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New Jersey Clean Energy
Local Government Energy Audit Program

Energy Audit Report For

Township of Wantage, New Jersey
Municipal Building

Project Number: LGEA04

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INTRODUCTION

On April 16th & 17th, Steven Winter Associates, Inc. (SWA) performed an energy audit and conditions assessment of the Township of Wantage Municipal building located in Wantage, NJ under the requirements of the New Jersey Clean Energy Local Government Energy Audit Program. Current conditions and energy related information was collected in order to analyze and facilitate the implementation of energy conservation measures for the building.

SWA reviewed architectural plans, examined the building envelope, and inspected the heating plant, including all controls and the distribution system, other major mechanical systems and lighting. Our inspections were conducted in general accordance with the standards and procedures set forth by the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), BPI and the New Jersey Clean Energy Program.

Energy data collected in the field was imported into the eQUEST energy conservation software to generate a baseline model of the building. SWA simulated the installation of energy improvement measures on the baseline model of the building. Energy saving calculations and projected economics are automated and served as the basis for our conclusions.

One building was evaluated for this energy audit; the Wantage Municipal building located at 888 State Route 23. In addition to the professional Township offices, the Municipal building also contains the court room for Municipal Court proceeding and garage space for Department of Public Works vehicles. The building consists of 13,453 square feet of conditioned space.

The DPW garage space uses approximately 5,265 square feet, with the remaining 8,188 square feet used for Township offices and Municipal Court.

The goal of this energy audit is to provide sufficient information to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the building.

EXECUTIVE SUMMARY

The Wantage Municipal building is a one-story building that houses the professional offices of Township as well as parking garages for Department of Public Works trucks. Based on the field visits performed by Steven Winter Associates (SWA) staff on April 16th and April 17th, 2009 and the results of a comprehensive energy analysis, this report describes the site's current conditions and recommendations for improvements. Suggestions for measures related to energy conservation and improved comfort are provided in the scope of work. Energy and resource savings are estimated for each measure that results in a reduction of heating, cooling and electric usage.

Electricity consumption for the building (including the three outbuildings on the same meter as the Municipal building) was 254,421 kilowatt hours (kWh) in 2007 and 255,184 kWh in 2008, costing Wantage $37,707.43 and $41,512.91 respectively. The two year consumption total was 509,605 kWh costing $79,220. The average cost of power over these two years was $0.155 per kWh. The electrical consumption was similar for both years.

The building is heated with #2 fuel oil. The Municipality purchased 10,904 gallons in 2007 costing $24,159.56 and 7,703 gallons costing $20,549.17 in 2008. The two year total was 18,607 gallons at a cost of $44,709, an average price of just over $2.40 per gallon. While purchase of heating oil was significantly lower in 2008, it is difficult to say with certainty that the building actually used that much less oil as the analysis is based on fuel deliveries during a calendar year and cannot account for fuel remaining in the storage tanks at the start of the year.

The major issues that SWA identified during our inspections were:

- Older technology fluorescent lighting using magnetic ballasts and T12 lamps.
- Heating and cooling controls:
    - Setpoints
    - Heating / cooling control scheduling

Our recommendations are to:

- Adjust heating and cooling control parameters
- Upgrade lighting
- Install a photovoltaic system
- Install domestic hot water maker timer

SWA is recommending a total of 4 Energy Conservation Measures (ECMs) for the Municipal building. The total investment cost for these ECMs is estimated at $94,510 exclusive of any program incentives. The first year saving projected to derive from these measures is $18,334. The incentives available from the NJ SmartStart program through the New Jersey Office of Clean Energy could provide $10,000 towards installation of a solar photovoltaic system and $2,960 towards a lighting upgrade. This program can also help provide technical assistance for the building in the implementation phase of any energy conservation project.

The following page is a summary table describing our recommendations. Section 4 of this report provides detailed information for each individual ECM.

SCOPE OF WORK – SUMMARY TABLE

ECM#	ECM description	Installed Cost		1st year energy savings					SPP	LoM	lifecycle	Averaged
		Estimated $	Source	usage	unit	demand	unit	$ savings			savings	ROI
	Heating and Cooling controls			18401	kwh			$ 2,944	immediate	5	$13,483	immediate
1	adjustment			1185	gall			$ 2,699	immediate	5	$12,363	immediate
2	Lighting improvement	$ 14,410	Contractor	30945	kwh			$ 4,951	2.9	12	$49,282	20.2%
3	Install 10 Kw Solar Photovoltaic System	$ 80,000	Vendor	12104	kwh			$ 7,728	10.4	25	$134,569	2.7%
4	Timer of DHW makers	$ 100	Vendor	70	kwh			$ 11	8.9	10	$96	-0.4%
Total		$ 94,510						$ 18,334	5.2			

Definitions:
SPP: Simple Payback
LoM: Life of Measure
ROI: Return On Investment
Assumptions:
Discount rate: 3.0% per DOE FEMP guidelines
Energy price escalation rate: 0% per DOE FEMP guidelines

1. HISTORIC ENERGY CONSUMPTION

1.1. Energy usage and cost analysis

The Township of Wantage provided copies of Electricity and #2 oil bills. The Electric Utility is Jersey Central Power & Light while Finch Fuel Oil Co., Kearny, NJ delivers heating oil to the building. Natural gas is not available in the area.

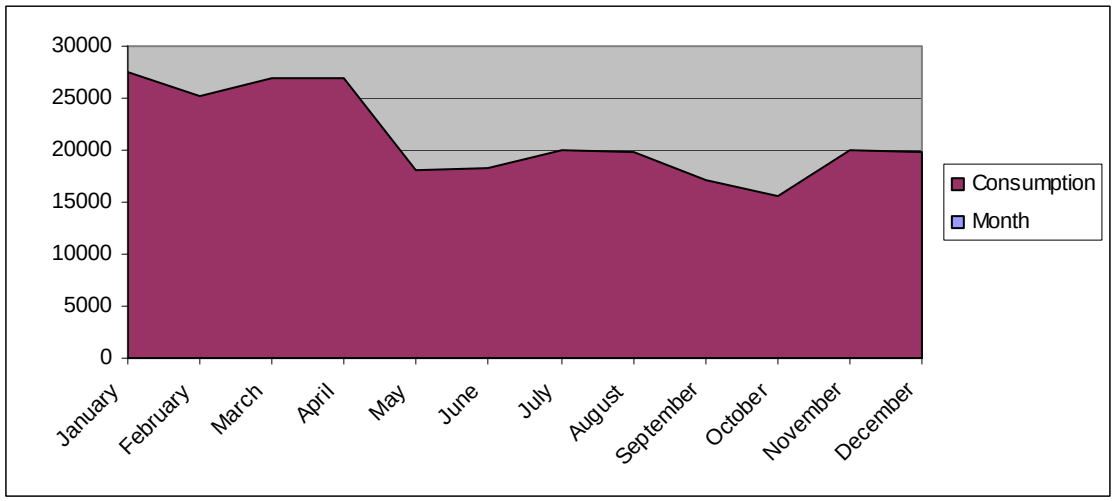
SWA analyzed the energy bills from the end of 2006 to the end of 2008.

The Wantage Township has one electric meter for all electricity provided to the municipal building and three small outbuildings adjacent to the Municipal building.

Electricity -The building used 255,184 kilowatt hours of electricity at a total cost of 41,512.91, an average rate of $.163 per kilowatt hour. In 2007 the building used 254,421 kilowatt hours costing 37,707.43, a rate of $.148.

