Replacement

Building Schedule:
Existing conditions (master switch): hrs/week
Supply Electric Rate $ 0.138 /kWh
Demand Rate $ 4.19 /kW

Instructions and notes:
Input existing fixtures and retrofit fixtures. Use light table

		EXISTING CONDITIONS										RETROFIT CONDITIONS								COST ANALYSIS				
Area Description		Number of Fixtures	Fixture Code	Watts per Fixture	Number of Non-Operational Fixtures	Watts per Non-Operational Fixtures	kW/Space	Exist Control	Daily Hours	Annual Hours	Annual kWh	Number of Fixtures	Fixture Code	Watts per Fixture	kW/Space	Retrofit Control	Daily Hours	Annual Hours	Annual kWh	kW Saved	Annual kWh Saved	Annual $ Saved	Retrofit Cost	Simple Payback
Main Entrance Area		18	F44EE	144	0	146.88	2.592	switch	8	2,920	7,569	18	F44ILL	112	2.016	switch	8	2,920	5,887	0.6	1,682	$ 261	$ 2,259	8.7
Side Entrance		1	F44EE	144	0	146.88	0.144	switch	8	2,920	420	1	F44ILL	112	0.112	switch	8	2,920	327	0.0	93	$ 14	$ 125	8.7
Costume Room		1	F44EE	144	0	146.88	0.144	switch	8	2,920	420	1	F44ILL	112	0.112	switch	8	2,920	327	0.0	93	$ 14	$ 125	8.7
Makeup Room/Kitchen		8	F44EE	144	0	146.88	1.152	switch	8	2,920	3,364	8	F44ILL	112	0.896	switch	8	2,920	2,616	0.3	748	$ 116	$ 1,004	8.7
Bathrooms		6	F44EE	144	0	146.88	0.864	switch	8	2,920	2,523	6	F44ILL	112	0.672	switch	8	2,920	1,962	0.2	561	$ 87	$ 753	8.7
Shoproom/Backstage		4	F44EE	144	0	146.88	0.576	switch	8	2,920	1,682	4	F44ILL	112	0.448	switch	8	2,920	1,308	0.1	374	$ 58	$ 502	8.7
TOTALS -		38			0		5.5				15,978	38			4.3				12,428	1.2	3,551	$ 550	$ 4,768	8.7

APPENDIX H

ECM-7 Replace Faucets with Low Flow

Borough of Sussex
CHA #21181
Tri State Actors Theater

ECM 7 - Replace Faucets with Low Flow

EXISTING CONDITIONS		
Cost of Water / 1000 Gallons	$26.61	$ / kGal
Faucets in Building	4	
Average Uses / Faucet (per day)	7	
Average Gallons / Use	0.75	Gal

PROPOSED CONDITIONS		
Proposed Faucets to be Replaced	4	
Proposed Gallons / Use	0.25	Gal
Proposed Material Cost of new Faucets	$105	
Proposed Installation cost of new Faucets	$56	
Total cost of new faucets	$645	

SAVINGS		
Current Faucet Water Use	7.7	kGal / year
Proposed Faucet Water Use	2.6	kGal / year
Water Savings	5.1	kGal / year
Cost Savings	$136	/ year
Simple Payback	4.7	years

Usage Estimation			
Occasion	# people	x per month	Total
Performance	100	5	500
Rehearsal	30	10	300
Set Work	3	15	45

Total Uses/ month	845

Total uses/day	28
Total uses/day/faucet	7

APPENDIX I

New Jersey Pay For Performance Incentive Program

Borough of Sussex
CHA #21181
Sussex Theater

New Jersey Pay For Performance Incentive Program

Note: The following calculation is based on the New Jersey Pay For Performance Incentive Program per April, 2010.
Building must have a minimum average electric demand of 200 kW. This minimum is waived for buildings owned by local governements or non-profit organizations.
The incentive values represented below are applicable through December 31, 2010.

