Advancing Residential Retrofits in Atlanta
Program Partners

• Subcontract with Southface Energy Institute
• Program Partners
  • Johns Manville
  • A.O. Smith
  • Southern Company
  • Retrofit Contractors
Homeowners agree to participate in the program

Energy assessment, homeowner survey, and homeowner agreement is completed

Prioritization protocol is used to derive an initial list of retrofit measures

Give a list suggested measures to homeowners

ORNl and Southface team members meet to discuss retrofit measures

Energy Gauge is used to estimate energy savings and inform any needed changes in the retrofit list
Retrofit Case Study

Home Type: Existing Single-Family, Affordable
Location: Atlanta, GA
Size: 1,111 sq. ft., (2-bedroom/1-bath)
Date Completed: 1945
IECC Climate Zone: 3
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**Home Type:** Existing Single-Family, Affordable

**Location:** Atlanta, GA

**Size:** 1,111 sq. ft., (2-bedroom/1-bath)

**Date Completed:** 1945

**IECC Climate Zone:** 3

**Air infiltration:** 3,800 cfm50 (i.e. 25 ACH)

**Duct blaster test:** 5% duct leakage

**Combustion safety test:** atmospherically vented gas water heater passed all combustion safety tests; the gas furnace was a sealed combustion unit

**Cooling equipment:** 12 SEER, 24 kBtu/hr capacity

**Heating equipment:** 0.93 AFUE, 43 kBtu/hr capacity

**Water heating equipment:** 0.56 energy factor (EF)

**Estimated annual source energy:** 149 MBtu
Key Efficiency Measures

**Phase One**
- Crawlspace subfloor insulated and air sealed with R-11 medium-density, open-cell spray foam insulation (Icynene®)
- Doors weather-stripped
- Lighting upgraded to ENERGY STAR® compact fluorescent lights (CFLs)
- Air-sealing completed in attic (e.g. wall top plates, fireplace chase)
- Baseboards air sealed with caulk and one-part foam
- Programmable thermostat installed
- Chimney damper installed
- **Infiltration reduced to 20 ACH50 from 25 ACH50.**

**Phase Two**
- Uninsulated wall cavities insulated with R-13 blown cellulose
- ENERGY STAR® ceiling fans installed
- Air-sealing completed in attic (e.g. wall top plates, fireplace chase)
- Baseboards air sealed with caulk and one-part foam
- Whole-house fan removed and replaced with a Panasonic energy recovery ventilator (ERV)
- Appliances (dishwasher, clothes washer, and refrigerator) upgraded to ENERGY STAR®
- Two windows replaced with fiberglass MARVIN ENERGY STAR® windows; U-Value: 0.26 & SHGC: 0.21
- Low-flow toilet and faucet installed
- **Infiltration reduced from 20 ACH50 to 12 ACH50**
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Annual source energy savings of approximately 30%, or 45 MBtu.
Are Individual Homeowners the Only Target Audience for Deep Energy Retrofits?

• Deep energy retrofits are expensive and often have paybacks that outlast the life of the equipment.
• Economic paybacks are most often longer than the average time horizon that individuals homeowners use to make decisions.
• Saving energy doesn’t have the curb appeal of other competing investments.
• Homeowners face capital investments challenges.
• Each homeowner will likely only own one home that they can retrofit
Institutions May be the Hidden Gem
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• Institutions often have departments devoted to sustainability for the sake of sustainability (not cost effectiveness).
• Institutions can have longer economic paybacks since they will own the building longer than the average homeowner.
• Saving energy helps institutions promote a sustainable image.
• Institutions can have greater access to capital.
• Institutions can retrofit 1, 2, 20, or more homes they own
Institutions May be the Hidden Gem

The American College & University Presidents Climate Commitment is a high-visibility effort to make campuses more sustainable and address global warming by garnering institutional commitments to reduce and ultimately neutralize greenhouse gas emissions on campus.

Presidents from 667 colleges and universities have signed the Commitment.
Institutions May be the Hidden Gem
For Example,

Home Type: Existing Single-Family
Location: Atlanta, GA
Size: 3,703 sq. ft.
Date Completed: 1920’s
IECC Climate Zone: 3

Air infiltration: 12,691 cfm50 (i.e. 20.6 ACH)
Duct blaster test: 22% (attic), ?? (crawlspace)
Cooling equipment: 3.5 ton, 9.3 SEER (crawlspace); 2.5 ton, 9.5 SEER (attic)
Heating equipment: 0.91 AFUE (x2)
Water heating equipment: 0.59 energy factor
Tenant has Significantly High Utility Bills

$900.00
$800.00
$700.00
$600.00
$500.00
$400.00
$300.00
$200.00
$100.00
$0.00

Electricity
Natural Gas
Tenant has Significantly High Utility Bills

Total

- $1,000.00
- $900.00
- $800.00
- $700.00
- $600.00
- $500.00
- $400.00
- $300.00
- $200.00
- $100.00

Managed by UT-Battelle for the U.S. Department of Energy
Many Problems Exist
The Solution,
## The Solution,

<table>
<thead>
<tr>
<th>North Carolina Energy Upgrades</th>
<th>Estimated Site Energy Savings</th>
<th>Packaged Measures</th>
<th>Comments and Details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Infiltration</td>
<td>Reduce the infiltration 25%.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ducts</td>
<td>Repair, seal, and bring the ducts into conditioned space.</td>
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<tr>
<td></td>
<td>50%</td>
<td>Attic</td>
<td>Air seal and improve the existing average R-20 to minimum R-38 and improve knee wall insulation to minimum R-13.</td>
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<tr>
<td></td>
<td></td>
<td>Foundation</td>
<td>Insulate the band of the crawl space connecting to main floor. Seal and place minimum R-5 on foundation walls to bring HVAC into conditioned space.</td>
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<tr>
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<td></td>
<td>Infiltration</td>
<td>Reduced the infiltration to reflect 40%.</td>
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<tr>
<td></td>
<td>30%</td>
<td>HVAC</td>
<td>Upgrade both AC units to 16 SEER.</td>
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<td></td>
<td>Water Heater</td>
<td>RHEEM heat pump water heater.</td>
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</tbody>
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Thank You

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