Fuel Oil - The building purchased 7,703 gallons of #2 Heating oil in 2008, at a total cost of 20,549.17, an average of $2.668 per gallon. In 2007 purchased fuel oil amounted to 10,904 gallons costing $24,159.56, an average of $2.216 per gallon.

2008 Electricity Consumption



In the above chart the consumption is significantly higher during the winter months. This is most probably caused by the electric re-heat function of the 9 variable air volume (VAV) boxes that provide cooling, ventilation and obviously some of the heating to most of the front office section of the building. Compared with the spring and fall months when there is for the most part no heating or cooling, our analysis of the electricity bills indicates that during the coldest months the building uses approximately an 8,678 kilowatt hours over and above the base usage (not weather dependent). While some of this additional usage may be the result of more lighting hours, most of it is due to the electric reheating.

The much more moderate spikes in the summer months reflect an average of 2,580 additional kilowatt hours a month due to cooling.

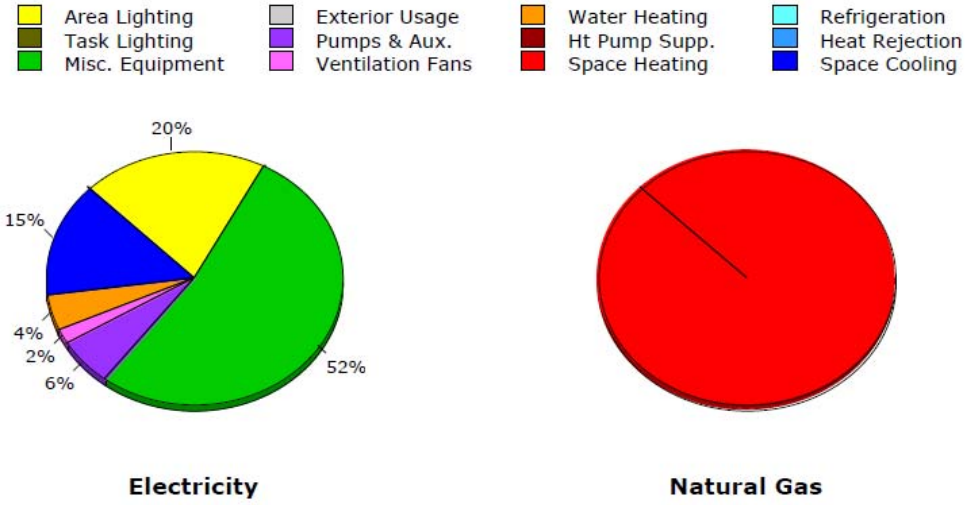
The following chart provides information on annual energy consumption by endues. It is generated by eQuest.

For computer building simulation and modeling purposes, # oil consumption was converted into natural gas, using the following conversion factors:

1 therm of natural gas = 100,000 Btu
1 gallon of #2 oil = 140,000 Btu

Annual Energy Consumption by Enduse

	Electricity kWh (x000)	Natural Gas MBtu	Steam Btu	Chilled Water Btu
Space Cool	37.77	-	-	-
Heat Reject.	-	-	-	-
Refrigeration	-	-	-	-
Space Heat	-	1,071.5	-	-
HP Supp.	-	-	-	-
Hot Water	11.43	-	-	-
Vent. Fans	5.05	-	-	-
Pumps & Aux.	15.69	-	-	-
Ext. Usage	-	-	-	-
Misc. Equip.	132.61	-	-	-
Task Lights	-	-	-	-
Area Lights	52.12	-	-	-
Total	254.67	1,071.5	-	-



Electricity **Natural Gas**

Heating Oil Consumption

#2 heating oil consumption at the Wantage Municipal building from February of 2006 through October of 2008 amounted to 23,494 gallons at a total cost of $53,531.81. This reflects an average cost of $2.28 per gallon of heating oil over the billing period. The range of the cost of a gallon of heating oil was from a low of $1.60 in January of 2007 to a high of $3.05 in March of 2008 before settling down to $2.33 by October of 2008. The increase of almost 91% in a little over a year reflects a volatility in oil prices that is likely to continue into the foreseeable future, making it difficult for Municipalities to budget the energy portion of operating costs.

2006 Fuel Oil Delivery Date	Gallons	Cost	Cost / Gal.
2/23/2006	2,000	$ 3,638.60	$ 1.8193
10/25/2006	2,887	$ 5,184.48	$ 1.7958
TOTAL	**4,887**	**$ 8,823.08**	**$ 1.8054**
2007 Fuel Oil			
1/22/2007	2,200	$ 3,519.12	$ 1.5996
2/22/2007	2,000	$ 3,674.20	$ 1.8371
7/17/2007	2,822	$ 6,105.68	$ 2.1636
11/12/2007	1,882	$ 5,458.36	$ 2.9003
12/3/2007	2,000	$ 5,402.20	$ 2.7011
TOTAL	**10,904**	**$24,159.56**	**$ 2.2157**
2008 Fuel Oil Delivery Date			
1/18/2008	2,300	$ 6,150.43	$ 2.6741
3/4/2008	2,503	$ 7,635.65	$ 3.0506
10/22/2008	2,900	$ 6,763.09	$ 2.3321
TOTAL	**7,703**	**$20,549.17**	**$ 2.6677**
GRAND TOTALS	**23,494**	**$53,531.81**	**$ 2.2785**

Electricity Consumption

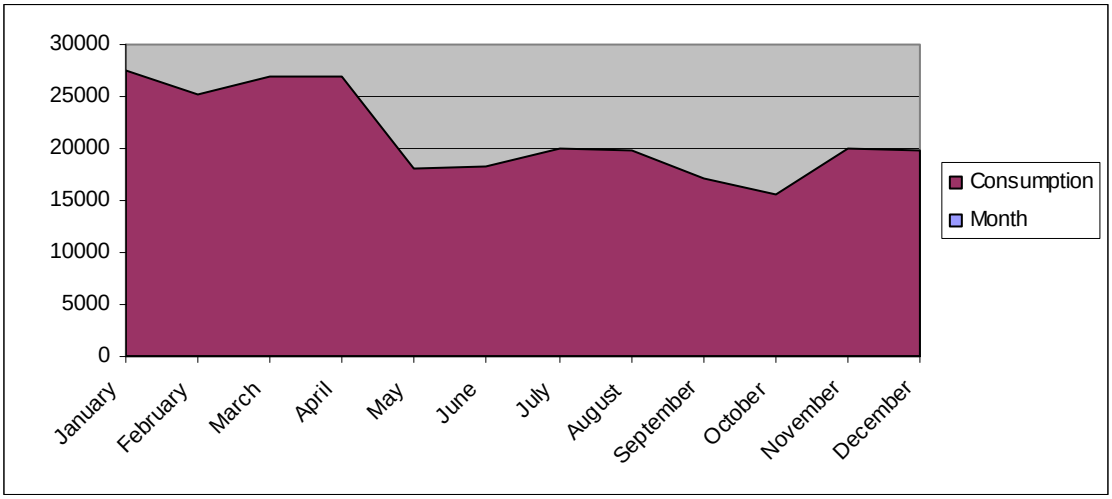
Electricity during the period January, 2007 – March 2009 was 589,811 kilowatt-hours at a total cost of $92,327.50, a cost of $.163 per kilowatt-hour. The range here was from a low of $0.127 per kWh in March of 2007 to a high of $0.187 in September of 2008. This reflected an increase of more than 47% in a year and a half. The price of electricity has since moderated to $0.163 that Wantage paid in March of 2009.

