



Steven Winter Associates, Inc.
Building Systems Consultants
www.swinter.com

293 Route 18, Suite 330
East Brunswick, NJ 08816

Telephone (866) 676-1972
Facsimile (203) 852-0741

March 8, 2011

Local Government Energy Program Energy Audit Report

**City of Summit
Community Center
100 Morris Avenue
Summit, 07901**

Project Number: LGEA74



TABLE OF CONTENTS

TABLE OF CONTENTS	2
EXECUTIVE SUMMARY	3
HISTORICAL ENERGY CONSUMPTION.....	7
EXISTING FACILITY AND SYSTEMS DESCRIPTION.....	13
RENEWABLE AND DISTRIBUTED ENERGY MEASURES.....	22
PROPOSED ENERGY CONSERVATION MEASURES	23
APPENDIX A: EQUIPMENT LIST	39
APPENDIX B: LIGHTING STUDY	41
APPENDIX C: THIRD PARTY ENERGY SUPPLIERS	43
APPENDIX D: GLOSSARY AND METHOD OF CALCULATIONS	45
APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®	49
APPENDIX F: INCENTIVE PROGRAMS.....	50
APPENDIX G: ENERGY CONSERVATION MEASURES	52
APPENDIX H: METHOD OF ANALYSIS.....	53

EXECUTIVE SUMMARY

The Summit Community Center is a single-story building with a partial basement comprising a total conditioned floor area of 9,450 square feet. The original structure was built in 1955, and renovated in 2002. The following chart provides an overview of current energy usage in the building based on the analysis period of April 2009 through March 2010:

Table 1: State of Building-Energy Usage

	Electric Usage, kWh/yr	Gas Usage, therms/yr	Fuel Oil Usage, gal/yr	Current Annual Cost of Energy, \$	Site Energy Use Intensity, kBtu/sq ft yr	Joint Energy Consumption, MMBtu/yr
Current	93,280	N/A	4,660	\$29,464	102.4	971
Proposed	91,017	5,230**	N/A	\$23,354	88.6	840
Savings	2,263	1,230	N/A	\$6,141*	13.8	131
% Savings	2%	19%		21%	13%	13%
Proposed Renewables	35,400	Includes SRECs		\$27,442	12.8	121

*Includes operation and maintenance savings; ** Assumes conversion from fuel oil to natural gas

There may be energy procurement opportunities for the Summit Community Center to reduce annual electric utility costs, which are \$2,983 higher, when compared to the average estimated NJ commercial utility rates. SWA highly recommends switching facility from oil to natural gas heating.

SWA has also entered energy information about the Community Center in the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® Portfolio Manager Energy benchmarking system. The resulting Site Energy Use Intensity is 102.4kBtu/sq ft yr, which is higher than the average comparable building by 57.5%.

Based on the current state of the building and its energy use, SWA recommends implementing various energy conservation measures from the savings detailed in Table 1. The measures are categorized by payback period in Table 2 below:

Table 2: Energy Conservation Measure Recommendations

ECMs	First Year Savings (\$)	Simple Payback Period (years)	Initial Investment, \$	CO2 Savings, lbs/yr
0-5 Year	\$3,043	0.4	\$1,312	8,343
5-10 Year	\$125	6.0	\$750	739
>10 year	\$2,973	25.2	\$74,928	8,526
Total	\$6,141	12.5	\$76,990	17,609
Renewables	\$27,442	6.8	\$187,500	63,384

SWA estimates that implementing the recommended ECMs is equivalent to removing approximately 1 car from the road each year or the equivalent of planting 43 trees to offset the annual CO2 emissions generated.

Further Recommendations: Other recommendations to increase building efficiency pertaining to capital improvements and operations and maintenance are (with additional information in the Proposed Further Recommendations section):

Capital Improvements

- Replace building exhaust fans
- Replace all original gravel ballast flat roof sections
- Replace basement sump pump

- Replace original single pane windows with low-e, double pane, high performance windows

Operations and Maintenance

- Insulate hot water piping in the Boiler room and throughout the building
- Thoroughly and evenly insulate space above the ceiling tiles
- Provide weather-stripping/air-sealing
- Repair/seal wall cracks and penetrations
- Repair broken/missing brick veneer

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Summit. Based on the requirements of the LGEA program, the City of Summit must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is \$1,285 (or 25% of \$5,139).

Financial Incentives and Other Program Opportunities

The table below summarizes the recommended next steps that the City of Summit can take to achieve greater energy efficiency and reduce operating expenses.

Table 3: Next Steps for the Community Center

Recommended ECMs	Incentive Program (Please refer to Appendix F for details)
Upgrade (3) Thermostats to Programmable Type	Direct Install
Install (1) new CFL Fixture	Direct Install
Install (4) Lighting Occupancy Sensors	Smart Start, Direct Install
Replace old Refrigerator with an ENERGY STAR® Model	N/A
Install a 30kW Solar Photovoltaic Rooftop System	SRECs
Replace (1) Oil-fired DHW heater with 86 gal. Storage with an ENERGY STAR® Gas-fired condensing model with 50 gal. Storage	Smart Start, Direct Install
Replace Old Oil-fired Boiler and HVAC system with (4) Gas-fired Condensing Furnaces and Add Gym Air-conditioning feature	Smart Start, Direct Install

There are various incentive programs that the Summit could apply for that could help lower the cost of installing the ECMs. For the Community Center, and contingent upon available funding, SWA recommends the following incentive programs:

- **Direct Install 2010 Program:** Commercial buildings with peak electric demand below 100kW can receive up to 60% of installed cost of energy saving upgrades. The 100kW threshold does not apply for LGEA projects that are also receiving EECBG funding. Program incentives are capped at \$50,000 per building and \$250,000 per customer per year.
- **Smart Start:** Most of energy savings equipment and design measures have moderate incentives under this program.
- **Renewable Energy Incentive Program:** Receive up to \$0.75/Watt toward installation cost for PV panels upon available funding. For each 1,000 kWh generated by PV renewable energy, receive a credit between \$475 and \$600.
- **Utility and Fuel Supply Co. Sponsored Programs:** See available programs with JCP&L https://www.firstenergycorp.com/JCP_L/index.html and Mitchell Supreme Fuel Co. <http://www.mitchellsupreme.com/index.php?section=commercial&screen=commercial>

- **Energy Efficiency and Conservation Block Grant Rebate Program:** Provides up to \$20,000 per local government toward energy saving measures; <http://njcleanenergy.com/EECBG>

Please refer to Appendix F for further details.

INTRODUCTION

Launched in 2008, the Local Government Energy Audit (LGEA) Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, Summit halls, police and recreations, sanitation buildings, transportation structures, schools and community centers. The Program will subsidize up to 100% of the cost of the audit. The Board of Public Utilities (BPUs) Office of Clean Energy has assigned TRC Energy Services to administer the Program.

Steven Winter Associates, Inc. (SWA) is a 38-year-old architectural/engineering research and consulting firm, with specialized expertise in green technologies and procedures that improve the safety, performance, and cost effectiveness of buildings. SWA has a long-standing commitment to creating energy-efficient, cost-saving and resource-conserving buildings. As consultants on the built environment, SWA works closely with architects, developers, builders, and local, state, and federal agencies to develop and apply sustainable, 'whole building' strategies in a wide variety of building types: commercial, residential, educational and institutional.

SWA performed an energy audit and assessment for the Community Center at 100 Morris Avenue, Summit, 07901. The process of the audit included facility visits on July 29 and August 5, 2010, benchmarking and energy bills analysis, assessment of existing conditions, energy modeling, energy conservation measures and other recommendations for improvements. The scope of work includes providing a summary of current building conditions, current operating costs, potential savings, and investment costs to achieve these savings. The facility description includes energy usage, occupancy profiles and current building systems along with a detailed inventory of building energy systems, recommendations for improvement and recommendations for energy purchasing and procurement strategies.

The goal of this Local Government Energy Audit is to provide sufficient information to the City of Summit to make decisions regarding the implementation of the most appropriate and most cost-effective energy conservation measures for the Community Center.

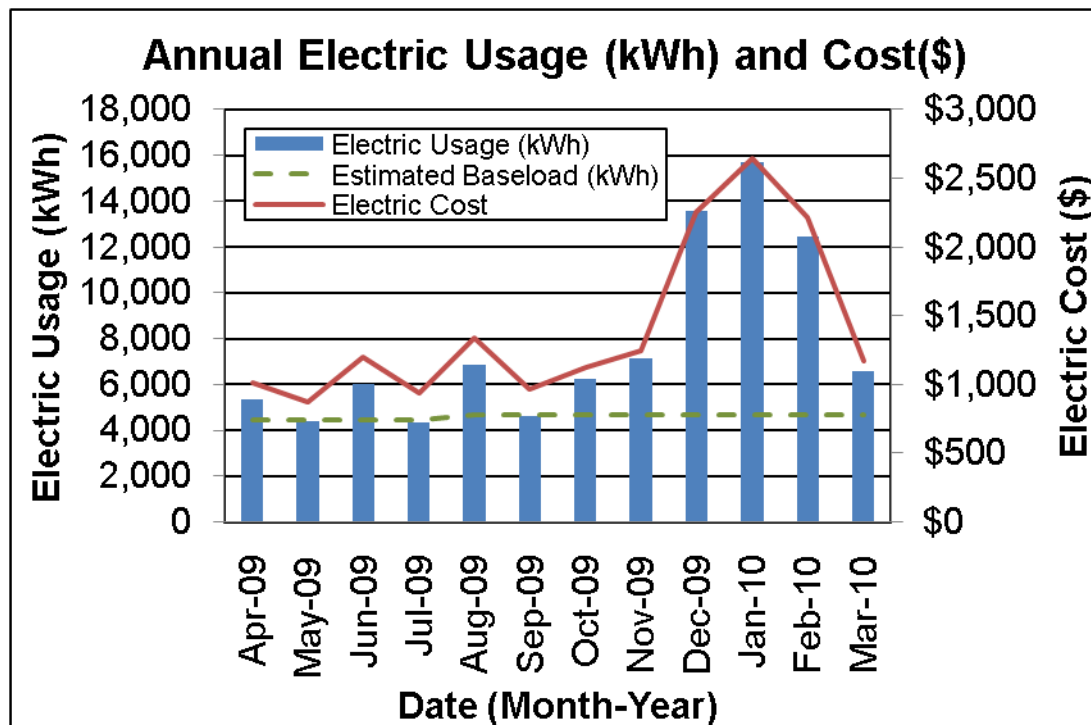
HISTORICAL ENERGY CONSUMPTION

Energy usage, load profile and cost analysis

SWA reviewed utility bills from November 2008 through March 2010 that were received from the utility companies supplying the Community Center with electricity and Fuel Oil. A 12 month period of analysis from April 2009 through March 2010 was used for all calculations and for purposes of benchmarking the building.

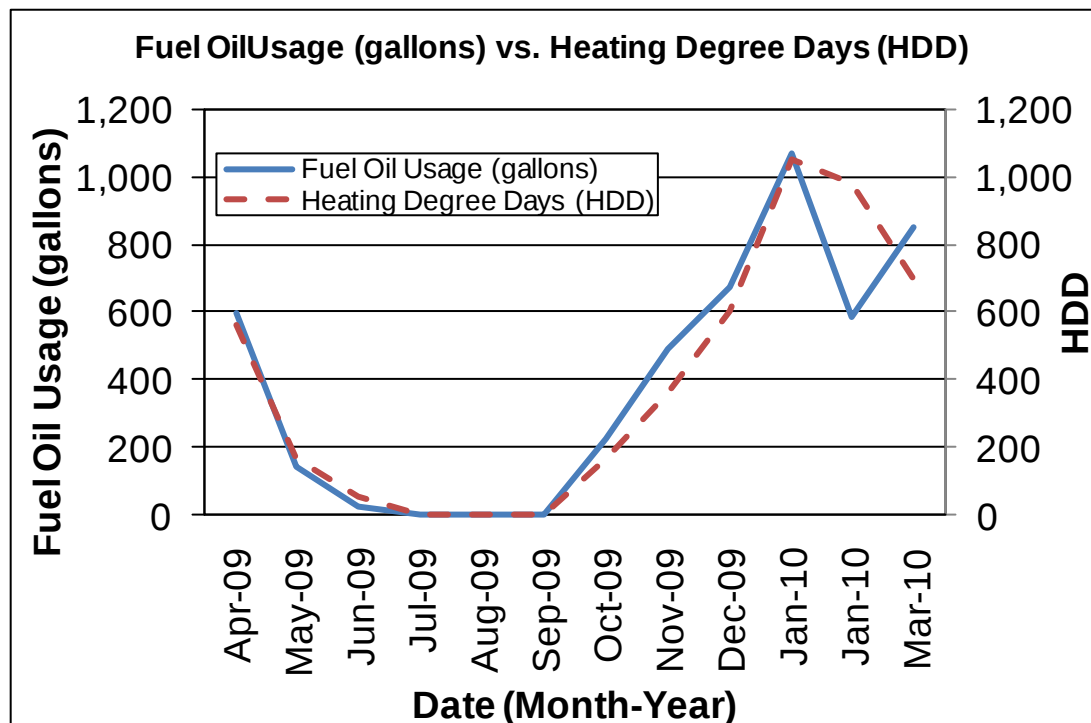
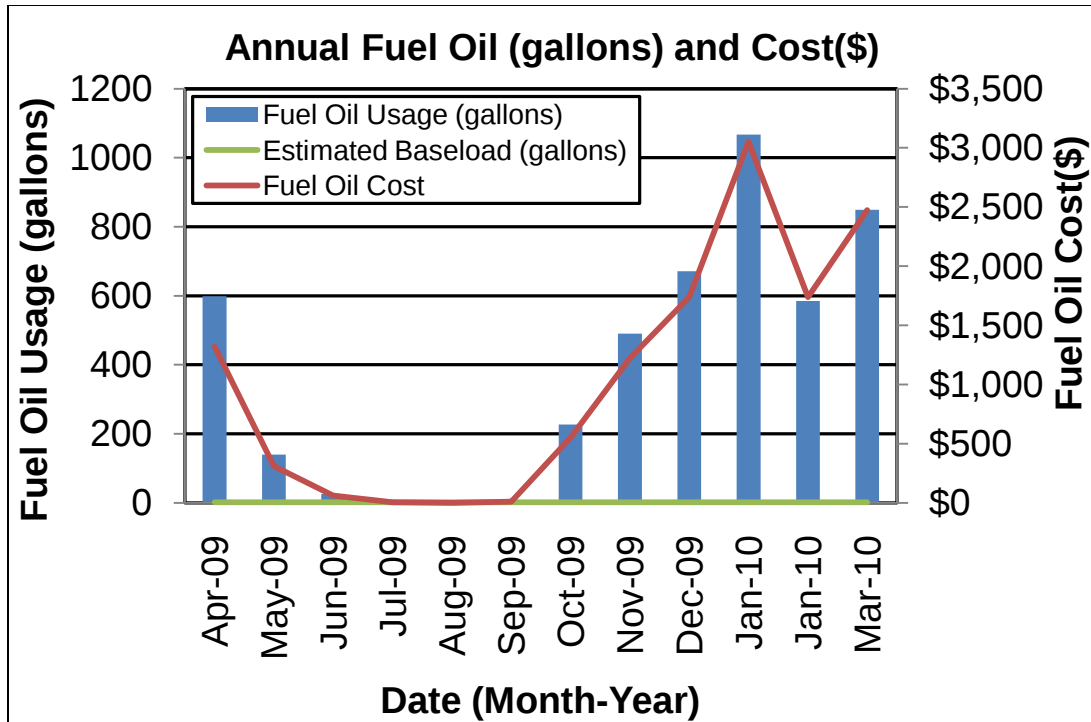
Electricity - The Community Center is currently served by one electric meter. The Community Center currently buys electricity from JCP&L at **an average aggregated rate of \$0.182/kWh**. The Community Center purchased **approximately 93,280 kWh, or \$16,974 worth of electricity**, in the previous year. The average monthly demand was 65.0 kW and the annual peak demand was 69.0 kW.

