



Presented at the 2017 ACEEE National
Conference on Energy Efficiency as a Resource

Case Study

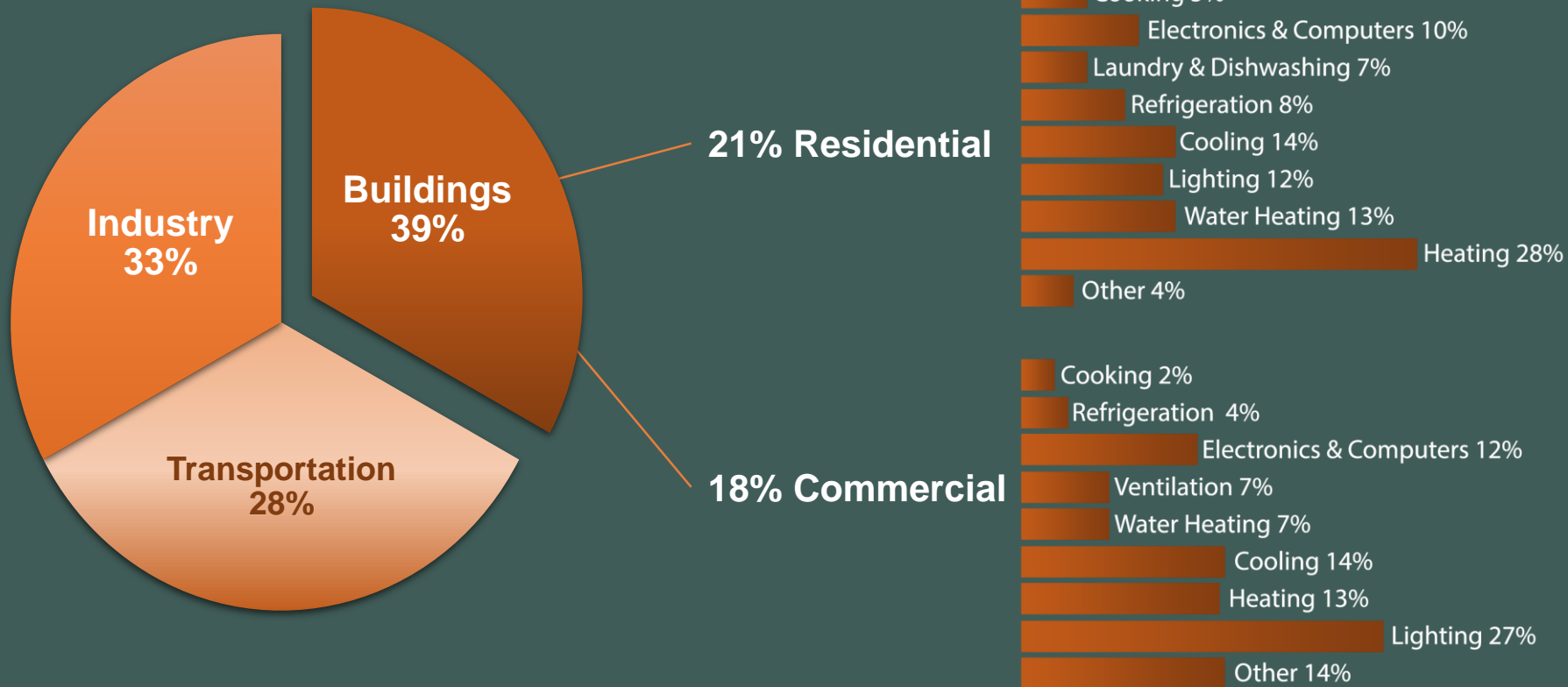
A Whole-House Approach to Energy Savings

