

Upper Darby Township Energy Assessment

Senior Center

326 Watkins Avenue, Upper Darby, PA 19082



Prepared By:

Practical Energy Solutions of West Chester, PA

Prepared For:

Upper Darby Township, as part of the Delaware Valley Regional Planning Commission's *Circuit Rider for Energy Efficiency* program

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Executive Summary

The Upper Darby Senior Center (15,234 ft²) is a one-story facility comprising an open seating and activity area, a large high-bay gymnasium with attached fitness and game rooms, administrative offices, a commercial kitchen, and a multipurpose room/studio. An attached two-story brick house serves as additional office space. This facility also operates a group of athletic fields adjacent to the Senior Center; the fields contain nearly 100 high-intensity discharge (HID) pole lights.

The Senior Center is open six days per week for approximately eight hours per day. It is heavily used, and the activity area and gymnasium are often fully occupied. Meals are prepared in the kitchen six days per week.

From November 2011 through October 2012, Upper Darby spent \$22,669 on energy for the Senior Center. An estimated 72 percent of this expense (\$16,292) was for electricity, and the remaining 28 percent (\$6,377) was for natural gas used for space heating and domestic hot water. The annual cost of energy per square foot was \$1.49.

On behalf of the *DVRPC Circuit Rider Program*,¹ Practical Energy Solutions (PES) performed a walkthrough interior lighting evaluation. PES recommends replacing all four-lamp 4' T12 fixtures with two-lamp 4' 28W T8 fixtures with high-efficiency electronic ballasts and reflectors. This will reduce electricity use by approximately 72 percent per fixture while notably improving light output and quality.

The township should also consider replacing each of the existing 15 metal halide fixtures in the gymnasium with a four-lamp T5/high-output (HO) fixture. This measure could reduce energy costs by nearly \$900 per year and reduce annual lamp replacement costs by \$70 per year.

Overall, these energy conservation measures can cut electricity use at the Senior Center 18.5 percent and save the township more than \$3,100 annually in annual energy costs at today's prices. They will also reduce CO₂ emissions due to fossil fuel use by nearly 40,000 pounds of CO₂ per year, which has the same CO₂ reduction impact as removing 3.5 passenger cars from the road each year or planting approximately 833 mature trees.

Table 1 provides a summary of calculated savings and paybacks.

Table 1: Summary of Energy Conservation Measures

#	Measure Description	Annual Energy Savings [kWh]	CO ₂ Savings [lbs]	Energy Cost Savings [\$ /yr]	Est. Project Cost*	Simple Payback [yrs]
1	Upgrade Interior T12 Fixtures	23,305	29,365	\$2,270	\$7,480	3.3
2	Upgrade Gym Lighting	8,387	10,567	\$866	\$3,270	3.8
TOTAL		31,692	39,932	\$3,136	\$10,750	3.4

Notes: *Project cost assumes in-house labor. Project #2 cost does not include lift rental. All energy cost savings also include savings resulting from reduced lamp replacement costs. Savings are based on current electricity prices and will change as energy prices change.

Source: Practical Energy Solutions for DVRPC 2014.

¹ <http://www.dvrpc.org/EnergyClimate/CircuitRider/>

Building Description

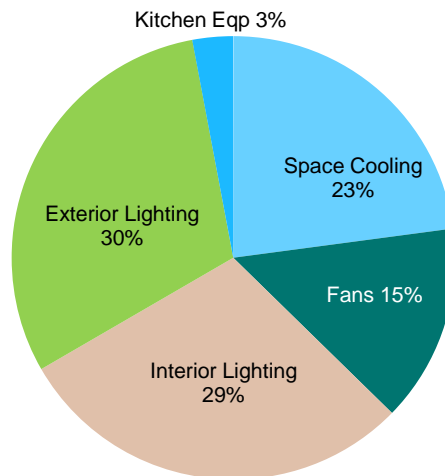
The Upper Darby Senior Center (15,234 ft²) is a one-story facility comprising an open seating and activity area, a large high-bay gymnasium with attached fitness and game rooms, administrative offices, a commercial kitchen, and a multipurpose room/studio. An attached two-story brick house serves as additional office space. This facility also operates a group of athletic fields adjacent to the Senior Center; the fields contain nearly 100 high-intensity discharge (HID) pole lights.

The Senior Center is open six days per week for approximately eight hours per day (48 hours per week total). It is heavily used, and the activity area and gymnasium are often fully occupied. Meals are prepared in the kitchen six days per week for both in-house and homebound community members as part of a nutrition assistance program. The athletic fields are in use five days per week when weather permits, and the lights are operated in the evenings for approximately four hours per day (until 10:00 p.m.).

Historic Energy Use

Annual Energy Costs

Figure 1: Electricity End Uses



Notes: Fans = air handlers/ventilation. **Source:** Practical Energy Solutions for DVRPC 2014

From November 2011 through October 2012, Upper Darby spent \$22,669 on energy for the Senior Center. An estimated 72 percent of this expense (\$16,292) was for electricity, and the remaining 28 percent (\$6,377) was for natural gas used for space heating and domestic hot water. The annual cost of energy per square foot was \$1.49.