Total Building Area (Square Feet)	7,200
Is this audit funded by the NJ BPU (Y/N)	Yes

Bureau of Public Utilites (BPU)

Incentive #1		
Audit not funded by NJ BPU	$0.10	$/sqft
Audit is funded by NJ BPU	$0.05	$/sqft

	Annual Utilities	
	kWh	Therms
Existing Cost (from utility)	$7,693	$3,741
Existing Usage (from utility)	38,840	3,460
Proposed Savings	23,928	601
Existing Total MMBtus	479	
Proposed Savings MMBtus	142	
% Energy Reduction	**29.6%**	
Proposed Annual Savings	$5,101	

	≥ %15	
	$/kWh	$/therm
Incentive #2	$0.11	$1.10
Incentive #3	$0.07	$0.70

	Incentives $		
	Elec	Gas	Total
Incentive #1	$0	$0	$360
Incentive #2	$2,632	$662	$3,294
Incentive #3	$1,675	$421	$2,096
Total All Incentives	**$4,307**	**$1,083**	**$5,750**

Total Project Cost	$21,698

		Allowable Incentive
% Incentives #1 of Utility Cost*	3.1%	$360
% Incentives #2 of Project Cost**	15.2%	$3,294
% Incentives #3 of Project Cost**	9.7%	$2,096
Total Eligible Incentives***	**$5,750**	
Project Cost w/ Incentives	$15,948	

Project Payback (years)	
w/o Incentives	w/ Incentives
4.3	3.1

* Maximum allowable incentive is 50% of annual utility cost if not funded by NJ BPU, and %25 if it is.
** Maximum allowable amount of Incentive #2 is 30% of total project cost.
Maximum allowable amount of Incentive #3 is 20% of total project cost.
*** Maximum allowable amount of Incentive #1 is $50,000 if not funded by NJ BPU, and $25,000 if it is.
Maximum allowable amount of Incentive #2 & #3 is $1 million per gas account and $1 million per electric account

APPENDIX J

Photovoltaic (PV) Rooftop Solar Power Generation

PVWatts *** AC Energy & Cost Savings

Cautions for Interpreting the Results

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

Station Identification	
City:	Newark
State:	New_Jersey
Latitude:	40.70° N
Longitude:	74.17° W
Elevation:	9 m
PV System Specifications	
DC Rating:	24.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	18.5 kW
Array Type:	Fixed Tilt
Array Tilt:	40.7°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	19.8 ¢/kWh

Results

Month	Solar Radiation ($kWh/m^2/day$)	AC Energy (kWh)	Energy Value ($)
1	3.36	1987	393.62
2	4.05	2145	424.92
3	4.58	2602	515.46
4	4.84	2543	503.77
5	5.30	2802	555.08
6	5.33	2643	523.58
7	5.27	2669	528.73
8	5.25	2641	523.18
9	5.06	2562	507.53
10	4.46	2413	478.02
11	3.15	1722	341.13
12	2.87	1661	329.04
Year	4.46	28392	5624.45

Output Hourly Performance Data * Output Results as Text

About the Hourly Performance Data

Saving Text from a Browser

Run PVWATTS v.1 for another US location or an International location
Run PVWATTS v.2 (US only)

Please send questions and comments regarding PVWATTS to Webmaster

PVWatts Cautions for Interpreting the Results

The monthly and yearly energy production are modeled using the PV system parameters you selected and weather data that are typical or representative of long-term averages. For reference, or comparison with local information, the solar radiation values modeled for the PV array are included in the performance results.

Because weather patterns vary from year-to-year, the values in the tables are better indicators of long-term performance than performance for a particular month or year. PV performance is largely proportional to the amount of solar radiation received, which may vary from the long-term average by ± 30% for monthly values and ± 10% for yearly values. How the solar radiation might vary for your location may be evaluated by examining the tables in the *Solar Radiation Data Manual for Flat-Plate and Concentrating Collectors* (*http://rredc.nrel.gov/solar/old_data/nsrdb/redbook/*).

For these variations and the uncertainties associated with the weather data and the model used to model the PV performance, future months and years may be encountered where the actual PV performance is less than or greater than the values shown in the table. The variations may be as much as 40% for individual months and up to 20% for individual years. Compared to long-term performance over many years, the values in the table are accurate to within 10% to 12%.

If the default overall DC to AC derate factor is used, the energy values in the table will overestimate the actual energy production if nearby buildings, objects, or other PV modules and array structure shade the PV modules; if tracking mechanisms for one- and two-axis tracking systems do not keep the PV arrays at the optimum orientation with respect to the sun's position; if soiling or snow cover related losses exceed 5%; or if the system performance has degraded from new. (PV performance typically degrades 1% per year.) If any of these situations exist, an overall DC to AC derate factor should be used with PVWATTS that was calculated using system specific component derate factors for *shading*, *sun-tracking*, *soiling*, and *age*.

