



Home Performance With Energy Star, Which Measures Get You 30% Savings?

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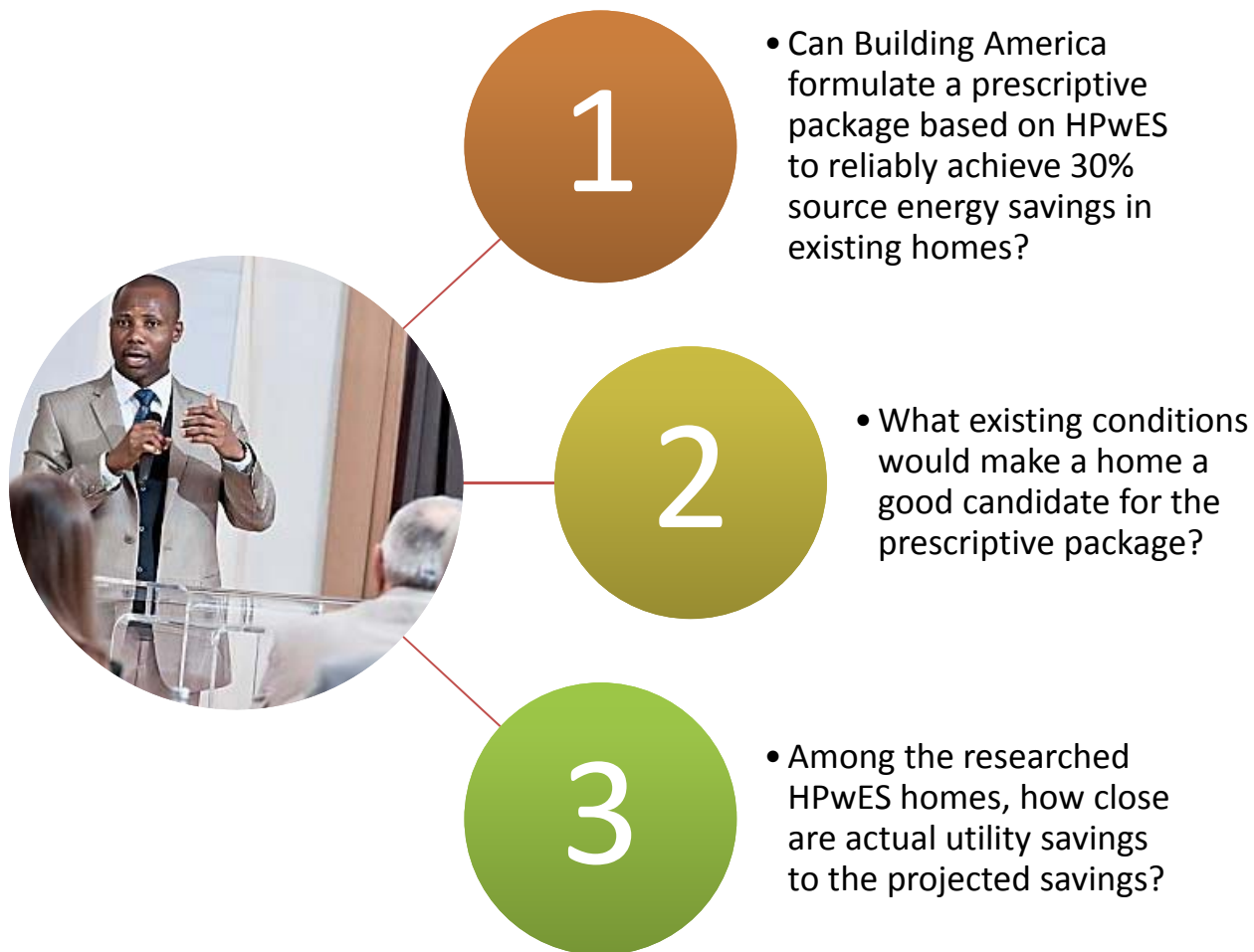
Building America Retrofit Alliance



Context



Research Questions



New Jersey HPwES

Home Performance with ENERGY STAR

Home Performance with ENERGY STAR is your "whole-house" solution for a more energy efficient, comfortable home. Find out where the money is escaping from your house and learn how to put 5%-30% of your energy bill back in your pocket!

A photograph of a two-story house with a white picket fence in front. The house has a gabled roof and a small porch with a door. There are some plants and flowers in front of the house.

Program Highlights

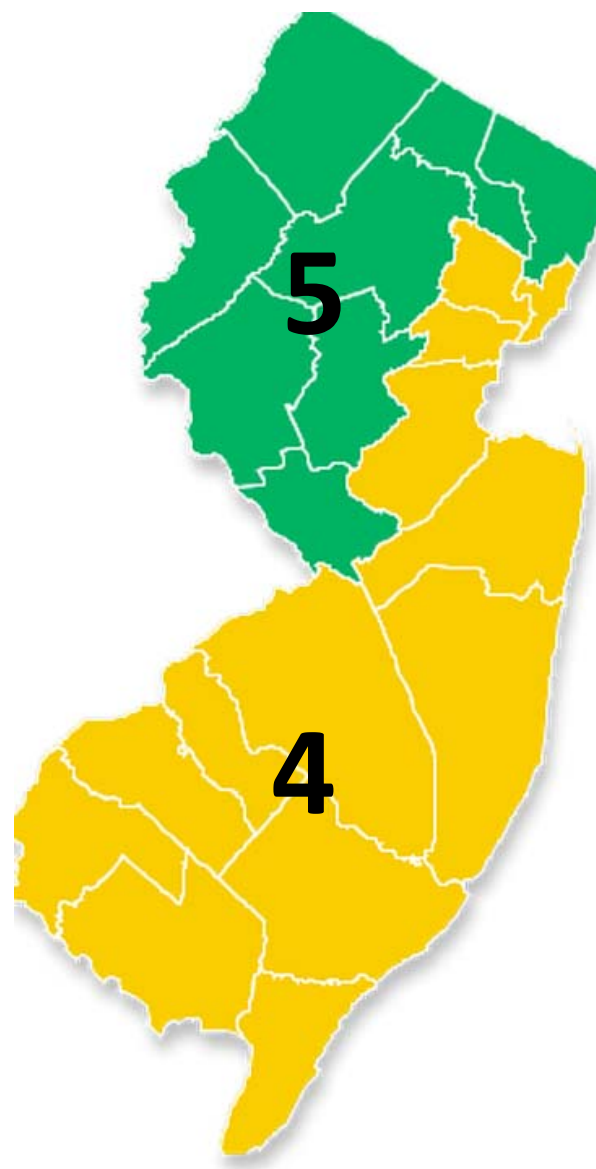
- Rebates up to \$5,000 and 0% interest loan!
- Save up to 30% on energy costs.
- Work with specially trained and certified technicians, who will assess your home from top to bottom by conducting a home energy audit. This video can show you what to expect.

Find a Home Performance contractor today!

- BARA worked with the NJ Clean Energy Program and culled the top 50 projects in 2011 for projected energy savings
- 42 had modelled savings of at least 25%
- 17 provided utility data

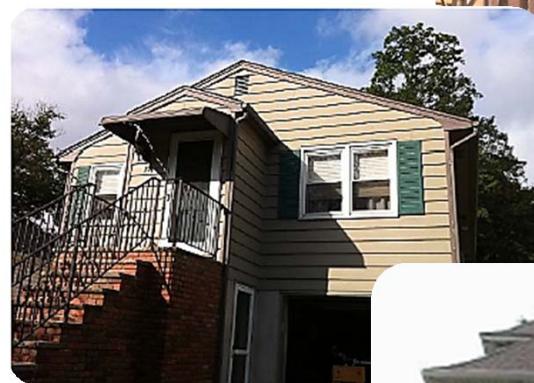
New Jersey Climate

- Mixed Humid
 - 8 Northern counties in IECC climate zone 5
 - 13 Central and Southern counties in IECC climate zone 4



