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Apr. 27, 2011
**First Energy/SAIC Energy
Program Energy Audit Report for
Ebensburg Borough
300 West High St
Ebensburg, PA 15931**

INTRODUCTION

As an approved energy consulting firm under the First Energy (ATAC) program, ThermoCat, LLC. was selected to perform an energy audit and assessment for the **Ebensburg Borough building**. This report addresses the **Ebensburg Borough building** located at **300 West High St.** The current conditions and energy-related information was collected in order to analyze and suggest the implementation of building improvements and energy conservation measures.

The **Ebensburg Borough building** was built in approximately 1920, underwent renovations twice, and houses several offices as well as a board and community room, and the police department. The building consists of approximately 17,028 square feet of conditioned space with occupancy of approximately 11 employees. The building is operated regularly, with occasional night time use for meetings. The goal of this Local Government Energy Audit (ATAC) is to provide sufficient information to Ebensburg Borough to make decisions regarding the implementation of the most appropriate and most cost effective energy conservation measures for the building.

Launched in 2010, the SAIC Program provides subsidized energy audits for municipal and local government-owned facilities, including offices, courtrooms, town halls, police and fire stations, sanitation buildings, transportation structures, schools and community centers. The Program will subsidize 2K of the cost of the audit.

- Report covers a description and analysis of the building existing conditions.
- A detail inventory of major electrical and mechanical systems in the building.
- Description of our suggestions.

EXECUTIVE SUMMARY

The energy audit performed by ThermoCat encompasses the **Ebensburg Borough building** located at **300 West High St.** The building is a two story building with mechanical room and a total floor area of **17,028** square feet. The original structure was built in approximately 1920 and has undergone minor upgrades.

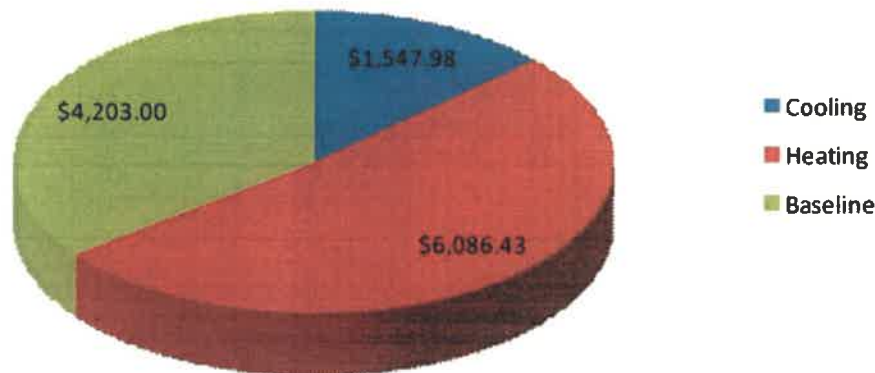
Based on the field visits performed by the THERMOCAT staff on **3/2/2011** and the results of a comprehensive energy analysis, this report describes the site's current conditions and suggestions for improvements. Suggestions for measures related to energy conservation and improved comfort are provided 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.

Existing conditions

From Sept 2009 through Sept 2010, the period of analysis for this audit, the building consumed **70,286 kWh** or **\$5,792.53** worth of electricity at an approximate rate of **\$0.0824/kWh**. This building as well consumed **740.9 CCF** or **\$6,336.85** worth of gas at approximate rate of **\$8.5529 per CCF**.

THERMOCAT has entered energy information about the **Ebensburg Borough building** in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* benchmarking system. The building was benchmarked as an office building since a majority of the space is used for offices. The building received an Energy Star performance rating of **79** which is higher compared to the national average of **50**. THERMOCAT encourages **Ebensburg Borough** to continue entering utility data in *Energy Star Portfolio Manager* in order to track weather normalized source energy use over time. The Site Energy Use Intensity is **37 kBtu/ft²yr** compared to the national average of an office building consuming **54 kBtu/ft²yr**.

Energy Use Chart Baseline Compared to Cooling and Heating Costs



Suggestions:

The **Ebensburg Borough building** is approximately 90 years old and therefore most HVAC equipment as well as lighting has been installed according to past building codes, and upgraded as needed. Equipment was observed in age-appropriate condition and has a majority of the remaining useful lifetime left. THERMOCAT has included a mechanical inventory list of equipment for the entire facility.