2007	Usage	Cost	Cost / kWh
January	23,842	$ 3,196.38	$ 0.134
February	28,079	$ 3,764.38	$ 0.134
March	28,082	$ 3,560.79	$ 0.127
April	21,322	$ 2,813.37	$ 0.132
May	18,802	$ 2,495.83	$ 0.133
June	18,882	$ 3,133.89	$ 0.166
July	20,282	$ 3,588.71	$ 0.177
August	19,882	$ 3,505.06	$ 0.176
September	17,442	$ 3,051.68	$ 0.175
October	16,842	$ 2,536.99	$ 0.151
November	16,562	$ 2,485.87	$ 0.150
December	24,402	$ 3,574.48	$ 0.146
TOTAL	**254,421**	**$ 37,707.43**	**$ 0.148**

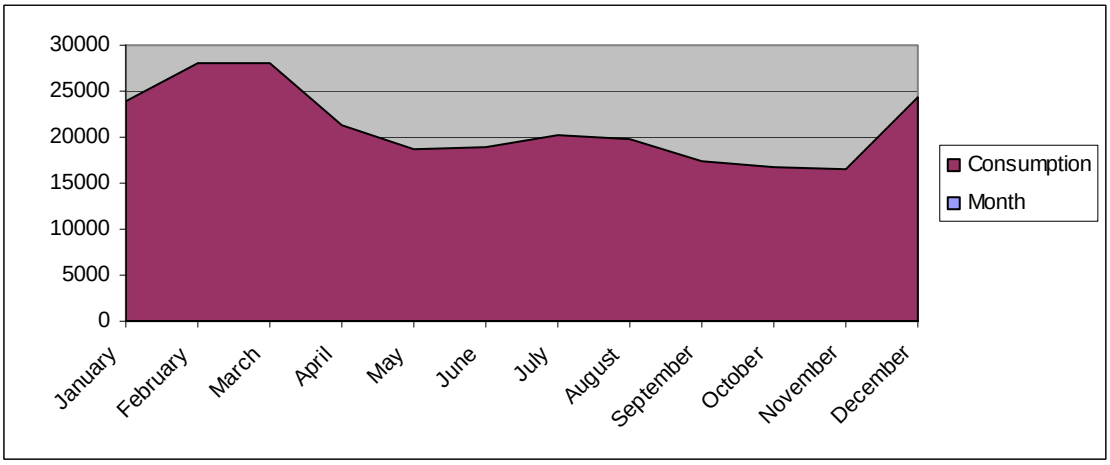
2008	Usage	Cost	Cost / kWh
January	27,442	$ 4,208.74	$ 0.153
February	25,162	$ 3,869.14	$ 0.154
March	26,882	$ 4,045.56	$ 0.150
April	26,882	$ 3,947.22	$ 0.147
May	18,162	$ 2,706.86	$ 0.149
June	18,202	$ 3,248.22	$ 0.178
July	20,002	$ 3,689.43	$ 0.184
August	19,882	$ 3,669.52	$ 0.185
September	17,082	$3,188.04	$ 0.187
October	15,602	$ 2,530.37	$ 0.162
November	20,042	$ 3,173.61	$ 0.158
December	19,842	$ 3,236.20	$ 0.163
TOTAL	**255,184**	**$ 41,512.91**	**$ 0.163**

2009	Usage	Cost	Cost / kWh
January	27,682	$ 4,496.91	$ 0.162
February	26,602	$ 4,393.79	$ 0.165
March	25,922	$ 4,216.46	$ 0.163
TOTAL	**80,206**	**$ 13,107.16**	**$ 0.163**
GRAND TOTAL	**589,811**	**$ 92,327.50**	**$ 0.157**

2008



2007



It should be noted that from 2007 to 2008, the electricity consumption varied by a virtually insignificant 0.3%. This consistent usage should allow some predictability in the operating cost budget process.

It was noted that electrical consumption is consistently higher during the winter months. This is unusual as cooling is most often the heavier electrical load in this type of building. The higher winter load at Wantage is due to the electric reheat function in the variable air volume (VAV) system. Zoning in VAV systems utilizes VAV boxes for each zone. The VAV boxes contain equipment that allows either heating or cooling to be delivered to different parts of the building. In this system, in addition to the fans and heating or cooling coils, there is a function that allows air taken from the plenum (usually warmer than the air in the conditioned spaces) to be electrically reheated to maintain the temperature of the zone to heating set point.

1.2. Utility rate

Jersey Central Power & Light – Account Number 10 00 01 5276 8 6
1. General Service Secondary Three Phase
2. Outdoor Lighting Service

Please note that the above tables and charts are based on the total of both the General Service and Outdoor Lighting usage and cost. The outdoor lighting usage is a consistent 522 kWh each month for the entire period for which we have the invoices.

1.3. Energy benchmarking

The municipal building information and utility data were entered into the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* energy benchmarking system. The building data could be documented; however, a performance score could not be generated since the building consists of the professional town offices, the courtroom and the DPW garages. The Energy Star Portfolio Manager currently is not capable of generating a benchmark score for these types of buildings. SWA recommends that the Wantage Township create a Portfolio Manager account at the link below, so data can be shared:
http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

STATEMENT OF ENERGY PERFORMANCE
Township of Wantage

Building ID: 1762231
For 12-month Period Ending: November 30, 2008[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: June 05, 2009

Facility
Township of Wantage
888 State Route 23
Wantage, NJ 07461

Facility Owner
N/A

Primary Contact for this Facility
N/A

Year Built: 1980
Gross Floor Area (ft²): 13,453

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

Site Energy Use Summary[3]

Electricity (kBtu)	886,246
Fuel Oil (No. 2) (kBtu)	1,250,283
Natural Gas (kBtu)[4]	0
Total Energy (kBtu)	2,136,529

Energy Intensity[5]

Site (kBtu/ft²/yr)	159
Source (kBtu/ft²/yr)	314

Emissions (based on site energy use)

Greenhouse Gas Emissions ($MtCO_2e$/year)	92

Electric Distribution Utility
Jersey Central Power & Lt Co

National Average Comparison

National Average Site EUI	104
National Average Source EUI	213
% Difference from National Average Source EUI	47%
Building Type	Other

TBD - Professional stamp is not required at this point in time.

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Meets Industry Standards[6] **for Indoor Environmental Conditions:**

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

Certifying Professional
N/A

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

EPA Form 5900-16

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The Wantage Municipal building is used as professional offices for the Township and for providing certain services for the public. The Municipal Courtroom is also part of the building as is garage space for the Township DPW.

The professional offices and the courtroom are generally in good condition with a finished interior consistent with the services it provides. The building department area is part of a more recent addition while the DPW space is the original section of the building construction.

There are reports from many of the staff that the building is often too hot or too cold. The land use planning staff expressed dissatisfaction with the ventilation in their part of the building.

2.2. Building occupancy profiles

Number of employees: 17 full-time and 6 part-time employees.

The Municipal offices are open from 8:15 AM to 4:45 PM, Monday through Friday year round. The building is opened earlier however and the building is occupied from about 7:30 AM to 7:00 PM.

The Department of Public Works area typical work hours are 7:00 AM to 3:00 PM but is also occupied for longer hours occasionally.

The court room is used for the most part only when court is in session, less than 10 hours a week.

The Municipal building is in operation weekdays for all 52 weeks of the year except for 11 holidays annually.