November 7, 2017

Market Need/Opportunity for Improvement – Existing Homes

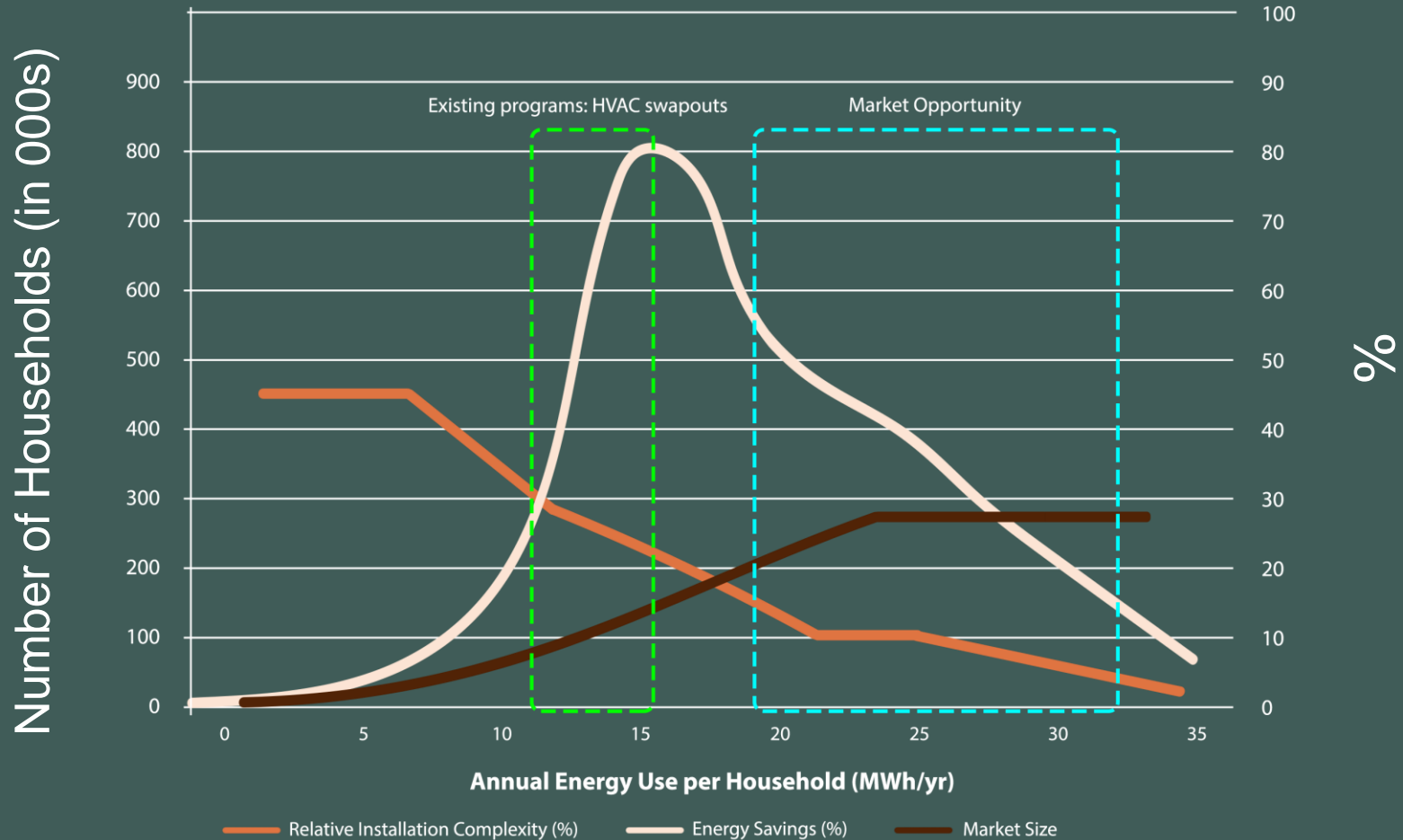
Energy Consumption in the U.S.

~ 130 million



Why important?

Example - Residential EE Consumer Market



Existing Home Retrofit Program Design

Target a small number of high energy usage homes.

Achieve:	Resource	Service	Mandate
• Energy savings/ lower bills	X	X	
• Increased customer satisfaction		X	
• Improved comfort		X	
• Peak load reduction	X		
• High program participation	X	X	
• High energy savings per measure	X	X	
• Low program costs	X	X	

Teaser Results from Pilot

- Avg Monthly net savings of \$24
- Avg annual savings of 10,800 kWh/yr (> 30%)
- Peak reductions of 27% summer and 46% winter
- 98% homeowner satisfaction
- Over 125 participating homes – 8 month pilot (6/2011-2/2012)

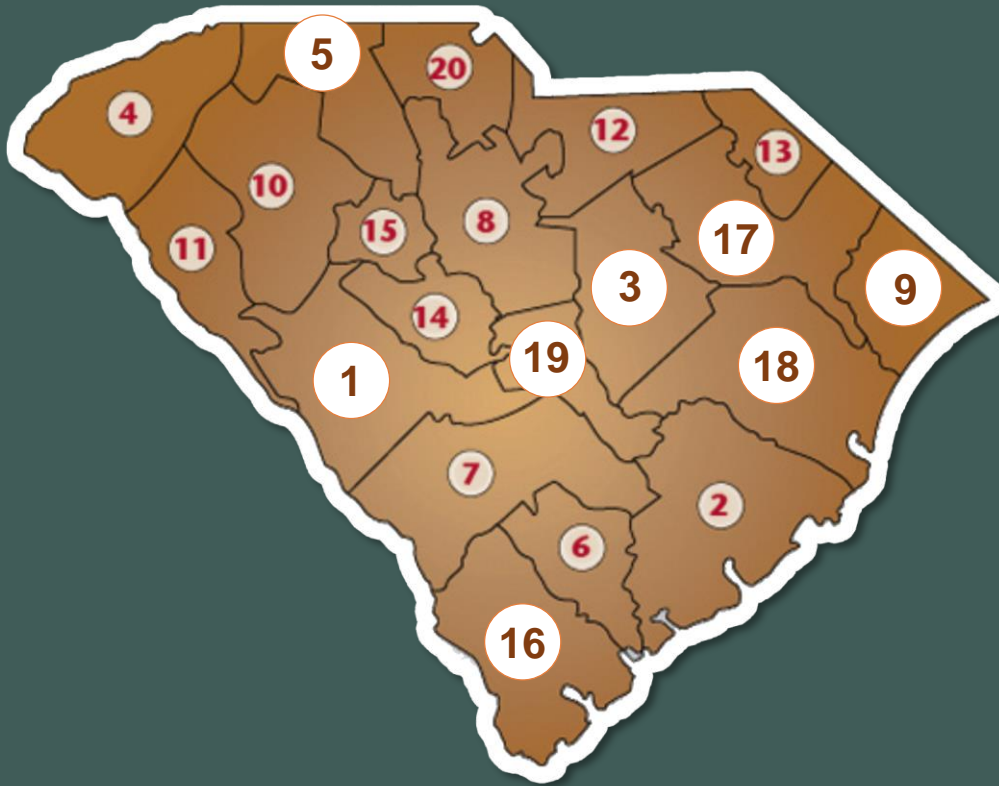
High
Savings
Per House

High
Customer
Satisfaction

High
Program
Participation

Testimonials

8 Participating Electric Co-ops and...



- #1 Aiken
- #3 Black River
- #5 Broad River
- #9 Horry
- #16 Palmetto
- #17 Pee Dee
- #18 Santee
- #19 Tri-County