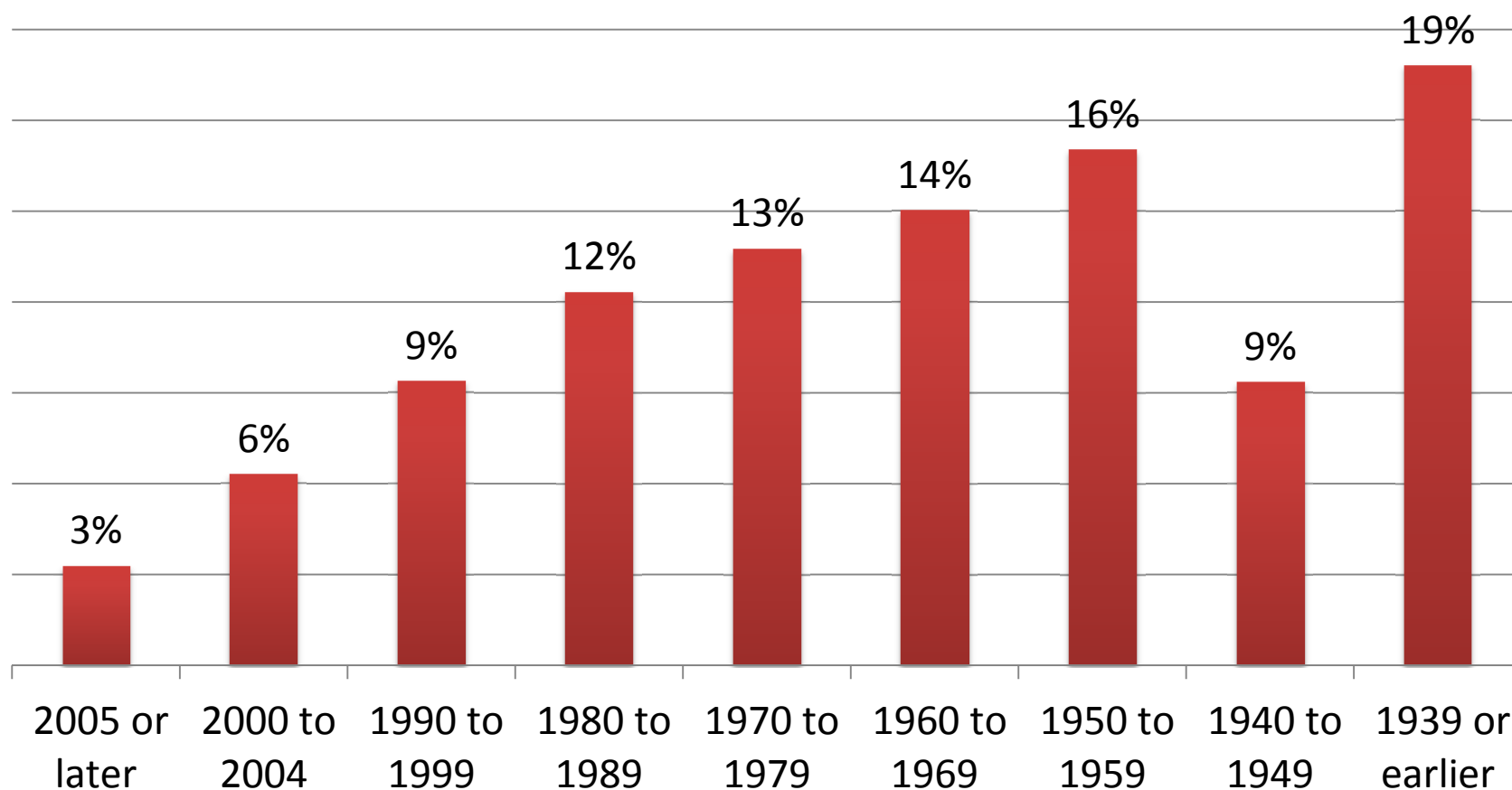
New Jersey Housing Stock

- 3.5 million existing housing units
- 38% in multi-unit structures
- 62% single family detached



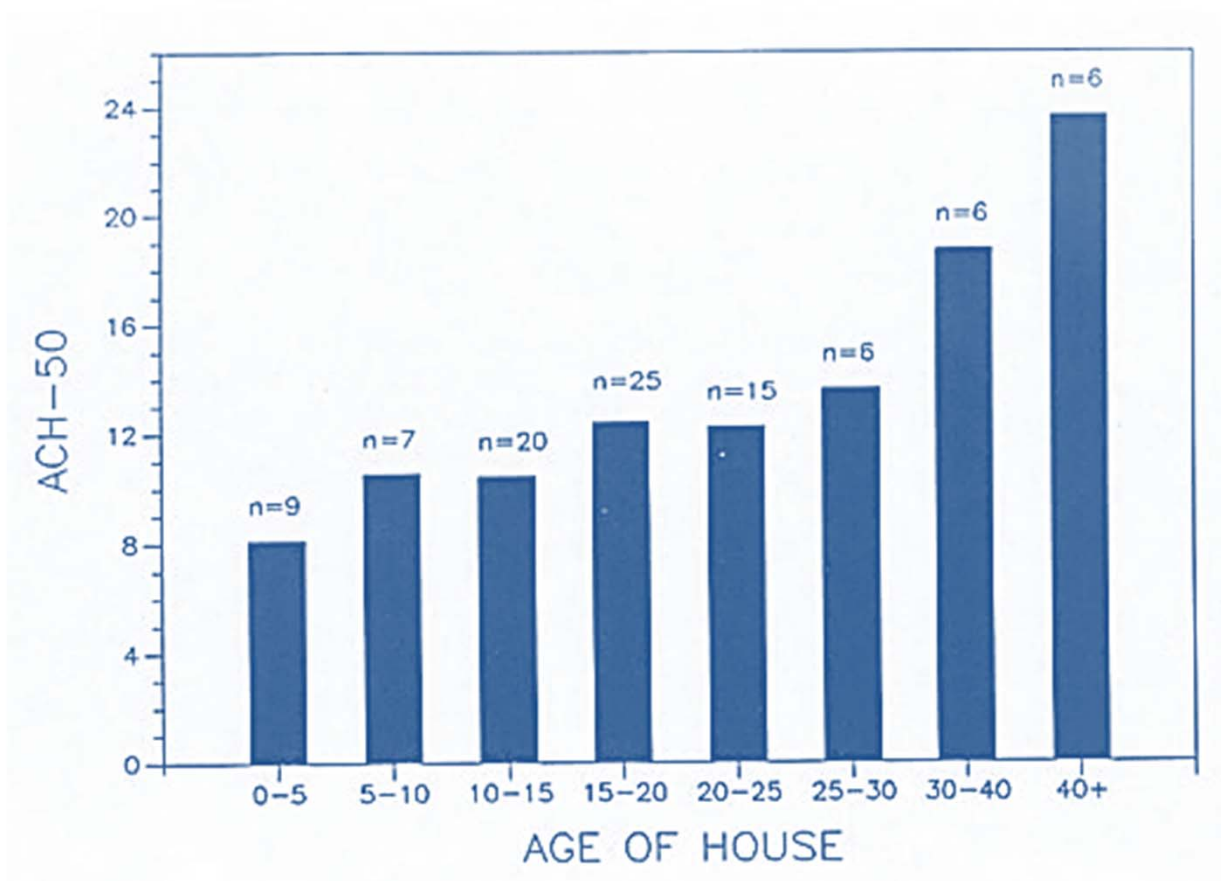
NJ Housing Stock, 3.5 Million Units

Year Structure Built



Older Houses are Leakier

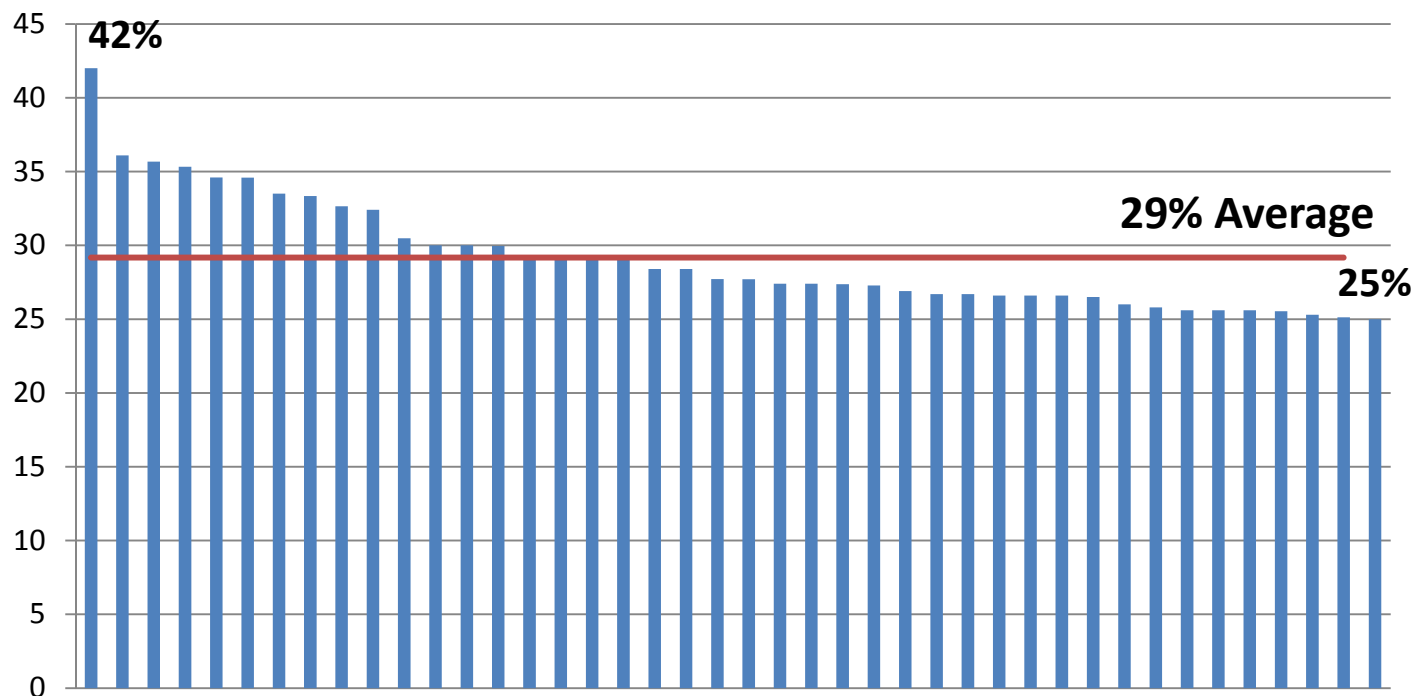
Figure 7. House airtightness (ACH50) as a function of age, measured by blower door in 95 Florida homes. Average = 12.7 ACH50.