The PV system size is the nameplate DC power rating. The energy production values in the table are valid only for crystalline silicon PV systems.

The cost savings are determined as the product of the number of kilowatt hours (kWh) and the cost of electricity per kWh. These cost savings occur if the owner uses all the electricity produced by the PV system, or if the owner has a net-metering agreement with the utility. With net-metering, the utility bills the owner for the net electricity consumed. When electricity flows from the utility to the owner, the meter spins forward. When electricity flows from the PV system to the utility, the meter spins backwards.

If net-metering isn't available and the PV system sends surplus electricity to the utility grid, the utility generally buys the electricity from the owner at a lower price than the owner pays the utility for electricity. In this case, the cost savings shown in the table should be reduced.

Besides the cost savings shown in the table, other benefits of PV systems include greater energy independence and a reduction in fossil fuel usage and air pollution. For commercial customers, additional cost savings may come from reducing demand charges. Homeowners can often include the cost of the PV system in their home mortgage as a way of accommodating the PV system's initial cost.

To accelerate the use of PV systems, many state and local governments offer financial incentives and programs. Go to http://www.nrel.gov/stateandlocal for more information.

RReDC Return to RREDC Home Page (*http://rredc.nrel.gov/*)

Sussex Borough
DPW Building
CHA #21181

Cost of Electricity $0.198 $/kWh

Photovoltaic (PV) Rooftop Solar Power Generation-24 kW System

Budgetary Cost	Annual Utility Savings				Estimated Maintenance Savings	Total Savings	New Jersey Renewable * Energy Incentive	New Jersey Renewable ** SREC	Payback (without incentive)	Payback (with incentive)
$	kW	kWh	therms	$	$	$	$	$	Years	Years
$192,000	**0.0**	**28,392**	**0**	**$5,600**	**0**	**$5,600**	**$24,000**	**$13,800**	**34.3**	**8.7**

Note: Budgetary cost is based on $8,000/kW.
*Incentive based on New Jersey renewable energy program for non-residential applications(PV)= $1.00/W of installed PV system
** Estimated Solar Renewable Energy Certificate Program (SREC) SREC for 15 Years= $487/1000kwh

Estimated Solar Renewable Energy Certificate Program (SREC) payments for 15 Years from RR Renewable Energy Consultants

Year	SREC
1	600
2	600
3	600
4	500
5	500
6	500
7	500
8	500
9	500
10	500
11	400
12	400
13	400
14	400
15	400
AVG	**487**