And

- 1st Cooperative Federal Credit Union
- Central Electric Co-op
- KW Savings (non-profit admin)
- Environmental and Energy Study Institute
- Ecova + Advanced Energy

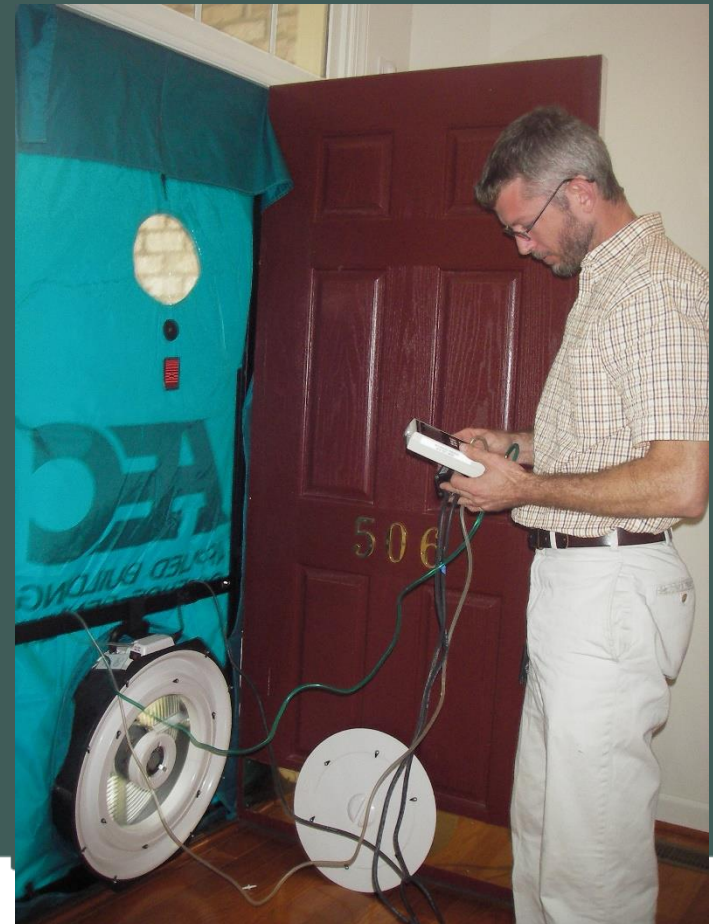
Homeowner Qualifications

- All electric homes; stick-built and manufactured homes
- Owned or landlord sign-off for rental
- No Health & Safety concerns (local weatherization)
- Top third in energy usage of 650,000 homes
 - Avg SC coop home 15,000 kWh/yr
 - Avg pilot home 30,000 kWh/yr
- Must have good payment history for last 12 months
- At least 12 months of pre-retrofit energy usage