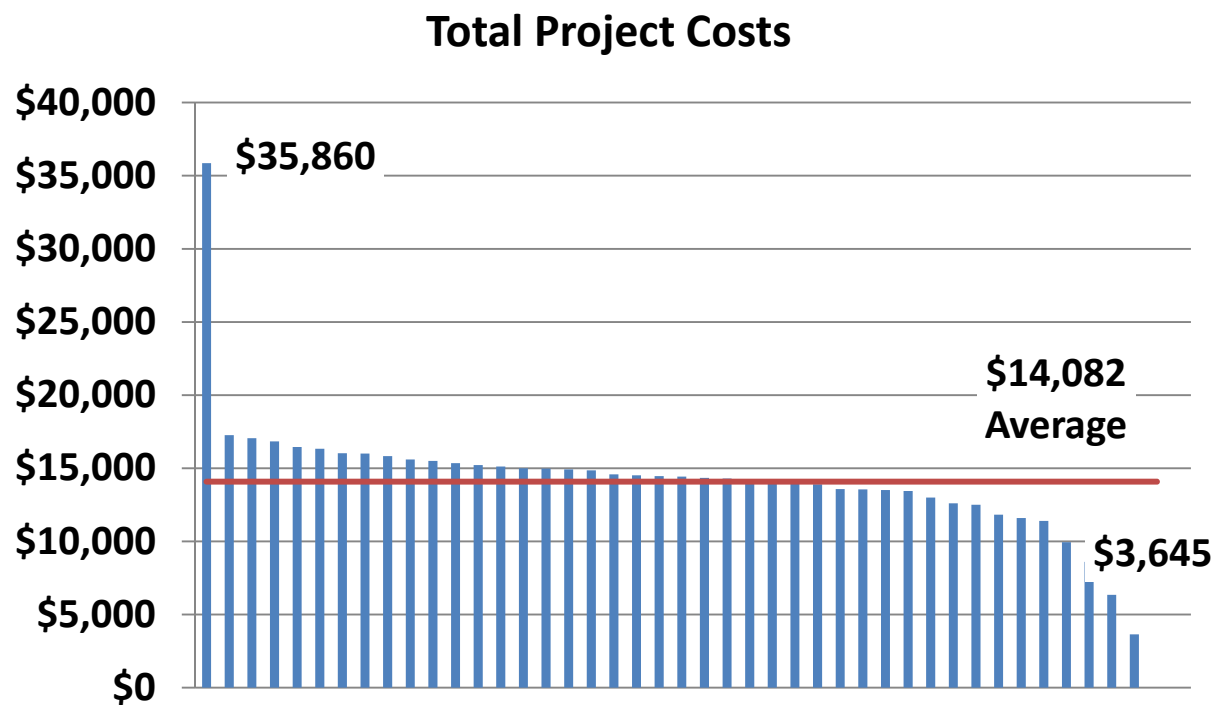
FSEC, 1991

Top 42 homes in 2011 NJ HPwES

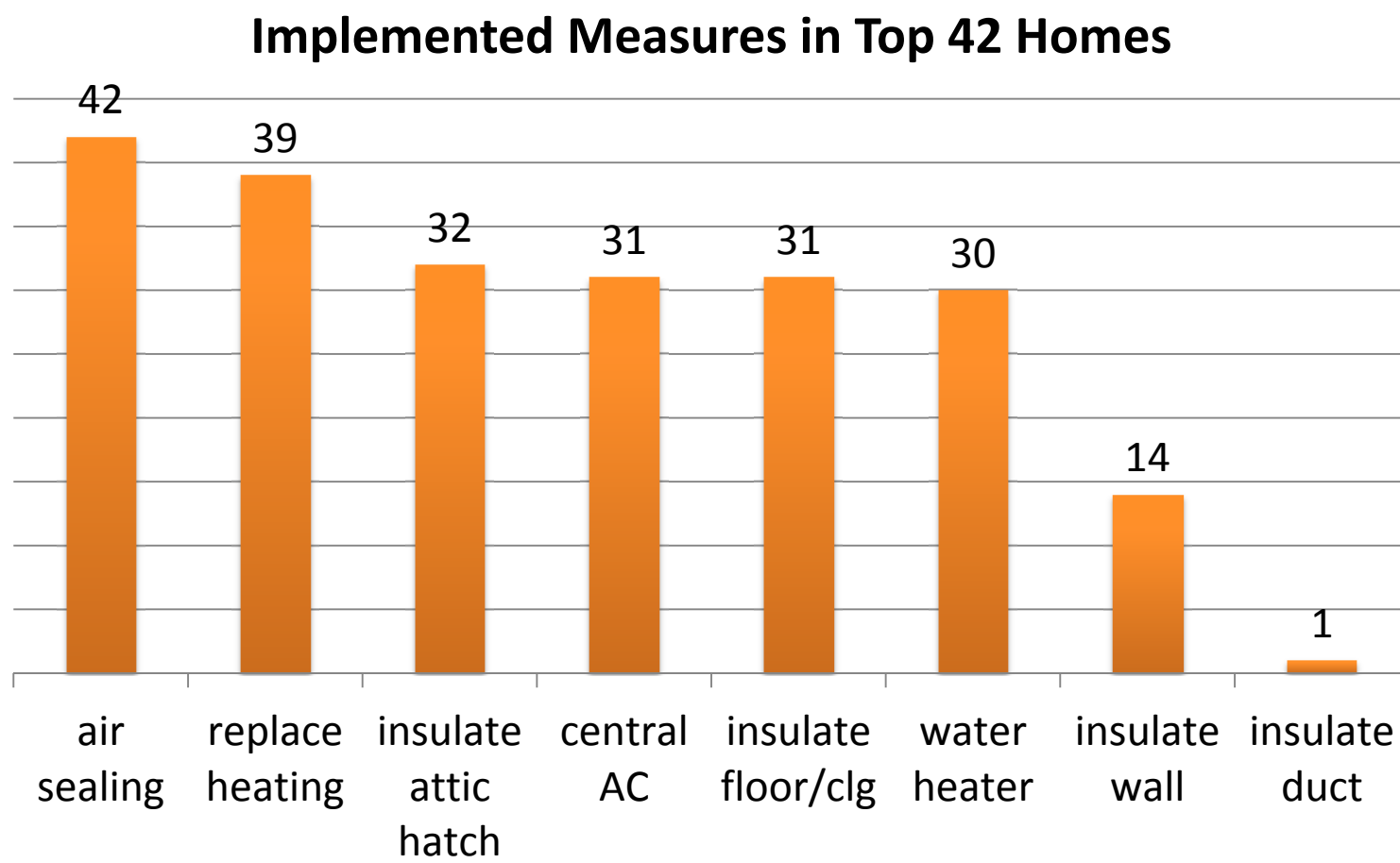
Percentage Modelled Total Energy Savings



