# Use Proper Thickness of Insulation on Building Envelope (Arc 2.7492)

(The analysis below was extracted from one of the assessment reports by the Clemson University Industrial Assessment Center (IAC). This is only an example recommendation and hence, not all the background information and sources for numbers are included here.)

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|---|---|
| *Est. Electric Consumption Savings* | = ***$13,606.87 kWh/yr*** |
| *Est. Electric Consumption Cost Savings* | = ***$816.41/yr*** |
| *Est. Total Cost Savings* | = ***$816.41/yr*** |
| *Est. Implementation Cost* | = ***$574*** |
| *Simple Payback Period* | = ***8.43 months*** |

**Recommended Action:**
It is recommended to insulate the preprinting office sheet metal wall that separates the office from the warehouse. A good insulation option is Polyisocyanurate (foil-faced) foam board which has one of the highest R values of rigid insulation.

**Background:**
In a climate like up state South Carolina, it is important to have high quality insulators to help save costs on heating and cooling as seasons change. The average summer temperature in the area is 89°F with high's exceeding 100°F. The average winter temperature is 54°F with lows dropping into the 20s. These swings in temperature makes it important to have proper insulation to save energy and costs from losing hot or cold air.

Sheet metal walls are low quality insulators. On their own they have an R value of .61. By adding 1.5-inch-thick Polyisocyanurate foam boards the total R value of the wall would increase to roughly 10.80.(A good option is Johns Manville AP™ Foil-Faced Polyiso Insulation board.). When properly installed, Foil-Faced Polyiso Insulation functions as a water-resistive barrier, vapor barrier and air barrier, eliminating the need to install additional components. Moreover, Foil-Faced Polyiso Continuous Insulation is produced with an EPA-compliant hydrocarbon-based blowing agent that has zero Ozone Depletion Potential (ODP) and virtually no Global Warming Potential (GWP). Lastly, it also meets both CFC- and HCFC-free specification requirements. (Johns Manville, 2019)

**Anticipated Savings:**
Adding Polyiso foam board would reduce BTUs/hr.*F from 1115 to 63. This would lead to a yearly BTU reduction from 138,713,136.0 to 7,837,603.2. This is a total reduction of over 130 million BTUs.
130 mil /2.8 gives BTUs of electricity and then convert to kWh hours of electricity.
The annual *electric consumption savings, ECS*

Electric Consumption Savings (ECS) = 130 mil BTUs / 2.8 (scaling factor for heat to electricity)

then convert BTUs to kWh

***ECS = 46428571.43 BTUs = 13,606.87 kWh***

The annual *electric consumption cost savings, ECCS*, is the following:

Electric Consumption Cost Savings (ECCS) = ECS × Electric Rate

ECCS = 13,606.87 kWh × $0.06/kWh

***ECCS = $816.41***

The annual *total cost savings*, *TCS*, without considering demand cost, equals ECCS:

Total Cost Savings (TCS) = ECCS

Total Cost Savings (TCS) = $816.41

***TCS = $816.41***

**Implementation Cost:**

To facilitate identifying and repairing air leaks we recommend purchasing an ultra-sonic leak detector and establishing a monthly preventative maintenance program to identify and repair compressed air leaks.

Ultrasonic leak detectors can be purchased for about $1,000. We estimate it would take about five hours at most to insulate this wall. Wall insulation is a labor cost that would only be needed once in roughly 100 years if foam board insulation is maintained. Thus, the below cost uses an example labor cost of $25 dollars an hour for a one-time event. The labor cost would be about:

$25/hour × 5 hours/1 time = $125 Dollars

The cost of polyiso foam board was estimated to be $0.66/ft^2. This wall is 680ft^2 which yields a purchasing cost of $448.80. Therefore, the *implementation cost, IC*, can be estimated:

***Implementation Cost (IC) = $125 + $448.80 = $573.80***

**Simple Payback Period:**

The *simple payback period, SPP*, is the time required to pass before the estimated total cost savings equal the estimated implementation cost, and is calculated:

$$SPP = \frac{IC}{TCS} \times 12\ months/year$$

$$SPP = \frac{\$573.8}{\$816.41/yr} \times 12\ months/year$$

***SPP = 8.43 months***

Thus, after 8.43 months all savings in electric consumption will be profit compared to an uninsulated wall.