Based on the assessment of the building, THERMOCAT has separated the suggestions into three categories. These are summarized as follows:

Category I Suggestions: Capital Improvement Measures

- Check window warranty/Install interior storm windows
- Caulk and airseal all window frames.

Category II Suggestions: Operations and Maintenance

- Maintain roof
- Provide weather stripping/air sealing
- Provide water efficient fixtures and controls
- Use Energy Star labeled appliances

Category III Suggestions: Energy Conservation Measures

At this time, THERMOCAT highly suggests a total of (3) Energy Conservation Measures (ECMs) for the facility that is summarized in the following Table 1. The total investment cost for these ECMs, with incentives, is **\$3,468**. THERMOCAT projects a first year savings of **\$688**. THERMOCAT projects a simple payback of **5.04** years.

Energy Conservation Measures (ECM's) Summary Table

The implementation of all the suggested ECMs would reduce the building electric usage by **8,610** kWh annually of the building's current electric consumption. THERMOCAT estimates that implementing these ECMs will reduce the carbon footprint of the building.

There are various incentives that you could apply for that could also help lower the cost of installing the ECMs. THERMOCAT suggests that the **Borough** apply for the Sustainable Energy Fund low interest energy conservation program.

The following table summarize the proposed Energy Conservation Measures (ECM) and their economic relevance.

Energy Conservation Measures (ECM's) Summary Table

ECM	Total	<i>initial cost</i>		<i>FirstEnergy</i>	Total Cost	<i>annual savings</i>		Payback	kWh/yr	Life
		Install	Material	Incentive		kWh	Energy			
T-8 Lighting upgrade from T-12	58	\$1,160.00	\$2,320.00	\$812.00	\$2,668.00	5,281.00	\$422.00	6.32	1,305.00	20
Occupancy Sensors	12	\$240.00	\$540.00	\$420.00	\$360.00	2,367.00	\$189.00	1.90	900.00	20
Insulate/Air seal	1	\$200.00	\$240.00	NA	\$440.00	962.00	\$77.00	5.71	320.00	20

Energy benchmarking:

THERMOCAT has entered energy information about the **Ebensburg Borough** building in the U.S. Environmental Protection Agency's (EPA) *Energy Star Portfolio Manager* Energy benchmarking system. The building was benchmarked as an office building since a majority of the space is used for offices.

Per the SAIC program requirements, THERMOCAT has assisted you to create an *Energy Star Portfolio Manager* account and has shared the Municipal building facility information to allow future data to be added and tracked using the benchmarking tool. THERMOCAT is sharing this Portfolio Manager Site information with ThermoSave Energy. As per requirements, the account information is provided below:

Username: Upon Request

Password: Upon Request

See following  report

2. FACILITY AND SYSTEMS DESCRIPTION

2.1. Building Characteristics

The **Ebensburg Borough** building was built in approximately 1920 and faces NNE. The building is one story with a mechanical room in the basement and a total floor area of 17,028 square feet, ignoring the unconditioned space on the top floor. Exterior fascia is block with brick veneer. Standard 16 OC frame spacing with average R-14 value in the exterior walls.

2.2. Building Occupancy Profiles

There are approximately 11 full time employees in the **Ebensburg Borough building** at any given time but occupancy can increase when the board is in session or during meetings and special events. The building is operated regularly from 8am to 4pm, Monday through Friday with occasional night time use for supervisors and other meetings.

2.3. Building Envelope

2.3.1. Exterior Walls

The exterior walls of the building consist of block faced brick façade, with drywall on the interiors. Insulation was added with a building upgrade to provide an approximate R-12 Insulation level. We would suggest some minor brick pointing and crack repair as regular maintenance, as some minor cracks were observed.

Overall, exterior and interior wall finishes of the envelope were found to be in age-appropriate, good condition with no major signs of water or air leakage. We would recommend outlet insulation around all outlets on exterior walls to prevent air infiltration.