2.3. Building envelope

The building envelope, or thermal envelope, is the term given collectively to the surfaces of the building that are adjacent to the outside, the ground or other unconditioned spaces (such as an unheated garage). The envelope is comprised of the roof (or top floor ceiling, if it is insulated), the exterior perimeter walls above grade, windows and doors to the outside, the walls below grade (basement, cellar or foundation walls) and the floor – in this case a slab on grade.

2.3.1. Exterior walls

The exterior wall assembly is comprised of concrete and brick construction. The interior side of the walls are insulated to an R-11 and finished with painted drywall.

At this time there would be no cost/effective benefit associated with adding more wall insulation. The walls are in good condition and there is no need for any corrective action.

2.3.2. Roof

The roof was constructed using wood trussed members, wood sheathing and composition shingles. Different parts of the roof are in various stages of deterioration. Some areas are in satisfactory condition and some are not in good condition at all. In general, the roof is approaching the end of its useful life and should be replaced.

The existing insulation for this assembly is in the ceiling joists. There would be no cost/effective benefit associated with opening the ceiling to add more insulation. If the roof were to be replaced and no photovoltaic membrane or panels were installed, a savings in summer cooling electrical usage could be obtained by installing a high albedo (albedo is a measure of reflectivity) membrane. If solar photovoltaic membrane and/or panels are installed, use of a high albedo roof covering would become moot.

2.3.3. Base

The municipal building was built with a concrete slab on grade base. There is no evidence of perimeter insulation. The floor and foundation walls do not show the need for any improvement or corrective action at this time.

2.3.4. Windows

The windows are aluminum frame, air-filled, dual glazed with no low emissivity coating. The majority of the windows are fixed; the operable windows are sliding units. The weather-stripping on the operable windows is in satisfactory condition.

Window replacement is an expensive undertaking and while new technologies in window manufacture are available that could save energy and provide more comfort, the savings would not be enough to create a viable return on investment and as the existing windows are in good condition, no improvement options are recommended.

2.3.5. Exterior doors

The exterior doors of the Municipal offices sections of the building are either double glass or insulated, metal clad and are in good condition. The doors of the DPW section are large, overhead doors and are not at all airtight.

The weatherstripping of the garage doors, and of all exterior doors, should be inspected on a regular basis and replaced whenever and wherever daylight can be seen from the inside.

2.3.6. Building air tightness

The envelope of the Municipal office sections of the building is in good condition and provides good protection against heat loss and infiltration of unconditioned air. The DPW section, mostly due to the overhead doors and being an older part of the building, is not very airtight.

2.4. HVAC systems

The HVAC system is comprised of two oil-fired, hydronic boilers, split-system cooling (outside condensing units with corresponding air handlers in the attic space) and fresh air provided by the air handlers.

The HVAC is controlled by a Building Automation System (BAS). The BAS for the municipal building is the Carrier Comfort Network (CNN). The CNN is a computer based system that can be monitored and operated either locally or remotely. The CNN is a sophisticated control system that maintains comfort based on measurements of the buildings' interior temperatures and relative humidity. Separate zones within the building have their own sensors and thermostats so that each zone can demand heating or cooling as needed.

One small thing that could easily be changed to make the system less expensive to operate is to check the control settings. A technician from Automated Building Controls, Inc., the company that is contracted to maintain the control system, during very recent scheduled maintenance, reported that the boiler is set to operate Monday through Saturday from 6:00 A.M. to 10:00 P.M. They also reported that the large air handler, which drives all the VAV boxes for the various zones, is schedule to run on Saturdays from 10:00 A.M to 4:00 P.M. and on Sundays from 6:00 A.M. to 10:00 P.M. It is SWA's understanding that the municipal building operation does not include weekends. There is no need to keep the building cooled for the entire weekend or heated on Saturdays.

A designated Township staff person should be trained in operating the Carrier Comfort Network controls so that the Township can more closely monitor exactly how the system is working, what the setpoints are and what the time schedule is.

2.4.1. Heating

Space heating is provided primarily through two oil fired boilers (#2 fuel oil) with hydronic distribution. The boilers are one Hydrotherm Multitemp MO – 770A with an input capacity of 606,000 BTUH, and one Hydrotherm Multitemp MO – 660A with an input capacity of 502,000 BTUH. Both boilers are equipped with Beckett RWB burners. One boiler provides heat to the garages, the new building department addition and the kitchen while the other provides heat to the remaining areas (the public service areas and offices). These boiler units are unusual insofar as each boiler housing actually contains two boilers that can operate separately and are designed to serve separate zones.

Heating water is circulated through the building to baseboard units along the perimeter of the exterior walls and to coils in the air handlers. The variable air volume (VAV) system is zoned through VAV boxes to which air flows from the central air handling unit. The VAV boxes then direct either cooled air, fresh air or heated air to each box's dedicated zone. The VAV boxes also have the capability of electrically reheating air before sending it to the building. It is this reheating function that explains why electrical consumption for the building is significantly higher during the winter months.

In the DPW garage section of the building, the heating water is circulated to overhead fan/coil units.

There are times during the spring and fall - shoulder months - when parts of the building are calling for heat and others for cooling. At one point during our inspection, heat water was circulating through the perimeter baseboard convectors while the cooling system was circulating cooled air.

Outdoor temperature sensors are used to override the controls. The boilers will not start up if the outside temperature is above 60 degrees (F). The cooling system will not start if the outside temperature are below 70 degrees (F). The heating override setpoint should be lowered to 55 degrees. This would help eliminate circulating heating water at the same time as parts of the building are being cooled.

Natural gas service in Sussex County is provided by Elizabethtown Gas who has confirmed that supplying the building is an option. Considering the increased efficiencies available in gas fired boilers and the projected availability of natural gas versus oil, the Township may want to consider converting to gas heat at such time as boiler replacement is called for.

2.4.2. Cooling

Cooling is provided by a split system with four Carrier Motormaster condensing units located on concrete bases outside the south side the building and the corresponding air handlers located in the attic space. Unit 2 provides cooling for the court room and one of the adjacent court offices, unit 3 for building inspections and unit 4 for the kitchen/clerks. The largest condensing unit, Carrier Model # 38ARD12501CA has a ten ton (120,000 BTU) capacity and, along with approximately nine VAV zone boxes, serves the bulk of the offices and public service areas. There are two Carrier five-ton units and one two-ton unit. The air handler for the ten-ton unit is a Carrier, with Magicaire airhandlers for the smaller units.

Split system cooling is characterized by having the condensing units in a different location than the air handlers. In this type of system, the condensing units are usually outside the building, as they are at the Wantage municipal building, with the air handlers inside; in this case, the air handlers are in the attic. The outside units contain the refrigerant compressor and the condensing coil.

One of the issues identified was that one of the offices adjacent to the Court and the Courtroom itself are part of the same zone. This is a problem in that the court office is occupied and operating for many more hours that the courtroom. The court office should be separated from the courtroom zone and connected to one of the other adjacent office zones. This would allow the office to be kept comfortable without providing conditioned air to an unoccupied courtroom.

2.4.3. Ventilation

The ventilation in the front offices, service areas and new addition is provided as part of the building's entire HVAC system, with a certain portion of the air that the air handlers direct through the duct work being fresh air, and a certain portion being recirculated air.

The garage areas have a separate ventilation system with each bay having its own supply and exhaust ducts on separate manual switches as well as CO sensor controls.

