Phoenixville Borough Energy Assessment

Civic Center

123 Main Street, Phoenixville, PA 19460

Prepared By:

Practical Energy Solutions of West Chester, PA

Prepared For:

Phoenixville Borough, as part of the Delaware Valley Regional Planning Commission's *Circuit Rider for Energy Efficiency* program

APRIL 2016

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

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Executive Summary

The Phoenixville Borough Civic Center (estimated at 32,160 ft^2) is a multiuse recreational facility constructed in 1908. It is a two-story building with an attached high-bay gymnasium. The two-story building contains offices, a daycare, and restrooms. Both buildings share a basement that houses a boxing gym, locker room, maintenance office, storage area, and mechanical room. Occupancy is low, with most of the facility in use fewer than 20 hours per week.

From September 2011 through August 2012, the Borough of Phoenixville spent $21,824 on energy for the Civic Center; 78 percent of these costs were for #2 heating oil.

On behalf of the *DVRPC Circuit Rider Program*[1], Practical Energy Solutions (PES) performed an energy assessment of the facility to identify opportunities for energy savings.

4-Step HVAC Strategy

This building has an antiquated, largely one-pipe/radiator steam heating system that does not allow temperature control of individual spaces. As a result, there is significant energy use and discomfort. However, there are achievable ways to reduce energy use and improve comfort at this facility.

PES recommends a 4-step strategy to address the significant discomfort and energy use in this building resulting from the steam system:

1. Convert the existing oil-fired boiler to a natural gas boiler to address a failing underground storage tank.
2. Insulate lateral steam piping to reduce energy waste, reduce pipe leakage and repair bills, and improve function of the steam system.
3. Install low-cost thermostatic radiator valves (TRVs) on relevant single-pipe radiators, as well as a master thermostatic control to prevent continuous boiler operation, improve comfort, and reduce energy use.
4. As soon as feasible, replace the gymnasium steam unit heaters with natural gas-fired infrared (IR) tube heaters to significantly improve efficiency.

In the future, if the borough wishes to continue to use the facility, upgrade to high-efficiency ductless split systems, which will allow for high-efficiency heating and cooling. Because the ductless split systems are powered by electricity, this also enables a future transition to clean, renewable energy sources such as grid-purchased wind power and/or solar panels.

Practical Lighting Strategies

PES also recommends reducing lighting electricity use and costs by taking two simple steps:

- As they burn out, replace 32W T8 tubes with lower-wattage 28W T8 tubes; and
- Replace all incandescent exit signs (approximately 40W) with LED exit signs (approximately 10W).

Additionally, the borough should continue converting its outmoded four-lamp T12 fixtures to T8 fixtures as time and budget permits. However, PES recommends replacing all remaining four-lamp T12 fixtures with 28W two-lamp T8 fixtures with high-efficiency ballasts and reflectors. The result will be a 65 percent or greater reduction in electricity use per fixture, with notably improved light output and quality. This measure represents

[1] http://www.dvrpc.org/EnergyClimate/CircuitRider/

a long-term investment for the township, since this is a low-use facility. However, a T12 upgrade is inevitable due to Energy Policy Act of 2005 lighting requirements, which effectively banned production of T12 ballasts.

The borough may also consider installing occupancy sensors in the boxing gym, locker room, restrooms, storage areas, and game room to further reducing lighting electricity use.

Building Envelope Upgrades

Finally, PES recommends replacing windows on the first floor of the building due to significant frame damage and placing a doorsweep on the second-floor daycare exterior door.

Savings

Overall, these measures are expected to cut annual energy costs at the Civic Center in half. These measures will also reduce CO_2 emissions due to fossil fuel by nearly 60,000 pounds of CO_2 per year, which has the same CO_2 emissions reduction as removing more than five passenger cars from the road per year or planting 1,238 mature trees.

Table 1 provides a summary of calculated savings and paybacks. All savings are based on converting the boiler from fuel oil to natural gas as a first step. Table 1 also includes an estimate of increased electricity use as a result of the switch from natural gas (heating only) to electricity for both heating and cooling, as recommended in Measure Number 5 (High-Efficiency Ductless Split System Heat Pumps). Note that this measure does not save energy overall due to the addition of air conditioning.