2.3.2. Roof/Ceiling

The roof of the building is slightly pitched or low sloped roof. The surface of the roof is shingles, and appeared from street level observation to be in good condition. The administration area has a dropped ceiling grid design with R-30 insulation batt insulation laid on the grid, and no air barrier present.

2.3.3. Base

The building's base is 5- 6" concrete slab-on-grade. There were no observed problems with water penetration or moisture.

2.3.4. Windows

The existing windows at the front of the building are aluminum frame units with dual glazing. All other first floor windows are a mix of double pane vinyl or wood. These windows are equipped with a thermal break that is supposed to prevent heat transfer across the frame of the window. All windows are in good condition.

As a best practice, THERMOCAT suggests that all windows be inspected at least once a year. Any gaps, cracks, or damage to weather-stripping or caulking should be repaired or replaced, as needed, to minimize energy loss around those openings. Building staff should also verify that windows open and close properly and repair, as needed.

2.3.5. Exterior doors

The exterior doors at the entrance of the building are glass with metal frame, double pane. The remainder are metal insulated, are in good condition and the majority weather-stripping is still intact. However, the door on the first floor in the south side of the building needs adjusted and weather stripping replaced. The installation of door sweeps on the bottoms of this door and the Police Dept exterior door would also reduce air infiltration.

The bay door in the basement is in fair shape, however, our recommendation would be to install new weatherstripping and bottom to the door to prevent air infiltration.

If not properly maintained, exterior doors can become major sources of heat loss and infiltration. As a best practice, THERMOCAT suggests checking the weather-stripping of each door on a regular basis and replacing any broken seals immediately. This will help optimize comfort and energy performance.

2.3.6. Building Air Tightness (+1 Pascal average in conditioned space)

Based on a visual inspection, the building was observed to be relatively tight for not having an air barrier. Building air tightness could not be measured with the manometer, due to high winds on the day of the audit.

2.4. HVAC Systems (See Mechanical Schedule)

2.4.1. Heating

The heating systems include (Two) natural gas Burnham Series II boilers, (Four) Nesbitt hydronic circulators Exchangers in the basement, and a Heil packaged unit that serves the police department. It was noted that some of the pipes from the boiler are not insulated. Our recommendation would be to insulate all hydronic pipes to and from the boiler to maximize efficiency.

At the time of the audit, there were no major complaints.

2.4.2. Cooling

The building is cooled using (6) Sanyo split system units, one Fujitsu system, and the Heil package listed above. Upon inspection, it was noted that there was considerable air infiltration around the Sanyo units. We recommend air sealing around these units to prevent air infiltration and maximize efficiency.

2.4.3. Ventilation

As mentioned above, a majority of the building is provided conditioned air from the heating/cooling plant via air handlers.

2.4.4. Domestic Hot Water

There is one Bradford White 40 gallon electric water heater. Insulation blanket is needed. This domestic hot water heater was observed to be properly sized and in working condition. This electric hot water heater serves only sinks located within the building. There have been no reports of domestic hot water problems within the building.

2.5. Electrical Systems

2.5.1. Lighting

Interior Lighting – The building is over 90 years old and therefore contains some inefficient lighting. In the basement, there is considerable older 4' and 8' T-12 fixtures with magnetic ballasts. There are some areas that use either incandescent bulbs or older T-12, depending on area. The lighting ECM is listed later in this document.

THERMOCAT observed opportunities to replace older T-12 fixtures or incandescent bulbs with newer, lower wattage screw-in bulbs or efficient T-8 lighting. We also suggest installing occupancy sensors throughout the building to limit the amount of runtime of certain fixtures. See energy conservation measures for upgrades.

Exit Lights - Exit signs efficient and not in need of replacement.

Exterior Lighting - The exterior lighting surveyed during the building audit were found to be mostly metal halide, with the exception of a mercury vapor that should be replaced to increase energy efficiency. Penelec's rebate program will partially cover this upgrade, as well as upgrades for the interior lighting.

2.5.2. Appliances and Computers

The only appliances found were two small refrigerators. No replacement is necessary.

