Seal and Insulate with ENERGY STAR®
Savings Analysis Baseline Home Assumptions

Parameter	Assumption	Source	Notes
Vintage	1970 - 1989	RECS 2009	Previous Seal & Insulate (S&I) analysis used RECS 2005 (G. Chinery, US EPA, 2008), same vintage. RECS 2009 data confirmed that this date range contained the largest percentage of existing single-family homes. 31% based on RECS Table HC 2.3.
Conditioned floor area	1,700 square feet	RECS 2009 (table HC10.9)	Average size single family home for 1970 through 1989 vintage. Larger than the previous S&I analysis value of 1,500.
Footprint & Height	25 feet-by-34 feet: Two Story 8.5 feet per story	DOE Methodology adjusted by RECS 2009	U.S. DOE methodology uses a 2,400 square foot home with a footprint that is 30 ft. by 40 ft. Recommend keeping the aspect ratio constant with the DOE methodology while adjusting for the smaller home size.
Area above unconditioned space	850 square feet (Over a vented crawlspace or unconditioned basement)	DOE Methodology adjusted by RECS 2009	U.S. DOE methodology uses a 1,200 square foot footprint. Recommend keeping the aspect ratio constant with the DOE methodology while adjusting for the smaller home size.
Area below roof/ceilings	850 square feet; 70% with attic, 30% cathedral	DOE Methodology adjusted by RECS 2009	U.S. DOE methodology uses a 1,200 square foot ceiling area. Recommend keeping the aspect ratio constant with the DOE methodology while adjusting for the smaller home size. The proportions of attic and cathedral ceiling align with the DOE methodology.
Perimeter length	118 feet	DOE Methodology adjusted by RECS 2009	U.S. DOE methodology uses a 140 foot perimeter Recommend keeping the aspect ratio constant with the DOE methodology while adjusting for the smaller home size.
Gross exterior wall area	2,003 square feet	DOE Methodology adjusted by RECS 2009	U.S. DOE methodology uses a 2,380 square foot exterior wall area. Recommend keeping the aspect ratio constant with the DOE methodology while adjusting for the smaller home size.
Window area	Fifteen percent equally distributed to the four cardinal directions	DOE Methodology	Aligns with the Certified Homes emissions analysis and the ENERGY STAR HVAC Verified Installation (ESVI) calculator.
Door area	42 square feet	DOE Methodology	Aligns with the Certified Homes emissions analysis and the ESVI calculator.
Internal gains	91,436 Btu/day	DOE Methodology; 2006 IECC, Section 404	Aligns with the Certified Homes emissions analysis and the ESVI calculator.
Heating system	Single (1) zone system: natural gas furnace, heat pump	DOE Methodology	Aligns with the Certified Homes emissions analysis and the ESVI calculator.
Cooling system	Single (1) zone system: central electric air conditioning	DOE Methodology	Aligns with the Certified Homes emissions analysis and the ESVI calculator.
Water heating	Natural gas	DOE Methodology	Aligns with the Certified Homes emissions analysis and the ESVI calculator.