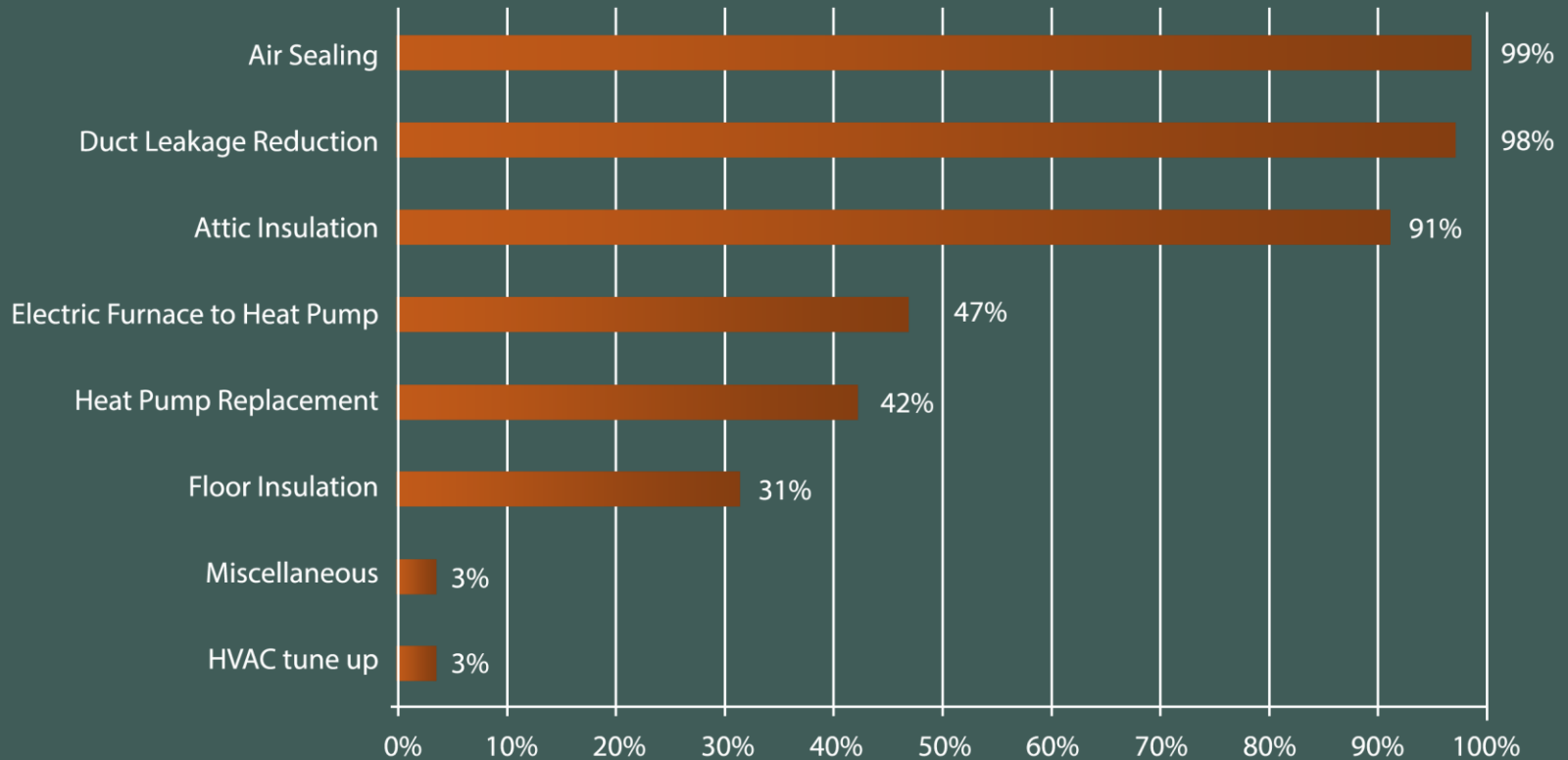


Contractor Qualifications

- Certifications
- Comprehensive Audit training including House Characterization and Performance Testing Equipment
- Software training