2.4.4. Domestic Hot Water

Domestic hot water is provided primarily by one Maytag stand alone (heating and storage in same housing) 40 gallon system using electricity to heat the water. There is a second heater serving the small kitchen area. Domestic hot water is not a significant load in this type of building use and occupancy. The water heater is in good condition and replacing it would not be recommended at this time. SWA does, however, recommend installing a timer so that water is not being produced or circulated except during building operating hours.

2.5. Electrical system

There is one entry service and meter serving the entire building as well as three small outbuildings with minimal lighting and electrical loads.

2.5.1. Lighting

Most of the lighting in the building is comprised of fixtures containing older technology magnetic ballasts and T12 (1.5 inch diameter) linear fluorescent lamps). The newer section of the building, housing the building department, uses newer electronic ballasts and T8 (one inch diameter) lamps.

There are several types of lighting that are used in the building, the most most prevalent being fluorescent.

Fluorescent lighting uses 25%–35% of the energy used by incandescent lamps to provide the same amount of illumination (efficacy of 30–110 lumens per watt). They also last about 10 times longer (7,000–24,000 hours). The light produced by a fluorescent tube is caused by an electric current conducted through mercury and inert gases. Fluorescent lamps require a ballast (transformer) to regulate operating current and provide a higher start-up voltage. Except for the building department, which is part of the most recent addition to the building, most of the lighting ballasts at the building are magnetic and should be upgraded. Electronic ballasts outperform standard and improved electromagnetic ballasts by operating at a very high frequency that eliminates flicker and noise. Electronic ballasts also are more energy-efficient. Special ballasts are needed to allow dimming of fluorescent lamps.

Improvements in technology have resulted in fluorescent lamps with color temperature and color rendition that are comparable to incandescent lamps.

There are two general types of fluorescent lights:

- Compact fluorescent lamps (CFLs)
- Fluorescent linear tubes, U-tubes and circline lamps

The municipal building uses predominantly linear and U-tube fluorescents but there are a small number of compact fluorescents in te recessed fixtures over several of the service counters.

The exit lighting at the Wantage building presently contains small incandescent lamps and should be replaced with light emitting diode (LED) fixtures at such time that the existing fixtures need replacement.

A light-emitting diode is a semiconductor diode that emits light when an electric current is applied in the forward direction of the device. LEDs are widely used as indicator lights on electronic devices and increasingly in higher power applications such as flashlights and even in some area lighting. An LED is usually a small area light source, often with optics added to the chip to shape its radiation pattern and assist in reflection. The color of the emitted light depends on the composition and condition of the semi-conducting material used, and can be infrared, visible, or ultraviolet.

The lighting for the building is generally on for approximately 10 hours a day during the Municipality's business hours (Monday through Friday year round).

In accordance with requirements of the Local Government Energy Audit program, SWA, Inc. performed an investment grade lighting audit, which provides a comprehensive survey of existing lighting, and an extensive technical and financial analysis. It provides a dynamic simulation of the base building, calibrated against actual energy bills, as well as the proposed energy conservation measures.

Refer to Appendix A for a table detailing the survey the existing lighting and separate tables showing the lighting fixtures that should be improved and the fixtures that should replace them and an analysis showing simple payback, life cycle cost/benefit and return on investment.

There are significant opportunities for savings with new technology high-efficiency lighting.

2.5.2. Appliances and process

Aside from standard office equipment (servers, a computer at each work station, copy machines, etc.), there are some kitchen appliances in the staff room (refrigerator, toaster, water cooler, coffee makers, microwave). The kitchen appliances will contribute a negligible amount to the building's electrical load.

2.5.3. Elevators

There are no elevators in the building.

2.5.4. Others electrical systems

N/A

3. EQUIPMENT LIST

INVENTORY

Building System	Description	Model#	Fuel	Space served	Estimated Remaining useful life %
Heating	Boiler 1 (twin boilers)	MO-770A	#2 fuel oil	Garage, Bldg. Dep't., Kitchen	35%
	Hydrotherm Multitemp				
	Boiler 2 (twin boilers)	MO-660A	#2 fuel oil	Offices	35%
	Hydrotherm Multitemp				
Lighting	*see details appendix A*				various
Cooling	Condensing Unit #1 – 10 Ton Carrier	38ARD012501CA	Electricity	Offices	75%
	(w/ dedicated air handler for each)				
	Condensing Unit #2 – 5 ton Carrier	38CKC060570	Electricity	Court	75%
	Condensing Unit #3 – 5 ton Carrier	38CKC060570	Electricity	Building Dep't.	75%
	Condensing Unit #4 – 2 ton Carrier	38TKB024330	Electricity		75%
	Air Handler #1 - Carrier	39LC2081LB2135R	Electricity		75%
	Air Handler #2 - Magicaire	60HBAX3	Electricity		
	Air Handler #3 - Magicaire	60HBAX3	Electricity		75%
	Air Handler #4 - Magicaire	24HBAX3	Electricity		75%
	Air Exchanger #1 - Greenheck	ERV251S20AES	Electricity		75%
	Air Exchanger #2	EZV340	Electricity		75%

Note:

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

4. ENERGY CONSERVATION MEASURES

Summary table

ECM#	Description
1	Heating/Cooling controls adjustment
2	Retrofit or replace lighting fixtures as per Appendix A
3	Install solar photovoltaic roof shingles and/or panels
4	Install timer on domestic water heater

ECM # 1: *Heating and Cooling controls adjustment*

Description:

- The outdoor heating setpoint should be lowered to 55 degrees to prevent heating water to be able to be circulated through the perimeter convectors during times that some sections of the building might be using cooling,
- Modify heating and cooling schedule to provide comfort temperatures only during operating hours,
- Have municipality personnel receiving advanced training on computerized control system,
- Re-arrange duct system so that the court office is on a separate air handler than the court room. As the courtroom is in use for significantly less time that the adjacent offices and the rest of the municipal building, the courtroom should be supplied HVAC separately from the adjacent office(s) or any other section of the building.

Installation cost:

Low cost/no cost

Economics:
The two line items reflect savings in electrical consumption as well as oil consumption.

Installed Cost		1st year energy savings					SPP	LoM		
Estimated $	Source	Usage	unit	demand	unit	$ savings			Lifecycle savings	Averaged ROI
		3,155	kWh	NA		$ 505	immediate	12	$5,025	immediate
		1,923	Gallons	NA		$ 4,615	immediate	12	$45,940	immediate

Assumptions:
We calculated savings based on the performance of a programmable thermostat providing night and week ends setback.

Rebates/financial incentives:

This is a low cost/no cost measure.

Options for funding ECM:

N/A

ECM#2: *High Efficiency Lighting*

Description:

Replace (or retrofit) approximately 171 incandescent or older fluorescent fixtures (those with T12 lamps and magnetic ballasts) with electronic ballast, T8 or smaller diameter lamps.

Appendix A (pg. 2) indicates the areas of the building where lighting should be improved.

Installation cost:

Estimated installed cost: $14,410
Source of cost estimate: Synergy Lighting Co.- lighting contractor

Economics:

1st year energy savings					SPP	LoM	lifecycle savings	Averaged ROI
usage	unit	demand	unit	$ savings				
30,945	kWh	NA	Kw	$ 4,951	2.9	12	$49,284	20.2%

Assumptions:
Assumptions were made, based on conversations with staff regarding the time that various lights were actually in operation before and after actual times that the Municipal building was open for business.

