Recommendations to Reduce Energy and water Usage and Bills, Report to Twin Farms

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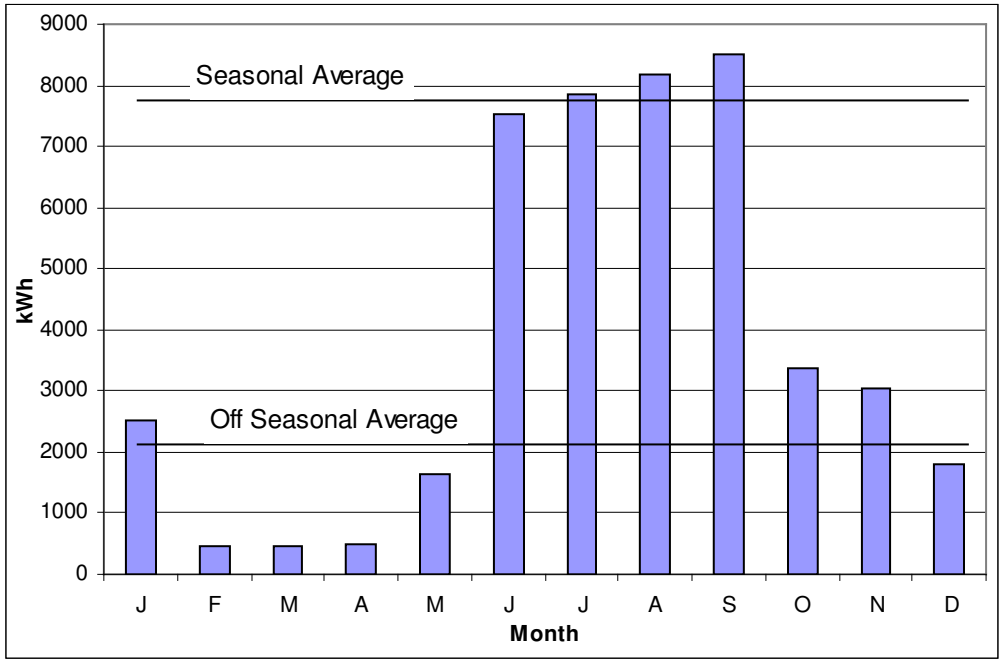
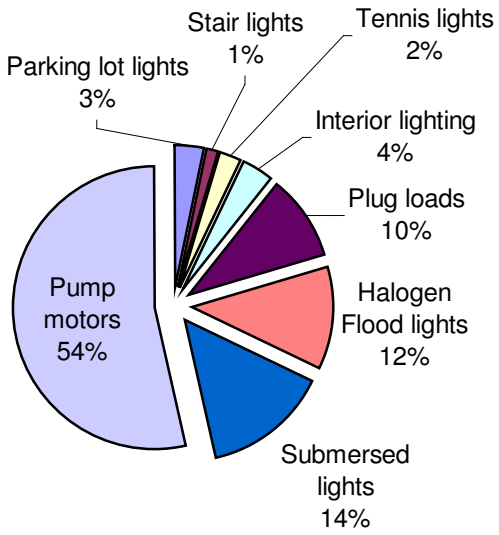
During this pre-season period, I examined the usage patterns, based upon previous utility and propane bills and took notes on nameplate loads. During the season, I will be able be able to track actual loads.

Input data:

Electric: Usage patterns from January 2005 through January 2007. Bills for January 2006 through January 2007.
Caveat: Electric meter readings during the off-season are estimated, as the meter is inside a wooden cabinet and there is no one there to provide access for PEPCO.
Propane: Usage is based upon the one delivery during 2006 of 109.9 gallons on 5/8/2006 for $465.63.
Water: Readings and bills were sporadic perhaps because of limed access for WSSC during the off season.

Summary usage pattern:





Annual Electric Use during 2006: 47,643 kWh / $10,564 (16.4¢ / kWh)
Annual Propane Use: 109.9 gallons / $465.63
Annual Water Use: 1,043,000 gallons / $4,525 ($4,34 / 1000 gallons)

Load Calculations:
Loads were computed using nameplate readings for various fixtures and appliances, as they were not powered during this off-season. Where nameplate readings were not available (street, stair, and tennis lighting), power ratings were estimated based upon the type of appliance. Best and worst case scenario of appliance usage was computed. Worst case (appliance operates continuously) corresponds most closely to the actual billing levels. This pie chart shows worst case usage:

Suggested Improvements:

1. **Reduce pump energy use by ensuring that pool filters are kept clean - good return**

Cost: $0
Potential savings: Depends upon the extra energy needed to pump through a partially clogged filter.
Payback interval: Immediate

2. **Use timer to limit pump operation to pool hours only plus 1 hour before and one hour after.** [1] [2] **- Good Return**