The chart below shows the monthly electric usage and costs. The dashed green line represents the approximate base-load or minimum electric usage required to operate the Community Center.



Fuel Oil - The Community Center is currently served by a 1,000 gal fuel oil tank. The Community Center currently buys fuel oil from Mitchell Supreme Fuel Co. at **an average delivered rate of \$2.680/gal**. The Community Center purchased **approximately 4,660 gal, or \$12,489 worth of fuel oil**, in the previous year.

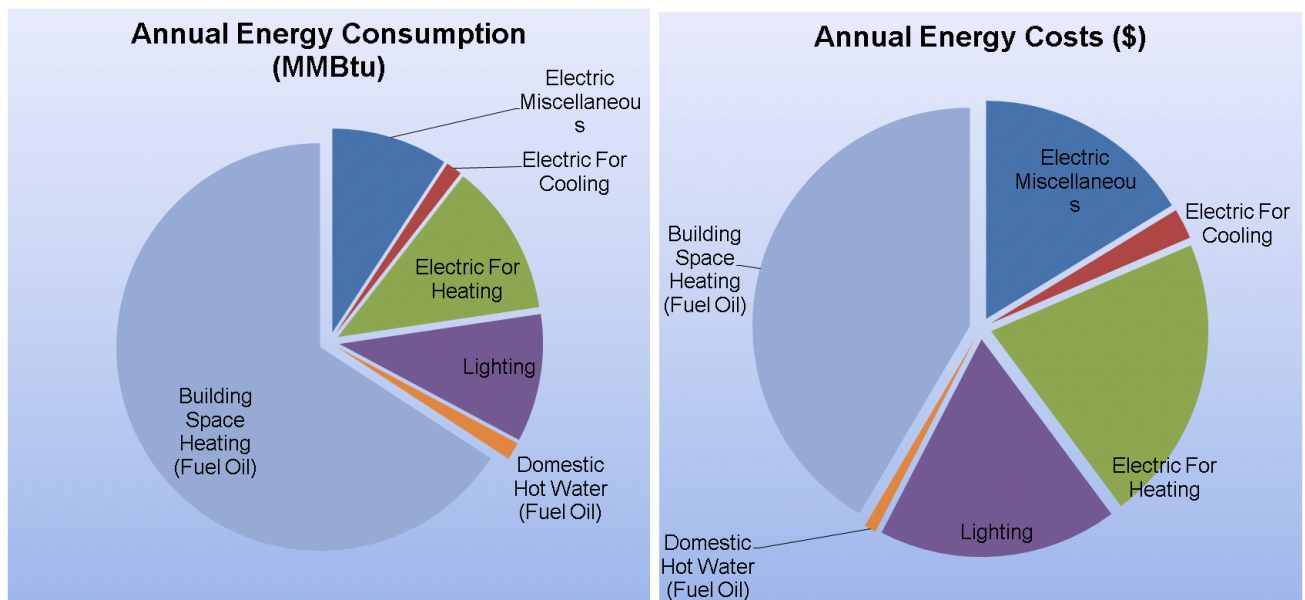
The following chart shows the monthly fuel oil usage and costs. The green line represents the approximate base-load or minimum fuel oil usage required to operate the Community Center.



The previous chart shows the monthly fuel oil usage along with the heating degree days or HDD. Heating degree days is the difference of the average daily temperature and a base temperature, on a particular day. The heating degree days are zero for the days when the average temperature exceeds the base temperature. SWA's analysis used a base temperature of 65 degrees Fahrenheit.

The following table and charts show energy use for the Community Center based on utility bills for the 12 month period. Note that electrical cost at \$53MMBtu of energy is 2.8 times as expensive as fuel oil at \$19/MMBtu.

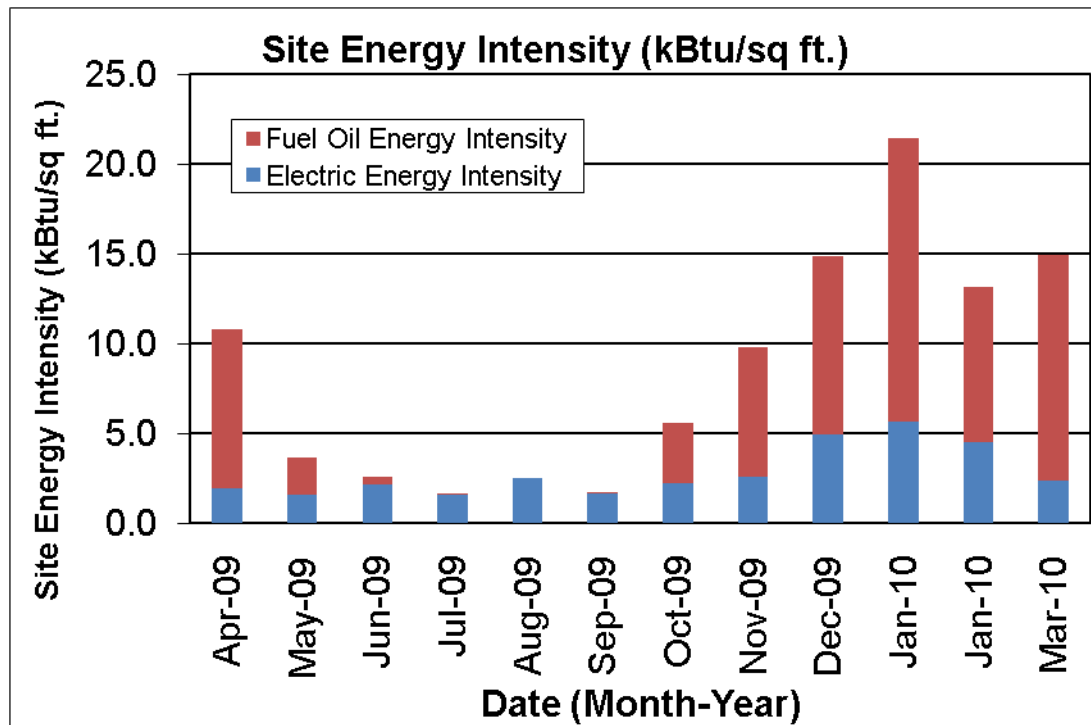
Annual Energy Consumption / Costs					
	MMBtu	% MMBtu	\$	% \$	\$/MMBtu
Electric Miscellaneous	90	9%	\$4,799	16%	53
Electric For Cooling	12	1%	\$665	2%	53
Electric For Heating	117	12%	\$6,265	21%	53
Lighting	98	10%	\$5,246	18%	53
Domestic Hot Water (Fuel Oil)	13	1%	\$258	1%	19
Building Space Heating (Fuel Oil)	639	66%	\$12,231	42%	19
Totals	971	100%	\$29,464	100%	
Total Electric Usage	318	33%	\$16,975	58%	53
Total Fuel Oil Usage	652	67%	\$12,489	42%	19
Totals	971	100%	\$29,464	100%	



Energy benchmarking

SWA has entered energy information about the Community Center in the U.S. Environmental Protection Agency's (EPA) ENERGY STAR® Portfolio Manager Energy benchmarking system. This recreation facility is categorized as a non-eligible ("Other") space type. Because it is an "Other" space type, there is no rating available. Consequently, the Community Center is not eligible to receive a national energy performance rating at this time. The Site Energy Use Intensity is 102.4kBtu/sq ft yr compared to the national average of a recreation building consuming 65.0kBtu/sq ft yr. See ECM section for guidance on how to improve the building's rating.

Due to the nature of its calculation based upon a survey of existing buildings of varying usage, the national average for “Other” space types is very subjective, and is not an absolute bellwether for gauging performance. Additionally, SWA encourages the City of Summit to explore improving the building’s site energy intensity by considering other large scale and financially less advantageous improvements that can be made, such as envelope window, door and insulation upgrades that would help the building.



Per the LGEA program requirements, SWA has assisted the City of Summit to create an ENERGY STAR® Portfolio Manager account and share the Community Center facilities information to allow future data to be added and tracked using the benchmarking tool. SWA has shared this Portfolio Manager Account information with the City of Summit (user name of “cityofsummit” with a password of “cityofsummit”) and TRC Energy Services (user name of “TRC-LGEA”).

Tariff analysis

As part of the utility bill analysis, SWA evaluated the current utility rates and tariffs. Tariffs are typically assigned to buildings based on size and building type.

Tariff analysis is performed to determine if the rate that a building is contracted to pay with each utility provider is the best rate possible resulting in the lowest costs for electric, gas and fuel oil provision. Typically, the fuel oil prices increase during the heating months when fuel oil is used for heating. Typically, electricity prices also increase during the cooling months when electricity is used by the HVAC for cooling.

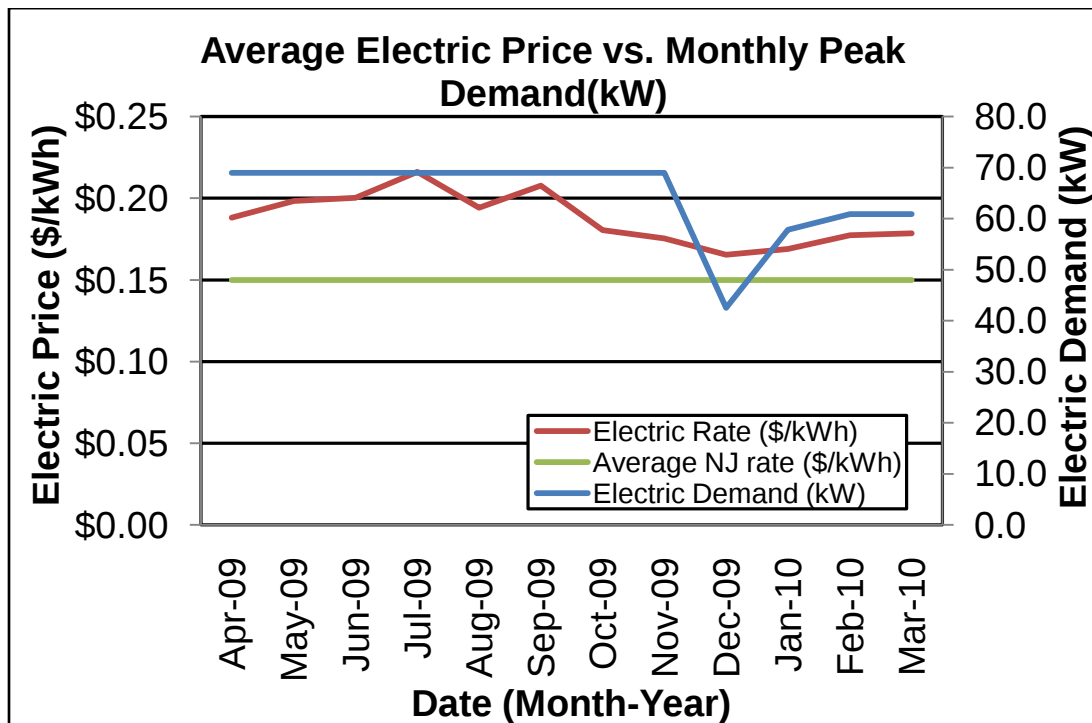
The fuel oil supplier charges a market-rate price based on use. Currently, the building is paying a general rate for fuel oil. The building is direct metered and currently purchases electricity at a

general service rate for usage with an additional charge for electrical demand factored into each monthly bill. The general service rate for electric charges is market-rate based on usage and demand. Demand prices are reflected in the utility bills and can be verified by observing the price fluctuations throughout the year.