Computers left on in the building consume a lot of energy. A typical desk top computer uses 65 to 250 watts and uses the same amount of energy when the screen saver is left on. Televisions in meeting areas use approximately 3-5 watts of electricity when turned off. THERMOCAT suggests all computers and all appliances (i.e. refrigerators, coffee makers, televisions, etc) be plugged into power strips and turned off each evening just as the lights are turned off. The building computers are generally programmed for the power save mode, to shut down after a period of time that they have not been used.

2.5.3. Elevators

The building does not have any installed elevators.

4. ENERGY CONSERVATION MEASURES

Energy Conservation Measures (ECM's) #1

ECM	Total	Initial cost		FirstEnergy		Annual savings		Payback	Peak	Life
		Install	Material	Incentive	Total Cost	kWh	Energy			
T-8 Lighting upgrade from T-12	58	\$1,160.00	\$2,320.00	\$812.00	\$2,668.00	5,281.00	\$422.00	6.32	1,305.00	20

Description:

The majority of the lighting in the office area has been upgraded, however, the building (primarily the basement) is lighted with inefficient T-12 (4) Bulb X 34 watts, magnetic ballasts in the balance of the building. Areas such as the basement have T-12 (2) Bulb X 65 watts, magnetic ballast. Based upon the size and wattage the First Energy incentive is approx. 14.00 per fixture. By replacing with efficient T-8 lighting, average 16-34 watt bulbs and electronic ballasts the facility will benefit from an appreciable decrease in kWh consumption. This is low hanging fruit for saving and should be strongly considered.

Source of pricing: Pa. approved COSTAR/ESCO published pricing.

Assumptions: Discount Rate: 3.2% per DOE FEMP; Energy Price Escalation Rate: 0% per DOE FEMP Guidelines

Note: Replace the incandescents over the reception area and in the Police locker room with CFLs or L.E.D.s. Replace the outside Mercury Vapor with Metal Halide.

Energy Conservation Measures (ECM's) # 2

ECM	Total	Initial cost		FirstEnergy		Annual savings		Payback	Peak	Life
		Install	Material	Incentive	Total Cost	kWh	Energy			
Occupancy Sensors	12	\$240.00	\$540.00	\$420.00	\$360.00	2,367.00	\$189.00	1.90	900.00	20

Description:

The Borough would benefit greatly with the addition of motion sensors to ensure lights are turned off when not in use. As an example, I opened a closet in the main hallway and the lights were on. They may have been on overnight or even several days. With the low cost after rebate, we would recommend every lighted closet or room be equipped with motion sensors. I highly recommend a motion sensor in the police locker room, and additionally, a motion sensor on the exhaust fan in the police locker room. In addition, install motion sensors in the small rooms in the police area.

(A portion maybe eliminated by in house staff helping with the work)

Note: Consider installing motion sensors in the following areas: Restrooms, Council Meeting room, Community Room, garage, storage area in the garage, boiler room, and the computer room in the front office.

Source of pricing: Pa. approved COSTAR/ESCO published pricing.

Assumptions: Discount Rate: 3.2% per DOE FEMP; Energy Price Escalation Rate: 0% per DOE FEMP Guidelines

Energy Conservation Measures (ECM's) #3

ECM	Total	Initial costs			FirstEnergy		Annual savings		Payback	Peak	Life
		Install	Material	Incentive	Total Cost	kWh	Energy				
Insulate/Air seal	1	\$200.00	\$240.00	NA	\$440.00	962.00	\$77.00	5.71	320.00	20	