Potential savings from going from 24 hours / day to 14 hours per day, 41.7% decrease are: 11,407 kWh / $1,833
Approximate installed cost: $700. ($500 equipment + $200 installation)
Payback interval: < 1 season

3. **Reduce pump energy use by using a motor controller** (e.g., such as Circuit Master or Motor Boss) **- good return** [3]

Potential savings (based upon timed operations): Estimated additional 10%: (1,602 kWh / $256)
Approximate installed cost: $950 ($750 equipment + $200 installation)
Payback interval: 3 seasons

4. **Reduce pump energy use by purchasing a more efficient motor - poor return**

Potential savings: 358 kWh / $57
Approximate installed cost: $1,300
Payback interval: 22 seasons

5. **Control submerged lights so they are only on when the pool is in operation at night - good return**

Approximate installed cost: $400 ($200 equipment + $200 installation)
Potential savings: 5,760 kWh / $922
Payback interval: < 1 season

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[1] How many hours per day does a pool pump need to run for health and safety? One reference (http://www.answers.com/topic/swimming-pool) states: "Once the pool has been filled with water all the equipment should be turned on. Chemicals such as chlorine, muriatic acid, and stabilizer will need to be added. The filter system should be run continuously the first 24 hours until the water reaches the desired level of clarity. This typically represents the time required for 99% of the pool water to pass through the filter. Usually, once this level is reached the pool can run as little as six hours a day to maintain a healthy environment. The surface of the water usually contains the most pollutants (i.e., body oils, grease, sweat, and skin debris). To keep the pool clean, a skimmer (filtering device) should draw at least 70% of the pool water from the surface for filtration and treatment. Other web sites, such as http://askalanaquestion.com/pool_filtration_problems.htm, provide similar advice. These are shorter hours than suggested here.

[2] Items 2, 5, and 6 share an industrial timer / controller, Intermetic ET70415CR with ET7232M1 interface module. Because the cost of this new equipment is shared among improvements 2, 5, and 6, these must be implemented in tandem.

[3] These are estimates; this must be deferred until we can take some measurements of the load when pool operations are underway so we can get definitive results for annual energy and dollar savings.

6. **Replace all five 500-watt halogen floodlights with 65-watt fluorescent** (Lights of America 9266)**; add daylight sensor - good return** [4] [5]

Approximate installed cost: $550 ($300 materials + $250 installation)
Potential savings: 5,844 kWh / $935
Payback interval: < 1 season

7. **Replace refrigerator gasket (current one broken; refrigerator can't close) - essential!**

Approximate installed cost: $160 ($60 material + $100 labor)
Potential savings: 936 kWh / $150
Payback interval: < 1 season

8. **Enact a policy to limit plug loads (e.g., no space heaters) - essential!**

Cost: $0
Potential savings: 1,800 kWh / $288
Payback interval: Immediate

9. **Disconnect freezer decorative lights - good return**

Cost: $0
Potential savings: 84 kWh / $13
Payback interval: Immediate

10. **Replace all incandescent lights with compact fluorescent lights (CFL) - good return**

Cost: $20 for 2 four-pack 23-watt (100-watt equivalent) lamps from Home Depot.
Potential savings: 118 kWh / $20
Payback interval: 1 season

11. **Install a window in the meter box to allow PEPCO to read its meter at all times - recommended** [6]

Cost: $0
Potential savings: None.
Payback interval: Not applicable

12. **Purchase and install a water heater insulating jacket - good return**

Cost: $30
Potential savings: 11 gallons propane / $46 (10%)
Payback interval: < 1 season

13. **Purchase and install efficient shower nozzles - good return**

Cost: $80 (8 x $10 at Amicus Green Building Center)
Potential savings: $92 ($46 propane + $46 water)
Payback interval: < 1 season

14. **Fix any water leaks - essential**

Cost: $0 (assuming that it's just a washer that's needed)
Potential savings: $92 ($46 propane + $46 water)
Payback interval: Immediate

15. **Install a solar water heater** (Solcan Ltd, London ON, CA 866-765-2263) **- Poor return**

Cost: $2500
Potential savings: $231 propane
Payback interval: More than 10 seasons

Summary of measures marked as having a good return, essential, or recommended:
Items: 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, & 14
Total costs: $2,890
Annual Savings: $5,011
Payback interval: 6 months

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[4] I recall seeing these lights on at the pool during the day during the season.
[5] TF may wish to combine controls for items 2, 5, and 6, such as Intermatic digital controller ET70415CR which can control up to 4 circuits.
[6] This will eliminate most estimated bills, it will allow us to defer payment until actual time of usage, and it will improve our ability to track electrical usage and cost. I can donate the window and the labor to install it.