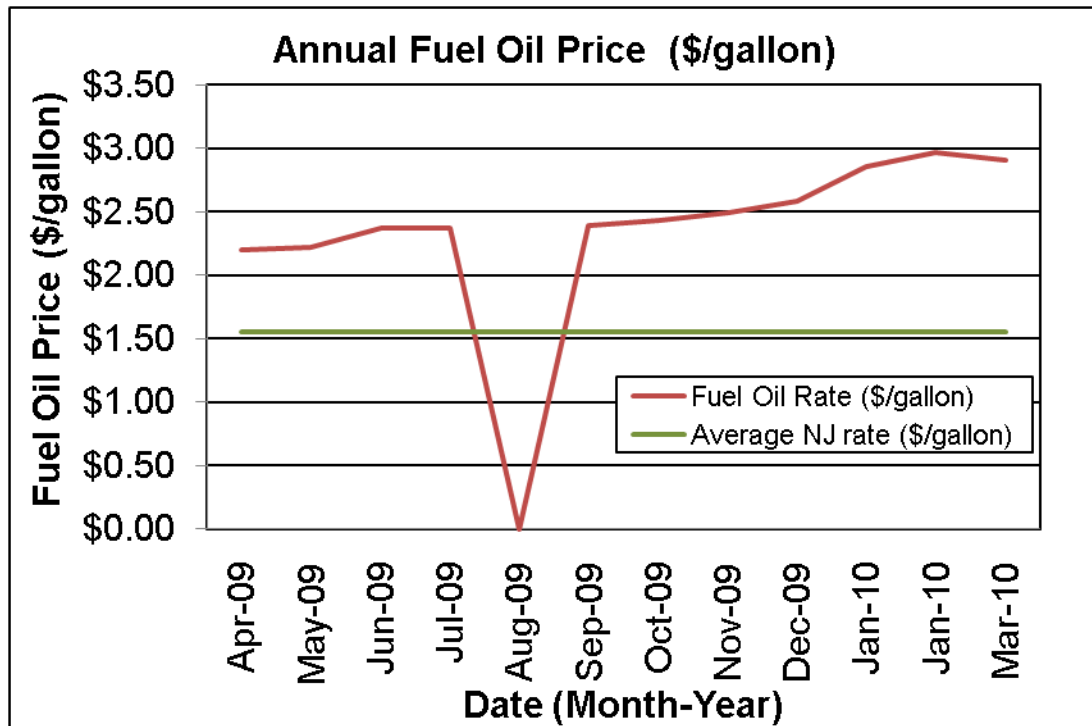
Energy Procurement strategies

Billing analysis is conducted using an average aggregated rate that is estimated based on the total cost divided by the total energy usage per utility per 12 month period. Average aggregated rates do not separate demand charges from usage, and instead provide a metric of inclusive cost per unit of energy. Average aggregated rates are used in order to equitably compare building utility rates to average utility rates throughout the state of New Jersey.

The average estimated NJ commercial utility rates for electric are \$0.150/kWh, while the Community Center pays a rate of \$0.182/kWh. The Community Center annual electric utility costs are \$2,983 higher, when compared to the average estimated NJ commercial utility rates. Electric bill analysis shows fluctuations up to 20% over the most recent 12 month period.



The Community Center pays a rate of \$2.680/gal. Fuel Oil bill analysis shows fluctuations up to 26% over the most recent 12 month period.



Utility rate fluctuations may have been caused by unusual high and recent escalating energy costs.

SWA recommends that the Community Center further explore opportunities of purchasing both fuel oil and electricity from third-party suppliers in order to reduce rate fluctuation and ultimately reduce the annual cost of energy for the Community Center. Appendix C contains a complete list of third-party energy suppliers for the City of Summit service area.

SWA highly recommends switching the facility from fuel oil to natural gas heating. PSE&G service is available on Morris Avenue. Switching to natural gas and based on an average rate of \$1.450/therm, paid by other City of Summit municipal buildings, could generate annual savings of approximately \$5,800.

EXISTING FACILITY AND SYSTEMS DESCRIPTION

This section gives an overview of the current state of the facility and systems. Please refer to the Proposed Further Recommendations section for recommendations for improvement.

Based on the visit from SWA on July 29 and August 5, 2010, the following data was collected and analyzed.

Building Characteristics

The single-story with a partial basement, 9,450 square foot Summit Community Center building was originally built in 1955 and renovated in 2002. The Community Center building houses a gymnasium, a classroom space (the Benson room), offices, meeting rooms, storage spaces, administrative offices, bathrooms and a kitchen. It is a Recreation Center, a Senior Center and provides Special Needs activities.



North West Façade and Main Entrance



North East Façade



South East Façade and Rear Façade



North East Facing Façade

Building Occupancy Profiles

The Community Center has four full time and one part-time employees working weekdays. There are 8-12 volunteers in the building at any one time, mainly working with the Special Needs program. There are on average 50 or more people in the building at any one time. The Community Center operates: Monday - Friday 8:30 AM (8:00 AM during the summer) - 4:30 PM, Saturday-Sunday, depending on events, 10:00 AM to 10:00 PM or approximately 70 hours/week.

Building Envelope

Due to unfavorable weather conditions (min. 18 deg. F delta-T in/outside and no/low wind), no exterior envelope infrared (IR) images were taken during the field audit.

Exterior Walls

The exterior wall envelope is mostly constructed of solid brick walls. The gymnasium is composed of hollow concrete block walls with exterior brick veneer. During the 2002 renovation, the office areas were framed, insulated with fiberglass batt insulation, and gypsum board was installed. The interior walls are composed of various materials including: exposed brick, subway tile (in the gymnasium), or gypsum board (in office areas).

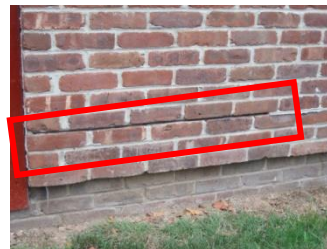
Note: Wall insulation levels could not be verified in the field and no construction plans were available.

Exterior and interior wall surfaces were inspected during the field audit. They were found to be in overall age-appropriate condition with only a few signs of uncontrolled moisture, air-leakage or other energy-compromising issues detected on all facades.

The following specific exterior wall problem spots and areas were identified:



Damaged exterior brick



Deteriorated mortar joints

It is also important to note that the building currently does not contain any type of vestibule or air curtain to prevent conditioned air from leaving the building.

Roof

The building's roof is partially a flat, no parapet type over steel decking, with tar and gravel ballast. This roof section is original to the building. There is no known insulation in the roof assembly. The gymnasium roof is wood framed with an asphalt shingle roofing membrane including two inches of rigid insulation. The roof was replaced during the 2002 renovation. It is in good condition with no detectable water or moisture issues.

Note: Roof insulation levels could not be verified in the field, and no construction plans were available. Information was confirmed by building management.

Roofs, related flashing, gutters and downspouts were inspected during the field audit. They were reported to be in overall poor condition, with numerous signs of uncontrolled moisture, air-leakage and other energy-compromising issues mostly detected on flat roof areas.

The following specific roof problem spots were identified:



Uncontrolled vegetation growth on roof



Standing water on roof



Uncontrolled vegetation growth on roof



Uncontrolled moss muck on roof



Signs of water damage on ceiling tile

Base

The building has a partial basement with poured concrete foundation walls. The majority of the building base is slab-on-grade with a perimeter footing with poured concrete foundation walls and no detectable slab edge/perimeter insulation.

Note: Slab/perimeter insulation levels could not be verified in the field and no construction plans were available.

The building's base and its perimeter were inspected for signs of uncontrolled moisture or water presence and other energy-compromising issues. Overall the base was reported to be in good condition with only a few signs of uncontrolled moisture, air-leakage and/or other energy-compromising issues.

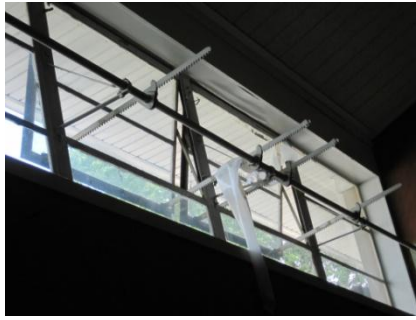
Windows

The building contains several different types of windows:

- The building has double-hung type, fixed, and casement windows with an aluminum clad frames, double glazing and interior mini blinds. The windows are located throughout the building and were replaced during recent renovations. The windows found throughout the gymnasium are single pane, awning type, aluminum framed windows, original to the building. Some of the windows do not close properly.

Windows, shading devices, sills, related flashing and caulking were inspected as far as accessibility allowed for signs of moisture, air-leakage and other energy compromising issues. Overall, the windows were found to be in age appropriate condition with numerous signs of uncontrolled moisture, air-leakage and/ or other energy-compromising issues.

The following specific window problem spots were identified:



Single pane windows that do not fully close

Exterior doors

The building contains glass with aluminum/steel frame type exterior doors. They are located in the front of the building and were replaced recently. There are door aluminum doors in the rear and side of the building in overall acceptable condition.

All exterior doors, thresholds, related flashing, caulking and weather-stripping were inspected for signs of moisture, air-leakage and other energy-compromising issues. Overall, the doors were found to be in acceptable/age appropriate condition with only a few signs of uncontrolled moisture, air-leakage and/or other energy-compromising issues.

The following specific door problem spots were identified:



Missing/worn weather-stripping

Building air-tightness

Overall, the field auditors found the building to be not adequately air-tight with numerous areas of suggested improvements, as described in more detail earlier in this chapter.

The air tightness of buildings helps maximize all other implemented energy measures and investments, and minimizes potentially costly long-term maintenance, repair and replacement expenses.

Mechanical Systems

Heating Ventilation Air Conditioning

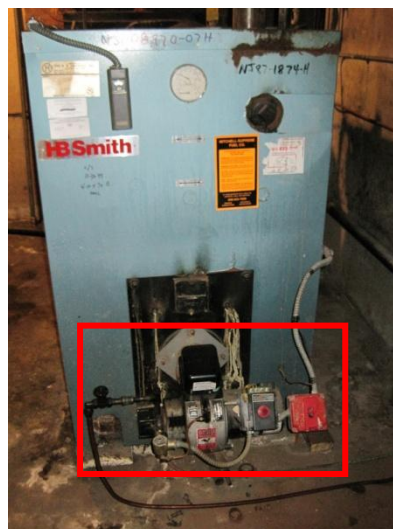
The Community Center is heated via baseboard, hydronic terminal units and unit ventilators with hot water provided by a cast iron sectional boiler and hot water pumps (serving three building zones) located in the basement. Various sections of the building are cooled by six rooftop units (RTUs) and associated distributive ducts. Four of the rooftop condensing units are the outdoor sections of ductless mini split units. A comprehensive Equipment List can be found in Appendix A.

Equipment

A HB Smith 629.6MBtu/hr cast iron sectional boiler, model 18 Series-9, installed in 1981, provides hot water to several unit ventilators, perimeter baseboard heaters and hydronic terminal units in the building. The boiler has an Allanson fuel oil fired burner. The boiler's efficiency is estimated to be 83%. It is in passable condition and operating beyond its expected service life. There are three circulators serving three heating zones: 1. The Benson room and Director's office, 2. Administration area, lobby and small conference room and 3. The Gym, bathrooms and kitchen. The building's management would prefer heating via RTUs, from similar units that now provide the building with cooling only.

HB Smith 629.6MBtu/hr
cast iron sectional boiler
(below and center)

Allanson fuel oil fired
burner (center)



Three B&G zone circulators
and un-insulated hot water
piping (below)



The 1955 original unit ventilators, perimeter baseboard heaters and hydronic terminal units located throughout the building are operating beyond their expected service lives. The one exception is one of three unit ventilators in the gym which was replaced in 2009 with a newer Nesbitt model. After so many years in operation the heat transfer surface areas are fouled which is considerably reducing their efficiency to heat spaces. The three heating hot water circulation pumps are also operating beyond their expected service lives and should be upgraded or replaced with a different system. The bulk of the heating generating system and its distributed terminal units is in poor condition and should be replaced with the next major renovation.



Gym Nesbitt unit ventilators, 1955 vintage (left and center) and 2009 newer unit (right) - Not the best application where there is a high tendency for units to be banged by balls

The Community Center is cooled by six rooftop package units (RTU).

The 10 ton RTU, 11 EER, serving the Benson big meeting room has a 45% remaining expected service life.

The 5 ton RTU, 11 EER, serving the Administration offices has a 45% remaining expected service life.

The two 1-1/2 ton mini split ductless RTUs, 10.5 EER, serving the front lobby and area by the trophy cases have 45% remaining expected service lives.

The two 2 ton mini split ductless RTUs, 11.2 EER, serving the front conference room and Director's office have 45% remaining expected service lives.

Generally, all RTUs and matching air handlers/evaporators are performing satisfactorily however recently a couple of air handlers had to be repaired and one compressor replaced.

The ductless mini split air conditioners are a cost effective alternative to central air conditioning. While slightly more expensive than the typically wall or window air conditioner, the minor additional cost is easily and quickly recouped in energy savings. Since the compressor sits on the outside, the ductless mini split air conditioner is very quiet and efficient. Also, since ductless mini split air conditioners have no ducts; they avoid the energy losses associated with the ductwork of central forced air systems. Duct losses can account for more than 30% of energy consumption for space conditioning, especially if the ducts are in unconditioned spaces such as an attic. Like central air conditioning units, ductless mini split air conditioners have two main components: an outdoor unit or compressor/condenser, and an indoor unit or evaporator/air-handling unit. The two units are connected by the power cables, refrigerant tubing, suction tubing, and a condensate drain. These connecting pipes link the outdoor and indoor units through a small hole that is drilled in the wall of the building. The advantages of ductless mini split air conditioner are their small size and flexibility for zoning, heating, or cooling to individual rooms. Since each of the ductless mini split air conditioner zones or rooms will have an individual thermostat, only that area where someone is present needs to be conditioned, saving additional energy and money.

Each of the two larger rooftop units contain a direct expansion (DX) system for cooling, made up of an evaporator, condenser and refrigerant loop. The R-22 refrigerant absorbs heat from the passing air in the evaporator coil and transfers the heat to the atmosphere in the condenser.



10 ton RTU;



5 ton RTU;



Four ductless mini split air conditioners

The Benson big meeting room and the Administration offices are provided ventilation by outside air intake louvers on the rooftop units. The outside air louvers are manually fixed to allow economizer efficient operation when the outside air conditions are favorable. The Benson meeting/class-room exhaust fan installed to remove cigarette smoke is no longer operated and the two bathroom fan motors are burned out and need replacement. The majority of fresh air brought into the building appears to be via door openings and infiltration. All building exhaust fans are in in-operable condition and beyond their expected service lives.