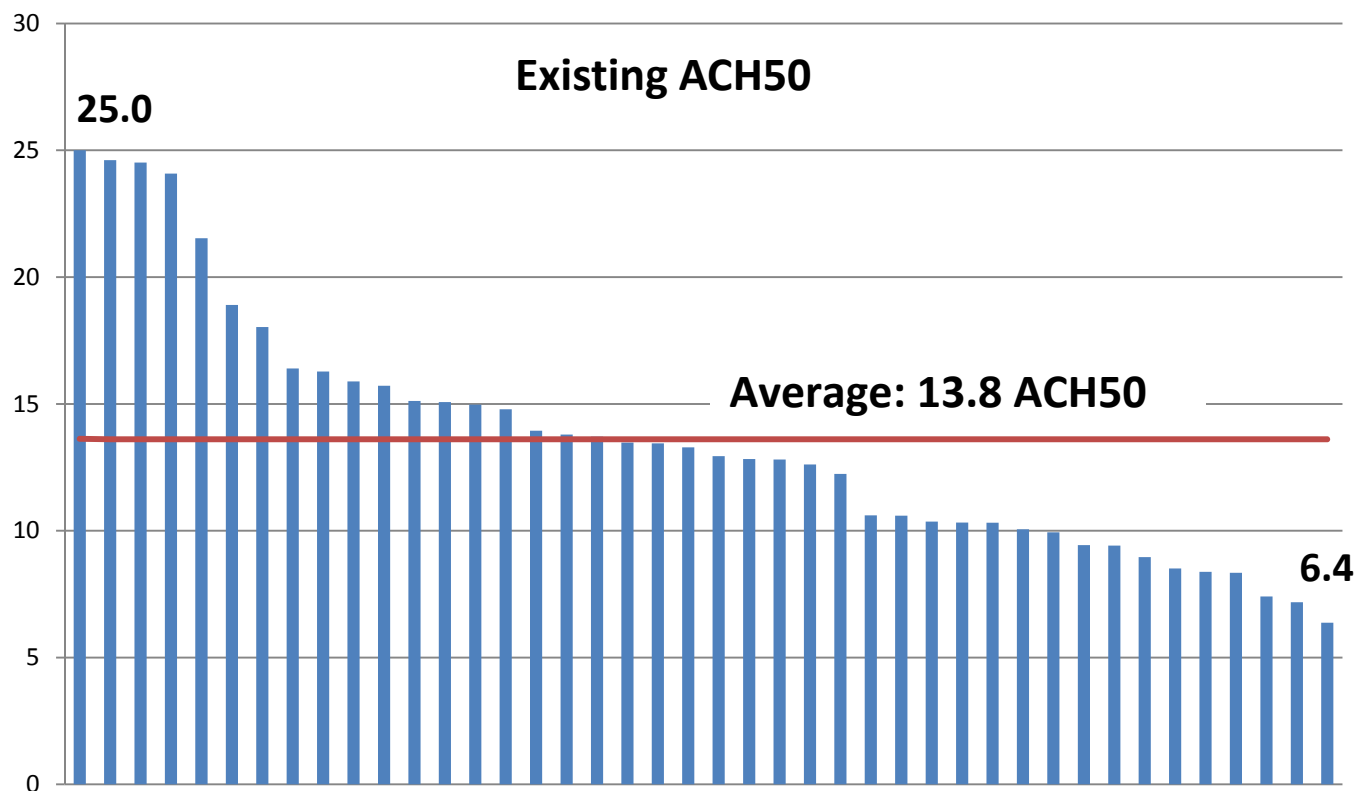
Top 42 homes in 2011 NJ HPwES



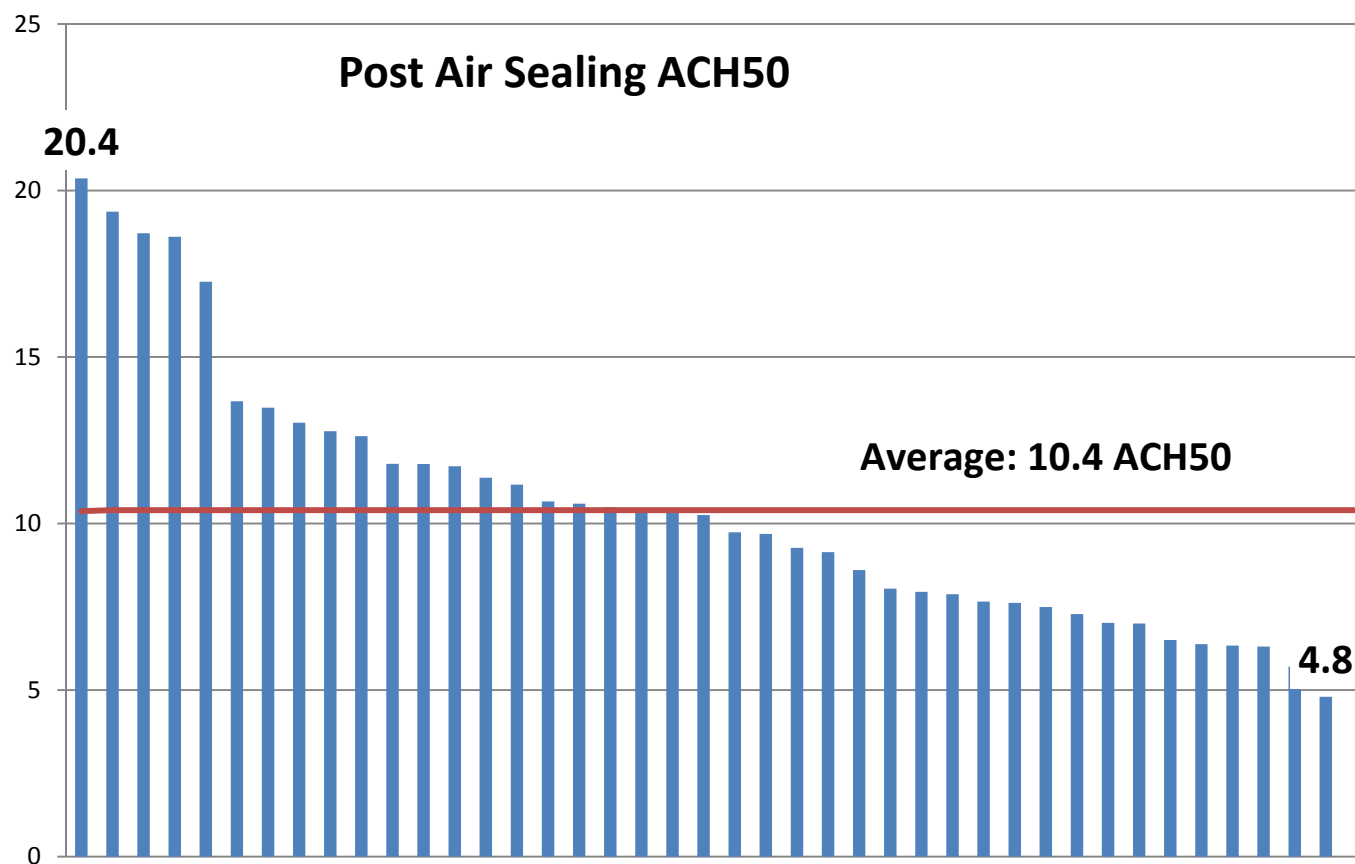
What measures were used in the 42 homes?