APPENDIX K

Solar Domestic Hot Water Plant

NJBPU Energy Audits
CHA #21181
Building: Sussex Theater

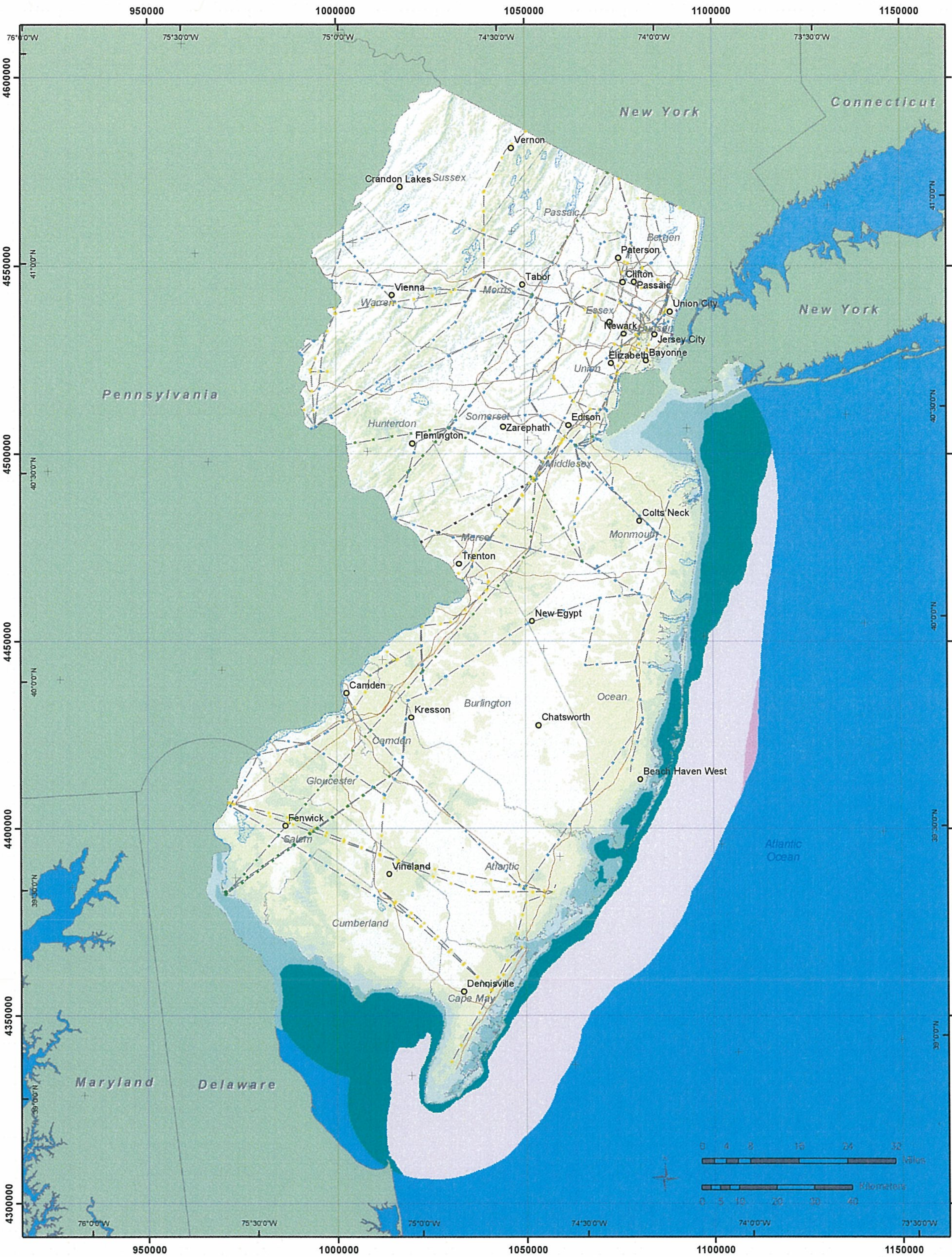
Multipliers	
Material:	0.98
Labor:	1.21
Equipment:	1.09

Description	QTY	UNIT	UNIT COSTS			SUBTOTAL COSTS			TOTAL COST	REMARKS
			MAT.	LABOR	EQUIP.	MAT.	LABOR	EQUIP.		
Synergy Solar Thermal System	2	ea			$ 3,600	$ -	$ -	$ 7,848	$ 7,848	
Piping modifications	1	ls	$ 2,000	$ 3,500		$ 1,960	$ 4,235	$ -	$ 6,195	
Electrical modifications	1	ls	$ 1,000	$ 1,000		$ 980	$ 1,210	$ -	$ 2,190	
65 Gallon Storage Tanks	2	ea	$ 200	$ 250		$ 400	$ 500	$ -	$ 900	
10 Gallon Drip Tank	2	ea	$ 100	$ 78		$ 200	$ 156	$ -	$ 356	
						$ -	$ -	$ -	$ -	

$17,489	Subtotal
$ 2,623	15% Contingency
$ 2,623	15% Contractor O&P
$ 4,372	25% Engineering
$27,108	**Total**

APPENDIX L

Wind



Wind Resource of New Jersey *Mean Annual Wind Speed at 30 Meters*

Features

- City
- Interstate Highway
- County Boundary
- Water Body

Generalized Transmission Line

Category

- Under 100 kV
- 100 kV-161 kV
- 230 kV-287 kV
- 345 kV
- 500 kV
- 735 kV +
- Step-Up
- DC Line

Mean Speed at 30 m

mph	m/s
< 10.1	< 4.5
10.1 - 11.2	4.5 - 5.0
11.2 - 12.3	5.0 - 5.5
12.3 - 13.4	5.5 - 6.0
13.4 - 14.5	6.0 - 6.5
14.5 - 15.7	6.5 - 7.0
15.7 - 16.8	7.0 - 7.5
16.8 - 17.9	7.5 - 8.0
17.9 - 19.0	8.0 - 8.5
> 19.0	> 8.5

AWS Truewind

Projection: Tranverse Mercator,
UTM Zone 17 WGS84
Spatial Resolution of Wind Resource Data: 200m
This map was created by AWS Truewind using the MesoMap system and historical weather data. Although it is believed to represent an accurate overall picture of the wind energy resource, estimates at any location should be confirmed by measurement.