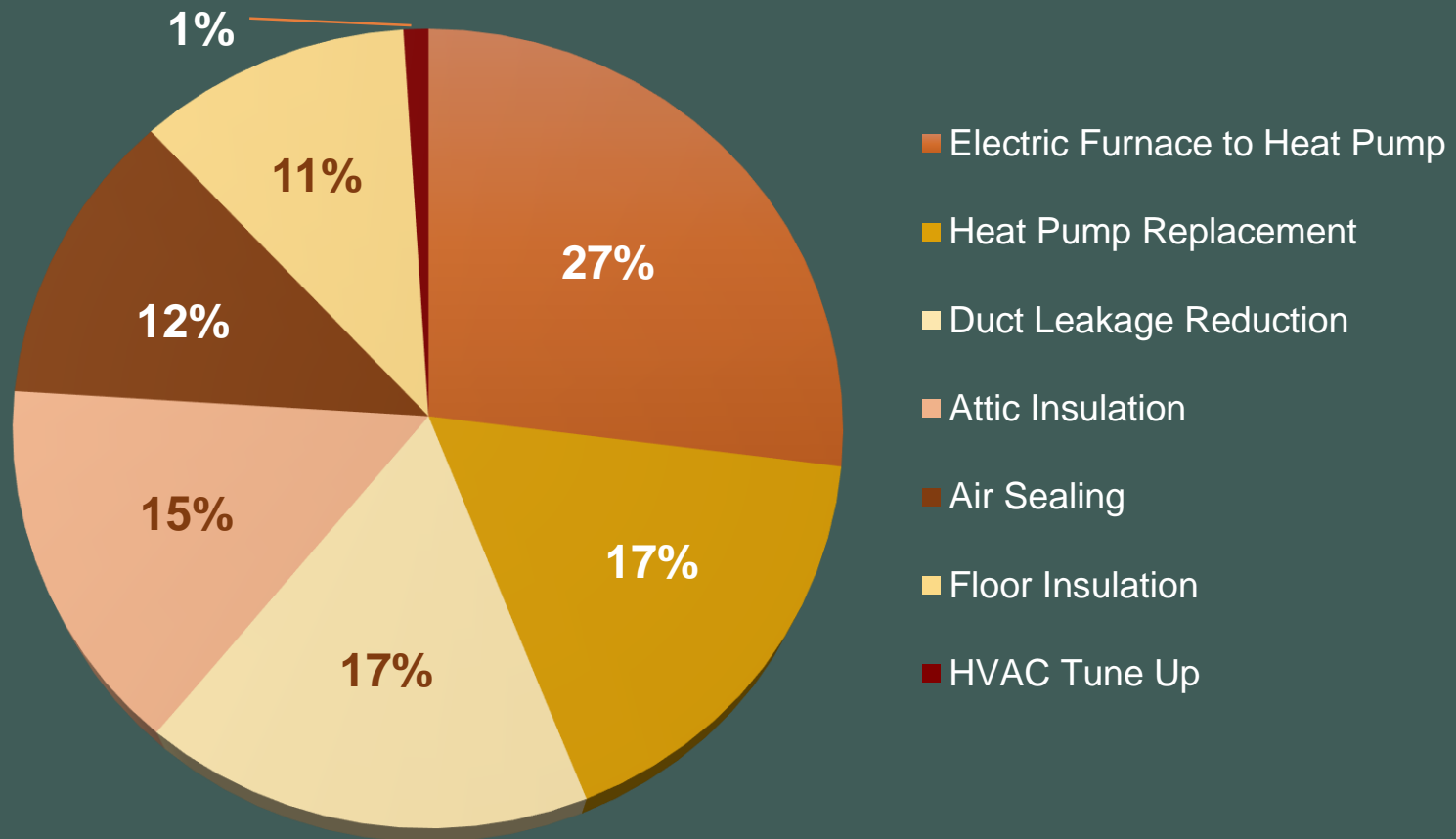
Retrofit Measures



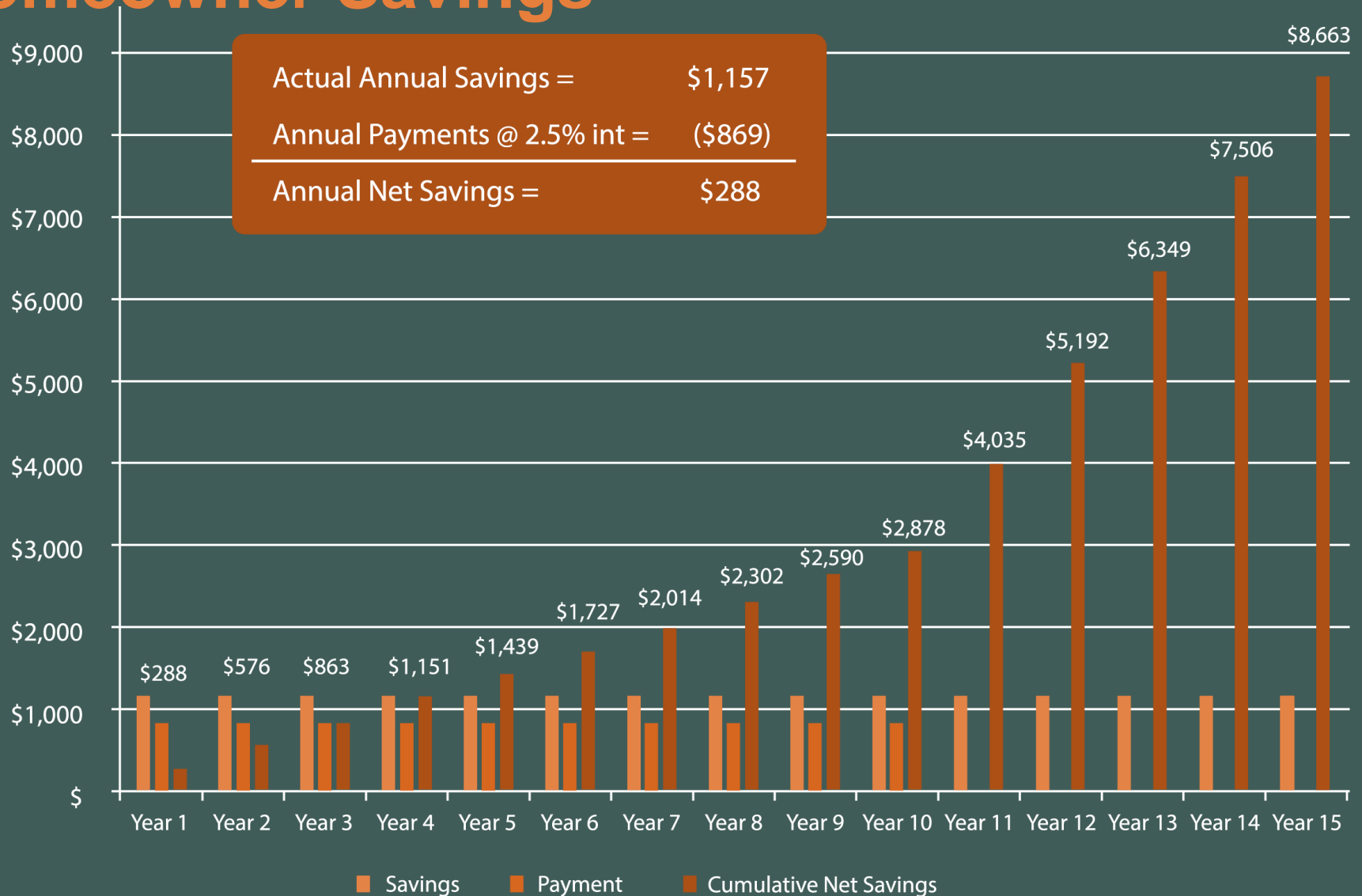
www.eesi.org/files/HelpMyHouseFinalSummaryReport_June2013.pdf

Retrofit Measures

Distribution of Savings from Pilot Measures



Homeowner Savings



Outcomes – Phase I (2011-2012)

- USDA Rural Economic Development Loans & Grants
- High program participation (125 homes)
- Avg loan of \$7200
- Avg measured savings 10,800 kWh/year (~34% savings)
- Coincident peak demand reductions (27% in summer, 46% in winter)
- High customer satisfaction (98% in 2012 and 96% in 2013)
- Default Rate < 1%

Participant Testimonials

“I am saving about \$300 to \$400 a month.”

“They were genuinely concerned about my high utility bills.”

“It is not a big payment. It is something I can afford.”