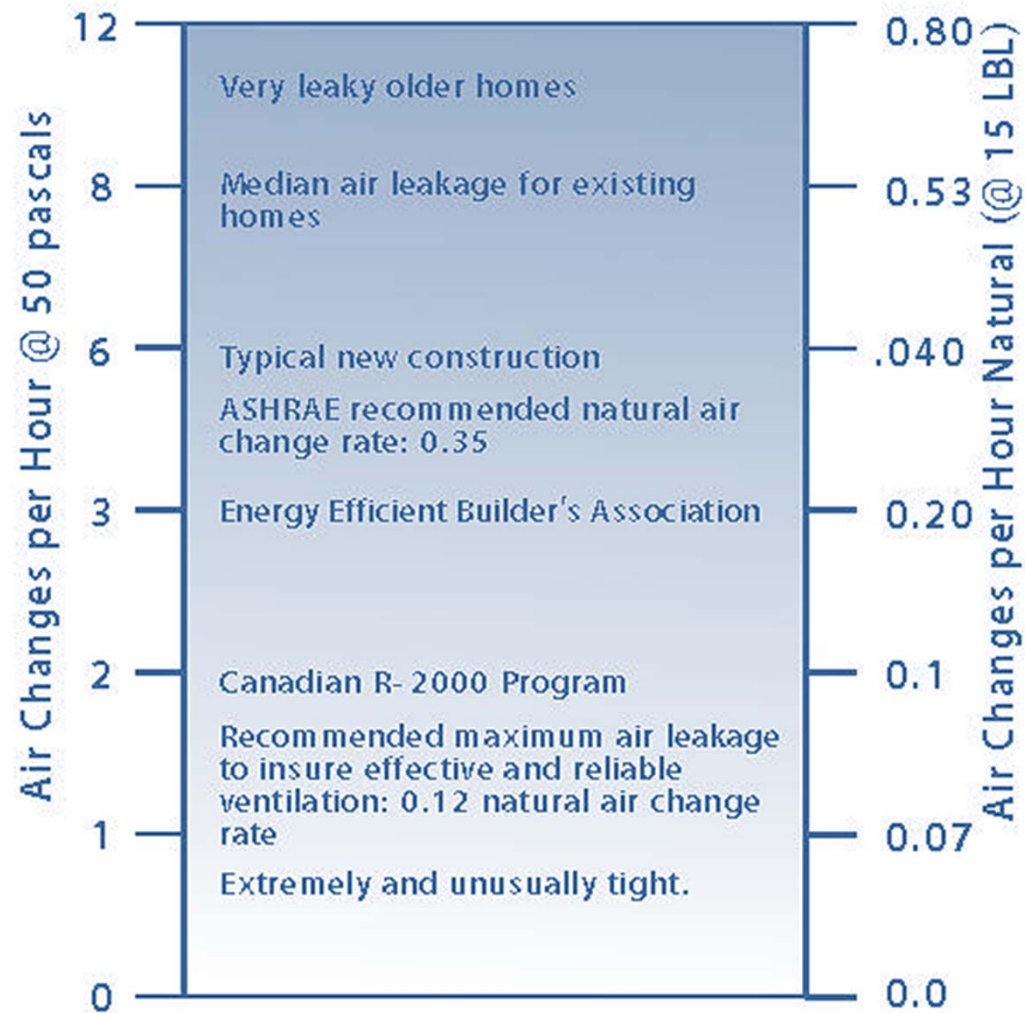


Air Sealing, 42 Homes: Existing Conditions



Air Sealing, 42 Homes: Results

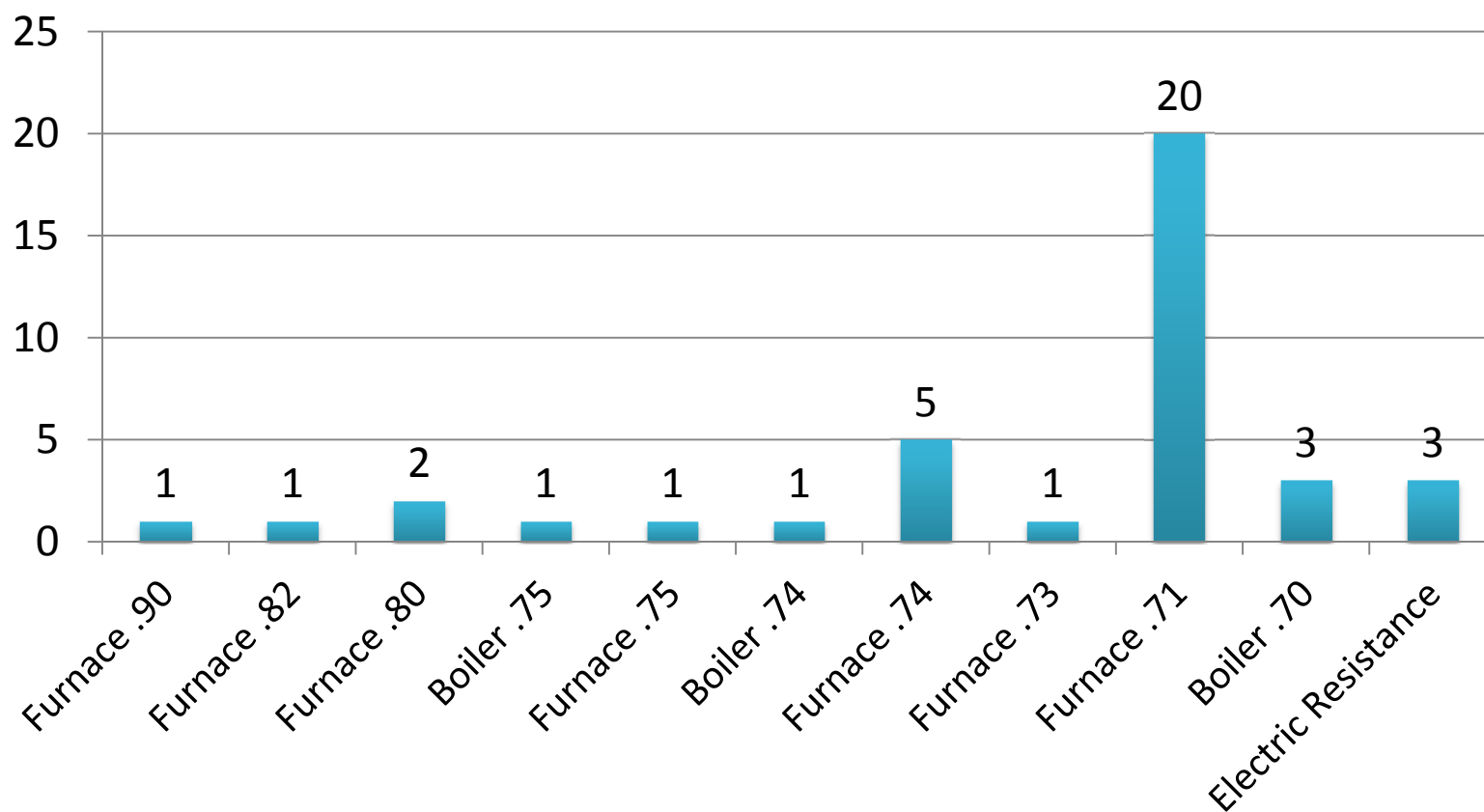




(Kriger & Dorsi, 2009)

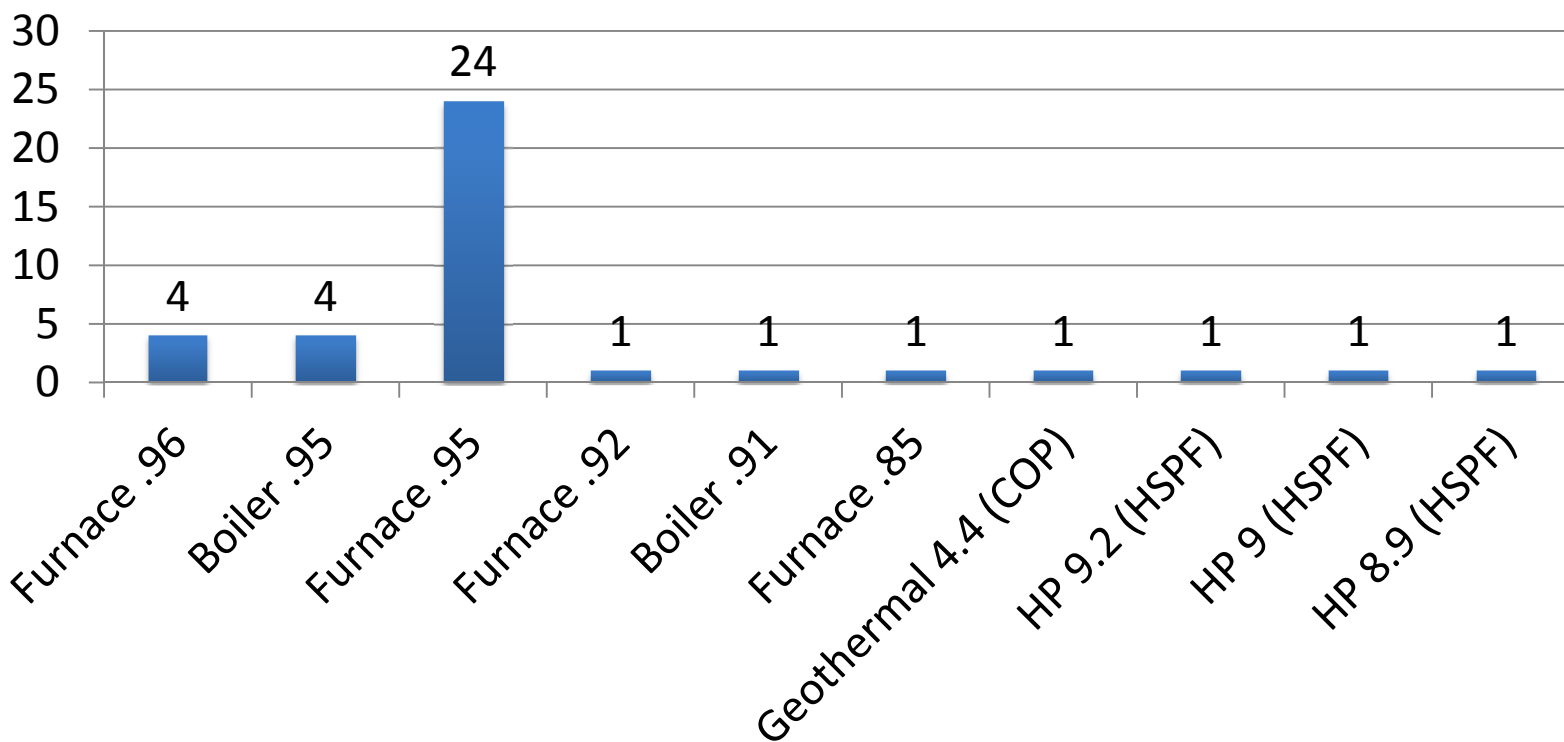


Heating Replacement, 39 Homes: Existing Systems

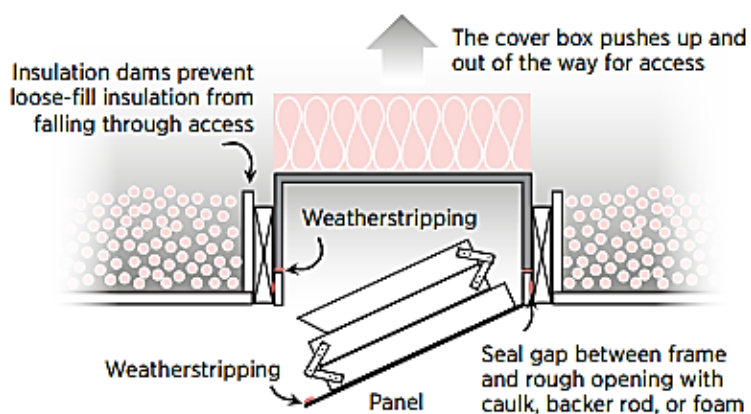


Heating Replacement, 39 Homes: New Systems

Replacement Heating Systems



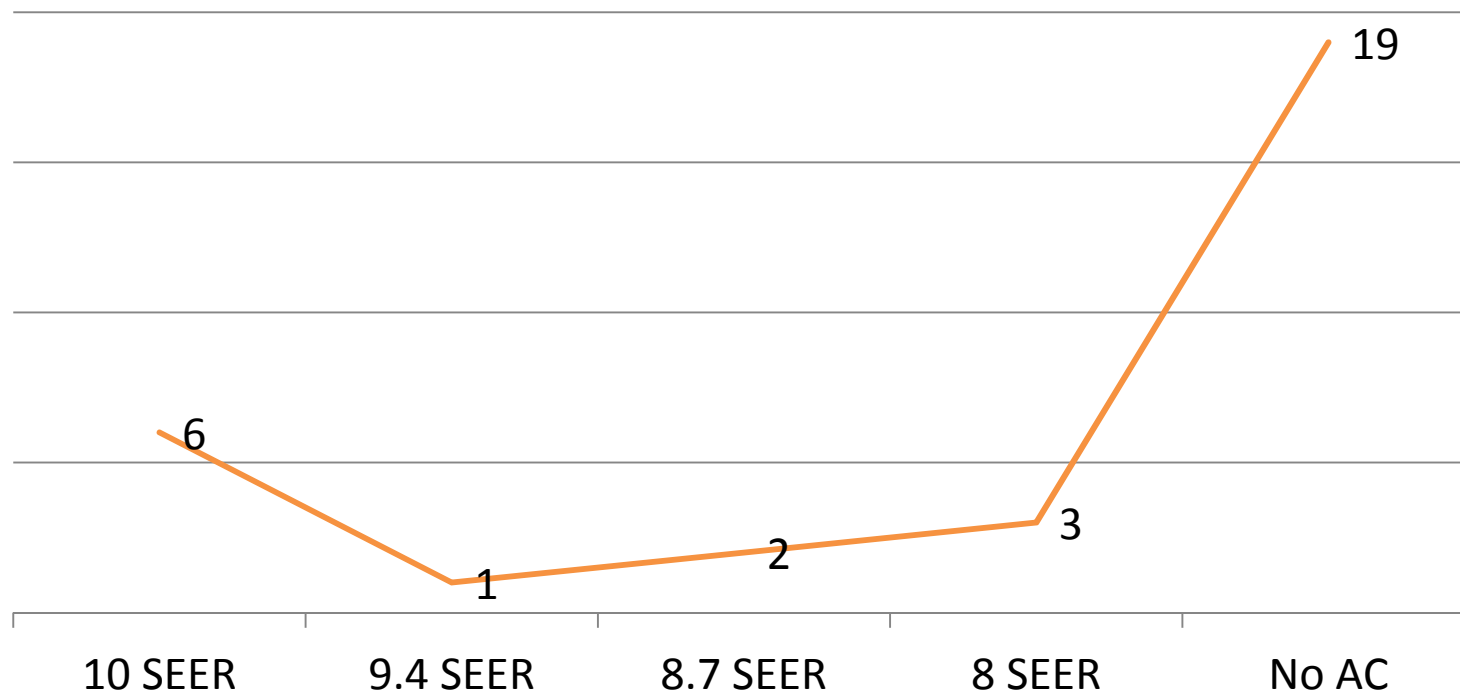
Insulate Attic Hatch, 32 Homes: Insulation Level