Benson meeting room exhaust fan;



Two bathroom inoperable exhaust fans



Distribution Systems

A typical rooftop unit arrangement draws in fresh air and brings it into a mixing box, where it is combined with return air from the building. A small portion of the return air is purged and vented outside prior to entering the mixing box. The mixed air inside the air handler is sent through a filter before passing through the evaporator or direct expansion (DX) coil. The air handler fan then pushes the air through the furnace (not provided on the Community Center RtUs) section before the conditioned air is distributed into the building spaces. The DX system is only active in the cooling season. In between seasons only the blower will be active to provide fresh air to the building.

The Community Center Benson big meeting room and the Administration offices RTUs distribute conditioned air to associated spaces via a ductwork system and diffusers. The ducts are insulated on the inside for heat and noise abatement. The RTUs are activated on/ff via programmable thermostats that satisfy the temperature settings of the room/rooms that they serve.

Heating hot water is distributed throughout the building to terminal units and circulated back to the boiler.

The building also contains exhaust fans on the roof of the building; some of which were not working at the time of the energy audit. These exhaust fans are critical to prevent even flow of air throughout the building. Exhaust fans are critical to removing stale air from the bathroom and inducing fresh supply air from the general spaces into the bathroom. In this building specifically, the bathrooms are located directly above the boiler room. This location allows for excess heat to build up on the floor of the bathroom and for the bathroom temperatures to increase beyond the comfort of the tenants. Fixing the exhaust fans will help alleviate this overheating and induce fresh air into the building.

Controls

The cooling equipment is controlled by programmable thermostats. All heating is controlled by three manual thermostats and on/off switches. The Gym/bathroom/kitchen thermostat (located in the Gym) is in disrepair.



Typical: Programmable thermostats for cooling;



Manual thermostat for heating

Domestic Hot Water

The domestic hot water (DHW) for the Community Center is provided by a fuel oil heated A O Smith, 245 792P with 86 gal storage. It has 81.5% estimated efficiency and 245,000 Btu/hr heating capacity. This DHW Heater appears in disrepair and is not able to heat water properly. Building staff were unaware until recently that the DHW heater was not functioning because warm temperatures were received at the faucets due to heat gain from un-insulated piping. The Community Center Director believes that a standard 40 to 50 gal unit is sufficient for the ongoing activities in the building.



Fuel oil fired 86 gal DHW heater serving the Community Center building (left)

Electrical systems

Lighting

See attached lighting schedule in Appendix B for a complete inventory of lighting throughout the building including estimated power consumption and proposed lighting recommendations.

As of **July 1, 2010** magnetic ballasts most commonly used for the operation of T12 lamps will no longer be produced for commercial and industrial applications. Also, many T12 lamps will be phased out of production starting July 2012.

Interior Lighting - The Community Center currently contains T8 and ceiling mounted Metal Halide fixtures. Based on measurements of lighting levels for each space, there are no vastly over-illuminated areas.

Exit Lights - Exit signs were found to be LED type.

Exterior Lighting - The exterior lighting surveyed during the building audit was found to be a mix of Metal Halide lamp and CFL fixtures. Exterior lighting is controlled by photocells.

Appliances and process

SWA has conducted a general survey of larger, installed equipment. Appliances and other miscellaneous equipment account for a significant portion of electrical usage within the building. Typically, appliances are referred to as "plug-load" equipment, since they are not inherent to the building's systems, but rather plug into an electrical outlet. Equipment such as process motors, computers, computer servers, radio and dispatch equipment, refrigerators, vending machines, printers, etc. all create an electrical load on the building that is hard to separate out from the rest of the building's energy usage based on utility analysis.

Elevators

The Community Center does not have an installed elevator.

Fuel Oil Tank

A 1,000 gal fuel oil above ground tank located in a shed in the rear of the Community Center stores fuel oil for the heating system. It is in satisfactory condition and has a 75% remaining estimated service life.

Other electrical systems

There are not currently any significant energy-impacting electrical systems installed at the Community Center. The incoming power main transformer is owned/maintained by JCP&L appears in satisfactory condition.

RENEWABLE AND DISTRIBUTED ENERGY MEASURES

Renewable energy is defined as any power source generated from sources which are naturally replenished, such as sunlight, wind and geothermal. Technology for renewable energy is improving, and the cost of installation is decreasing, due to both demand and the availability of state and federal government-sponsored funding. Renewable energy reduces the need for using either electricity or fossil fuel, therefore lowering costs by reducing the amount of energy purchased from the utility company. Technology such as photovoltaic panels or wind turbines, use natural resources to generate electricity on the site. Geothermal systems offset the thermal loads in a building by using water stored in the ground as either a heat sink or heat source. Solar thermal collectors heat a specified volume of water, reducing the amount of energy required to heat water using building equipment. Cogeneration or CHP allows you to generate electricity locally, while also taking advantage of heat wasted during the generation process.

Existing systems

Currently, there is not a renewable system installed at the Summit Community Center.

Evaluated Systems

Solar Photovoltaic

Photovoltaic panels convert light energy received from the sun into a usable form of electricity. Panels can be connected into arrays and mounted directly onto building roofs, as well as installed onto built canopies over areas such as parking lots, building roofs or other open areas. Electricity generated from photovoltaic panels is generally sold back to the utility company through a net meter. Net-metering allows the utility to record the amount of electricity generated in order to pay credits to the consumer that can offset usage and demand costs on the electric bill. In addition to generation credits, there are incentives available called Solar Renewable Energy Credits (SRECs) that are subsidized by the state government. Specifically, the New Jersey State government pays a market-rate SREC to facilities that generate electricity in an effort to meet state-wide renewable energy requirements.

Based on utility analysis and a study of roof conditions, the Community Center is a good candidate for a 30 kW Solar Panel installation. See ECM#5 for details.

Solar Thermal Collectors

Solar thermal collectors are not cost-effective for this building and would not be recommended due to the insufficient and intermittent use of domestic hot water throughout the building to justify the expenditure.

Wind

The Community Center is not a good candidate for a wind power generation due to unfavorable wind conditions in this area of New Jersey.

Geothermal

The Community Center is not a good candidate for a geothermal installation since it would require replacement of the entire existing HVAC system, of which major components still have between 45% and 95% remaining useful life.

Combined Heat and Power

The Community Center is not a good candidate for a CHP installation and would not be cost-effective due to the size and operations of the building. Typically, CHP is best suited for buildings with a high electrical base-load to accommodate the electricity generated, as well as a means for using waste heat generated. Typical applications include buildings with an absorption chiller, where waste heat would be used efficiently.

PROPOSED ENERGY CONSERVATION MEASURES

Energy Conservation Measures (ECMs) are recommendations determined for the building based on improvements over current building conditions. ECMs have been determined for the building based on installed cost, as well as energy and cost-savings opportunities.

Recommendations: Energy Conservation Measures

ECM#	Description of Recommended 0-5 Year Payback ECMs
1	Upgrade (3) Thermostats to Programmable Type
2	Install (1) New CFL Fixture
3	Install (4) Lighting Occupancy Sensors
ECM#	Description of Recommended 5-10 Year Payback ECMs
4	Replace Old Refrigerator with an ENERGY STAR® Model
5	Install a 30 kW Solar Photovoltaic Rooftop System
ECM#	Description of Recommended >10 Year Payback (End of Life Cycle)
6	Replace (1) Oil Fired DHW Heater with 86 gal Storage with an ENERGY STAR® Gas Fired Condensing Model with 50 Gal Storage
7	Replace Old Oil Fired Boiler and HVAC System with (4) Gas Fired Condensing Furnaces and Add Gym Air Conditioning Feature

In order to clearly present the overall energy opportunities for the building and ease the decision of which ECM to implement, SWA calculated each ECM independently and did not incorporate slight/potential overlaps between some of the listed ECMs (i.e. lighting change influence on heating/cooling).

ECM#1: Upgrade (3) Thermostats to Programmable Type

During the field audit, SWA completed a building HVAC controls analysis and observed spaces in the building where temperature is manually controlled without setbacks to reduce energy consumption during unoccupied periods of time, such as evenings and weekends. Programmable thermostats offer an easy way to save energy when correctly used. By turning the thermostat setback 10-15 degrees F for eight hours at a stretch (at night), the heating bill can be reduced substantially (by a minimum of 10% per year). In the summer, the cooling bill can be reduced by keeping the conditioned space warmer when unoccupied, and cooling it down only when using the space. The savings from using a programmable thermostat is greater in milder climates than in more extreme climates. Temperature settings and time periods should be checked and optimized for spaces that have already been retrofitted with programmable thermostats. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor. This ECM assumes that the three heating zones will be controlled by programmable thermostats and that the building will be converted from fuel oil to gas heat (although it is not necessary to gain the savings).

Installation cost:

Estimated installed cost: \$501 (includes \$225 of labor)

Source of cost estimate: RS Means; Published and established costs; Similar projects

Economics:

est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
501	0	501	0	0.0	456	4.8	1,458	2,681	12	32,177	0.2	6,323	527	535	25,071	5,031

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA also assumed an aggregated 40 min/wk to make manual adjustments vs. installed programmable thermostats. SWA assumed that temperatures would be setback based on the operation schedule of the building and used ENERGY STAR® site: http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=TH, Excel spreadsheet for Savings Calculator as well as assumed a conservative 10% savings of heating/cooling loads when systems are operating per pre-agreed settings.

Rebates/financial incentives:

- There is no incentive available for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

ECM#2: Install (1) New CFL Fixture

During the field audit, SWA completed a building lighting inventory (see Appendix B). The existing lighting also contains an inefficient incandescent lamp. SWA recommends that each incandescent lamp is replaced with a more efficient, Compact Fluorescent Lamp (CFL). CFLs are capable of providing equivalent or better light output while using less power when compared to incandescent, halogen and Metal Halide fixtures. CFL bulbs produce the same lumen output with less wattage than incandescent bulbs and last up to five times longer. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: \$11 (Includes \$7 of labor)
Source of cost estimate: Manufacturers information

Economics:

est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
11	0	11	175	0.0	0	0.1	25	54	5	269	0.2	2462	492	512	227	314

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA also assumed an aggregated 1/2 hr/yr to replace aging burnt out lamps/fixtures vs. newly installed.

Rebates/financial incentives:

- There is no incentive available for this measure at this time.

Please see Appendix F for more information on Incentive Programs.

ECM#3: Install (4) Lighting Occupancy Sensors

During the field audit, SWA completed a building lighting inventory (see Appendix B). SWA observed that the existing lighting has minimal to no control via occupancy sensors. SWA identified a number of areas that could benefit from the installation of occupancy sensors. SWA recommends installing occupancy sensors in areas that are occupied only part of the day and the payback on savings is justified. Typically, occupancy sensors have an adjustable time delay that shuts down the lights automatically if no motion is detected within a set time period. Advance micro-phonic lighting sensors include sound detection as a means to control lighting operation. The labor for the recommended installations is evaluated using prevailing electrical contractor wages. The building owner may decide to perform this work with in-house resources from the Maintenance Department on a scheduled, longer timeline than otherwise performed by a contractor.

Installation cost:

Estimated installed cost: \$880 (Includes \$265 of labor)

Source of cost estimate: Manufacturers information

Economics:

est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
880	80	800	1,675	0.3	0	0.6	0	276	15	4,145	2.9	418	28	34	2,376	2,999

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis.

Rebates/financial incentives:

- NJ Clean Energy - Occupancy sensors, wall mounted (\$20 per control) - Maximum incentive amount is \$80.

Please see Appendix F for more information on Incentive Programs.

ECM#4: Replace Old Refrigerator with ENERGY STAR® Model

On the days of the site visit, SWA observed an older refrigerator that was not ENERGY STAR® rated (using as much as 728 kWh/yr). SWA highly recommends the City of Summit consider replacement of all refrigerators over 10-12 years of age with more modern, ENERGY STAR®, energy efficient appliances. In addition to saving energy, the replacements will also keep the refrigerator locations cooler. Furthermore, the older model refrigerators may utilize R-12 refrigerant, which is not an ozone-friendly refrigerant. Newer systems should be specified with R-134A or R-404A refrigerant. When compared to the average electrical consumption of older equipment, ENERGY STAR® equipment results in large savings. Look for the ENERGY STAR® label when replacing appliances and equipment, including window air conditioners, refrigerators, printers, computers, copy machines, etc. More information can be found in the “Products” section of the ENERGY STAR® website at: <http://www.energystar.gov>.

Installation cost:

Estimated installed cost: \$750 (Includes \$50 of labor)

Source of cost estimate: Energy Star purchasing and procurement site, similar projects, manufacturer and store established costs.

Economics:

est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
750	0	750	413	0.0	0	0.1	50	125	12	1,502	6.0	100	8	13	466	739

Assumptions: SWA calculated the savings for this measure using measurements taken the day of the field visit and using the billing analysis. SWA assumed one annual call to a refrigeration contractor to perform minor repairs on old refrigerators.

Rebates/incentives:

- There are no incentives at this time offered by NJ Clean Energy for this energy conservation measure.

Please see Appendix F for more information on Incentive Programs.

ECM#5: Install a 30 kW Solar Photovoltaic Rooftop System

Currently, the building does not use any renewable energy systems. Renewable energy systems such as photovoltaic (PV) panels can be mounted on the building roof facing south which can offset a portion of the purchased electricity for the building. Power stations generally have two separate electrical charges: usage and demand. Usage is the amount of electricity in kilowatt-hours that a building uses from month to month. Demand is the amount of electrical power that a building uses at any given instance in a month period. During the summer periods, electric demand at a power station is high, due to the amount of air conditioners, lights, and other equipment being used within the region. Demand charges increase to offset the utility's cost to provide enough electricity at that given time. Photovoltaic systems offset the amount of electricity used by a building and help to reduce the building's electric demand, resulting in a higher cost savings. Installing a PV system will offset electric demand and reduce annual electric consumption, while utilizing available state incentives. PV systems are modular and readily allow for future expansions.

The size of the system was determined considering the available roof surface area, without compromising service space for roof equipment and safety, as well as the facilities' annual base load and mode of operation. A PV system could be installed on a portion of the roof with panels facing south. A commercial multi-crystalline 230 watt panel has 17.5 square feet of surface area (providing 13.1 watts per square foot). A 30 kW system needs approximately 130 panels which would take up 2,280 square feet.