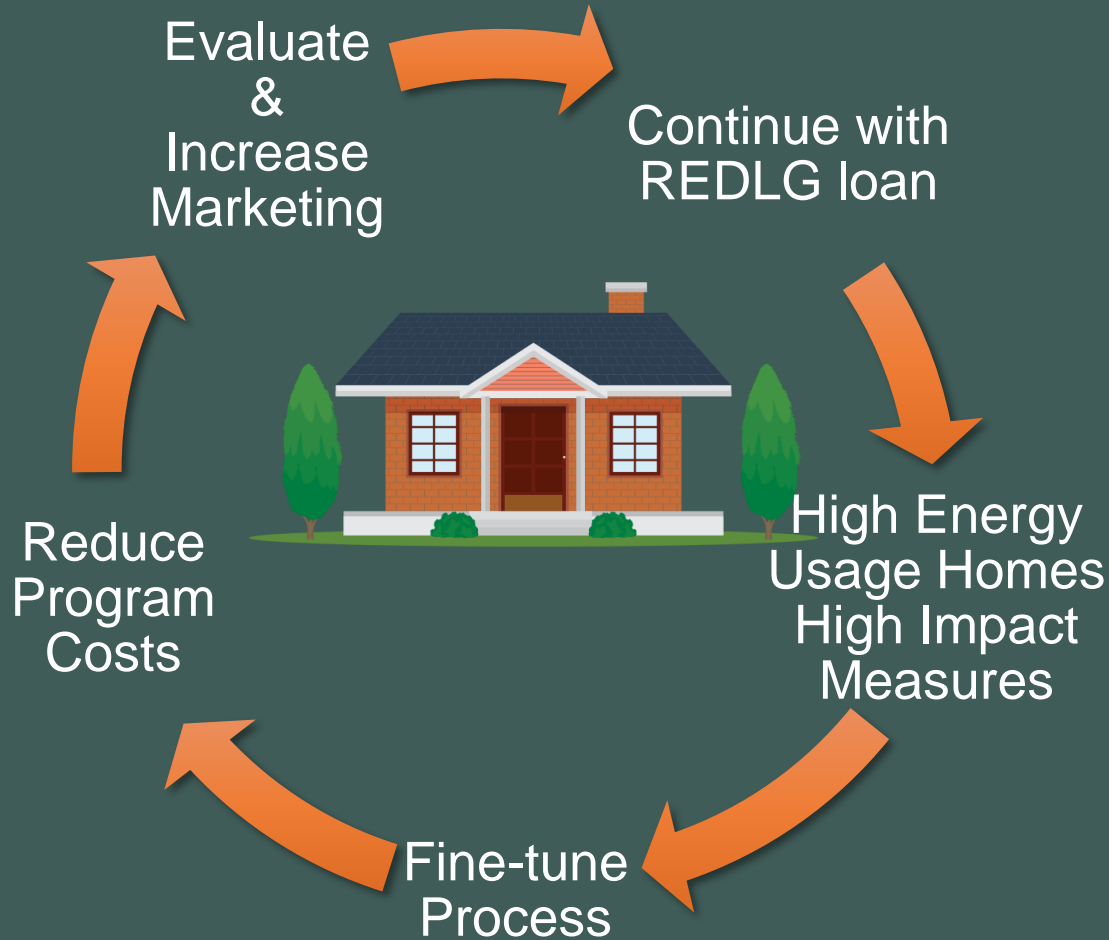
“I would not be in the home if I did not get the Help My House loan.”

“During winter, it keeps it warm. During summer, it keeps it cool.”

Pilot Recommendations

1. Co-ops offer OBF programs. Great service to members.
2. Collaborate with others to standardized a program to reduce costs and improve quality.
3. ID a centralized support organization to improve the efficiency and the quality of program delivery.
4. Support emergency replacements for heat pumps and water heaters.
5. Co-deploy load control devices, which will improve load factor and benefit the system, the power purchaser and even the non-participants.
6. Consider including renewables and eventually energy storage.
7. Standardize process to scale up for interested co-ops.

Into Phase II (2012-2017)



Outcomes – Phase II (2012-2017)

525 HOMES



Phase III Status

- 2017- Future
- USDA Rural Energy Savings Program - \$13M
- KW Savings RFP for Implementation Contractor and Software
- Partners to help with the Low and Fixed Income Health and Safety weatherization prior to retrofits.

Summary: Weatherization based on Energy Savings – not enough.

What are the financial costs of the rate structure?

There are THREE main categories of cost incurred by our system by residential and commercial members:

1. Account charge Residential 80¢/day Commercial \$1.10/day

This recovers the cost of making service available to each member.

2. Energy charge Residential 4.7¢/kWh Commercial 5.7¢/kWh

This is the energy portion of the power cost.

3. On-Peak charge Residential \$12/kWh Commercial \$14.75/kWh

This is the rate for the highest ONE hour of electric use during the On-Peak time frame of the billing period.

Summary: Utility OBF weatherization programs

- Whole house retrofit works – design a good program.
- Retrofit is both a resource and a service.
 - For South Carolina cooperatives, it is currently just a member service.
- Low Income (LI) – our retrofit program is not a LI program, but is a loan program.
 - It serves the LI and fixed income communities
 - Need a plan to address Health and Safety – who are your partners
- Demand – How do you account for the demand savings?
 - Understanding the demand impacts helps justify wholesale power savings
 - Rates are changing which will impact the return for homeowners

Thank you!