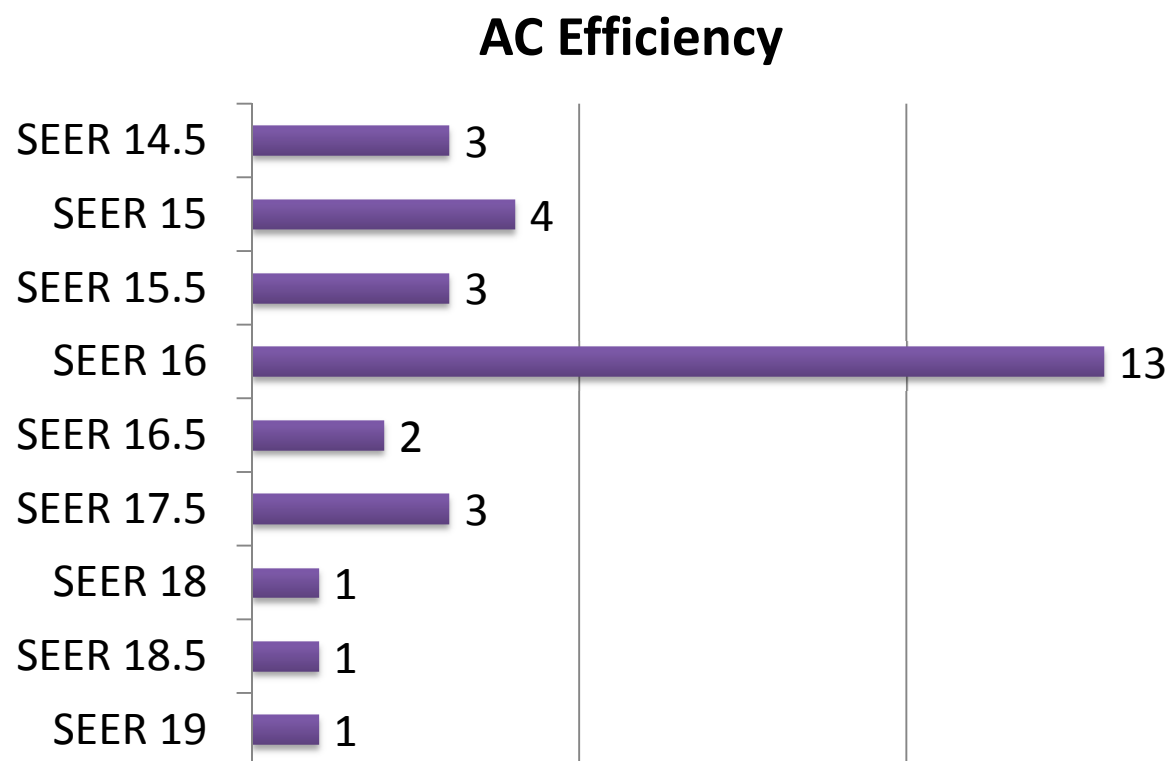
PNNL, 2010

- Insulate Hatch to R19:
 - 21 homes
- Install R14 Stair cover:
 - 11 homes

Install Central AC, 31 Homes: Existing Systems



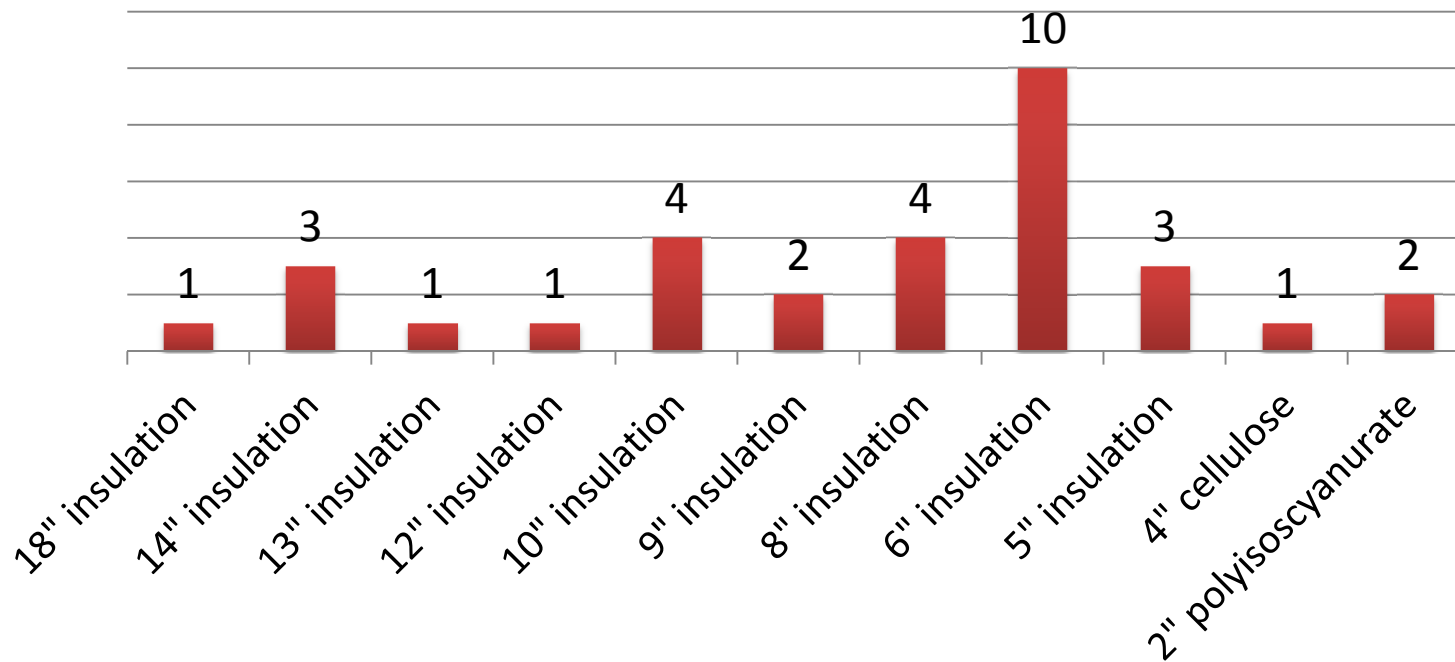
Install Central AC, 31 Homes: New Equipment



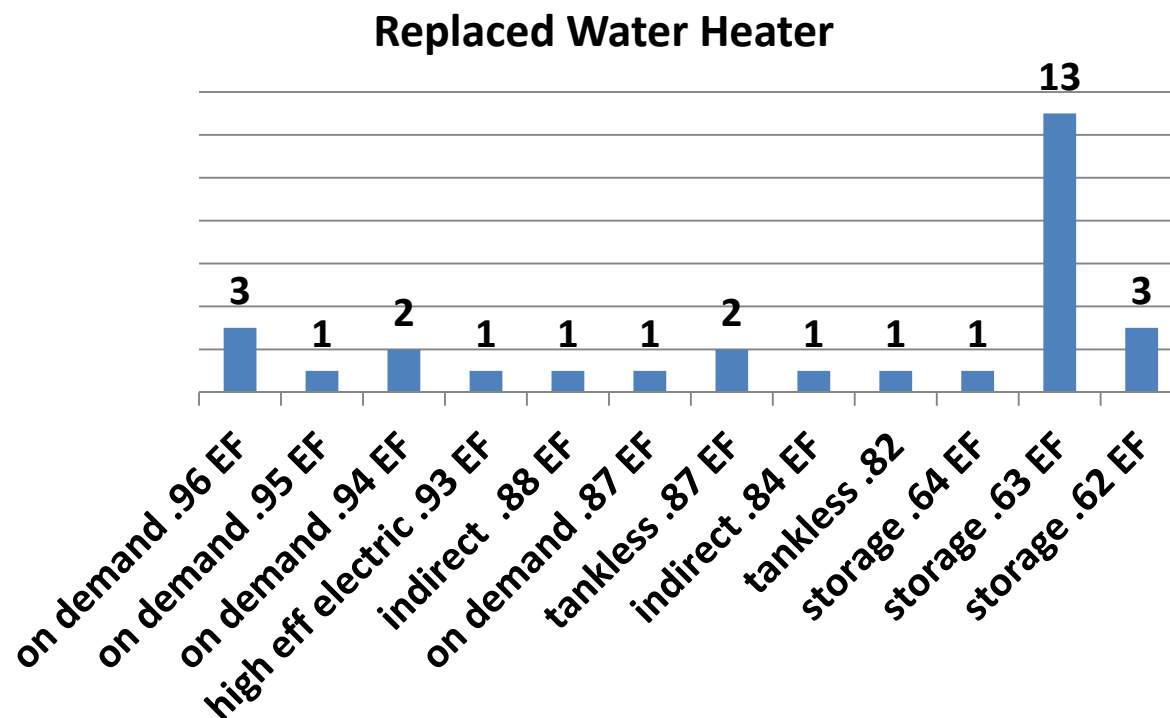
Insulate Attic-Floor/Ceiling, 31 Homes: Added Insulation



