Air Tight Spray Foam
Existing home retrofit
Case Study

Solar Reflection Inc located in Charleston, South Carolina conducted a study to quantify the benefits of an air tight spray foam retrofit of an existing home.

The test home is a single story 3 bedroom, 2 bath, 1550 square foot residence built on a concrete slab in 2000. This home used typical construction practices which included R-13 fiberglass insulation in the walls and blown cellulose insulation in the attic. The air handler and the ductwork for the home are located in the attic space connected to a 3 ton air conditioning unit.

The retrofit consisted of removing the blown cellulose insulation from the ceiling and applying 2 to 3 inches of closed cell spray foam insulation on the underside of the roof framing for an average insulation value of R-19. The roof soffits, ridge vents and gable end walls were sprayed as well to convert the attic to an air tight enclosure.

The analysis consisted of conducting a blower door test (measurement of air infiltration) prior to and after applying the spray foam. A REMRATE analysis, which provides an estimate of the heating and cooling design loads with projected energy costs, was also performed before and after spray foam installation.

	Blower Door Test	Design HVAC Unit sizing	
		Heating Load	Cooling Load
Before	1350 cfm_{50} (.30 ACH)	30 kBTU/hr	2.0 tons
After	700 cfm_{50} (.16 ACH)	18 kBTU/hr	1.5 tons
Improvement	47% Reduction	40% Reduction	25% Reduction

ACH or Air Changes per Hour is a measurement of how much air is replaced in the house every hour. In this case 30% of the volume of air in the home was replaced every hour before sealing the attic space compared to 16% after.

Summary of Benefits

•Air leakage in a home typically accounts for 40% of the total energy losses. Sealing the attic space with spray foam reduced the air leakage by 47%.

•Reducing air leakage will improve indoor air quality, improve home comfort and improve humidity control in the home.

•Insulating the roof line which places the air handler and the ductwork in conditioned space reduces the heating and cooling design loads for the equipment.

•Estimated annual savings for heating and cooling cost could reach $480/ year.

Spray Foam Energy savings

	Monthly	Annual
Est. Utility Savings	**$40**	**$480**
Equity Loan *	**$28**	**-$336**
Cost Savings	**$12**	**$144**

*Based on $4,000 additional cost @ 6% interest (Home equity loan)