Table 1: Summary of Energy Conservation Measures

#	Measure Description	Annual Energy Savings	CO_2 Savings [lbs]	Energy Cost Savings [$/yr]	Est. Project Cost	Simple Payback [yrs]
1	Convert Boiler to Natural Gas	0	26,749	$7,024	$4,980	<1
2	Steam Pipe Insulation	411 ccf	4,974	$536*	$4,842	9*
3	Thermostatic Radiator Valves	1,067 ccf	12,912	$1,390	$4,531	3.3
4	Replace Gym Steam Unit Heaters with Natural Gas IR Tube Heaters	1,251 ccf	15,138	$1,630	$11,908	7.3
5	High-Efficiency Ductless Split-System Heat Pumps	5,936 ccf (62,281) kWh	(6,643)	($560)	$41,488	--
6	Lighting Renovations	5,008 kWh	6,311	$667	$ 5,530	8.3
	TOTAL	**8,665 ccf** **(57,273) kWh**	**59,441**	**$10,687**	**$73,279**	**7**

Notes: *Does not include avoided repair costs. Payback will be faster when these ongoing repair costs are considered. All savings based on current energy rates. Savings will change as energy prices change.
Source: Practical Energy Solutions for DVRPC 2014

Building Description

The Phoenixville Borough Civic Center (estimated at 32,160 ft^2) is a multiuse recreational facility constructed in 1908. It is a rectangular two-story building with an attached high-bay gymnasium. The two-story building contains first-floor offices, a second-floor daycare, and restrooms. The buildings share a basement that houses a boxing gym, locker room, maintenance office, storage area, and mechanical room. Both structures are heavy-weight brick construction.

Occupancy is relatively low. With the exception of the front office, most spaces are used fewer than 20 hours per week.

Historic Energy Use

Annual Energy Costs

From September 2011 through August 2012, the Borough of Phoenixville spent $21,824 on energy for the Civic Center, with the majority of these costs (78 percent, $14,981) for #2 heating oil. Twenty-one percent of the remaining energy costs were for electricity ($6,427); the remaining $415 (1 percent) was for natural gas to heat domestic hot water.

CO_2 Emissions

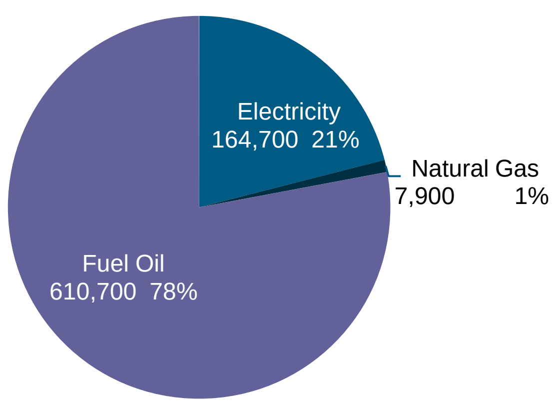
Total energy use at this facility is responsible for approximately 114,200 pounds of CO_2 emissions annually—the CO_2 emissions equivalent of 10 passenger cars per year. Fifty-three percent of CO_2 emissions were due to the use of electricity. The vast majority of remaining CO_2 emissions were due to the combustion of heating oil.

Energy End Uses

To determine the most appropriate energy conservation measures, it is important to understand how building systems use energy. PES developed the following breakdown of energy "end-uses" (i.e., lighting, HVAC, plug loads, etc.) based on historical utility energy use and our site walkthrough:

- On a Btu basis, more than two-thirds of all energy used is due to the use of #2 heating oil for space heating, as shown in Figure 1 below.

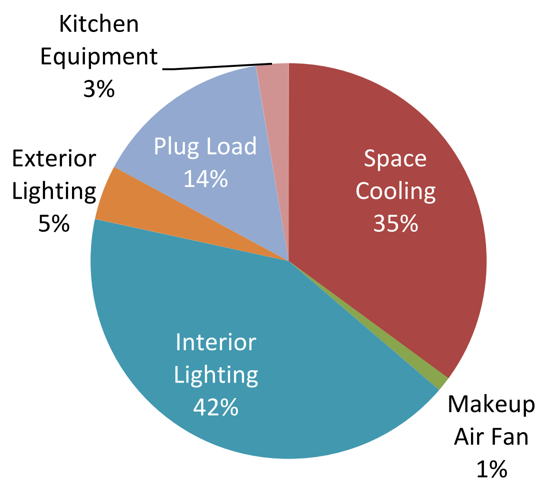
Figure 1: Energy Use in kBtu (10^3 Btu)



Source: Practical Energy Solutions for DVRPC 2014

- Figure 2 below shows all electricity end uses. Forty-two percent of all electricity is used for lighting, and 35 percent is used for air-conditioning.

Figure 2: Electricity End Uses



Notes: Plug Load = computers, desk lamps, printers, faxes, copiers vending machines, other plug loads. **Source:** Practical Energy Solutions for DVRPC 2014

Scope of Analysis

PES performed a walkthrough assessment of the Phoenixville Civic Center to identify opportunities to reduce energy use and costs, focusing on the heating system, as it represents the majority of energy use and costs.

HVAC

HVAC: Findings

Steam Heating System

This facility has a one-pipe steam heating system served by a 13-year-old dual-fuel cast-iron Smith 19A-9 boiler (409 MBH, 80 percent thermal efficiency, model year 2000), currently fueled by #2 heating oil, that appears to be in good condition. The underground storage tank, however, is failing.

