



Philly Row Home Philadelphia, Pennsylvania

Building Usage
Single Family Residence

Occupants
Jones-Nestor Family

Size
1,845 sq ft

Stories
Three

Year Built
1893

Start Year for Energy Management
2001

Energy Efficiency Typology
Residential Retrofit

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retrofit at a glance

- Compact Fluorescent Light Bulbs
- Reflective Roof Coating
- Window Replacement
- Programmable Thermostat
- Boiler Replacement
- Gas Heater Replacement
- Retrocommissioning
- Insulate Building Envelope

Overview & Scope

The Jones-Nestor residence is located in the Fairmont Park neighborhood of Philadelphia. It is a three-story brick row home that is approximately 1,845 sq ft, with a full unfinished basement and rooftop deck. It was built in 1893 and, despite its age, has undergone minimal renovations prior to the last decade.

The Jones-Nestor family purchased the row home in the summer of 2000. It was chosen for its proximity to owners' workplaces, (downtown Philadelphia and Fairmont Park). The historical charm of the house, with its original architectural features of high ceilings and fireplaces, were also strong selling points. Upon moving in with their college-aged children, the Jones-Nestors made a concerted effort to improve the design and functionality of the spaces to accommodate their family's needs. Thus, throughout the years, a majority of the rooms have been remodeled and updated. Within each of these construction projects, measures have been taken to improve energy efficiency, such as the addition of insulation, weather stripping, and caulking/sealing as necessary. These smaller energy efficiency measures were augmented by a series of larger retrofit upgrades.

Project Details

Lighting Measures

Compact Fluorescent Light Bulbs - The owners are in the process of exchanging all of their incandescent light bulbs for energy efficient compact fluorescent lights (CFLs). Currently, approximately 30% of existing incandescent fixtures have been upgraded.

HVAC

Heating System Replacement - In May of 2007, the owners replaced their aging heating unit with a new energy-efficient system that was supplied and installed by Regnier & Associates of Newtown, Pennsylvania. The heating system that was purchased was the most energy-efficient unit available at the time that would work within the constraints of their basement flue. The upgrade included the gas forced-air heater, programmable thermostat installation, coordination with their existing hot water heater, and the replacement of their oversized and inefficient ductwork, at a cost of \$4,050.

Air Conditioning System - There is no central air conditioning system within the home. The owners have instead installed ceiling fans, nine in total, as an energy efficient alternative. There is one window A/C unit that is used for selective cooling in the master bedroom.

Operations & Maintenance

Regnier & Associates return annually to conduct routine maintenance, including, but not limited to, mechanical system calibrations, changing filters, cleaning duct work, draining the hot water heater of sediments, etc. This system maintenance costs the homeowner \$156 per year.

Building Envelope

Window Upgrade - Existing aluminum windows were replaced in 2002 with the most energy-efficient units available, featuring double-paned glass and low-e technology. The total cost of the replacement was \$6,115, including a 10-year manufacturer's warranty. Insulated shades and/or curtains were incorporated in every window, effectively using passive solar strategies to control the amount of light and heat gain infiltrating the house.

Non-Energy Improvements

Water Efficiency - The hot water heater was replaced in 2001. The heater cost \$200 and it is an energy efficient product.

Roof Improvements - A roof deck was added to the home in 2001, giving the family additional outdoor space with views of the park. When the deck was built, the remaining half of the roof that was left uncovered was rebuilt and re-sealed. The owners added insulation to the roof, raising the R-value and increasing its insulating ability during the colder seasons. In conjunction with increased insulation, they added a highly reflective roof to reduce the home's internal heat gain during the summer by reflecting the

sun's rays. The owners used a silver, aluminum fiber coating that was painted on top of the normal asphalt covering, sealing and prolonging the life of the roofing material below. The coating costs \$60 it and is reapplied every two years.

Project Outcome

The homeowner's energy efficient retrofits significantly reduced their annual electricity and gas expenditures. In measuring the changes in energy usage from 2001-2010, the pre-retrofit baseline year, it was determined that the family cumulatively saved \$3,917. Replacement of the home's existing windows brought an annual average savings of \$295 for gas and electricity expenses and the installation of an energy efficient gas heating system led to a \$663 savings. This new heating system lowered natural gas consumption by 51% and electricity consumption by 26%. In addition to the economic benefits of the retrofits, the building's energy reduction measures resulted in 24 fewer tons of CO₂ being emitted between 2002 and 2010.

Lessons Learned

Small projects, done continuously over time, will eventually result in great savings in the long-run. Also, the owners found a number of energy efficiency strategies through websites, blogs and individual reviewers; providing a solid framework of proven methods to reduce energy and save money.

Economic Analysis

Energy Savings Investments		
	COST	PAYBACK
Window Replacement	\$ 6,115	21 Years
Energy Efficient Gas Heater	\$ 4,050	8 Years
Annual Retro-Commissioning	\$ 156	
Energy Efficient Water Heater	\$ 200	
9 Ceiling Fans	\$1,800	
Biennial White Roof	\$ 60	
Summary of Savings		
Cost Reduction in Electric Bills (avg)		19%
Cost Reduction in Natural Gas Bills (avg)		27%
Annual Electricity Reduction (kWh)	2,114	
Annual Natural Gas Reduction (ccf)	29,775	
Energy Savings 2002-2010	\$ 3,917	
Annual Greenhouse Gas Reduction (Tons CO ₂ e)	4.3 (37% Decrease)	