Added Attic Floor Insulation



Replace Water Heater, 30 Homes: Installed Water Heaters



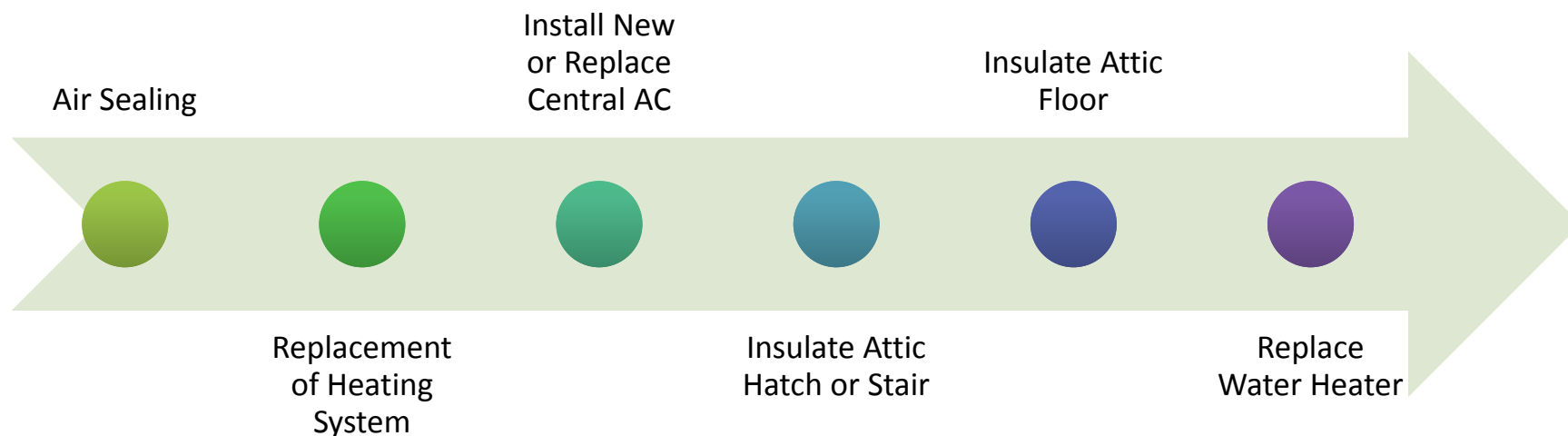
16 combinations of measures

Packages	A	B	C	D	E	F*	G	H	I	J	K	L	M	N	O	P
air seal	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
heating	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
ac	X			X	X	X		X	X	X	X	X	X			
hatch	X	X	X		X		X			X	X	X			X	X
floor	X	X	X	X			X			X	X				X	X
dhw	X		X	X			X	X	X		X	X	X	X	X	
wall		X	X						X		X	X			X	X
duct insulation													X			
Total Houses	11	5	2	3	2	2	4	1	2	2	2	1	1	1	2	1

* Heating and cooling provided by geothermal heat pump



Most Common Package – 11 homes



Average job cost - \$15,460
Modelled savings – 27%
Source energy savings (2 homes) – 33%

Three Homes without Heating or Cooling Replacement

Source Energy Savings:

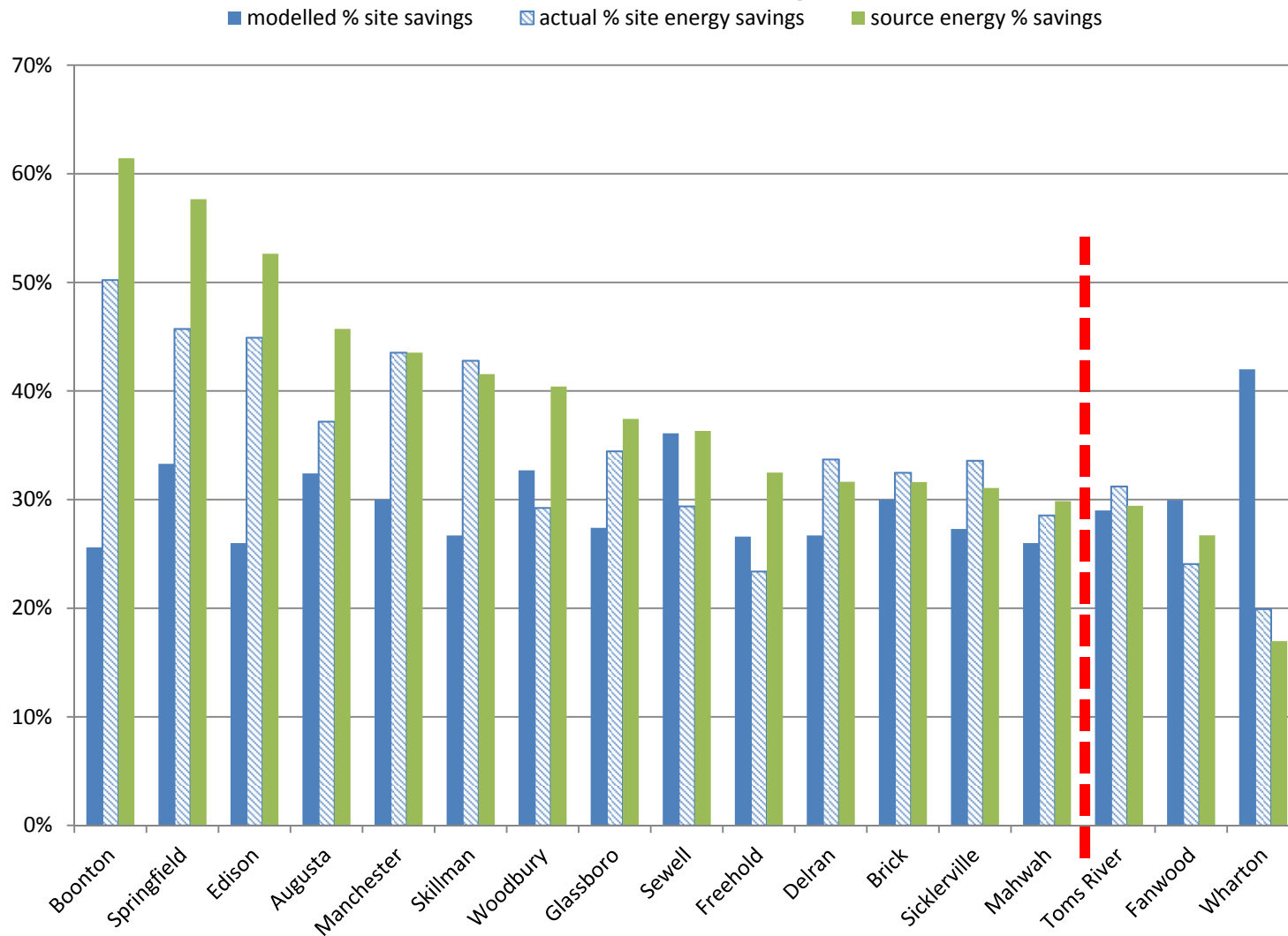
- 17%
- 27%
- 32%
- **Average: 25%**

Total Project Costs

- \$6,351
- \$14,980
- \$3,645
- **Average: \$8,325**



17 homes with Utility Data



Air Sealing Considerations

Blower door guided air sealing may limit air sealing work to avoid the need for mechanical ventilation

- Post air sealing ACH 50 still high in most of the 42 homes
- the average infiltration reduction was 715CFM50 over their BAS