Steam radiators deliver heat to each room primarily via a single-pipe system; steam flows to the radiators and condensate flows back to the boiler via gravity through the same pipe. The steam system also provides heat to the gymnasium via four ceiling-hung steam unit heaters (90 MBH estimated capacity, 80 percent estimated thermal efficiency).

The building is divided into two thermostatic zones:

- A manual thermostat in the basement hallway controls the basement and first-floor gymnasium, and
- A manual thermostat in the first-floor office controls the first-floor offices and the second floor.

These thermostats must be set high (typically 75°F to 85°F) to provide sufficient heat to the floor above, causing significant overheating and energy use on the floors below. Specifically, personnel must increase the first-floor thermostat setpoint to adequately heat the daycare center above, and this overheats the first-floor offices. Similarly, to heat the gym, employees turn the basement thermostat up to 85°F and manually open the unit heater steam valves. This, in turn, overheats the entire basement, and if employees forget to set back the thermostat after the gymnasium is no longer in use, this energy use can go unnoticed for days.

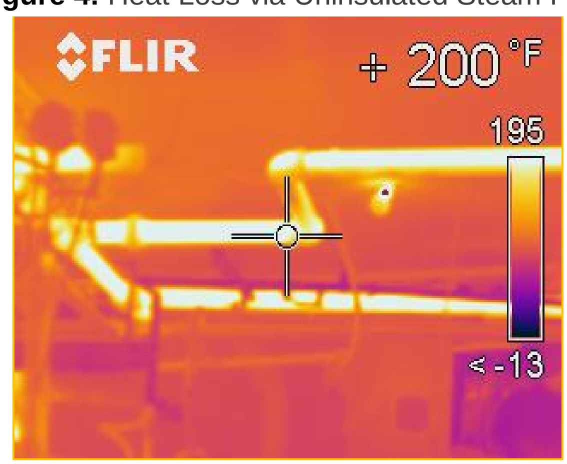
As a result, many rooms are overheated, and employees are uncomfortable. Figure 3 below shows two images captured during PES's site visit in the first-floor front office. The photograph on the right of Figure 3 is an image taken with an infrared camera. The circle centered in the infrared image was aimed at one of the steam radiators and measured 185°F, while the temperature above the radiator near the window measured closer to 48°F. As shown in the picture on the left of Figure 3, this radiator was within several feet of an employee's desk.

Figure 3: Uncontrolled Steam Radiator in Close Proximity to Office Worker's Desk

Source: Practical Energy Solutions for DVRPC 2014

PES also observed that long lateral piping sections were uninsulated. According to the borough's HVAC contractor, asbestos insulation was removed in the 1980s. As a result, there is significant heat loss, and significant premature condensation causes pipe degradation and leakage, requiring ongoing repairs. Figure 4

Figure 4: Heat Loss via Uninsulated Steam Pipes



Source: Practical Energy Solutions for DVRPC 2014

is an infrared image captured during the site visit showing high (200°F) surface temperature of the steam pipes and a high ambient temperature in the mechanical room, indicating significant energy loss.

Air Conditioning

The building also contains window air conditioners for the offices and daycare. At the time of our wintertime visit, several air conditioners remained in place. Employee interviews indicate that some additional units may have been removed for the winter. The units that remained in place were in generally poor condition and were not sealed in the window frame, allowing significant air infiltration, as shown in Figure 5. This increases both heating and cooling energy use and costs.

Figure 5: Window Air Conditioner, With Infiltration

Source: Practical Energy Solutions for DVRPC 2014

HVAC: Recommendations

Currently, it is not clear how the borough will continue to use this facility into the future. If the borough decides to retain the facility for the long term, PES recommends considering upgrading to high-efficiency, all-electric ductless split systems. Otherwise, PES recommends a four-step strategy to addressing the HVAC issues in this facility for the shorter term:

1. Switch the existing dual-fuel boiler from #2 heating oil to natural gas. This will enable the borough to address the failing storage tank issue and, at today's prices, will reduce energy costs considerably and allow the borough to apply some of these savings to the other recommended energy-efficiency projects outlined in this report.
2. Insulate the lateral steam piping. This will quickly pay back in both energy savings, piping repair bills, and comfort.
3. Install thermostatic radiator valves (TRVs). This measure will pay back quickly in both energy savings and comfort.
4. As soon as feasible, replace the steam unit heaters in the gymnasium with natural gas-fired infrared (IR) tube heaters.

