

POLYISO PERFORMS: SIGNIFICANT ENERGY AND CONSTRUCTION SAVINGS!

Looking for improved performance in roof insulation? Then polyiso is the product of choice.

Polyiso insulation provides significant energy and construction savings while reducing the harm to the environment. A new study released by the Polyisocyanurate Insulation Manufacturers Association (PIMA) reveals that increasing the thickness of polyiso roof insulation significantly reduces energy costs while providing a positive rate of return on the cost of installation. The bottom-line numbers of this study reinforce why polyiso is the leading roof insulation product in the marketplace today.



THE STUDY Energy Services Provider Group (ESPG), an independent energy analysis firm in Baltimore, Maryland, performed the case study—using ASHRAE 90.1-1999 as a baseline. The purpose of the case study was to measure the economic and environmental effects of additional thickness of polyiso roof insulation over the minimum code requirement in two types of facilities: a retail building and an elementary school. Building energy costs were calculated for buildings in seven US cities: Boston, Chicago, Los Angeles, Dallas, Seattle, Denver and Atlanta.

THE METHODOLOGY The study examined two types of facilities: a retail building and an elementary school. A “model” of each facility, based on a statistical database of 25 years of energy simulations, was referenced. The current ASHRAE 90.1-1999 standards for roof insulation were used as the baseline for the minimum roof insulation requirements.

RETAIL BUILDINGS The database defined the typical retail building as a single-story, 100,000 square-foot structure (two-to-five length/width ratio) with 30% glazing. The structure was cooled to 78° F in the summer and heated to 72° F in the winter. Unoccupied temperatures were maintained at 90° F in summer and 55° F in winter. Using the "model," energy simulations were run for the different locations with their corresponding utility rates to establish the comparisons. In addition, the impact of these savings on the environment was assessed.

RESULTS

In each city, except for Los Angeles, the ASHRAE-specified minimum insulation value equates to 2 1/2" of polyiso roof insulation. In Los Angeles, the ASHRAE-specified minimum insulation value equates to 1 1/2" of polyiso roof insulation. Using this as the baseline case, the study found that increasing the insulation thickness by 1" or more:

- Provides a significant rate of return to users for the financial investment of installing additional polyiso insulation;
- Reduces the costs to facilities on average \$2,500 per year; and
- Reduces CO₂ emissions by thousands of pounds, SO₂ emissions by thousands of grams, and NO_x emissions by thousands of grams per year.

CITY	ASHRAE 90.1-199 THICKNESS				ENERGY COST SAVINGS**/ IRR (%) INTERNAL RATE OF RETURN		
Boston	R15, 2.5"	3"	3.5"	4.8"	\$1,788/ 16.1	\$3,094/ 15	\$5,342/ 10.2
Chicago	R15, 2.5"	3"	3.5"	4.8"	\$1,808/ 16.3	\$3,176/ 15.4	\$5,390/ 10.3
Los Angeles	R10, 1.5"	2"	2.5"	4.8"	\$1,740/ 16.8	\$2,833/ 16.9	\$4,654/ 5.5
Dallas	R15, 2.5"	3"	3.5"	4.8"	\$1,511/ 13.6	\$2,566/ 12.3	\$4,298/ 7.7
Seattle	R15, 2.5"	3"	3.5"	4.8"	\$1,088/ 9.3	\$1,842/ 8.2	\$2,984/ 3.9
Denver	R15, 2.5"	3"	3.5"	4.8"	\$1,495/ 13.4	\$2,588/ 12.5	\$4,480/ 8.2
Atlanta	R15, 2.5"	3"	3.5"	4.8"	\$1,345/ 12.1	\$2,284/ 10.8	\$3,835/ 6.5

** Energy cost savings values listed above represent the reduction in cost per year for increasing the thickness of polyiso roof insulation over the ASHRAE required thickness listed in the previous column.

ELEMENTARY SCHOOLS The database defined the typical elementary school as a single-story 65,000 square-foot structure (two-to-five length/width ratio) with 30% glazing. The structure was cooled to 75° F in the summer and heated to 72° F in the winter. Unoccupied temperatures were maintained at 90° F in summer and 60° F in winter. Using the “model,” energy simulations were then run for the different locations with their corresponding utility rates to establish the comparisons. In addition, the impact of these savings on the environment was assessed.

RESULTS

In each city, except for Los Angeles, the ASHRAE-specified minimum insulation value equates to 2 1/2” of polyiso roof insulation. In Los Angeles, the ASHRAE-specified minimum insulation value equates to 1 1/2” of polyiso roof insulation. The study concluded that the environmental impact of these energy savings in elementary schools equates to significant reductions in CO₂ emissions, SO₂ emissions and NO_x emissions. Although the overall energy savings for schools is somewhat less due to the longer period when they are unoccupied in the summer months, the savings in operating costs and energy use are still significant. In addition, users receive a positive rate of return on their investment (see chart below).

CITY	ASHRAE 90.1-1999 THICKNESS				ENERGY COST SAVINGS**/ IRR (%) INTERNAL RATE OF RETURN		
	2.5"	3"	3.5"	4.8"			
Boston	R15, 2.5"	3"	3.5"	4.8"	\$954/ 13.2	\$1,641/ 12.1	\$2,086/ 4.6
Chicago	R15, 2.5"	3"	3.5"	4.8"	\$357/ 9.2	\$1,002/ 9.6	\$1,957/ 5.6
Los Angeles	R10, 1.5"	2"	2.5"	4.8"	\$2,608/ 35.7	\$3,800/ 32.6	\$5,297/ 13.5
Dallas	R15, 2.5"	3"	3.5"	4.8"	\$918/ 12.6	\$1,559/ 11.5	\$2,661/ 7.1
Seattle	R15, 2.5"	3"	3.5"	4.8"	\$955/ 13.2	\$1,581/ 12	\$2,363/ 5.9
Denver	R15, 2.5"	3"	3.5"	4.8"	\$748/ 10	\$1,174/ 8	\$2,041/ 4.4
Atlanta	R15, 2.5"	3"	3.5"	4.8"	\$903/ 12.4	\$1,515/ 11.1	\$2,575/ 6.8

** Energy cost savings values listed above represent the reduction in cost per year for increasing the thickness of polyiso roof insulation over the ASHRAE required thickness listed in the previous column.

The Polyisocyanurate Insulation Manufacturers Association (PIMA) is the national trade association that advances the use of polyiso insulation. Polyiso insulation is one of the nation's most widely used and cost-effective insulation products. PIMA's membership consists of manufacturers and re-labelers of polyiso insulation as well as suppliers to the industry. Its members account for virtually all of the polyiso insulation used in roofing in North America today.

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