Rebates/financial incentives:

NJ Clean Energy – Prescriptive Lighting Incentive, Incentive based on installing T5 or T8 lamps with electronic ballasts in existing facilities ($10-$30 per fixture, depending on quantity of lamps). Maximum incentive amount $2,960.

NJ Clean Energy – Prescriptive Lighting Incentive, Incentive based on installing LED Exit signs ($10/$20 per fixture).

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.

The building is too small to be considered under a performance contracting agreement.
http://www.njcleanenergy.com/commercial-industrial/programs/nj-smartstart-buildings/nj-smartstart-buildings

ECM # 3: *Install 10 KW Solar Photovoltaic System*

Description: Please see Section 5, Renewable and Distributed Energy Measures

ECM # 4: *Install Timer on Domestic Water Heater*

Description:

Install a timer on the electric water heater so that the heater stops heating water immediately after the last hot water usage of the day and on weekends.

The timer will be in the DPW section where the water heater is located

Installation cost:

Estimated installed cost: $100 per timer
Source of cost estimate: World Wide Web for Intermatic Model 32999 + $50 installation per unit.

Economics:

1st year energy savings					SPP	LoM	lifecycle savings	Averaged ROI
usage	unit	demand	unit	$ savings				
70	kWh	NA		$ 11	8.9	10	$96	-0.4%

Assumptions:

Rebates/financial incentives:

There are no rebates or other incentives for this low cost improvement

Options for funding ECM:

N/A

5. RENEWABLE AND DISTRIBUTED ENERGY MEASURES

5.1. Existing systems

There are no renewable energy sources being used at the building at the time of this inspection.

5.2. Solar Photovoltaic

Description: Install solar photovoltaic roofing membrane at south facing roof surfaces when roof is to be replaced. Install solar photovoltaic panels where solar roofing membrane is not feasible.

Solar photovoltaic (PV) shingles or panels convert sunlight directly into electricity. Solar roof shingles are coated with PV cells made of amorphous silicon. These look remarkably like ordinary composition shingles once installation is complete. The whole PV system is connected to the utility grid through an inverter and produces electricity on the customer's side of the meter.

The table below shows average daily solar radiation (kWh/M squared/day) for Trenton, NJ

Latitude	Longitude	Jan.	Feb.	March	April	May
40' 13" N	74' 46" W	1.71	2.39	3.43	4.04	5.26

June	July	August	Sept.	Oct.	Nov.	Dec	**AVG.**
5.67	5.39	5.14	4.18	3	1.98	1.48	**3.63**

Installation cost:

Estimated installed cost: $ 80,000
Source of cost estimate: Kyocera online solar calculator (and confirmed with a local contractor)

Economics:

Without incentives: installed cost = $80,000

1st year energy savings					SPP	LoM	lifetime	
Usage	Unit	demand	unit	$ savings			cost savings	ROI
12,104	kWh		Kw	$ 1,008	41.3	25	$28,812	-3.2%

With incentives: installed cost = $70,000

1st year energy savings					SPP	LoM	lifetime	
Usage	Unit	demand	unit	$ savings			cost savings	ROI
2,104	kWh		Kw	$ 7,728	9.1	25	$134,569	3.7%

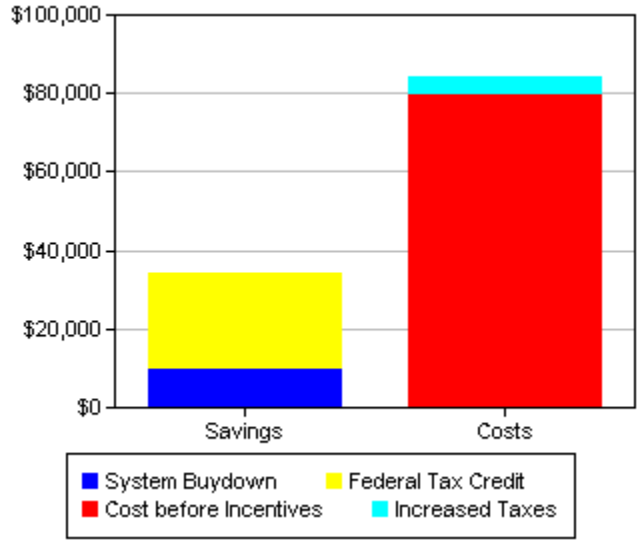
KYOCERA CALCULATOR

Environmental Impacts **Each year prevent.....17,361 lbs of carbon dioxide pollution This is equivalent to.....reducing 20,833 miles of auto driving...planting 1.3 acres of trees**

System Highlights

Net system cost after incentives:	$80,000
System savings from incentives:	$10,000
PV system electricity production:	12,104 kWh/year
Electricity production supplied by system:	5%
First Year electric bill savings:	$1,008 per year
Carbon dioxide emission reduction:	8.7 tons per year

View...Net Cost Detail Monthly Electric Bill Annual Cash Flow Daily PV Output Monthly PV Output System Production Net Cash Flow Cumulative Cash Flow Discounted Cash Flow



Rebates/financial incentives:

NJ Clean Energy – Renewable Energy Incentive Program, Incentive based on $1.00/watt Solar PV application. Incentive amount for this application is $10,000 (10kW solar photovoltaics at $1.00 per watt). The estimated investment cost will be lower from $80,000 to $70,000.

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 1000kWh (1MWh) of electricity, a SREC is issued which can then be sold or traded separately from the power. SREC are estimated at $6,720 per year for 10 years.

5.3. Combined Heat and Power

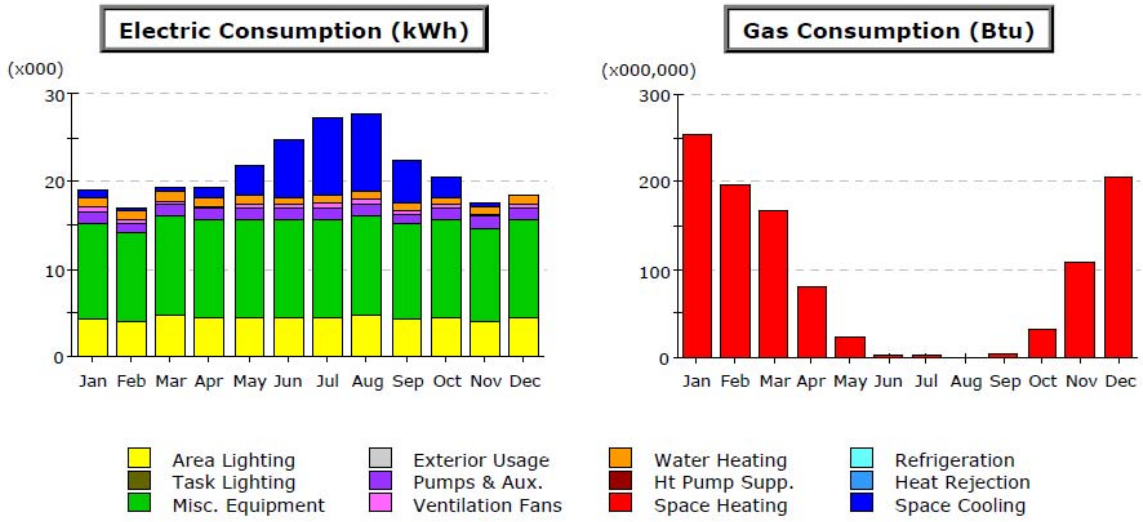
Building is too small for considering CHP and the HVAC system is not compatible with this type of application.