Oil to Gas Conversion

Natural gas is:

- Currently less expensive than #2 fuel oil. It may reduce current heating energy costs as much as 47 percent. However, future prices are likely to rise as Pennsylvania natural gas gains access to worldwide markets and sees increased uses (e.g., local petrochemical production).
- Cleaner burning than #2 fuel oil. Pollutants such as sulfur oxides, particulates, and carbon monoxide can be reduced by 35 percent to 75 percent. In addition, CO_2 emissions due to on-site combustion may be reduced by approximately 27 percent.

Table 2 outlines fuel savings associated with this conversion. Project costs will depend on the cost of increasing the size of the gas main and installing new gas piping to the boiler. Alternately, the contractor may request high-pressure delivery and reduce pipe pressures upon entry to the building. Often, PECO will upgrade natural gas service at a very minimal cost, if any.

PES recommends first obtaining simultaneous contractor quotes for this project and the IR unit heater upgrade, since both projects require natural gas piping. Once gas demands are determined, the borough should request a gas line adequacy assessment from PECO, as this will help define the best course of action and any associated costs. A copy of PECO's Application for Natural Gas Services is included as Appendix A. The borough can then evaluate total costs in light of the long-term savings of this measure (as shown in Table 2 below) and the savings associated with the preferred, high-efficiency measure (shown in Table 6 below).

Table 2: Savings: Boiler Conversion to Natural Gas (Option 2)

#	Measure Description	Annual Energy Savings	CO_2 Savings [lbs]	Energy Cost Savings [$/yr]	Est. Project Cost	Simple Payback [yrs]
1	Convert Boiler to Natural Gas*	0	26,749	$7,024	$4,980	<1 yr

Notes: Savings based on current energy rates. Savings will change as energy prices change. Boiler conversion savings are fully dependent on the price difference between #2 oil and natural gas. *Contractor quote/PECO assessment required**.**
Source: Practical Energy Solutions for DVRPC 2014

Steam Pipe Insulation

Installing mineral fiber or equivalent pipe insulation could reduce current heating energy costs by up to 7 percent, assuming 1″ insulation on piping 4″ in diameter and smaller, and 2″ insulation on pipes larger than 4″. Table 3 shows the energy savings and paybacks for these immediate HVAC measures.

Table 3: Savings: Steam Pipe Insulation

#	Measure Description	Annual Energy Savings [ccf]^	CO_2 Savings [lbs]	Energy Cost Savings [$/yr]	Est. Project Cost	Simple Payback [yrs]
2	Steam Pipe Insulation	411 ccf	4,974	$536*	$4,842	9*

Notes: Savings based on current oil prices. Savings will change as oil prices change and/or oil to gas conversion is implemented. ^Post boiler conversion. *Does not include piping repair. Payback will be faster when avoided repair costs are included.
Source: Practical Energy Solutions for DVRPC 2014

Thermostatic Radiator Valve (TRV) Installation

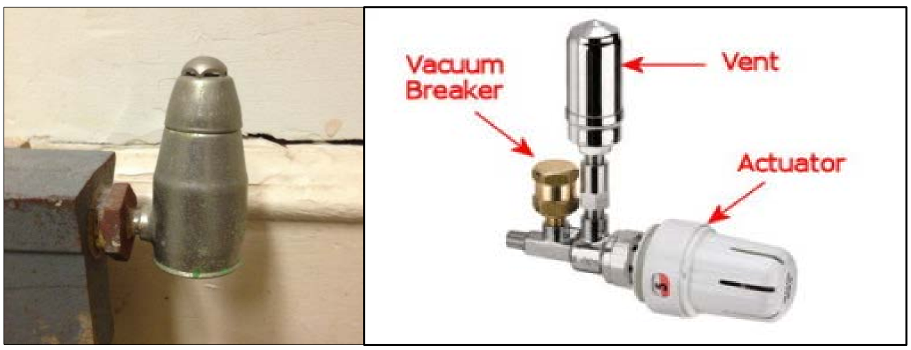
Installing TRVs on the most relevant single-pipe radiators in the facility within each temperature zone will allow the radiators to maintain their own setpoints, which should reduce overheating and conserve energy.

These devices are relatively inexpensive, and installing the TRVs will reduce current heating energy use by as much as 18 percent.

Care must be taken to choose a TRV for the single-pipe steam system, as this method of steam distribution differs significantly from other steam heating systems. The one-pipe TRV, which will replace the existing radiator air vent, is equipped with an adjustable thermostatic operator that allows the radiator to fill with air (and therefore block steam flow) when the temperature setpoint is met. The TRV should also have a built-in vacuum breaker to prevent condensate from getting trapped in the radiator. Figure 6 below shows an image of the existing air vent on the left and a sample illustration of a one-pipe TRV to the right.

Since the one-pipe TRV functions by controlling air escape from the radiator, it will work only if the boiler is controlled by temperature, not steam pressure. Leaving a pressuretrol in place will force constant steam pressure and prevent proper TRV operation. To ensure compatible boiler operation, consider a timed outdoor air sensor for the boiler or a master programmable thermostat that will not continuously call for heat, and disconnect the two manual thermostats in the building. In addition, radiators with covers should be installed with remote temperature sensors to ensure proper function.