A PV system would reduce the building's electric load and allow more capacity for surrounding buildings as well as serve as an example of energy efficiency for the community. The building is not eligible for a residential 30% federal tax credit. The building owner may want to consider applying for a grant and / or engage a PV generator / leaser who would install the PV system and then sell the power at a reduced rate. Typically, a major utility provides the ability to buy SREC's at \$600/MWh or best market offer. However, this option is not available from the local utility. Please see below for more information.

Please note that this analysis did not consider the structural capability of the existing building to support the above recommended system. SWA recommends that the City of Summit contract with a structural engineer to determine if additional building structure is required to support the recommended system and what costs would be associated with incorporating the additional supports prior to system installation. Should additional costs be identified, the City of Summit should include these costs in the financial analysis of the project.

Installation cost:

Estimated installed cost: \$187,500 (includes \$120,000 of labor)

Source of cost estimate: Similar projects

Economics (with incentives):

est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
210,000	22,500	187,500	35,400	30.0	0	12.8	0	27,442	25	686,051	6.8	266	11	13	\$164,074	63,384

Cash flow:

Annual Solar PV Cost Savings Breakdown				
Rated Capacity (kW)		30.0		
Rated Capacity (kWh)		35,400		
Annual Capacity Loss		0%		
Year	kWh Capacity	Installed Cost	Incentives	Electric Savings (\$)
0		\$210,000	\$22,500	
1	35,400		\$21,000	\$6,442
2	35,400		\$21,000	\$6,442
3	35,400		\$21,000	\$6,442
4	35,400		\$21,000	\$6,442
5	35,400		\$21,000	\$6,442
6	35,400		\$21,000	\$6,442
7	35,400		\$21,000	\$6,442
8	35,400		\$21,000	\$6,442
9	35,400		\$21,000	\$6,442
10	35,400		\$21,000	\$6,442
11	35,400		\$21,000	\$6,442
12	35,400		\$21,000	\$6,442
13	35,400		\$21,000	\$6,442
14	35,400		\$21,000	\$6,442
15	35,400		\$21,000	\$6,442
16	35,400		\$0	\$6,442
17	35,400		\$0	\$6,442
18	35,400		\$0	\$6,442
19	35,400		\$0	\$6,442
20	35,400		\$0	\$6,442
21	35,400		\$0	\$6,442
22	35,400		\$0	\$6,442
23	35,400		\$0	\$6,442
24	35,400		\$0	\$6,442
25	35,400		\$0	\$6,442
	kWh	Cost	Saving	
Lifetime Total	885,000	(\$210,000)	\$337,500	\$161,051

Assumptions: SWA estimated the cost and savings of the system based on past PV projects. SWA projected physical dimensions based on a typical Polycrystalline Solar Panel (230 Watts, model #ND-U230C1). PV systems are sized based on Watts and physical dimensions for an array will differ with the efficiency of a given solar panel (W/sq ft).

Rebates/financial incentives:

NJ Clean Energy - Renewable Energy Incentive Program, Incentive based on \$0.75 / watt Solar PV application for systems 30 kW or less. Incentive amount for this application is \$22,500 for the proposed option. <http://www.njcleanenergy.com/renewable-energy/programs/renewable-energy-incentive-program>

NJ Clean Energy - Solar Renewable Energy Certificate Program. Each time a solar electric system generates 1,000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. The buildings must also become net-metered in order to earn SRECs as well as sell power back to the electric grid. A total annual SREC credit of \$21,000 has been incorporated in the above costs however it requires proof of performance, application approval and negotiations with the utility.

Options for funding ECM:

This project may benefit from enrolling in NJ SmartStart program with Technical Assistance to offset a portion of the cost of implementation.

<http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings>

Please see Appendix F for more information on Incentive Programs.

ECM#6: Replace (1) Oil Fired DHW Heater with 86 gal Storage with an ENERGY STAR® Gas Fired Condensing Model with 50 Gal Storage

During the field audit, SWA inspected the existing Domestic Hot Water (DHW) heater. There is one oil fired heater in the basement of the building that produces DHW for the entire year. The water heater utilizes an external storage tank. The expected service life of a DHW heater is 10-13 years. Consideration should be given to replace the existing 86 gal heater (oversized, according to the Director of the Community Center), which is in disrepair, with an efficient ENERGY STAR® gas fired condensing type as part of a capital improvement plan and switching from fuel oil to gas heating service.

It is important that the domestic hot water heater is replaced immediately. Currently the unit is not properly heating water up to the correct temperature. The amount of gas required to heat up water to the proper temperature will increase the usage of the unit but will also increase the system efficiency. When domestic water is not heated properly to temperatures above 110 deg F, there is an increased possibility of bacteria growth and legionella in the water tank. SWA recommends that the domestic hot water heater is replaced with a high efficiency unit as an energy efficiency measure as well as a health and safety measure.

The most efficient DHW systems available are generally gas-fired. The estimated efficiency for the existing heater is 0.815. In order to increase the efficiency of the domestic hot water distribution system, SWA also recommends that all corroded piping is replaced and insulation is added to all un-insulated DHW pipes.

The capacity of a water heater is an important consideration. The water heater should provide enough hot water at the busiest time of the day. For a storage water heater, this capacity is indicated by its "first hour rating" (found on Energy Guide label alongside efficiency rating) which accounts for the effects of tank size and the speed by which cold water is heated.

DHW heaters range in size from 20 to 80 gallons (or larger) and fueled by electricity, gas, propane, or oil. Storage water heaters transfer heat from a burner or coil to water in an insulated tank. Because heat is lost through the flue (except in electric models) and through the walls of the storage tank, energy is consumed even when no hot water is being used.

New energy-efficient gas-fired storage water heaters are a good, cost-effective replacement option for old water heaters. They have higher levels of insulation around the tank and one-way valves where pipes connect to the tank, substantially reducing standby heat loss. Newer super-efficient "condensing" and "near-condensing" gas water heaters save much more energy compared to traditional models. For safety as well as energy efficiency, fuel-burning water heaters should be installed with sealed combustion ("direct-vented" or "power-vented"). Sealed combustion means that outside air is brought in directly to the water heater and exhaust gases are vented directly outside, keeping combustion totally separate from the house air.

This ECM assumes that the building will be converted from fuel oil to gas heat (although it is not necessary to gain the savings).

Installation cost:

Estimated installed cost: \$5,950 (includes \$2,070 of labor)

Source of cost estimate: Manufacturer and Store established costs, NJ Clean Energy Program, Similar Projects

Economics (with incentives):

est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
Replace (1) Oil Fired DHW Heater with 86 gal Storage in Kind																
5,000	0	5,000	0	0.0	0	0.0	150	150	12	1,800	33.3	-64	-5	-13	-3,415	0
Incremental Difference to Replace (1) Oil Fired DHW Heater with 86 gal Storage with an Energy Star Gas Fired Condensing Model with 50 Gal Storage																
1,000	50	950	0	0.0	11	0.1	0	30	12	361	31.6	-62	-5	-12	-634	124
Replace (1) Oil Fired DHW Heater with 86 gal Storage with an ENERGY STAR® Gas Fired Condensing Model with 50 Gal Storage																
6,000	50	5,950	0	0.0	11	0.1	150	180	12	2,161	33.0	-64	-5	-13	-4,049	124

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. SWA assumed annual labor and parts insurance for existing DHW heater. The estimated overall efficiency of the existing DHW is in the 81.5% range, and a new high efficiency DHW heater would operate with an overall efficiency of approximately 90%.

Rebates/financial incentives:

- NJ Clean Energy - SmartStart - Gas Water Heaters >50 gal - <300 MBH, Minimum 85% AFUE (\$2.00 per MBH but not less than \$50/unit) - Maximum incentive amount is \$50

Please see Appendix F for more information on Incentive Programs.

ECM#7: Replace Old Oil Fired Boiler and HVAC System with (4) Gas Fired Condensing Furnaces and Add Gym Air Conditioning Feature

During the field audit, SWA inspected the old basement oil fired hot water boiler, associated baseboard, unit ventilator and hydronic terminal units. They are all operating beyond their estimated service lives (with one exception, a newer gym unit ventilator). The majority of the rooftop air

conditioning units have 45% remaining expected service lives. SWA recommends replacement of the existing old HVAC heating system with four ENERGY STAR® high efficiency condensing furnaces and evaporators connected to the existing rooftop condensers, as well as installing a 20 ton condenser for to serve the gymnasium.

The coils of boiler and associated hot water system may be partly fouled. The pump motors are standard rather than NEMA premium efficiency. SWA recommends replacement with four ENERGY STAR® condensing furnaces of 93% Annual Fuel Utilization Efficiency (AFUE) rating. The furnaces will be placed in three corner closets of the building and hanging from the gym's ceiling. One will serve the Benson Big Meeting room, another for the Administration area and Director's office, another for the Lobby and Conference room and lastly one to serve the Gymnasium. The heat capacity of each furnace should match the capacity required to heat each designated space. Evaporator coils should be installed in the furnace discharge ducts for cooling the re-circulating air via a matching existing split rooftop condenser, or in the case of the gym, a new condenser. **Note that the addition of air conditioning (AC) may require an upgrade to the existing electric service. Also, a gym AC will increase electric consumption.** Variable air volume boxes will be installed with units serving several spaces in order to allow individual space temperature adjustment. It is assumed that the building will switch from fuel oil to gas heating service as part of a capital improvement plan and in order to gain savings.

SWA recommends that the replacement furnaces be two-stage furnaces, which is like having two furnaces in one. On the coldest days, the furnace operates in the high-stage mode at 100% capacity. But on most days, the furnace comfortably conserves energy by operating in the low-stage mode at just 70% capacity. The two-stage gas valve runs quietly on the low stage 90% of the time, producing just 25% of the normal high-fire sound, while significantly reducing energy consumption. A central furnace control orchestrates the various functions of the furnace with digital accuracy. Functions like the blower and inducer motor are monitored for proper operation, increasing safety and reliability. SWA also recommends features like the corrosion-resistant, aluminized steel tubular heat exchanger with stainless-steel recuperative coil which will provide many years of trouble-free service. Plus, a furnace heavy-gauge, reinforced and insulated steel cabinet. The high-efficiency combustion process allows venting with 2 - 4 inch PVC without the need for a traditional chimney flue. And because it can be direct-vented to the outside, fresh air can be used for combustion. The fuel stingy auto-ignition system eliminates the old-fashioned standing pilot for greater ignition dependability without the wasted energy.

Essentially, SWA is recommending one central furnace and air conditioner for each of the four spaces. In a split-system central air conditioner, an outdoor (rooftop) metal cabinet contains the condenser and compressor, and an indoor cabinet (in the furnace discharge duct) contains the evaporator. Central air conditioners are more efficient than room air conditioners. In addition, they are out of the way, quiet, and convenient to operate. For an older central air conditioner, consider replacing the outdoor compressor with a modern, high-efficiency unit. Today's best air conditioners use 30%–50% less energy to produce the same amount of cooling as air conditioners made twenty years ago. Even if the air conditioner is only 10 years old, savings may be 20%–40% of the cooling energy costs by replacing it with a newer, more efficient model. Proper sizing and installation are key elements in determining air conditioner efficiency. Too large a unit will not adequately remove humidity. Too small a unit will not be able to attain a comfortable temperature on the hottest days. Improper unit location, lack of insulation, and improper duct installation can greatly diminish efficiency.

When buying an air conditioner, look for a model with a high efficiency. Central air conditioners are rated according to their seasonal energy efficiency ratio (SEER). SEER (Btu/Watt-hr) indicates the

relative amount of energy needed to provide a specific cooling output. Many older systems have SEER ratings of 6 or less (excluding the years of equipment degradation). The minimum SEER allowed today is 13. Look for the ENERGY STAR® label for central air conditioners with SEER ratings of 13 or greater, but consider using air conditioning equipment with higher SEER ratings for greater savings. SEER 13 is 30% more efficient than the previous minimum SEER of 10. The "lifespan" of a central air conditioner is about 15 to 20 years. More information can be found in the "Products" section of the Energy Star website at: <http://www.energystar.gov> .

The proposed replacement is as follows:

- Install one condensing furnace sized for 24,500 Btu/hr heating with evaporator and tie into one existing rooftop condenser to heat/cool the Benson Big Meeting room. Install additional ductwork for efficient air distribution and control.
- Install one condensing furnace sized for 24,500 Btu/hr heating with evaporator and tie into two existing rooftop condensers to heat/cool the Administration area and Director's office. Install additional ductwork and two variable air volume (VAV) boxes for efficient air distribution and control.
- Install one condensing furnace sized for 24,500 Btu/hr heating with evaporator and tie into two existing rooftop condensers to heat/cool the Lobby and Conference room. Install additional ductwork and two VAV boxes for efficient air distribution and control.
- Install one ceiling hung condensing furnace sized for 262,500 Btu/hr heating with evaporator and tie into a new 20 ton, 13 EER rooftop condenser to heat/cool the Gymnasium. Install additional ductwork for efficient air distribution and control.

This upgrade will cost approximately \$6,978 more vs. replacing the existing boiler and HVAC system in kind however a gymnasium AC unit will be gained.

This ECM assumes that the building will be converted from fuel oil to gas heat.

Installation cost:

Estimated installed cost: \$68,978 (includes \$48,000 of labor; not included are such activities as design, engineering, any civil and structural work, permitting and general conditions)

Source of cost estimate: Manufacturer and Store established costs, NJ Clean Energy Program, Similar Projects

Economics (with incentives):

est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
Replace Existing HVAC: (1) Boiler and Hydronic Terminal Units in Kind																
62,000	0	62,000	0	0.0	0	0.0	750	750	25	18,750	82.7	-70	-3	-8	-47,700	0
Replace (1) 83% Efficient Oil Fired Boiler and Associated Heating with (4) 95% Efficient Gas Condensing Furnaces and Add Gym Air Conditioning Feature (for the Big Meeting Room (a), Administration and Director's Area (b), Lobby and Conference Room (c), Gym (d))																
a-4,000	400	3,600	0	0.0	56	0.6	0	149	15	2,234	24.2	-38	-3	-5	-1,790	613
b-4,000	400	3,600	0	0.0	56	0.6	0	149	15	2,234	24.2	-38	-3	-5	-1,790	613
c-4,000	400	3,600	0	0.0	56	0.6	0	149	15	2,234	24.2	-38	-3	-5	-1,790	613
d-60,000	1,822	58,178	0	0.0	596	6.3	0	1,596	15	23,937	36.5	-59	-4	-9	-38,178	6,564
Replace Old Oil Fired Boiler and HVAC System with (4) Gas Fired Condensing Furnaces and Add Gym Air Conditioning Feature																
72,000	3,022	68,978	0	0.0	762	8.1	750	2,793	15	41,889	24.7	-39	-3	-6	-34,997	8,402

Assumptions: SWA calculated the savings for this measure using measurements taken during the field audit and using the billing analysis. In order to estimate savings for this measure, SWA assumed in the model an energy reduction based on the difference in efficiencies of existing vs. the proposed equipment. SWA also assumed that the existing units require additional annual repairs vs. new furnaces and condensers.