Interior and exterior lighting uses approximately 59 percent, or \$9,600, of the facility's annual electricity bill, as shown in Figure 1.

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Scope of Analysis

On behalf of the DVRPC Circuit Rider Program, PES performed a walkthrough lighting assessment at this facility to identify opportunities to reduce interior lighting energy use and costs. PES did not assess athletic field lighting.

Findings and Recommendations

Activity Area and Office Lighting

Most recessed fluorescent fixtures in this facility currently contain outdated 2' 40W T12 fluorescent tube lamps with magnetic ballasts. These bulbs and fixtures are no longer manufactured because they do not meet the efficiency standards of the federal Energy Policy Act of 2005.

PES recommends the following replacement scheme for the existing four-lamp 4' T12 fixtures:

- Replace all 4' T12 four-lamp fixtures with 4' T8 two-lamp fixtures, using high-efficiency 28W T8 lamps.
- Choose a fixture that has reflectors to direct light down into the room, enhancing light spread and output.
- Consider high-efficiency programmed start ballasts for all new T8 fixtures. Programmed start ballasts are more expensive than the standard "instant-start" ballasts, but they pay for themselves over time because they further reduce energy use and preserve the life of the bulbs, thereby reducing maintenance costs. Programmed start ballasts require a special lamp, as most T8 lamps are designed for the instant start ballast.
- Select a ballast with a low ballast factor. This will save energy and further reduce operational lighting costs.
- Buy new lenses with the new fixtures; using old, dirty lenses will compromise light quality and output.

The result will be an approximate 72 percent reduction in electricity use per fixture, with notably improved light output and quality. This measure will also reduce the total number of linear fluorescent lamps in this building by 46 percent, saving approximately \$55 per year in lamp replacement costs.

Table 2 shows the potential energy savings associated with the T12 lighting upgrade.

Table 2: Savings: T12 Lighting Upgrade

#	Measure Description	Annual Energy Savings	CO ₂ Savings [lbs]	Energy Cost Savings [\$ /yr]	Est. Project Cost*	Simple Payback [yrs]
1	Upgrade Interior T12 Fixtures	23,305 kWh	29,365	\$2,270	\$7,480	3.3

Notes: *Project cost assumes in-house labor. Savings are based on current electricity prices and will change as energy prices change. Project costs are estimated from RSMMeans 2011 Construction Cost Data guide and PES experience with lighting projects in the region.

Source: Practical Energy Solutions for DVRPC 2014

Gym Lighting

The gymnasium has 15 high-bay pendant fixtures, each of which contains a 400W metal halide lamp. Metal halides and other HID lamps are still the standard for many high-bay lighting applications, but building owners are increasingly turning to high output (HO) T5 fluorescent technology as a more energy-efficient, longer-lasting, and less expensive alternative.

The township should consider replacing each of the existing 15 metal halide fixtures with a four-lamp T5/HO fixture. This measure could reduce energy costs by nearly \$900 per year and reduce annual lamp replacement costs by approximately \$70 per year.

Table 3 shows the potential energy savings associated with the gymnasium lighting upgrade.

Table 3: Savings: Gymnasium Lighting Upgrade

#	Measure Description	Annual Energy Savings	CO ₂ Savings [lbs.]	Energy Cost Savings [\$ /yr.]	Estimated Project Cost*	Simple Payback [yrs.]
2	Upgrade Gym Lighting	8,387 kWh	10,567	\$866	\$3,270	3.8

Notes: *Project cost assumes in-house labor. Project estimate does not include lift rental. For contractor labor: Add \$3,100 to estimated project cost. Savings are based on current electricity prices and will change as energy prices change. Project costs are estimated from RSMeans 2011 Construction Cost Data guide. Cost for lift equipment rental may be additional. Contractor quotation recommended. **Source:** Practical Energy Solutions for DVRPC 2014.

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Energy, natural gas, electricity, energy management, lighting, controls, CO₂ emissions

Abstract:

On behalf of the DVRPC Circuit Rider Program Practical Energy Solutions (PES) performed a walkthrough interior lighting evaluation of the Upper Darby Township Senior Center. The Upper Darby Township Senior Center 15,234 ft² is a one-story facility comprising an open seating and activity area, a large high-bay gymnasium with attached fitness and game rooms, administrative offices, a commercial kitchen, a multipurpose room/studio, and attached office space. PES recommends replacing inefficient T12 lamps in the office spaces, and metal halide fixtures in the high bay gymnasium. These energy conservation measures are estimated to cut electricity use at the Senior Center by 18.5 percent and save the township more than \$3,100 annually in annual energy costs at today's prices. They will also reduce CO₂ emissions due to fossil fuel use by nearly 40,000 pounds of CO₂ per year.

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