Figure 6: Existing Air Vent (left) and Sample Replacement TRV (right)



Notes: Photo source (right): tunstall-inc.com/macon-controls/. Provided as an example only.
Source: Practical Energy Solutions for DVRPC 2014.

Table 4: Savings: TRV Installation

#	Measure Description	Annual Energy Savings [ccf]^	CO_2 Savings [lbs]	Energy Cost Savings [$/yr]	Est. Project Cost	Simple Payback [yrs]
3	Thermostatic Radiator Valves	1,067	12,912	$1,390	$4,531	3.3

Notes: Savings based on current oil prices. Savings will change as oil prices change and/or oil to gas conversion is implemented. ^Post boiler conversion.
Source: Practical Energy Solutions for DVRPC 2014

Gymnasium Heaters

PES recommends replacing the forced-air steam unit heaters in the gymnasium with high-efficiency natural gas infrared (IR) tube heaters. The existing heaters should be dismantled, and the steam lines should be capped.

IR heaters are more efficient in high-bay applications because they emit radiant energy toward the floors, which absorb and re-radiate heat from the ground up. With the existing heaters, warm convective air rises to the ceiling, heat does not effectively reach the people using the space, and the units tend to run continually to achieve setpoint temperatures. This measure can reduce gymnasium heating energy use by approximately 28 percent.

PES recommends obtaining contractor quotes, since this project will require installation of new gas lines and may require a larger gas main. PES also recommends maintaining just one gas meter for the whole building to avoid duplicate, recurring per-meter charges (i.e., customer charges).

Table 5: Savings: Infrared Tube Heaters, Gymnasium

#	Measure Description	Annual Energy Savings [ccf]^	CO_2 Savings [lbs]	Energy Cost Savings [$/yr]	Est. Project Cost*	Simple Payback [yrs]	Savings Over 15 Years
4	Upgrade Gym Unit Heaters	1,251	15,138	$1,630	$11,908	7.3	$26,081*

Notes: ^Post boiler conversion. *Natural gas piping costs will be additional. Savings are for illustrative purposes. Full contractor quote recommended. Savings based on current energy rates. Savings will change as energy prices change.
Source: Practical Energy Solutions for DVRPC 2014.

Future Option: Ductless Split Systems

In the longer term, Phoenixville Borough must decide whether to maintain the steam system or invest in a whole-system upgrade. If the borough plans to retain and operate this building for the long term, decommissioning the steam heating system and investing in a new high-efficiency, combined heating and cooling system is recommended. The existing one-pipe steam system is not designed for individual space control, is hard to maintain, and is inefficient—thereby increasing operational energy expenses over time and compromising employee comfort.

Specifically, PES recommends high-efficiency ductless split-system heat pumps to serve the primary use areas. These systems will provide high-efficiency cooling and heating (up to 17.5 SEER/9.3 HSPF), while eliminating fuel oil expenses and the need for window air conditioners. The borough should replace the steam radiators in the bathrooms, locker rooms, and other low-use areas that do not require cooling with thermostatically controlled electric resistance baseboards set as low as possible, yet high enough to avoid pipe freezing.

This all-electric system should produce a 25 percent to 35 percent increase in electricity use, but that is partially due to the addition of air conditioning capacity. This should not significantly increase overall energy costs, however, due to the reduction in oil/natural gas consumption. Unlike oil or natural gas-fired systems, the all-electric high-efficiency heat pump system also enables future integration with renewable energy sources—such as wind power purchasing through the grid or on-site solar panels.

Table 6: Savings: HVAC Upgrade to Ductless Split System Heat Pumps

#	Measure Description	Annual Energy Savings [natural gas]^		CO_2 Savings [lbs]	Energy Cost Savings [$/yr]	Est. Project Cost	Simple Payback [yrs]
5	Ductless Split-System Heat Pumps	5,936 (62,281)	ccf kWh	(6,643)	($560)	$41,488	N/A

Notes: Savings based on current energy rates. Savings will change as energy prices change. ^Post boiler conversion.
Source: Practical Energy Solutions for DVRPC 2014

Lighting

The lighting in this building is primarily a mixture of 40W T12 and 32W T8 fluorescent tubes in a variety of configurations. All lighting is controlled by manual wall switches, and the lights were on in several empty rooms (including the unused, locked boxing room) during PES' site visit.

The following lighting renovations are expected to reduce lighting energy use by up to 27 percent and improve lighting control. However, financial paybacks are longer in low-use buildings like this one, since lights are not on for extended periods of time.