Jonathan Coulter

jcoulter@advancedenergy.org

Mike Smith

mike.smith@ecsc.org

Why important?



PAIN



SATISFACTION

Data

Year Built	# of Homes	Avg Square	Avg Attic	Avg Floor	Avg Annual	kWh
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Single Family Detached

1900-1909	1	2,100	13.0	0.0	0.0	39,243
1920-1929	1	1,909	0.0	0.0	0.0	29,881
1940-1949	3	1,678	8.7	3.7	0.0	30,206
1950-1959	6	1,763	13.5	5.5	3.2	29,612
1960-1969	8	1,667	13.5	7.8	3.8	33,079
1970-1979	16	1,689	16.1	10.3	7.4	31,633
1980-1989	10	1,858	19.3	10.6	8.3	29,234
1990-1999	6	2,003	19.2	9.3	7.5	33,016
2000-2009	2	2,619	24.5	13.0	19.0	35,737
TOTAL	53	1,808	15.9	8.7	6.3	31,511

Manufactured Home Double Wide

1970-1979	2	1,652	19.0	11.0	1.9	27,423
1980-1989	10	1,547	9.6	9.6	1.9	28,173
1990-1999	43	1,796	10.3	9.6	2.0	31,483
2000-2009	13	2,123	9.6	9.6	1.9	34,552
TOTAL	68	1,818	10.2	9.6	2.0	31,436

Manufactured Home Single Wide

1980-1989	1	1,008	9.6	9.6	1.9	31,218
1990-1999	3	1,253	9.6	9.6	1.9	27,579
TOTAL	4	1,192	9.6	9.6	1.9	28,489

AVERAGE	125	1,793	12.6	9.2	3.8	31,388
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Help My House Process

- High energy usage
- Single family or manufactured home
- Air sealing, duct sealing, heat pumps replacement, attic insulation, floor insulation



1 Energy advisor identified and screened participants

Co-ops looked for homes with higher than average energy usage

2 Energy advisor conducted visual audit

This brief walk-through audit determined if a more comprehensive audit was needed

3 Auditor conducted comprehensive audit and modeling

Blower door and duct blaster tests by a certified auditor and computer modeling helped determine measure cost-effectiveness and measureable targets for quality assurance