Rebates/financial incentives:

- NJ Clean Energy - SmartStart - Gas Furnace (\$400 per furnace, >92% AFUE, with electronic commutated motor or equivalent) - Maximum incentive amount is \$1,600.
- NJ Clean Energy - SmartStart - Unitary HVAC / Split System, >11.25 to <20 tons (\$79 per ton, 11.5 EER) - Maximum incentive amount is \$1,422.

Please see Appendix F for more information on Incentive Programs.

PROPOSED FURTHER RECOMMENDATIONS

Capital Improvements

Capital Improvements are recommendations for the building that may not be cost-effective at the current time, but that could yield a significant long-term payback. These recommendations should typically be considered as part of a long-term capital improvement plan. Capital improvements should be considered if additional funds are made available, or if the installed costs can be shared with other improvements, such as major building renovations. SWA recommends the following capital improvements for the Community Center:

- Install premium motors when replacements are required - Select NEMA Premium motors when replacing motors that have reached the end of their useful operating lives.
- Replace building exhaust fans - this equipment is beyond its expected service life and driven by fractional horsepower motors, so the replacements cannot be justified by energy savings alone and there are no NJ Clean Energy rebates available. The exhaust fans that are not working are important to properly remove exhaust air from the building and induce fresh supply air into the bathrooms.
- Replace all original gravel ballast flat roof sections with a new ENERGY STAR® certified membrane and insulation (3" rigid) assembly (High Performance) reflective roof installed including the minimum code approved rigid insulation. New roof should be pitched correctly for drainage.
- During the next major construction, SWA recommends insulating the exterior walls of the structure by adhering 2" polyiso boards ([Polyisocyanurate](#)) together with furring strips to the inside of the CMU or brick walls.
- Replace basement sump pump operating beyond its expected service life with a newer updated model.
- Replace original single pane windows with low-e, double pane, high performance windows. SWA recommends selecting windows with a low U value. Currently, window replacement rebates and tax incentives are available only for residential buildings. The investment cannot be justified by energy savings alone and should be considered as part of a major renovation plan.
- Install a front vestibule or revolving doors on the front entrance to the building in order to keep conditioned air inside the building and prevent major temperature fluctuations when doors are opened.

Operations and Maintenance

Operations and Maintenance measures consist of low/no cost measures that are within the capability of the current building staff to handle. These measures typically require little investment, and they yield a short payback period. These measures may address equipment settings or staff operations that, when addressed will reduce energy consumption or costs.

- Repair and maintain 2002 aluminum windows, caulking around perimeter of exterior window framing and maintain sealants.

- Insulate hot water piping in the Boiler room and throughout the building, in order to deliver hot water where it is needed, without delay and energy losses, while providing personnel protection at the same time.
- Replace all corroded Domestic Hot water piping and insulated to prevent water leakage
- Thoroughly and evenly insulate space above the ceiling tiles and plug all ceiling penetration. Any missing ceiling tiles should be put back in place.
- Maintain roofs - SWA recommends regular maintenance to verify water is draining correctly and drains are cleaned.
- Maintain downspouts and cap flashing - Repair/install missing downspouts and cap flashing as needed to prevent water/moisture infiltration and insulation damage. SWA recommends round downspout elbows to minimize clogging.
- Provide weather-stripping/air-sealing - SWA observed that exterior door weather-stripping was beginning to deteriorate in places. Doors and vestibules should be observed annually for deficient weather-stripping and replaced as needed. The perimeter of all window frames should also be regularly inspected, and any missing or deteriorated caulking should be re-caulked to provide an unbroken seal around the window frames. Any other accessible gaps or penetrations in the thermal envelope penetrations should also be sealed with caulk or spray foam.
- Repair/seal wall cracks and penetrations - SWA recommends as part of the maintenance program installing proper flashing and correct masonry efflorescence, and sealing wall cracks and penetrations wherever necessary in order to keep insulation dry and effective.
- Repair broken/missing brick veneer – Siding is the first barrier serving to prevent water and wind intrusion into the thermal envelope. Broken brick veneer was seen during the building audit, along with unsealed mortar joints. SWA recommends regular maintenance on all exterior wall surfaces.
- Provide water-efficient fixtures and controls - Adding controlled on/off timers on all lavatory faucets is a cost-effective way to reduce domestic hot water demand and save water. Aerators in the bathrooms at the Community Center were rated 2.0gpm. Building staff can also easily install 0.5gpm faucet aerators and/or low-flow fixtures to reduce water consumption. There are many retrofit options, which can be installed now or incorporated as equipment is replaced. Routine maintenance practices that identify and quickly address water leaks are a low-cost way to save water and energy. Retrofitting with more efficient water-consumption fixtures/appliances will reduce energy consumption for water heating, while also decreasing water/sewer bills.
- SWA recommends that the building considers purchasing the most energy-efficient equipment, including ENERGY STAR® labeled appliances, when equipment is installed or replaced. More information can be found in the “Products” section of the ENERGY STAR® website at: <http://www.energystar.gov>.
- Use smart power electric strips - in conjunction with occupancy sensors to power down computer equipment when left unattended for extended periods of time.

- Create an energy educational program - that teaches how to minimize energy use. The U.S. Department of Energy offers free information for hosting energy efficiency educational programs and plans. For more information please visit: <http://www1.eere.energy.gov/education/>.
- Change filters on rooftop package units monthly to ensure efficient operation of the blowers and ensure adequate air delivery to the spaces.
- Tighten belts on exhaust fans and blowers every three to six months - Tightening belts on belt-driven fans/blowers can maximize the overall efficiency of the equipment.
- Inspect rooftop package units' coils for dirt buildup three to six months. These conditions should be rectified if found because they will cause inefficient operation and possibly damage to the equipment.

The recommended ECMs and the list above are cost-effective energy efficiency measures and building upgrades that will reduce operating expenses for Summit. Based on the requirements of the LGEA program, the City of Summit must commit to implementing some of these measures, and must submit paperwork to the Local Government Energy Audit program within one year of this report's approval to demonstrate that they have spent, net of other NJCEP incentives, at least 25% of the cost of the audit (per building). The minimum amount to be spent, net of other NJCEP incentives, is \$1,285 (or 25% of \$5,139).

APPENDIX A: EQUIPMENT LIST

Inventory

Building System	Description, % eff	Model # / Serial #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Heating	Oil fired hot water boiler, 629,600 Btu/hr water heating capacity, est 83% eff	H B Smith 18 Series-9, SHE87-942, Allanson oil burner	Fuel Oil	Basement Boiler Rm	Community Center	1981, minor parts 2001	0%
Heating	3 circulators for 3 building zones (mostly baseboard heat)	B&G 189134 840, Series 100 F90	Electric	Basement Boiler Rm	Community Center	1955	0%
Heating	Various number of terminal units, including (3) unit ventilators in the gymnasium	Nesbitt (missing nametags)	Electric (when fans)	Various spaces	Community Center	all 1955, one Gym unit 2009	0%/ one 95%
Cooling	10 ton refrigeration capacity, est 11 EER	Carrier Weathermaster 50HJ-012-561DA, Serial # 350163077	Electric	Rooftop	Big Meeting/ Class Rm space	2002	45%
Cooling	5 ton refrigeration capacity, est 11 EER (compressor is being replaced)	Carrier Weathermaster 50HJ-006-531DA, Serial # 3501625013	Electric	Rooftop	Admin Offices	2002	45%
Cooling	(2) units, each 18,000 Btu/hr cooling, est 10.5 EER	Carrier 38HDC018341, Serial #s 2901X13706 & 2901X13705	Electric	Rooftop	Front Lobby/ Lobby by trophy cases	2002	45%
Cooling	(2) units, each 23,000 Btu/hr cooling, est 11.2 EER	Carrier 38HDC024333 1, Serial #s 2501X11373 & 1501X05156	Electric	Rooftop	Conf rm/ Director's office	2002	45%
DHW	One 86 gal oil fired DHW heater, 245,000 Btu/hr capacity, 81.5% eff	AO Smith CD 245 792P, Serial # AKS1 26458 792P	Fuel Oil	Basement Boiler Rm	Community Center	circa 1985	0%
Ventilation	(3) exhaust fans (Benson Rm fan used to remove cigarette smoke is not operated; (2) bathroom fan motors are burned out and need replacement)	Penn DX08SR, DX13Q, DX12B (EF-4)	Electric	Rooftop	Community Center bathrooms and storage areas	circa 1985	0%

continued on the next page

continued from the previous page							
Building System	Description, % eff	Model # / Serial #	Fuel	Location	Space Served	Date Installed	Estimated Remaining Useful Life %
Oil Tank	One 1,000 gal fuel oil tank - above ground	No name tag found, UL #M689937	Fuel Oil	Rear of building in shed	Community Center	2002	75%
Sump Pump	(1) sump pump in accumulation tank	Nametag not accessible	Electric	Basement	Basement boiler Rm	circa 1985	0%
Lighting	See details - Appendix B	See details - Appendix B	Electric	Community Center	Community Center	Varies	Avg - 15%; Gym - 95%

Note: The remaining useful life of a system (in %) is an estimate based on the system date of built and existing conditions derived from visual inspection.

Appendix B: Lighting Study

Location			Existing Fixture Information											Retrofit Information											Annual Savings						
Marker	Floor	Room Identification	Fixture Type	Ballast	Lamp Type	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Controls	Operational Hours per Day	Operational Days per Year	Ballast Wattage	Total Watts	Energy Use kWh/year	Category	Fixture Type	Lamp Type	Ballast	Controls	# of Fixtures	# of Lamps per Fixture	Watts per Lamp	Operational Hours per Day	Operational Days per Year	Ballast Watts	Total Watts	Energy Use kWh/year	Fixture Savings (kWh)	Controls Savings (kWh)	Total Savings (kWh)	
1	1	Hallway	Recessed Parabolic	E	4'T8	13	3	32	Sw	10	365	5	1,313	4,792	N/A	sed Pa	4'T8	E	Sw	13	3	32	10	365	5	1313	4792	0	0	0	
2	1	Hallway	Exit Sign	S	LED	1	1	5	N	24	365	1	6	48	N/A	Exit Sign	LED	S	N	1	1	5	24	365	1	6	48	0	0	0	
3	1	Meeting Rm	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0	
4	1	Meeting Rm	Recessed Parabolic	E	4'T8	15	4	32	Sw	6	365	5	1,995	4,369	C	sed Pa	4'T8	E	OS	15	4	32	5	365	5	1995	3277	0	1092	1092	
5	1	Meeting Rm	Recessed	S	CFL	12	1	13	Sw	6	365	0	156	342	N/A	ecess	CFL	S	Sw	12	1	13	6	365	0	156	342	0	0	0	
6	1	Bathroom Women	Recessed Parabolic	E	4'T8	4	4	32	Sw	4	365	5	532	777	C	sed Pa	4'T8	E	OS	4	4	32	3	365	5	532	583	0	194	194	
7	1	Bathroom Men	Recessed Parabolic	E	4'T8	4	4	32	Sw	4	365	5	532	777	C	sed Pa	4'T8	E	OS	4	4	32	3	365	5	532	583	0	194	194	
8	1	Gymnasium	Ceiling Mounted	S	MH	24	1	200	Sw	4	365	56	6,144	8,970	MH	ng Mou	MH	S	Sw	24	1	200	4	365	56	6144	8970	0	0	0	
9	1	Gymnasium	Exit Sign	S	LED	2	1	5	N	24	365	1	11	96	N/A	Exit Sign	LED	S	N	2	1	5	24	365	1	11	96	0	0	0	
10	1	Office	Recessed Parabolic	E	4'T8	8	4	32	Sw	8	365	5	1,064	3,107	N/A	sed Pa	4'T8	E	Sw	8	4	32	8	365	5	1064	3107	0	0	0	
11	1	Office	Recessed	S	CFL	4	2	23	Sw	8	365	0	184	537	N/A	ecess	CFL	S	Sw	4	2	23	8	365	0	184	537	0	0	0	
12	1	Office	Recessed Parabolic	E	4'T8	3	4	32	Sw	8	365	5	399	1,165	N/A	sed Pa	4'T8	E	Sw	3	4	32	8	365	5	399	1165	0	0	0	
13	1	Kitchen	Recessed Parabolic	E	4'T8	4	4	32	Sw	4	365	5	532	777	C	sed Pa	4'T8	E	OS	4	4	32	3	365	5	532	583	0	194	194	
14	1	Storage Closet	Ceiling Mounted	E	4'T8	2	2	32	Sw	1	365	5	138	50	N/A	ng Mou	4'T8	E	Sw	2	2	32	1	365	5	138	50	0	0	0	
15	1	Storage Closet	Ceiling Mounted	S	CFL	1	1	23	Sw	1	365	0	23	8	N/A	ng Mou	CFL	S	Sw	1	1	23	1	365	0	23	8	0	0	0	
16	Bsmt	Mechanical Rm	Ceiling Suspended	S	CFL	3	1	13	Sw	1	365	0	39	14	N/A	g Suspe	CFL	S	Sw	3	1	13	1	365	0	39	14	0	0	0	
17	Ext	Exterior	Recessed	S	CFL	3	1	13	PC	8	365	0	39	114	N/A	ecess	CFL	S	PC	3	1	13	8	365	0	39	114	0	0	0	
18	Ext	Exterior	Spotlight	S	Inc	1	1	90	PC	8	365	0	90	263	CFL	Spotligh	CFL	S	PC	1	1	90	8	365	0	90	263	175	0	175	
19	Ext	Exterior	Wallpack	S	MH	2	1	250	PC	8	365	70	640	1,869	MH	Wallpac	MH	S	PC	2	1	250	8	365	70	640	1869	0	0	0	
20	Ext	Exterior	Wallpack	S	MH	1	1	175	PC	8	365	49	224	654	MH	Wallpac	MH	S	PC	1	1	175	8	365	49	224	654	0	0	0	
Totals:						109	42	1,071				217	14,072	28,826						109	42	1,011			217	14,012	26,976	175	1,675	1,850	
Rows Highlighted Yellow Indicate an Energy Conservation Measure is recommended for that space																															