- As they burn out, replace 32W T8 tubes with lower-wattage 28W T8 tubes.
- Replace all incandescent exit signs (approximately 40W) with LED exit signs (approximately 10W).
- Replace all four-lamp T12 fixtures with 28W two-lamp T8 fixtures with high-efficiency ballasts and reflectors. The lower bulb wattage and high-efficiency ballasts will reduce energy use, and the reflectors—which enhance light spread and output—allow each four-lamp T12 fixture to be replaced with a two-lamp 28W T8 fixture. The result is an approximate 65 percent reduction in electricity use per fixture, with notably improved light output and quality. This measure will also reduce the total number of lamps in the building by approximately 28 percent, saving up to $18 per year in lamp replacement costs.

  While this measure represents a long-term investment for the township, an upgrade from T12 is inevitable. The Energy Policy Act of 2005 required lamp manufacturers to stop producing T12 magnetic ballasts in 2010; therefore, as ballasts fail, they must be replaced with more efficient models. This recommendation will maximize the efficiency of these upgrades while minimizing operational costs over time.
- Consider installing occupancy sensors in the boxing gym, locker room, restrooms, storage areas, and game room.

Table 7 shows the energy and cost savings for these lighting projects.

Table 7: Savings: Lighting Upgrades

#	Measure Description	Annual Energy Savings		CO_2 Savings [lbs/yr]	Energy Cost Savings [$/yr]	Est. Project Cost	Simple Payback [yrs]
6a	T-12 to T-8 Conversion	2,199	kWh	2,771	$292.92	$4,320	14.7
6b	32W T-8 to 28W T-8 Replacement	438	kWh	552	$58.33	0	Immediate
6c	LED Exit Signs	1,577	kWh	1,987	$210.00	$300	1.4
	SUBTOTAL	**4,214**	**kWh**	**5,310**	**$561.25**	**$ 4,620**	**8.2**
Other Measures							
6d	Install Occupancy Sensors	794	kWh	1,001	$105.77	$910	8.6
	TOTAL	**5,008**	**kWh**	**6,311**	**$667.02**	**$5,530**	**8.3**

Notes: All savings based on current energy rates. Savings will change as energy prices change.
Source: Practical Energy Solutions for DVRPC 2014

Building Envelope

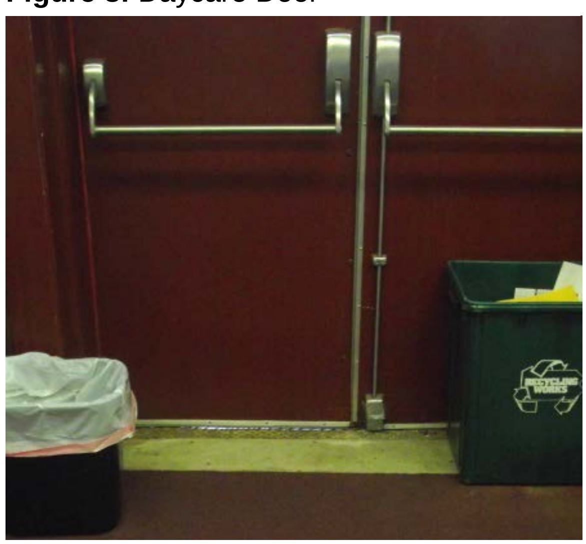
PES investigated the major building envelope components including walls, windows, and doors for signs of poor energy performance. The building envelope is generally in good condition with the exception of the first-floor windows, which show signs of damage and decay as shown in Figure 7 below. These windows should be replaced, but this will yield negligible energy savings because the existing windows have relatively good thermal performance due to their wood frames and double-paned glazing.

Figure 7: Window Frame

Source: Practical Energy Solutions for DVRPC 2014

PES noted a visible air gap around the bottom of the second-floor exterior door in the daycare center, as highlighted in the red circle in Figure 8 below. In many cases, this is a relatively simple fix requiring new weather-stripping around the door frame and a door sweep on the bottom. PES recommends installing a high-quality vinyl weather-stripping product with a metal backing that is mechanically attached to the door. Adhesive-backed weather-stripping is insufficient and should be avoided.

Figure 8: Daycare Door



Source: Practical Energy Solutions for DVRPC 2014

Appendix A

PECO
An Exelon Company

Application for Natural Gas Service

DELAWARE, YORK, & CHESTER COUNTIES, ALSO LOWER MERION: 1050 W. SWEDESFORD RD, BERWYN, PA. 19312
PHONE #610-725-7160; FAX # 610-725-1416
BUCKS & MONTGOMERY COUNTIES: 400 PARK AVE, WARMINSTER, PA. 18974
PHONE #215-956-3270; FAX #215-956-3240
NEW RESIDENTIAL CONSTRUCTION (UNDERGROUND ELECTRIC): 400 PARK AVE, WARMINSTER, PA. 18974-ALL COUNTIES
PHONE #215-956-3010; FAX #215-956-3380

1. Please provide the following information for the location of the gas service.

Customer Info: ☐ Own Property ☐ Lease Property

Contact Person ____________________

Company Name ____________________

Service Address ____________________

City, State, Zip ____________________

Telephone ____________________

Acct. Number ____________________

2. PECO Energy requires that our gas customers enter into an agreement prior to the installation of gas facilities. Please furnish the name and address for the person authorized to this contract.