The transmission line information was obtained by AWS Truewind from the Global Energy Decisions Velocity Suite. AWS does not warrant the accuracy of the transmission line information.

Bing Maps

74 Fountain Sq, Sussex, NJ 07461

My Notes

APPENDIX M

EPA Portfolio Manager

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Tri-State Actors Theater

Building ID: 2283773
For 12-month Period Ending: March 31, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: June 07, 2010

Facility
Tri-State Actors Theater
74 Fountain Square
Sussex, NJ 07461

Facility Owner
Sussex Borough
2 Main Street
Sussex, NJ 07461

Primary Contact for this Facility
Cathy Gleason
2 Main Street
Sussex, NJ 07461

Year Built: 1917
Gross Floor Area (ft^2): 7,200

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

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	133,321
Natural Gas (kBtu)[4]	344,865
Total Energy (kBtu)	478,186

Energy Intensity[5]	
Site (kBtu/ft^2/yr)	66
Source (kBtu/ft^2/yr)	112

Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	39

Electric Distribution Utility
FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison	
National Average Site EUI	95
National Average Source EUI	265
% Difference from National Average Source EUI	-58%
Building Type	Entertainment/Culture

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
N/A

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

ENERGY STAR® Data Checklist for Commercial Buildings

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

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Tri-State Actors Theater	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Entertainment/Culture	Is this an accurate description of the space in question?		☐
Location	74 Fountain Square, Sussex, NJ 07461	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		☐

Tri-State Actors Theater (Other)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	7,200 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Number of PCs	3(Optional)	Is this the number of personal computers in the space?		☐
Weekly operating hours	45Hours(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	3(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: FirstEnergy - Jersey Central Power & Lt Co

Fuel Type: Electricity

Meter: Tri-State Actors Theater (kWh (thousand Watt-hours)) **Space(s):** Entire Facility **Generation Method:** Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
02/14/2010	03/13/2010	2,280.00
01/14/2010	02/13/2010	2,600.00
12/14/2009	01/13/2010	3,320.00
11/14/2009	12/13/2009	2,280.00
10/14/2009	11/13/2009	2,840.00
09/14/2009	10/13/2009	3,560.00
08/14/2009	09/13/2009	4,720.00
07/14/2009	08/13/2009	3,480.00
06/14/2009	07/13/2009	4,320.00
05/14/2009	06/13/2009	3,680.00
04/14/2009	05/13/2009	3,000.00
Tri-State Actors Theater Consumption (kWh (thousand Watt-hours))		**36,080.00**
Tri-State Actors Theater Consumption (kBtu (thousand Btu))		**123,104.96**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**123,104.96**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Fuel Type: Natural Gas

Meter: Tri-State Actor's Theater Gas Bills (therms) **Space(s):** Tri-State Actors Theater		
Start Date	**End Date**	**Energy Use (therms)**
03/01/2010	03/31/2010	484.00
02/01/2010	02/28/2010	673.40
01/01/2010	01/31/2010	724.40
12/01/2009	12/31/2009	823.20
11/01/2009	11/30/2009	262.70
10/01/2009	10/31/2009	142.30
09/01/2009	09/30/2009	14.60
08/01/2009	08/31/2009	9.40
07/01/2009	07/31/2009	10.40
06/01/2009	06/30/2009	10.40
05/01/2009	05/31/2009	10.40

Tri-State Actor's Theater Gas Bills Consumption (therms)	**3,165.20**
Tri-State Actor's Theater Gas Bills Consumption (kBtu (thousand Btu))	**316,520.00**
Total Natural Gas Consumption (kBtu (thousand Btu))	**316,520.00**
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.	☐

Total IT Energy from All Required Meters	
Annual Site IT Energy (kWh)	**0.00**
Annual Source IT Energy (kWh)	**0.00**

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE 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
Tri-State Actors Theater
74 Fountain Square
Sussex, NJ 07461

Facility Owner
Sussex Borough
2 Main Street
Sussex, NJ 07461

Primary Contact for this Facility
Cathy Gleason
2 Main Street
Sussex, NJ 07461

General Information

Tri-State Actors Theater	
Gross Floor Area Excluding Parking: (ft²)	7,200
Year Built	1917
For 12-month Evaluation Period Ending Date:	March 31, 2010