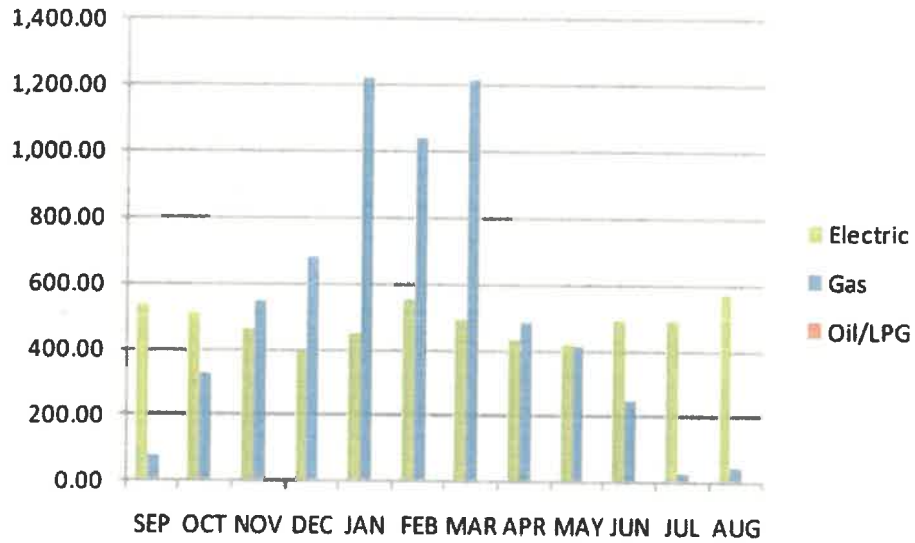
Description:

As noted in several areas above, insulating and air sealing will help conserve energy, and relatively inexpensive to install. Most notably will be insulating the boiler pipes, the doors (as noted in section 2.3.5), and around the Sanyo systems. In the large community room, it is our recommendation to remove some ceiling tiles and fully inspect all insulation to ensure all insulation is in place. Infrared imaging revealed missing insulation in the community room.

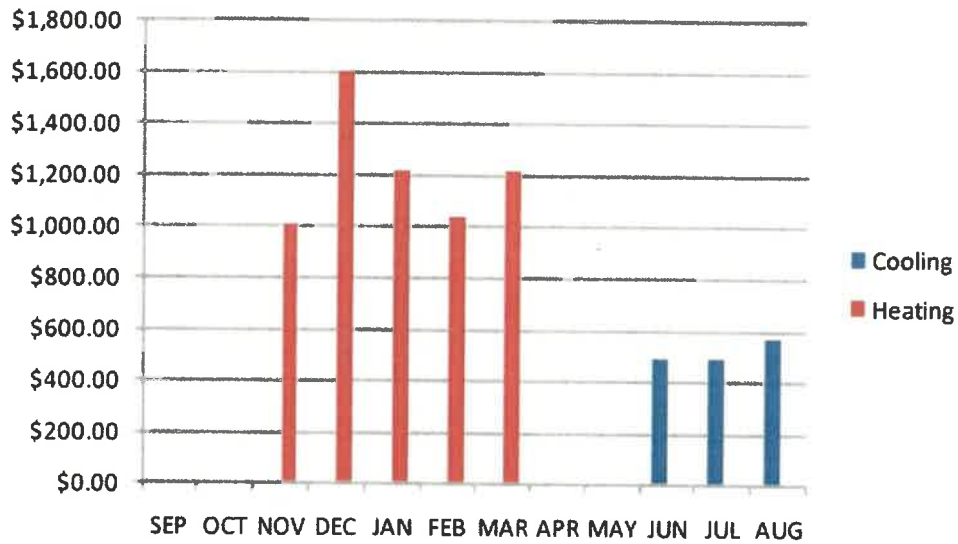
Mechanical Equipment Inventory Sheet

Description/Mfg.	Model	Source	BTU/ Tonage	SEER Rating	AFUE	Location	Condition	Life span
(Two) Burnham Series 2 Boilers	208NCL-TEI2	Natural Gas	232MBH		80%	Boiler Room	Good	15-20 yrs.
(4) Nesbitt Hydronic Circulators	No label visible	Heat from boiler	Unknown			Garage	Good	15-20 yrs.
Fujitsu	AOU9C1	Electric	9.4MBH	11		South side of Building	Good	15-20 yrs.
(6) Sanyo split systems	KMS1212	Electric	12.5MBH	10		Throughout Building	Good	10-15 yrs.
Heil	CH9536VKC1	Electric	34MBH	12		Police Dept	Good	10-15 yrs.

Annual Electric / Gas / Oil



Cooling and Heating



METHOD OF ANALYSIS

Assumptions and tools

Energy modeling tool: Established/standard industry assumptions, DOE 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 audit was prepared using the most current and accurate electrical/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 cost savings.

THE SUGGESTIONS 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, THERMOCAT 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.