Contact Name ____________________

Company Name ____________________

Street Address ____________________

City, State, Zip ____________________

Telephone ____________________

Tax ID # ____________________

3. LOAD REQUEST TYPE:

☐ New Construction
☐ New Gas Service, Existing Building
☐ Fuel Conversion from Oil/Propane
☐ Additional Gas Load/Service Adequacy

4. TYPE OF BUSINESS:

☐ Retail Store ☐ Institutional
☐ Office/Commercial ☐ Governmental
☐ Restaurant ☐ Industrial
☐ Warehouse ☐ Apartment/Condo
☐ Other ____________________
☐ Residence ____________________

5. Rates:

A. ☐ PECO Tariff or ☐ Transportation (5000MCF)
B. ☐ FIRM or ☐ Interruptible

6. CURRENT HEATING SOURCE: (If you don't know the BTU rating, please estimate or provide last year's total energy usage for the equipment that will be replaced).

☐ Gas ____________________ MCF/yr ☐ Propane ____________________ gal/yr
☐ Oil ____________________ gal/yr ☐ Other ____________________ /yr

7. EQUIPMENT LIST ITEMIZATION Will "heating load" Be added (ie: furnace, boiler, IR heat, rooftop heater)? Will "process load" be added (ie: water heater, paint dryers, fryer, grills)? Please provide the BTU input for EACH PIECE of equipment to be installed.

**************************MUST HAVE THIS INFORMATION TO PROCESS REQUEST*************************

New or Existing	Fuel Type (Nat Gas, Oil, Propane)	Equipment Type (Boiler, Furnace, WH, Grill)	No. of Units	BTU Input/Unit or MCF (BTU/hr, Gallons/hr)	Equipment Pressure	Hours Used Per Day
Sample: New	Natural Gas	Furnace	1	500,000 BTU's	LOW	12 hrs/day
NEW						
TOTAL						

Application for Natural Gas Service (con't)

8. TOTAL HEATED SQUARE FOOTAGE FOR THIS BUILDING THAT WILL UTILIZE NATURAL GAS:

☐ Office/Commercial/Retail Use ____________________ Sq. ft. Ceiling Height ____________

☐ Warehouse/Manufacturing space ____________________ Sq. ft.

☐ Residence ____________________Sq. ft.