Facility Space Use Summary

Tri-State Actors Theater	
Space Type	Other - Entertainment/Culture
Gross Floor Area(ft2)	7,200
Number of PCs°	3
Weekly operating hours°	45
Workers on Main Shift°	3

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	Current (Ending Date 03/31/2010)	Baseline (Ending Date 03/31/2010)	Rating of 75	Target	National Average
Energy Performance Rating	N/A	N/A	75	N/A	N/A
Energy Intensity					
Site (kBtu/ft2)	66	66	0	N/A	95
Source (kBtu/ft2)	112	112	0	N/A	265
Energy Cost					
$/year	$ 10,902.22	$ 10,902.22	N/A	N/A	$ 15,595.71
$/ft2/year	$ 1.51	$ 1.51	N/A	N/A	$ 2.16
Greenhouse Gas Emissions					
$MtCO_2e$/year	39	39	0	N/A	56
$kgCO_2e$/ft2/year	5	5	0	N/A	7

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

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

APPENDIX N

Equipment Inventory

New Jersey BPU Energy Audit Program
CHA #21181
Sussex Borough
Tri State Actor's Theater

Description	Manufacturer Name	Model No.	Serial Number	Equipment Type	Capacity/Size	Operation Hours	Location	Areas Served	Date Installed	Useable Life Expectancy (years)
Domestic Hot Water Heater	Bradford White	M15036EN10		Natural Gas Hot Water Heater	50 gallon 40,000 Btu/hr	Year Round	Basement	First Floor faucet fixtures		
Boiler	Weil Mclain			Natural Gas Boiler	137 Mbtu/hr	Winter	Basement	First Floor	1995	
Elevator	Elevator Controls	H-800	3329	Hydraulic Lift Elevator	25 HP	Year Round	West Side of Building	First and Second Floors		
Window Air Conditioner	Friedrich	5L33J30	JHE506966	Electric Window Unit	33000 Btu or 2.75 ton. 9.0 EER	Summer	First Floor Entrance Room	First Floor		
Packaged RTU	Rheem	RKKB-A180CL25E	2D6606ADAAF21307315	Heat and Cooling	15 ton cooling, 250 Mbtu Heating	Year Round	Roof	Theater and Backstage	2002	

APPENDIX O

Return On Investment

Borough of Sussex
CHA #21181
Engineer: Matt Pittinger

Return On Investment Calculation

Return on Investemet (ROI) = (Gain from Investment - Cost of Investment) / Cost of Investment

Utility Costs	
$ 0.152	$/kWh blended
$ 0.138	$/kWh supply
$ 4.190	$/kW
$ 1.080	$/Therm
$ 26.61	$/kgallon

Tri State Actors Theater

	Item	Annual Savings						Cost	Simple Payback	Life Years	Project Life Savings					ROI
		kW	kWh	Therms	kWh	$	kgals				kW	kWh	Therms	kgals H2O	$	
		demand	supply	Nat. Gas	cooling		Water									
ECM 1	Increase Roof Insulation	0	0	123	40	139	0	$ 2,949	21.2	20	0	791	2,468	-	$ 2,786	(0.1)
ECM 2	Increase Wall Insulation	0	0	419	327	502	0	$ 7,433	14.8	20	0	6,538	8,384	-	$ 10,050	0.4
ECM 3	Install Storm Windows	0	0	59	5	64	0	$ 1,847	28.7	25	0	133	1,470	-	$ 1,608	(0.1)
ECM 4	Replace EXIT signs with LED type	0.2	1,692	0	0	243	0	$ 808	3.3	15	3	25,386	-	-	$ 3,641	3.5
ECM 5	Work Lighting Addition	17.8	18,685	0	0	3,467	0	$ 3,247	0.9	15	267	280,276	-	-	$ 51,998	15.0
ECM 6	Light Replacement	1.2	3,551	0	0	550	0	$ 4,768	8.7	15	18	53,261	-	-	$ 8,251	0.7
ECM 7	Replace Faucets with Low Flow	0.0	0	0	0	136	5.1	$ 645	4.7	20	0	0	-	102	$ 2,720	3.2
Total		19.2	23,928	601	372	$ 5,101	7300	$ 21,698	4.3	19	288	366,385	12,322.1		$ 94,742	3.4