5.4. Geothermal

This option was considered but found cost prohibitive.

6. ENERGY PURCHASING AND PROCUREMENT STRATEGIES

6.1. Load profiles



Electric Consumption (kWh x000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	1.01	0.26	0.25	0.92	3.42	6.45	8.87	8.94	4.89	2.32	0.34	0.08	37.77
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	-	-	-	-	-	-	-	-	-	-	-	-	-
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	1.03	1.00	1.14	1.09	1.01	0.93	0.87	0.85	0.79	0.86	0.86	1.00	11.43
Vent. Fans	0.51	0.35	0.35	0.35	0.40	0.47	0.59	0.60	0.42	0.36	0.31	0.34	5.05
Pumps & Aux.	1.37	1.24	1.36	1.29	1.31	1.26	1.30	1.30	1.26	1.32	1.30	1.37	15.69
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	10.93	10.11	11.51	11.14	11.22	11.14	11.22	11.51	10.85	11.22	10.56	11.22	132.61
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	4.26	3.97	4.55	4.40	4.41	4.40	4.41	4.55	4.26	4.41	4.12	4.41	52.12
Total	19.12	16.91	19.16	19.19	21.77	24.66	27.26	27.75	22.47	20.48	17.50	18.41	254.67

Gas Consumption (Btu x000,000)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Reject.	-	-	-	-	-	-	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Heat	252.7	196.9	167.6	79.9	22.5	1.4	1.1	-	4.1	32.6	107.5	205.0	1,071.5
HP Supp.	-	-	-	-	-	-	-	-	-	-	-	-	-
Hot Water	-	-	-	-	-	-	-	-	-	-	-	-	-
Vent. Fans	-	-	-	-	-	-	-	-	-	-	-	-	-
Pumps & Aux.	-	-	-	-	-	-	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-	-	-	-	-	-	-
Misc. Equip.	-	-	-	-	-	-	-	-	-	-	-	-	-
Task Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Area Lights	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	252.7	196.9	167.6	79.9	22.5	1.4	1.1	-	4.1	32.6	107.5	205.0	1,071.5

Please note that although the building uses #2 heating oil, the simulation program (eQuest) converts usage to therms of natural gas for modeling purpose.

6.2. Tariff analysis

The building is presently on Central Jersey Power & Light's General Service Secondary 3 Phase for most of its' electrical usage. There is no demand charge on this rate although the cost per unit does increase somewhat in the summer months. This is the best rate for Wantage.

The exterior lighting is billed under Central Jersey Power and Light's Outdoor Lighting Service rate, which provides a fixed rate per month for specific lighting types.

6.3. Energy procurement strategies

The building would not be eligible for enrolling in a Demand Response Program because there is no electric demand charge.

7. METHOD OF ANALYSIS

7.1. Assumptions and tools

Energy modeling tool: eQUEST V3.6
Cost estimates:
- Contractors
- RS Means 2009 (Facilities Maintenance & Repair Cost Data)
- RS Means 2009 (Building Construction Cost Data)
- RS Means 2009 (Mechanical Cost Data)

7.2. 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.

Appendix A: Lighting study

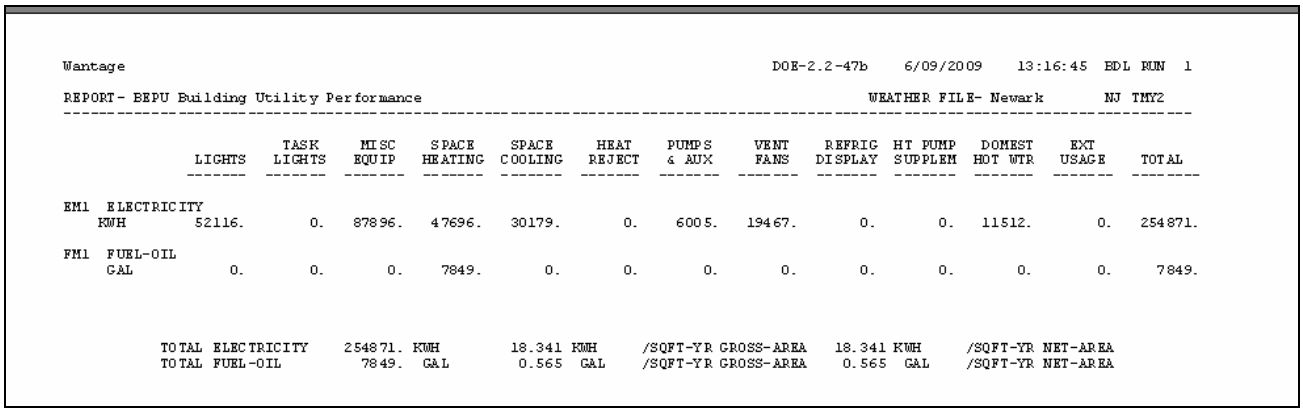
WANTAGE, NJ MUNICIPAL BUILDING AND TOWN GARAGE Existing lighting Conditions												
Building	Level/Floor	Location in Building	Measured Lighting Level in Footcandles	Fixture Type	Ballast Type	No. of Fixtures	No. of Lamps	Watts/Lamp	Hrs/Day	Energy Use (Watt hours/day)	Cost / Day	Daylighting possible?
Garages	Ground			2F96T12	M	15	30	96	8	23,040	$ 3.46	No
Garages	Ground			2F48T12	M	3	6	48	8	2,304	$ 0.35	No
Garages				1INC100	NA	3	3	100	8	2,400	$ 0.36	No
Garages				1INC100	NA	7	7	100	3	2,100	$ 0.32	No
Municipal Bldg.	Ground	Corridors	21.5 - 35.77	2FB40Spec35	M	26	52	40	11	22,880	$ 3.43	Yes
Municipal Bldg.	Ground	Corridors	14 -21	4F48T12	M	4	16	48	11	8,448	$ 1.27	No
Municipal Bldg.	Ground	Court Room	13.8 - 20	1PAR100	NA	19	19	100	10	19,000	$ 2.85	Yes
		Court Room	13.8 - 20	1INC75	NA	40	40	75	10	30,000	$ 4.50	Yes
		Older Offices	21 -73-118	4F48T12	M	48	44	176	11	85,184	$ 12.78	some
		New Offices	45 - 96	4F32T8	E	15	60	32	11	21,120	$ 3.17	Yes
		Staff Room	88 - 145	4F32T8	E	4	16	32	11	5,632	$ 0.84	Yes
		Baths		2FB40Spec35	M	3	6	40	11	2,640	$ 0.40	No
		Baths		2F30T12	M	3	6	30	11	1,980	$ 0.30	No
		Copy Room		2FB40Spec35	M	1	2	40	11	880	$ 0.13	No
		Assessor/Collector	30-63	1CF13		13	6	13	11	858	$ 0.13	No
TOTALS										**228,466**	**$ 34.27**	
ANNUAL										**59,401,160**	**$ 8,910.17**	