9. WHICH NATURAL GAS DELIVERY PRESSURE IS REQUIRED TO YOUR BUILDING:

☐ Low ☐ 12.2" ☐ 2 PSIG *☐ 5 PSIG *☐ 10 PSIG *☐ LINE

10. WHAT DATE IS SERVICE NEEDED BY? ____________________________

11. EQUIPMENT INSTALLATION DATE? ____________________________

12. PLEASE PRINT THE INFORMATION BELOW FOR THE CONTRACTOR THAT WILL BE INSTALLING THE NEW GAS EQUIPMENT:

CONTRACTOR NAME: ____________________________

COMPANY: ____________________________

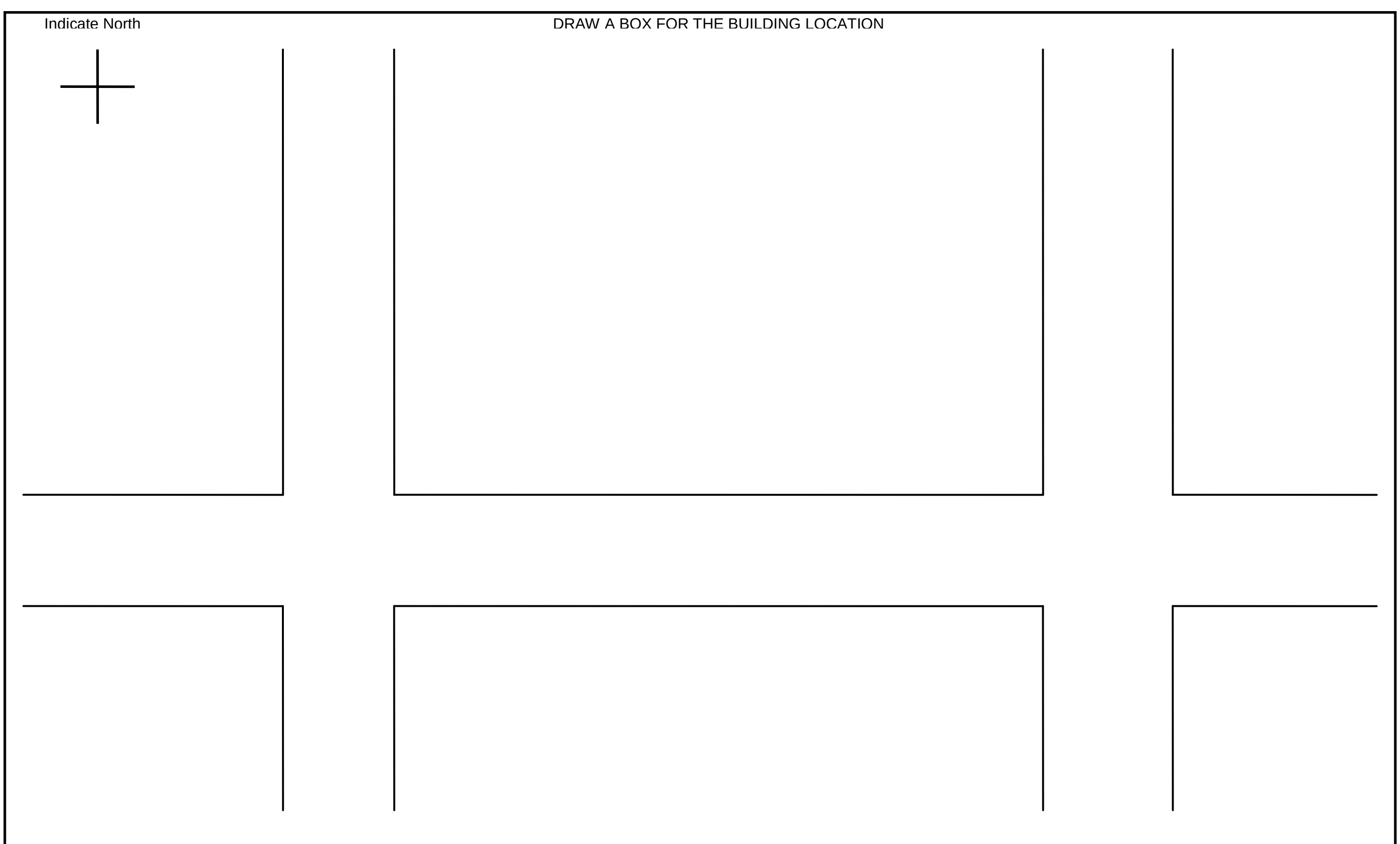
TELEPHONE: ______________ FAX NUMBER: ______________

13. Customer/Contractors Signature: ____________________________ **DATE:** ______________

14. Final Contract delivered to: ☐ Customer ☐ PECO Account Executive/Account Manager (For Internal Use only)

15. IN THE BOX BELOW, PLEASE DRAW A SIMPLE SKETCH OF YOUR BUILDING SHOWING:

- Building Location
- Street Address and closest intersecting cross street(s)
- Location of your Equipment Room
- Preferred Meter Location
- **# OF METERS REQUESTED** __________



Phoenixville Borough Energy Assessment

Civic Center

Publication Number: 15024H

Date Published: April 2016

Geographic Area Covered: Phoenixville Borough

Key Words:

Energy, natural gas, electricity, energy management, heating ventilation air conditioning (HVAC), steam, boiler, building automated system (BAS), windows, lighting, CO_2 emissions

Abstract:

On behalf of the DVRPC Circuit Rider Program Practical Energy Solutions (PES) performed an energy assessment of the Phoenixville Borough Civic Center. The Phoenixville Borough Civic Center (estimated at 32,160 ft^2) is a multiuse recreational facility with an attached high-bay gymnasium constructed in 1908. PES identified a three-step strategy to improve operational control and efficiency of the buildings antiquated and primarily one-pipe/radiator steam heating system, as well as a conversion from the existing oil-fired boiler to a natural gas boiler. PES also identified lighting strategies, such as retrofitting inefficient lamps, and recommended replacement of the deteriorating first-story windows. Overall, these measures are expected to cut annual energy costs at the Civic Center by 50 percent and will reduce CO_2 emissions due to fossil fuel by nearly 60,000 pounds of CO_2 per year.

Staff Contact:

Liz Compitello
Senior Research Analyst
☏ (215) 238-2897
ecompitello@dvrpc.org

Delaware Valley Regional Planning Commission
190 N. Independence Mall West, 8th Floor
Philadelphia, PA 19106-1520
Phone: (215) 592-1800
Fax: (215) 592-9125
Internet: www.dvrpc.org

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

DVRPC, 8TH FLOOR
190 N. INDEPENDENCE MALL WEST
PHILADELPHIA, PA 19106-1520
215.592.1800
WWW.DVRPC.ORG