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Foundation Type	Slab-on-Grade, Vented Crawlspace, Conditioned Basement, Unconditioned Basement	DOE Methodology	Aligns with the Certified Homes emissions analysis and the ESVI calculator.
Weather Location	105 Locations	DOE Methodology	Aligns with the Certified Homes emissions analysis and the ESVI calculator. Locations include each 2012 IECC Climate Zone in every U.S. State
Thermostat Setpoints	75˚F Cooling; 72˚F Heating	2012 IECC	Aligns with the Certified Homes emissions analysis and the ESVI calculator.
Ceiling Insulation	CZ1-3: R-13 CZ4-8: R-15 RESNET Grade III	EPA Typical Home	Aligns with prior SI analysis and the ESVI calculator. Based on Existing Buildings in Table 3.9, Building and Thermal Characteristics of Single-Family Building Prototypes, from Hanford, 1994. Note from prior S&I analysis: “In existing unimproved housing, RECS North=R15 matched the North assumption exactly, and RECS South=R13 matched South assumption exactly. Attic insulation was upgraded to R38 in both northern and southern houses. Radiant barrier installation was not considered for this analysis.” (G. Chinery, US EPA, 2008)
Wall Insulation	R-11 2x4 @ 16” o.c. wall; RESNET Grade III	EPA Typical Home	Aligns with prior S&I analysis and the ESVI calculator. Note from prior S&I analysis: “The R-value for the walls was assumed to be R11since R11 batts were commonly used for homes constructed in the 1975-85 time frame. REM/Rate automatically calculated any additional contributions or degradations from sheathing, siding, interior finish, and framing factors. Much older homes (built long before the 1975-85) made with clapboard and plaster, with stucco, or with concrete block have little if any insulation but were not weighted heavily.” (G. Chinery, US EPA, 2008)
Rim Joist Insulation	Uninsulated	EPA Typical Home	Aligns with prior S&I analysis and the ESVI calculator. Note from prior S&I analysis: “In many existing homes, there is no basement or 1st-2nd floor rim joist insulation at all. An R11 batt stuffed in the basement rim joist cavity between floor joists is a very common fix. The rim joist between the 1st and 2nd floors is usually not accessible unless there is a major home renovation.” (G. Chinery, US EPA, 2008)
Basement Insulation	Uninsulated	EPA Typical Home	For the house vintage used in this analysis, it was assumed that no insulation was installed in the basement. This approach aligns with the prior S&I analysis and the ESVI calculator.
Crawlspace Insulation	Uninsulated	EPA Typical Home	For the house vintage used in this analysis, it was assumed that no insulation was installed in the crawlspace. This approach aligns with prior the S&I analysis and the ESVI calculator.

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Window U-factor	0.52	RESFEN 6.0	Default window values for a double pane wood frame window from Lawrence Berkeley National Laboratory's RESFEN 6.0 software. LBL suggested closest approximation for a single pane plus a storm window in RESFEN, which was used in the previous analysis.
Window SHGC	0.57	RESFEN 6.0	Default window values for a double pane wood frame window from Lawrence Berkeley National Laboratory's RESFEN 6.0 software. LBL suggested closest approximation for a single pane plus a storm window in RESFEN, which was used in the previous analysis.
Infiltration	CZ1-3: 18.2 ACH50 CZ4-8: 17.4 ACH50	Lawrence Berkley National Laboratory Residential Diagnostics Database Calculator	Weighted infiltration rates for a range of location and foundation types, with home size and vintage used in this analysis. Additional information is in the Infiltration Research Summary section.
Duct Location	Slab-on-Grade: 25% Conditioned; 75% Attic Bsmt/Crawl: 50% Bsmt/Crawl; 50% Attic	ENERGY STAR Certified Homes HERS Index Target Procedure.	Default locations based on foundation type and number of stories. Aligns with the Certified Homes emissions analysis and the ESVI calculator. Ducts in basement align with basement conditions in home (conditioned vs. unconditioned).
Duct Leakage	23% of total system airflow	Advanced Energy: Field Adjusted SEER in Residential Buildings	Aligns with the ESVI calculator.
Duct Insulation	R-2	EPA Typical Home from previous S&I analysis	Aligns with prior S&I analysis and the ESVI calculator. RECS data does not include duct insulation so an assumption was made by G. Chinery based on field experience in existing homes. Housing built in the 1960s and 1970s was often ducted, but the duct layout was typically sheet metal or formed fiberglass with an R1.5-R2 duct liner. This practice continued until the post-oil-embargo conservations programs began in the mid-to-late '70's and throughout the 1980's.
HVAC Equipment Oversizing	Cooling equipment oversized 50%	Neme, 1999	Aligns with the ESVI calculator.
HVAC Refrigerant Charge	Improperly charged (4.0% degradation of heating and cooling electric use)	ENERGY STAR Certified Homes Program Version 3 emission analysis. (Pigg, 2010)	Aligns with the Certified Homes emissions analysis and the ESVI calculator.
HVAC System Air Flow	Improper airflow (2.9% degradation of heating and cooling electric use)	ENERGY STAR Certified Homes Program Version 3 emission analysis. (Pigg, 2010)	Aligns with the Certified Homes emissions analysis and the ESVI calculator.

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