Potential load reduction through air sealing may not be optimized



Even though mechanical equipment is typically upgraded



Wall Insulation Considerations

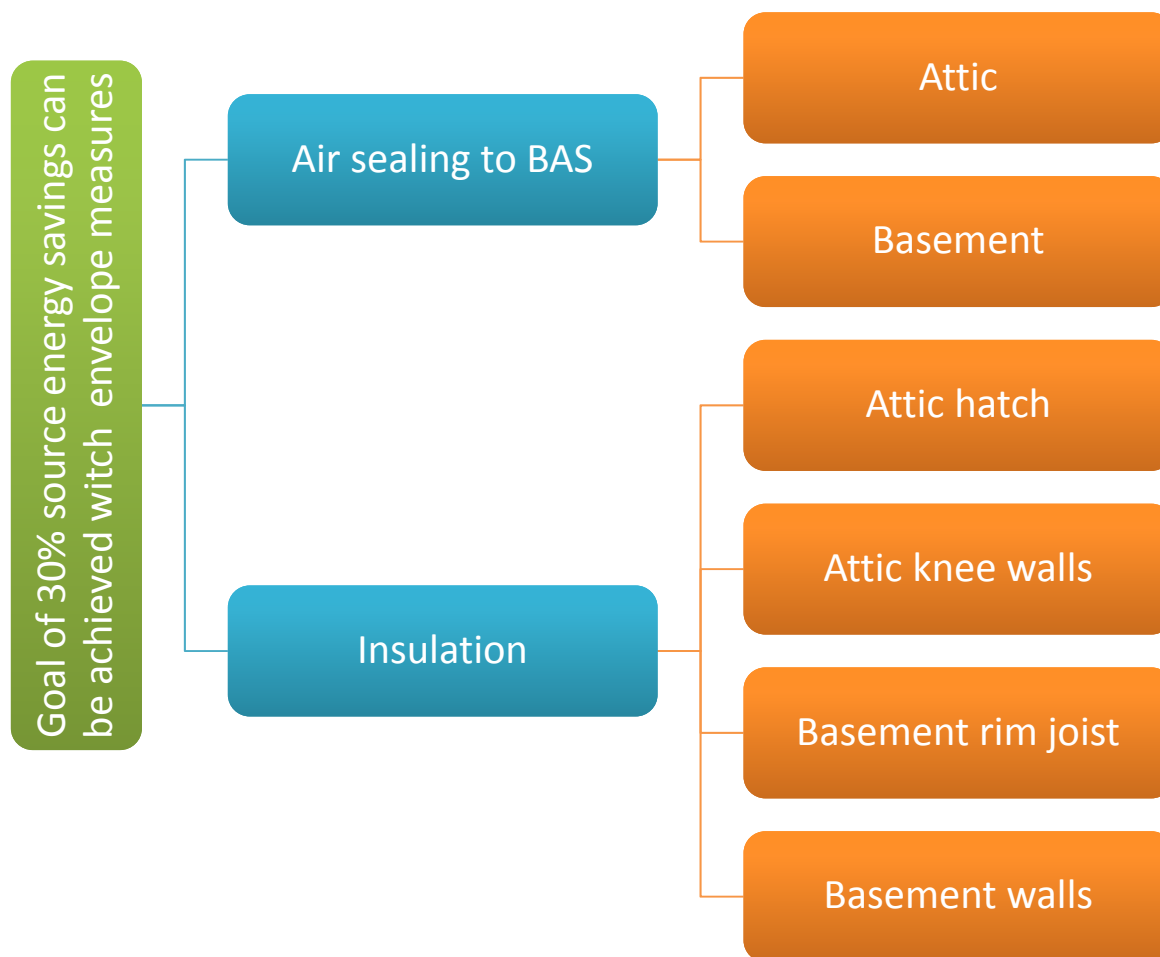


PNNL, 2012

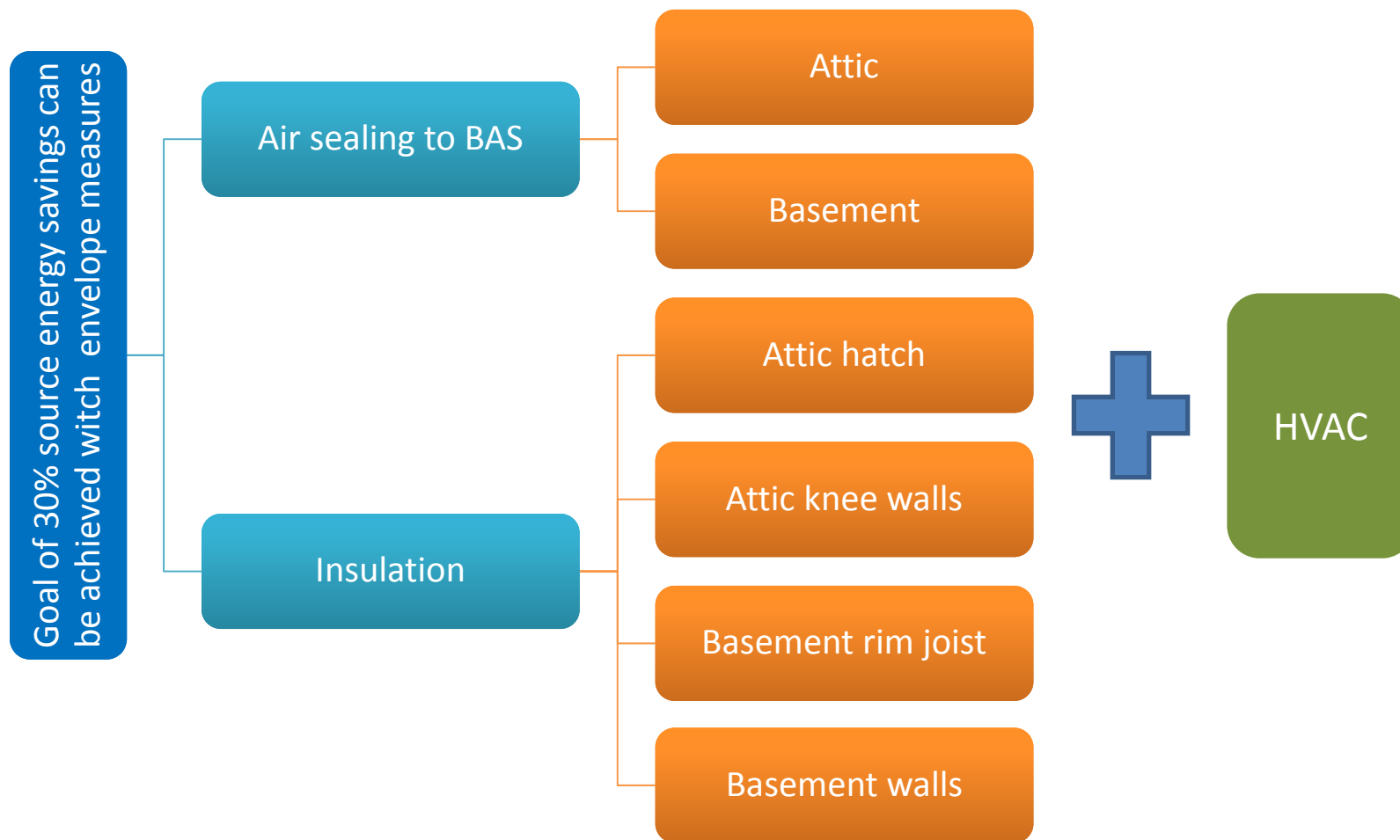


- Installed in 14 of 42 homes
- Most commonly on attic knee walls to varying levels of R-value

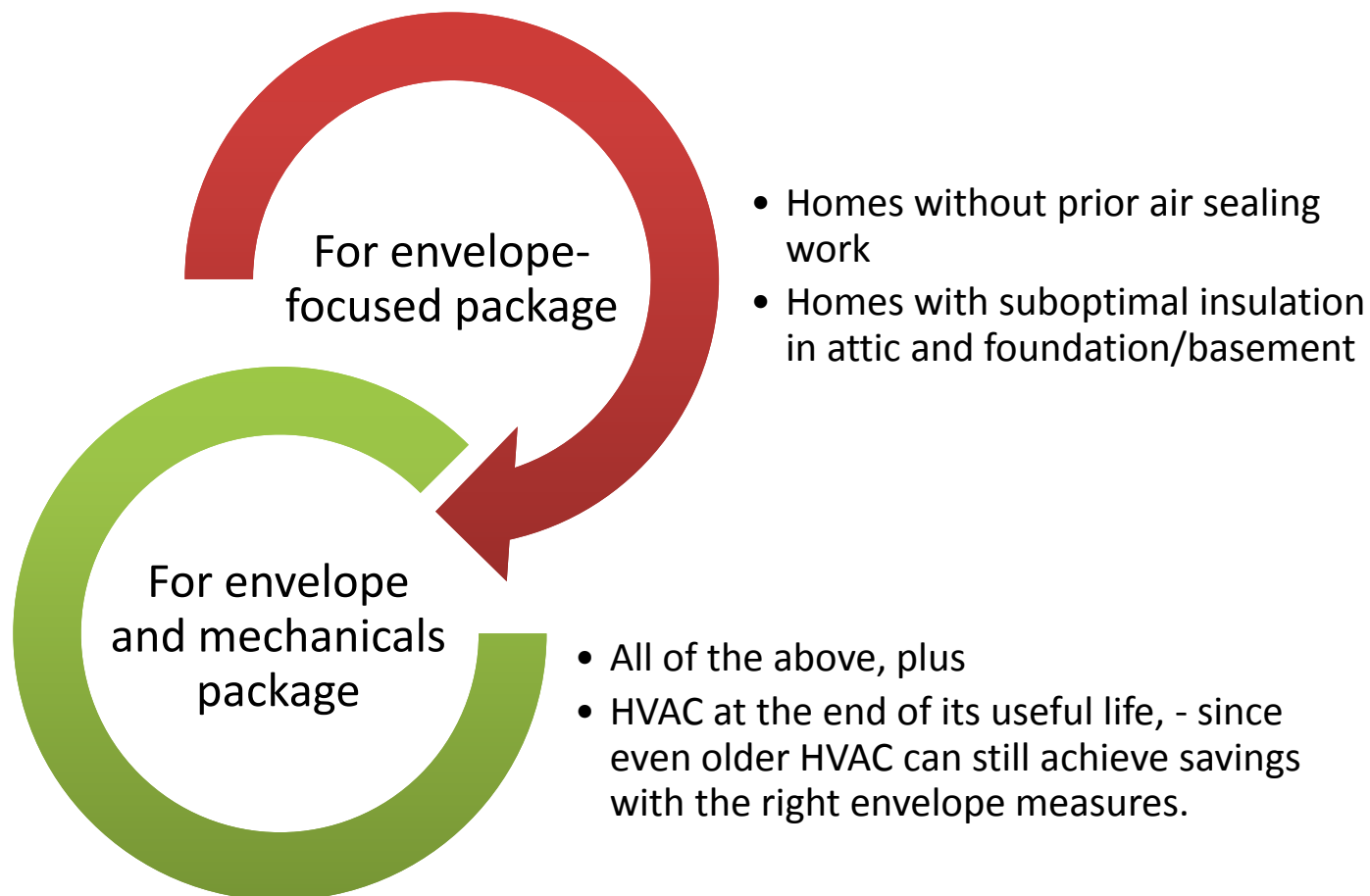
Prescriptive Package - Envelope



Prescriptive Package – Envelope+HVAC



Existing Conditions for Prescriptive Package to Work?



Reducing Energy Use in Existing Homes by 30%: Learning from Home Performance with Energy Star

DRAFT

December 2013

