



Building America Case Study

Philadelphia Housing Authority Energy-Efficiency Turnover Protocols

Philadelphia, Pennsylvania

PROJECT INFORMATION

Project Name: Philadelphia Housing Authority Unit Turnover Retrofit Program

Location: Philadelphia, PA

Partners:

Philadelphia Housing Authority,
pha.phila.gov

Advanced Residential Integrated
Solutions Collaborative (ARIES),
levypartnership.com

Building Component: Whole-building

Application: Retrofit; multifamily

Year Tested: 2014

Applicable Climate Zones: All, with
greater benefits in Zone 4 and higher

PERFORMANCE DATA

Cost of energy-efficiency measure
(including labor): \$185 per unit

Projected annual energy savings:
8% whole-house

Projected energy cost savings:
\$82/year/unit

More than 1 million public housing authorities (PHAs) that are supported by the U.S. Department of Housing and Urban Development provide rental housing for eligible low-income families across the country. Although there is a wide range of unit types, many are low-rise attached or multifamily units. Research shows that most public housing units are more than 30 years old and many have not been weatherized.

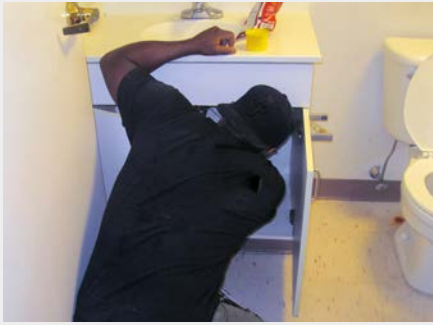
Most PHAs have limited resources to fund energy-efficiency measures. In addition, they do not directly benefit from lower housing-unit utility bills because utility costs are reimbursed by the government. Nevertheless, the PHAs are interested in making their housing more energy efficient—because of a commitment to the public and because of comfort and durability improvements associated with increased energy efficiency.

The Philadelphia Housing Authority (PHIHA) worked with the U.S. Department of Energy's Building America Program to integrate energy-efficiency measures into the refurbishment process that each unit normally goes through between occupancies. Many PHAs—including PHIHA—have skilled maintenance staff who can be trained to implement basic and cost-effective energy-efficiency measures.

Working with PHIHA, the Building America team Advanced Residential Integrated Solutions Collaborative (ARIES) developed an energy-efficiency turnover protocol and trained and coached PHIHA staff in its application. PHIHA then integrated the protocol into its normal operations with periodic follow-up testing and inspections by ARIES. By integrating this process into every turnover process, PHIHA could retrofit many of its 14,000-plus housing units each year.

ARIES trained PHIHA staff to implement energy-efficiency measures using an illustrated guideline and checklist. All activities in the checklist are intended to be low-cost, be achievable by in-house staff with readily available tools and materials, and fit within the time available during unit turnover.

DESCRIPTION



Plumbing penetrations were sealed with caulk or spray foam.



Combined with blower-door testing, smoke pens helped PHIHA staff determine the most important locations to air seal in typical units.



Sealing duct registers and boots to ceilings or floors can dramatically reduce unwanted duct leakage.

Air sealing also helps prevent odors and other contaminants from being spread between apartments.

For more information see the Building America report *Public Housing: A Tailored Approach to Energy Retrofits* at buildingamerica.gov.

Image credit: All images were created by the ARIES team.

The PHIHA Energy-Efficiency Turnover Protocol includes the following measures:

1. Seal the bottom of walls to floor.
2. Seal plumbing penetrations.
3. Seal electrical penetrations.
4. Seal at base of bathtubs and toilets.
5. Seal ceiling penetrations at lighting fixtures.
6. Seal exhaust-fan housing and ducts boots to ceiling.
7. Replace entry-door weather stripping.
8. Caulk around entry-door frame and windows.
9. Clean or replace the air-conditioner or air-handling-unit filter.
10. Check bath and kitchen exhaust-fan flow and condition.
11. Check and adjust the hot-water temperature.
12. Insulate exposed domestic hot-water pipes.
13. Check and fix attic insulation.
14. Add the attic hatch gasket and insulation.
15. Check and replace lights with efficient compact fluorescent (CFL) or light-emitting diode (LED) lights.

Guidelines from other PHA protocols also include:

16. Seal at stair treads and risers.
17. Insulate the hot-water tank.
18. Correct faucet and shower drips.
19. Check shower flow and install low-flow showerhead.
20. Clean bath and kitchen exhaust fans.

Lessons Learned

- Staff was able to reduce air infiltration as measured by a blower-door test by up to 25% with just a few hours of work and inexpensive materials.
- Effective basic energy-efficiency measures can be incorporated into normal housing operations at a low cost.
- To ensure consistent high-quality implementation, maintenance staff should be required to complete a checklist, and administrative staff should include the energy measures on their readiness inspection and checklist prior to releasing the unit to a new resident.
- Whole-house energy consumption was reduced by up to 10%.
- Before air sealing, a qualified person should ensure that tightening a PHA's homes will not lead to indoor-air-quality problems.

Looking Ahead

A survey of housing authorities indicates broad interest in adopting an energy-efficiency turnover protocol. Model protocols developed for mixed-humid and cold climates are available for use from Building America.