Rows Highlighted Yellow Indicate an Energy Conservation Measure is recommended for that space

Proposed Lighting Summary Table			
Total Gross Floor Area (SF)		9,450	
Average Power Cost (\$/kWh)		0.1820	
Exterior Lighting		Existing	Proposed
Exterior Annual Consumption (kWh)		2,900	2,724
Exterior Power (watts)		993	933
Total Interior Lighting		Existing	Proposed
Annual Consumption (kWh)		25,927	24,252
Lighting Power (watts)		13,079	13,079
Lighting Power Density (watts/SF)		1.38	1.38
Estimated Cost of Fixture Replacement (\$)		11	
Estimated Cost of Controls Improvements (\$)		800	
Total Consumption Cost Savings (\$)		362	

Legend							
Fixture Type		Lamp Type			Control Type	Ballast Type	Retrofit Category
Ceiling Suspended	Recessed	CFL	3'T12	8'T5	Autom. Timer (T)	S (Self)	N/A (None)
Exit Sign	Sconce	Inc	3'T12 U-Shaped	8'T5 U-Shaped	Bi-Level (BL)	E (Electronic)	T8 (Install new T8)
High Bay	Spotlight	LED	3'T5	8'T8	Contact (Ct)	M (Magnetic)	T5 (Install new T5)
Parabolic Ceiling Mounted	Track	HPS	3'T5 U-Shaped	8'T8 U-Shaped	Daylight & Motion (M)		CFL (Install new CFL)
Parabolic Ceiling Suspended	Vanity	MH	3'T8	Circline - T5	Daylight & Switch (DLSw)		LEDex (Install new LED Exit)
Pendant	Wall Mounted	MV	3'T8 U-Shaped	Circline - T8	Daylight Sensor (DL)		LED (Install new LED)
Recessed Parabolic	Wall Suspended	1'T12	4'T5	Circline - T12	Delay Switch (DSw)		D (De-lamping)
Ceiling Mounted	Wallpack	1'T12 U-Shaped	4'T5 U-Shaped	Fl.	Dimmer (D)		C (Controls Only)
Chandelier		1'T5	6'T12	Hal	Motion Sensor (MS)		PSMH (Install new Pulse-Start Metal Halide)
Equipment / Fume Hood		1'T5 U-Shaped	6'T12 U-Shaped	Induction	Motion& Switch (MSw)		
Flood		1'T8	6'T5	Infrared	None (N)		
Landscape		1'T8 U-Shaped	6'T5 U-Shaped	LPS	Occupancy Sensor (OS)		
Low Bay		2'T12 U-Shaped	6'T8	Mixed Vapor	Occupancy Sensor - CM (OSCM)		
Parabolic Wall Mounted		2'T5	6'T8 U-Shaped	Neon	Photocell (PC)		
Pole Mounted		2'T5 U-Shaped	8'T12	Quartz Halogen	Switch (Sw)		
Pole Mounted Off Building		2'T8 U-Shaped	8'T12 U-Shaped				

APPENDIX C: THIRD PARTY ENERGY SUPPLIERS

<http://www.state.nj.us/bpu/commercial/shopping.html>

JCP&LELECTRICAL SERVICE TERRITORY Last Updated: 06/15/09		
Hess Corporation 1 Hess Plaza Woodbridge, NJ 07095 (800) 437-7872 www.hess.com	BOC Energy Services, Inc. 1135 Mountain Avenue Murray Hill, NJ 011374 (800) 247-2644 www.boc.com	Commerce Energy, Inc. 4400 Route 9 South, Suite 100 Freehold, NJ 07728 (800) 556-84113 www.commerceenergy.com
Constellation NewEnergy, Inc. 900A Lake Street, Suite 2 Ramsey, NJ 07446 (888) 635-0827 www.newenergy.com	Direct Energy Services, LLC 120 Wood Avenue Suite 611 Iselin, NJ 08830 (866) 547-2722 www.directenergy.com	FirstEnergy Solutions Corp. 300 Madison Avenue MorrisSummit, NJ 0113113 (800) 977-0500 www.fes.com
Glacial Energy of New Jersey, Inc. 207 LaRoche Avenue Harrington Park, NJ 07640 (877) 569-2841 www.glacialenergy.com	Integritys Energy Services, Inc. 99 Wood Ave, South, Suite 802 Iselin, NJ 08830 (877) 763-9977 www.integritysenergy.com	Strategic Energy, LLC 55 Madison Avenue, Suite 400 MorrisSummit, NJ 011360 (888) 925-9115, www.sel.com
Liberty Power Holdings, LLC Park 80 West, Plaza II, Suite 200 Saddle Brook, NJ 07663 (866) 769-31139 www.libertypowercorp.com	Pepco Energy Services, Inc. 112 Main St. Lebanon, NJ 08833 (800) ENERGY-9 (363-7499) www.pepco-services.com	PPL EnergyPlus, LLC 811 Church Road Cherry Hill, NJ 08002 (800) 281-2000 www.pplenergyplus.com
Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8 th Floor Woodbridge, NJ 07095 (877) 273-6772 www.semprasolutions.com	South Jersey Energy Company One South Jersey Plaza Route 54 Folsom, NJ 08037 (800) 800-756-3749 www.southjerseyenergy.com	Suez Energy Resources NA, Inc. 333 Thornall Street 6th Floor Edison, NJ 08837 (888) 644-1014 www.suezenergyresources.com
UGI Energy Services, Inc. 704 East Main Street, Suite 1 MooresSummit, NJ 080113 (856) 273-9995 www.ugienergyservices.com	American Powernet Management, LP 437 North Grove St. Berlin, NJ 08009 (800) 437-7872 www.hess.com	ConEdison Solutions Cherry Tree, Corporate Center 1135 State Highway 38 Cherry Hill, NJ 08002 (888) 665-0955 www.conedsolutions.com

PSE&G NATURAL GAS SERVICE TERRITORY Last Updated: 06/15/09		
Cooperative Industries 412-420 Washington Avenue Belleville, NJ 07109 800-6BUYGAS (6-289427) www.cooperativenet.com	Direct Energy Services, LLP 120 Wood Avenue, Suite 611 Iselin, NJ 08830 866-547-2722 www.directenergy.com	Dominion Retail, Inc. 395 Highway 170 - Suite 125 Lakewood, NJ 08701 866-275-4240 http://retail.dom.com
Gateway Energy Services Corp. 44 Whispering Pines Lane Lakewood, NJ 08701 800-805-8586 www.gesc.com	UGI Energy Services, Inc. d/b/a GASMAR 704 East Main Street, Suite 1 Moorestown, NJ 08057 856-273-9995 www.ugienergyservices.com	Great Eastern Energy 116 Village Riva, Suite 200 Princeton, NJ 08540 888-651-4121 www.greateastern.com
Hess Energy, Inc. One Hess Plaza Woodbridge, NJ 07095 800-437-7872 www.hess.com	Hudson Energy Services, LLC 545 Route 17 South Ridgewood, NJ 07450 877- Hudson 9 www.hudsonenergyservices.com	Intelligent Energy 2050 Center Avenue, Suite 500 Fort Lee, NJ 07024 800-724-1880 www.intelligentenergy.org
Keil & Sons 1 Bergen Blvd. Fairview, NJ 07002 1-877-Systrum www.systrumenergy@aol.com	Metromedia Energy, Inc. 6 Industrial Way Eatontown, NJ 07724 877-750-7046 www.metromediaenergy.com	Metro Energy Group, LLC 14 Washington Place Hackensack, NJ 07601 888-53-Metro www.metroenergy.com
MxEnergy, Inc. 510 Thornall Street, Suite 270 Edison, NJ 088327 800-375-1277 www.mxenergy.com	NATGASCO (Mitchell Supreme) 532 Freeman Street Orange, NJ 07050 800-840-4GAS www.natgasco.com	Pepco Energy Services, Inc. 112 Main Street Lebanon, NJ 08833 800-363-7499 www.pepco-services.com
PPL EnergyPlus, LLC 811 Church Road - Office 105 Cherry Hill, NJ 08002 800-281-2000 www.pplenergyplus.com	Sempra Energy Solutions The Mac-Cali Building 581 Main Street, 8th fl. Woodbridge, NJ 07095 877-273-6772 800-2 SEMPRA www.semprasolutions.com	South Jersey Energy Company One South Jersey Plaza, Route 54 Folsom, NJ 08037 800-756-3749 www.sjindustries.com/sje.htm
Sprague Energy Corp. 12 Ridge Road Chatham Township, NJ 07928 800-225-1560 www.spragueenergy.com	Stuyvesant Energy LLC 10 West Ivy Lane, Suite 4 Englewood, NJ 07631 800-646-6457 www.stuyfuel.com	Woodruff Energy 73 Water Street Bridgeton, NJ 08302 800-557-1121 www.woodruffenergy.com

APPENDIX D: GLOSSARY AND METHOD OF CALCULATIONS

Net ECM Cost: The net ECM cost is the cost experienced by the customer, which is typically the total cost (materials + labor) of installing the measure minus any available incentives. Both the total cost and the incentive amounts are expressed in the summary for each ECM.

Annual Energy Cost Savings (AECS): This value is determined by the audit firm based on the calculated energy savings (kWh or Gallon) of each ECM and the calculated energy costs of the building.

Lifetime Energy Cost Savings (LECS): This measure estimates the energy cost savings over the lifetime of the ECM. It can be a simple estimation based on fixed energy costs. If desired, this value can factor in an annual increase in energy costs as long as the source is provided.

Simple Payback: This is a simple measure that displays how long the ECM will take to break-even based on the annual energy and maintenance savings of the measure.

ECM Lifetime: This is included with each ECM so that the owner can see how long the ECM will be in place and whether or not it will exceed the simple payback period. Additional guidance for calculating ECM lifetimes can be found below. This value can come from manufacturer's rated lifetime or warranty, the ASHRAE rated lifetime, or any other valid source.

Operating Cost Savings (OCS): This calculation is an annual operating savings for the ECM. It is the difference in the operating, maintenance, and / or equipment replacement costs of the existing case versus the ECM. In the case where an ECM lifetime will be longer than the existing measure (such as LED lighting versus fluorescent) the operating savings will factor in the cost of replacing the units to match the lifetime of the ECM. In this case or in one where one-time repairs are made, the total replacement / repair sum is averaged over the lifetime of the ECM.

Return on Investment (ROI): The ROI is expressed as the percentage return of the investment based on the lifetime cost savings of the ECM. This value can be included as an annual or lifetime value, or both.

Net Present Value (NPV): The NPV calculates the present value of an investment's future cash flows based on the time value of money, which is accounted for by a discount rate (assumes bond rate of 3.2%).

Internal Rate of Return (IRR): The IRR expresses an annual rate that results in a break-even point for the investment. If the owner is currently experiencing a lower return on their capital than the IRR, the project is financially advantageous. This measure also allows the owner to compare ECMs against each other to determine the most appealing choices.

Fuel Oil Rate and Electric Rate (\$/gal and \$/kWh): The fuel oil rate and electric rate used in the financial analysis is the total annual energy cost divided by the total annual energy usage for the 12 month billing period studied. The graphs of the monthly fuel oil and electric rates reflect the total monthly energy costs divided by the monthly usage, and display how the average rate fluctuates throughout the year. The average annual rate is the only rate used in energy savings calculations.

Calculation References

Term	Definition
ECM	Energy Conservation Measure
AOCS	Annual Operating Cost Savings
AECS	Annual Energy Cost Savings
LOCS*	Lifetime Operating Cost Savings
LECS	Lifetime Energy Cost Savings
LCS	Lifetime Cost Savings
NPV	Net Present Value
IRR	Internal Rate of Return
DR	Discount Rate
Net ECM Cost	Total ECM Cost – Incentive
LECS	AECS X ECM Lifetime
AOCS	LOCS / ECM Lifetime
LCS	LOCS+LECS
Simple Payback	Net ECM Cost / (AECS + AOCS)
Lifetime ROI	(LECS + LOCS – Net ECM Cost) / Net ECM Cost
Annual ROI	(Lifetime ROI / Lifetime) = [(AECS + OCS) / Net ECM Cost – (1 / Lifetime)]

* The lifetime operating cost savings are all avoided operating, maintenance, and/or component replacement costs over the lifetime of the ECM. This can be the sum of any annual operating savings, recurring or bulk (i.e. one-time repairs) maintenance savings, or the savings that comes from avoiding equipment replacement needed for the existing measure to meet the lifetime of the ECM (e.g. lighting change outs).

Excel NPV and IRR Calculation

In Excel, function =IRR (values) and =NPV (rate, values) are used to quickly calculate the IRR and NPV of a series of annual cash flows. The investment cost will typically be a negative cash flow at year 0 (total cost - incentive) with years 1 through the lifetime receiving a positive cash flow from the annual energy cost savings and annual maintenance savings. The calculations in the example below are for an ECM that saves \$850 annually in energy and maintenance costs (over a 10 year lifetime) and takes \$5,000 to purchase and install after incentives:

	A	B	C	D	E	F	G	H	I
1									
2									
3									
4					Year	Cash Flow			
5					0	\$ (5,000.00)			Investment Cost
6					1	\$ 850.00			
7					2	\$ 850.00			
8					3	\$ 850.00			
9					4	\$ 850.00			
10					5	\$ 850.00			
11					6	\$ 850.00			
12					7	\$ 850.00			
13					8	\$ 850.00			
14					9	\$ 850.00			
15					10	\$ 850.00			
16					IRR	11.03%			
17					NPV	\$2,250.67			

ECM Lifetime: 10 years (rows 5-14)

Cash Flow: Annual Energy Cost Savings + Annual Maintenance Savings

Formula:
 =IRR(F4:F14)
 =NPV(0.03,F5:F14)+F4

Solar PV ECM Calculation

There are several components to the calculation:

Costs:	Material of PV system including panels, mounting and net-metering + Labor
Energy Savings:	Reduction of kWh electric cost for life of panel, 25 years
Incentive 1:	NJ Renewable Energy Incentive Program (REIP), for systems of size 50kW or less, \$1/Watt incentive subtracted from installation cost
Incentive 2:	Solar Renewable Energy Credits (SRECs) – Market-rate incentive. Calculations assume \$600/Megawatt hour consumed per year for a maximum of 15 years; added to annual energy cost savings for a period of 15 years. (Megawatt hour used is rounded to nearest 1,000 kWh)
Assumptions:	A Solar Pathfinder device is used to analyze site shading for the building and determine maximum amount of full load operation based on available sunlight. When the Solar Pathfinder device is not implemented, amount of full load operation based on available sunlight is assumed to be 1,180 hours in New Jersey.