4 Participant got bids, selected contractors and signed loan documents

Contractors were trained, approved and used standard bid sheets

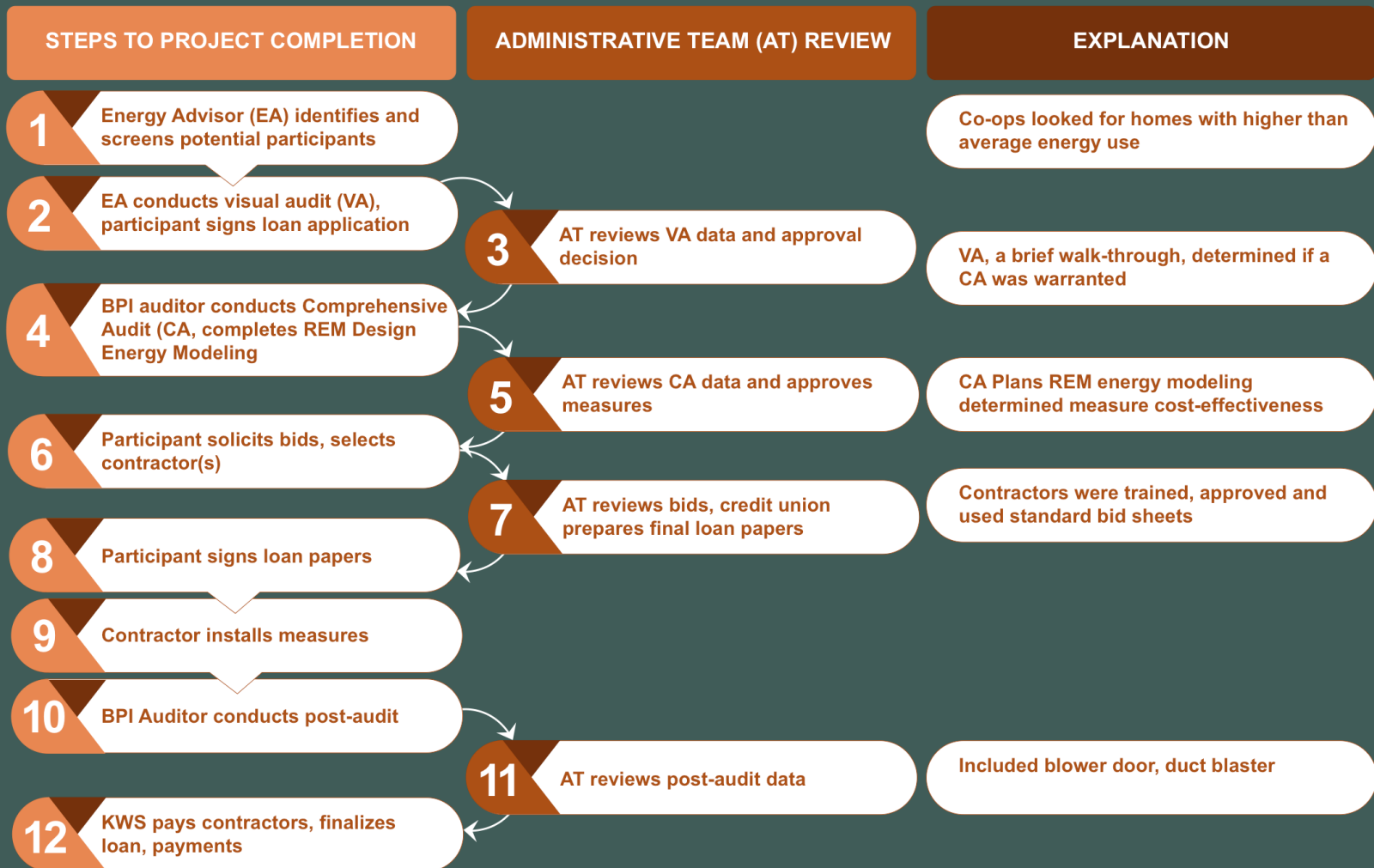
5 Measures installed

Contractors performed efficiency retrofits

6 Projects inspected and approved, KW Savings paid contractors

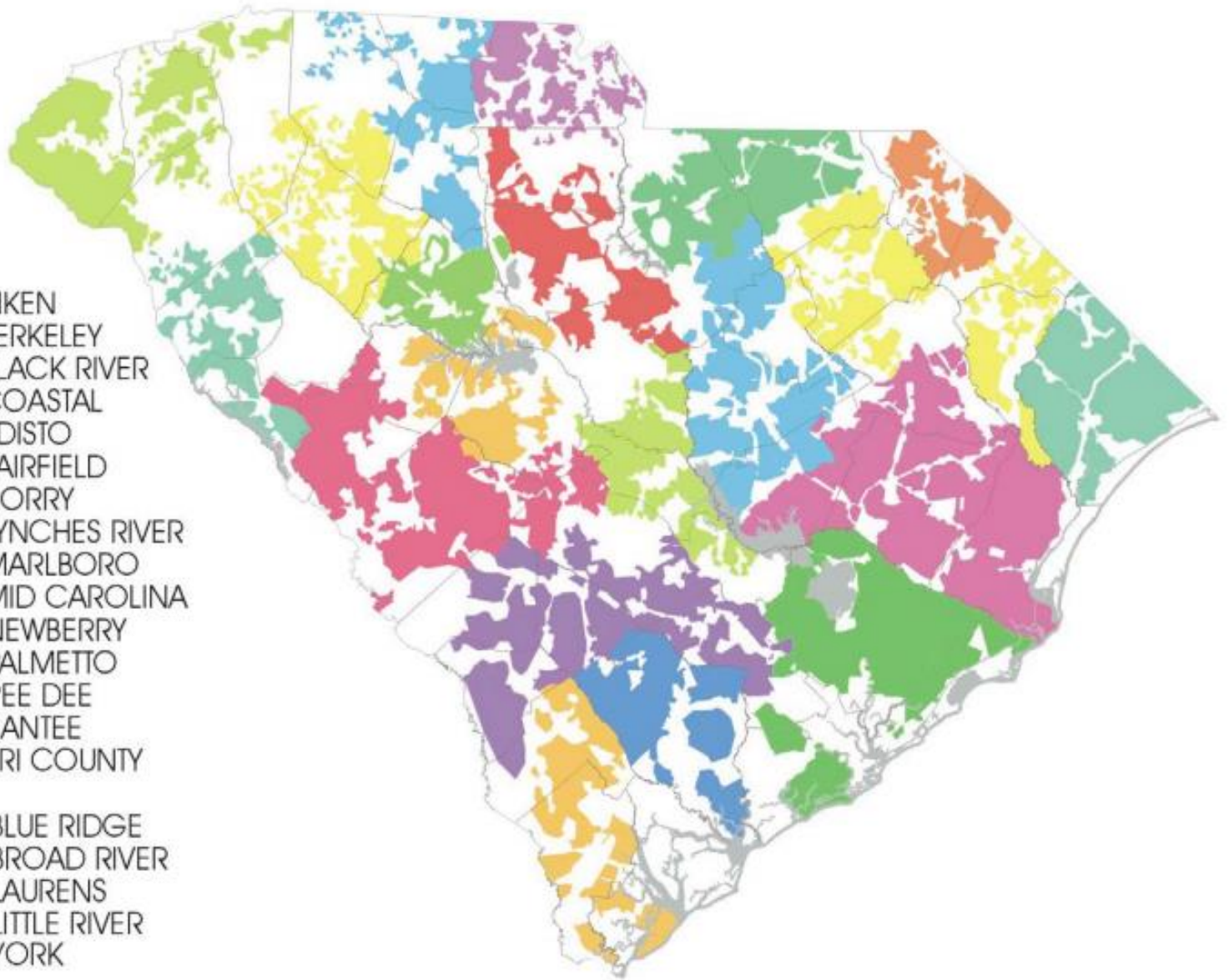
Inspection included testing for air leaks and duct leakage

Project Workflow



- AIKEN
- BERKELEY
- BLACK RIVER
- COASTAL
- EDISTO
- FAIRFIELD
- HORRY
- LYNCHES RIVER
- MARLBORO
- MID CAROLINA
- NEWBERRY
- PALMETTO
- PEE DEE
- SANTEE
- TRI COUNTY

- BLUE RIDGE
- BROAD RIVER
- LAURENS
- LITTLE RIVER
- YORK



Homeowner Savings