Recommended Lighting Replacements

WANTAGE TOWNSHIP, NEW JERSEY - LIGHTING REPLACEMENT RECOMMENDATIONS											
Existing						Renovated					
Location	Total Fixt Quantity	Hours/ Year	Fixture Code	Input watts	Annual KWh	Hours/ Year	Fixture Code	Input watts	Future kWh/yr	kWh/yr Savings	Unit Cost ($)
Corridors	26	2860	2FB40T12	82	6,098	2,860	2F17T8	25	1,859	4,239	$ 131
Corridors	4	2860	4F40T12	164	1,876	2,860	2F32T8HP	74	847	1,030	$ 131
Older Offices	48	2860	4F40T12	164	22,514	2,860	3F28T8	85	11,669	10,845	$ 131
Garages	15	2080	2F96T12	192	5,990	2,080	2F32T8HP	74	2,309	3,682	$ 131
Garages	3	2080	2F40T12	82	512	2,080	2F32T8	55	343	168	$ 131
Garages	3	2080	1inc100	100	624	2,080	1CF26	26	162	462	$ 10
Garages	7	780	1inc100	100	546	780	1CF26	26	142	404	$ 10
Court Room	40	2600	1inc75	75	7,800	2,600	CF20-GU-24	20	2,080	5,720	$ 18
Court Room	19	2,600	PAR100	100	4,940	2,600	CF23PAR	23	1,136	3,804	$ 12
Bathrooms	3	2860	2FB40T12	74	635	2,860	2F17T8	25	215	420	$ 131
Bathrooms	3	2860	2F30T12	60	515	2,860	2F25T8	40	343	172	$ 131
TOTALS	**171**				**52,049**				**21,104**	**30,945**	**$ 14,410**
									@	**$.16/kWh**	
										$ 4,951.19	

Appendix B: eQuest model

Baseline



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Wantage                                                                 DOE-2.2-47b    6/09/2009    13:16:45  EDL RUN  1

REPORT- BEPU Building Utility Performance                                          WEATHER FILE- Newark       NJ TMY2
-------------------------------------------------------------------------------------------------------------------------

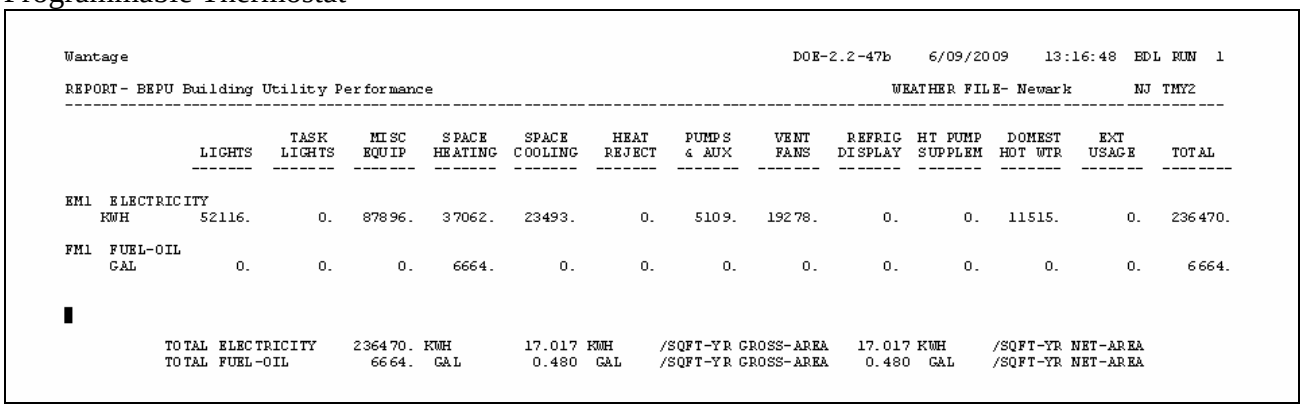
                 LIGHTS   TASK LIGHTS   MISC EQUIP   SPACE HEATING   SPACE COOLING   HEAT REJECT   PUMPS & AUX   VENT FANS   REFRIG DISPLAY   HT PUMP SUPPLEM   DOMEST HOT WTR   EXT USAGE   TOTAL
                 -------  -----------  -----------  --------------  --------------  ------------  ------------  ----------  ---------------  ----------------  ---------------  ----------  --------

EM1  ELECTRICITY
     KWH         52116.           0.        87896.          47696.          30179.            0.       6005.       19467.           0.                0.           11512.          0.    254871.

FM1  FUEL-OIL
     GAL             0.           0.           0.           7849.           0.            0.           0.          0.           0.                0.               0.          0.      7849.


            TOTAL ELECTRICITY    254871. KWH        18.341 KWH     /SQFT-YR GROSS-AREA    18.341 KWH     /SQFT-YR NET-AREA
            TOTAL FUEL-OIL         7849.  GAL         0.565  GAL    /SQFT-YR GROSS-AREA     0.565  GAL    /SQFT-YR NET-AREA
```

Programmable Thermostat



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Wantage                                                                 DOE-2.2-47b    6/09/2009    13:16:48  EDL RUN  1

REPORT- BEPU Building Utility Performance                                          WEATHER FILE- Newark       NJ TMY2
-------------------------------------------------------------------------------------------------------------------------

                 LIGHTS   TASK LIGHTS   MISC EQUIP   SPACE HEATING   SPACE COOLING   HEAT REJECT   PUMPS & AUX   VENT FANS   REFRIG DISPLAY   HT PUMP SUPPLEM   DOMEST HOT WTR   EXT USAGE   TOTAL
                 -------  -----------  -----------  --------------  --------------  ------------  ------------  ----------  ---------------  ----------------  ---------------  ----------  --------

EM1  ELECTRICITY
     KWH         52116.           0.        87896.          37062.          23493.            0.       5109.       19278.           0.                0.           11515.          0.    236470.

FM1  FUEL-OIL
     GAL             0.           0.           0.           6664.           0.            0.           0.          0.           0.                0.               0.          0.      6664.


            TOTAL ELECTRICITY    236470. KWH        17.017 KWH     /SQFT-YR GROSS-AREA    17.017 KWH     /SQFT-YR NET-AREA
            TOTAL FUEL-OIL         6664.  GAL         0.480  GAL    /SQFT-YR GROSS-AREA     0.480  GAL    /SQFT-YR NET-AREA
```

Timer on DHW

Wantage DOE-2.2-47b 6/09/2009 13:16:50 BDL RUN 1

REPORT- BEPU Building Utility Performance WEATHER FILE- Newark NJ TMY2

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY KWH	52116.	0.	87896.	37062.	23493.	0.	5006.	19278.	0.	0.	11442.	0.	236294.
FM1 FUEL-OIL GAL	0.	0.	0.	6664.	0.	0.	0.	0.	0.	0.	0.	0.	6664.

TOTAL ELECTRICITY 236294. KWH 17.004 KWH /SQFT-YR GROSS-AREA 17.004 KWH /SQFT-YR NET-AREA
TOTAL FUEL-OIL 6664. GAL 0.480 GAL /SQFT-YR GROSS-AREA 0.480 GAL /SQFT-YR NET-AREA

Lighting Improvement

Wantage DOE-2.2-47b 6/09/2009 13:16:53 BDL RUN 1

REPORT- BEPU Building Utility Performance WEATHER FILE- Newark NJ TMY2

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY KWH	21547.	0.	87896.	39606.	21391.	0.	5200.	19499.	0.	0.	11448.	0.	206586.
FM1 FUEL-OIL GAL	0.	0.	0.	7206.	0.	0.	0.	0.	0.	0.	0.	0.	7206.

TOTAL ELECTRICITY 206586. KWH 14.867 KWH /SQFT-YR GROSS-AREA 14.867 KWH /SQFT-YR NET-AREA
TOTAL FUEL-OIL 7206. GAL 0.519 GAL /SQFT-YR GROSS-AREA 0.519 GAL /SQFT-YR NET-AREA