Total lifetime PV energy cost savings =
kWh produced by panel * [\$/kWh cost * 25 years + \$600/Megawatt hour /1000 * 15 years]

ECM and Equipment Lifetimes

Determining a lifetime for equipment and ECM's can sometimes be difficult. The following table contains a list of lifetimes that the NJCEP uses in its commercial and industrial programs. Other valid sources are also used to determine lifetimes, such as the DOE, ASHRAE, or the manufacturer's warranty.

Lighting is typically the most difficult lifetime to calculate because the fixture, ballast, and bulb can all have different lifetimes. Essentially the ECM analysis will have different operating cost savings (avoided equipment replacement) depending on which lifetime is used.

When the bulb lifetime is used (rated burn hours / annual burn hours), the operating cost savings is just reflecting the theoretical cost of replacing the existing case bulb and ballast over the life of the recommended bulb. Dividing by the bulb lifetime will give an annual operating cost savings.

When a fixture lifetime is used (e.g. 15 years) the operating cost savings reflects the avoided bulb and ballast replacement cost of the existing case over 15 years minus the projected bulb and ballast replacement cost of the proposed case over 15 years. This will give the difference of the equipment replacement costs between the proposed and existing cases and when divided by 15 years will give the annual operating cost savings.

New Jersey Clean Energy Program Commercial & Industrial Lifetimes

Measure	Life Span
Commercial Lighting — New	15
Commercial Lighting — Remodel/Replacement	15
Commercial Custom — New	18
Commercial Chiller Optimization	18
Commercial Unitary HVAC — New - Tier 1	15
Commercial Unitary HVAC — Replacement - Tier 1	15
Commercial Unitary HVAC — New - Tier 2	15
Commercial Unitary HVAC — Replacement Tier 2	15
Commercial Chillers — New	25
Commercial Chillers — Replacement	25
Commercial Small Motors (1-10 HP) — New or Replacement	20
Commercial Medium Motors (11-75 HP) — New or Replacement	20
Commercial Large Motors (76-200 HP) — New or Replacement	20
Commercial VSDs — New	15
Commercial VSDs — Retrofit	15
Commercial Comprehensive New Construction Design	18
Commercial Custom — Replacement	18
Industrial Lighting — New	15
Industrial Lighting — Remodel/Replacement	15
Industrial Unitary HVAC — New - Tier 1	15
Industrial Unitary HVAC — Replacement - Tier 1	15
Industrial Unitary HVAC — New - Tier 2	15
Industrial Unitary HVAC — Replacement Tier 2	15
Industrial Chillers — New	25
Industrial Chillers — Replacement	25
Industrial Small Motors (1-10 HP) — New or Replacement	20
Industrial Medium Motors (11-75 HP) — New or Replacement	20
Industrial Large Motors (76-200 HP) — New or Replacement	20
Industrial VSDs — New	15
Industrial VSDs — Retrofit	15
Industrial Custom — Non-Process	18
Industrial Custom — Process	10
Small Commercial Gas Furnace — New or Replacement	20
Small Commercial Gas Boiler — New or Replacement	20
Small Commercial Gas DHW — New or Replacement	10
C&I Gas Absorption Chiller — New or Replacement	25
C&I Gas Custom — New or Replacement (Engine Driven Chiller)	25
C&I Gas Custom — New or Replacement (Gas Efficiency Measures)	18
O&M savings	3
Compressed Air (GWh participant)	8

APPENDIX E: STATEMENT OF ENERGY PERFORMANCE FROM ENERGY STAR®

OMB No. 2060-0347



STATEMENT OF ENERGY PERFORMANCE City of Summit - Community Center

Building ID: 2408836
For 12-month Period Ending: February 28, 2010¹
Date SEP becomes ineligible: N/A

Date SEP Generated: August 24, 2010

Facility City of Summit - Community Center 100 Morris Avenue Summit, NJ 07901	Facility Owner N/A	Primary Contact for this Facility N/A
---	------------------------------	---

Year Built: 1955
Gross Floor Area (ft²): 9,450

Energy Performance Rating² (1-100): N/A

Site Energy Use Summary³

Electricity - Grid Purchase (kBtu)	332,374
Fuel Oil (No. 2) (kBtu)	629,414
Natural Gas - (kBtu) ⁴	0
Total Energy (kBtu)	961,788

Energy Intensity⁵

Site (kBtu/ft²/yr)	102
Source (kBtu/ft²/yr)	185

Emissions (based on site energy use)

Greenhouse Gas Emissions (MtCO ₂ e/year)	97
---	----

Electric Distribution Utility

FirstEnergy - Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	65
National Average Source EUI	136
% Difference from National Average Source EUI	36%
Building Type	Recreation

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 Standards⁶ 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.

The government estimates the average time needed to fill out this form is 6 hours (includes the time for entering energy data, Licensed Professional facility inspection, and notarizing the SEP) and we welcome suggestions for reducing this burden. Send comments (including OMB control number) to the Director, Collection Strategies Division, U.S. EPA (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460.

EPA Form 5900-16

APPENDIX F: INCENTIVE PROGRAMS

New Jersey Clean Energy Pay for Performance

The NJ Clean Energy Pay for Performance (P4P) Program relies on a network of Partners who provide technical services to clients. LGEA participating clients who are not receiving Direct Energy Efficiency and Conservation Block Grants are eligible for P4P. SWA is an eligible Partner and can develop an Energy Reduction Plan for each project with a whole-building traditional energy audit, a financial plan for funding the energy measures and an installation construction schedule.

The Energy Reduction Plan must define a comprehensive package of measures capable of reducing a building's energy consumption by 15+%. P4P incentives are awarded upon the satisfactory completion of three program milestones: submittal of an Energy Reduction Plan prepared by an approved Program Partner, installation of the recommended measures and completion of a Post-Construction Benchmarking Report. The incentives for electricity and Fuel Oil savings will be paid based on actual savings, provided that the minimum 15% performance threshold savings has been achieved.

For further information, please see: <http://www.njcleanenergy.com/commercial-industrial/programs/pay-performance/existing-buildings>.

Direct Install 2010 Program*

Direct Install is a division of the New Jersey Clean Energy Programs' Smart Start Buildings. It is a turn-key program for small to mid-sized facilities to aid in upgrading equipment to more efficient types. It is designed to cut overall energy costs by upgrading lighting, HVAC and other equipment with energy efficient alternatives. The program pays **up to 60%** of the retrofit costs, including equipment cost and installation costs.

Eligibility:

- Existing small and mid-sized commercial and industrial facilities with peak electrical demand **below 200 kW** within 12 months of applying
- Must be located in New Jersey
- Must be served by one of the state's public, regulated or natural gas companies
 - Electric: Atlantic City Electric, Jersey Central Power & Light, Orange Rockland Electric, PSE&G
 - Fuel Oil: Elizabethtown Gas, New Jersey Fuel Oil, PSE&G, PSE&G

For the most up to date information on contractors in New Jersey who participate in this program, go to: <http://www.njcleanenergy.com/commercial-industrial/programs/direct-install>

Smart Start

New Jersey's SmartStart Building Program is administered by New Jersey's Office of Clean Energy. The program also offers design support for larger projects and technical assistance for smaller projects. If your project specifications do not fit into anything defined by the program, there are even incentives available for custom projects.

There are a number of improvement options for commercial, industrial, institutional,

government, and agricultural projects throughout New Jersey. Alternatives are designed to enhance quality while building in energy efficiency to save money. Project categories included in this program are New Construction and Additions, Renovations, Remodeling and Equipment Replacement.

For the most up to date information on how to participate in this program, go to:
<http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings>.

Renewable Energy Incentive Program*

The Renewable Energy Incentive Program (REIP) provides incentives that reduce the upfront cost of installing renewable energy systems, including solar, wind, and sustainable biomass. Incentives vary depending upon technology, system size, and building type. Current incentive levels, participation information, and application forms can be found at the website listed below.

Solar Renewable Energy Credits (SRECs) represent all the clean energy benefits of electricity generated from a solar energy system. SRECs can be sold or traded separately from the power, providing owners a source of revenue to help offset the cost of installation. All solar project owners in New Jersey with electric distribution grid-connected systems are eligible to generate SRECs. Each time a system generates 1,000 kWh of electricity an SREC is earned and placed in the customer's account on the web-based SREC tracking system.

For the most up to date information on how to participate in this program, go to:
<http://www.njcleanenergy.com/renewable-energy/home/home>.

Utility Sponsored Programs

Check with your local utility companies for further opportunities that may be available.

Energy Efficiency and Conservation Block Grant Rebate Program

The Energy Efficiency and Conservation Block Grant (EECBG) Rebate Program provides supplemental funding up to \$20,000 for eligible New Jersey local government entities to lower the cost of installing energy conservation measures. Funding for the EECBG Rebate Program is provided through the American Recovery and Reinvestment Act (ARRA).

For the most up to date information on how to participate in this program, go to:
<http://njcleanenergy.com/EECBG>

Other Federal and State Sponsored Programs

Other federal and state sponsored funding opportunities may be available, including BLOCK and R&D grant funding. For more information, please check <http://www.dsireusa.org/>.

*Subject to availability. Incentive program timelines might not be sufficient to meet the 25% in 12 months spending requirement outlined in the LGEA program.

APPENDIX G: ENERGY CONSERVATION MEASURES

ECM #	ECM description	est. installed cost, \$	est. incentives, \$	net est. ECM cost with incentives, \$	kWh, 1st yr savings	kW, demand reduction/mo	therms, 1st yr savings	kBtu/sq ft, 1st yr savings	est. operating cost, 1st yr savings, \$	total 1st yr savings, \$	life of measure, yrs	est. lifetime cost savings, \$	simple payback, yrs	lifetime return on investment, %	annual return on investment, %	internal rate of return, %	net present value, \$	CO ₂ reduced, lbs/yr
1	Install (1) New CFL	11	0	11	175	0.0	0	0.1	25	57	5	284	0.2	2,604	521	541	240	314
2	Upgrade (3) Thermostats to Programmable Type	501	0	501	0	0.0	456	4.8	1,458	2,681	12	32,177	0.2	6,323	527	535	25,071	5,031
3	Install (4) Occupancy Sensors	880	80	800	1,675	0.3	0	0.6	0	305	15	4,572	2.6	472	31	38	2,700	2,999
4	Replace (1) Refrigerator with an 18 cu ft Energy Star Model	750	0	750	413	0.0	0	0.1	50	125	12	1,502	6.0	100	8	13	466	739
5	Install 30 kW Solar Photovoltaic System	210,000	22,500	187,500	35,400	30.0	0	12.8	0	27,442	25	686,051	6.8	266	11	13	164,074	63,384
6	Replace Old Oil Fired Boiler and HVAC System with (4) Gas Fired Condensing Furnaces and Add Gym Air Conditioning Feature	72,000	3,022	68,978	0	0.0	762	8.1	750	2,793	15	41,889	24.7	-39	-3	-6	-34,997	8,402
7	Replace (1) Oil Fired DHW Heater with 86 gal Storage with an ENERGY STAR® Gas Fired Condensing Model with 50 Gal Storage	6,000	50	5,950	0	0.0	11	0.1	150	180	12	2,161	33.0	-64	-5	-13	-4,049	124

APPENDIX H: METHOD OF ANALYSIS

Assumptions and tools

Energy modeling tool: Established/standard industry assumptions, E-Quest
Cost estimates: RS Means 2009 (Facilities Maintenance & Repair Cost Data)
RS Means 2009 (Building Construction Cost Data)
RS Means 2009 (Mechanical Cost Data)
Published and established specialized equipment material and labor costs
Cost estimates also based on utility bill analysis and prior experience with similar projects

Disclaimer

This engineering audit was prepared using the most current and accurate fuel consumption data available for the site. The estimates that it projects are intended to help guide the owner toward best energy choices. The costs and savings are subject to fluctuations in weather, variations in quality of maintenance, changes in prices of fuel, materials, and labor, and other factors. Although we cannot guarantee savings or costs, we suggest that you use this report for economic analysis of the building and as a means to estimate future cash flow.

THE RECOMMENDATIONS PRESENTED IN THIS REPORT ARE BASED ON THE RESULTS OF ANALYSIS, INSPECTION, AND PERFORMANCE TESTING OF A SAMPLE OF COMPONENTS OF THE BUILDING SITE. ALTHOUGH CODE-RELATED ISSUES MAY BE NOTED, SWA STAFF HAVE NOT COMPLETED A COMPREHENSIVE EVALUATION FOR CODE-COMPLIANCE OR HEALTH AND SAFETY ISSUES. THE OWNER(S) AND MANAGER(S) OF THE BUILDING(S) CONTAINED IN THIS REPORT ARE REMINDED THAT ANY IMPROVEMENTS SUGGESTED IN THIS SCOPE OF WORK MUST BE PERFORMED IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS THAT APPLY TO SAID WORK. PARTICULAR ATTENTION MUST BE PAID TO ANY WORK WHICH INVOLVES HEATING AND AIR MOVEMENT SYSTEMS, AND ANY WORK WHICH WILL INVOLVE THE DISTURBANCE OF PRODUCTS CONTAINING MOLD, ASBESTOS, OR LEAD.