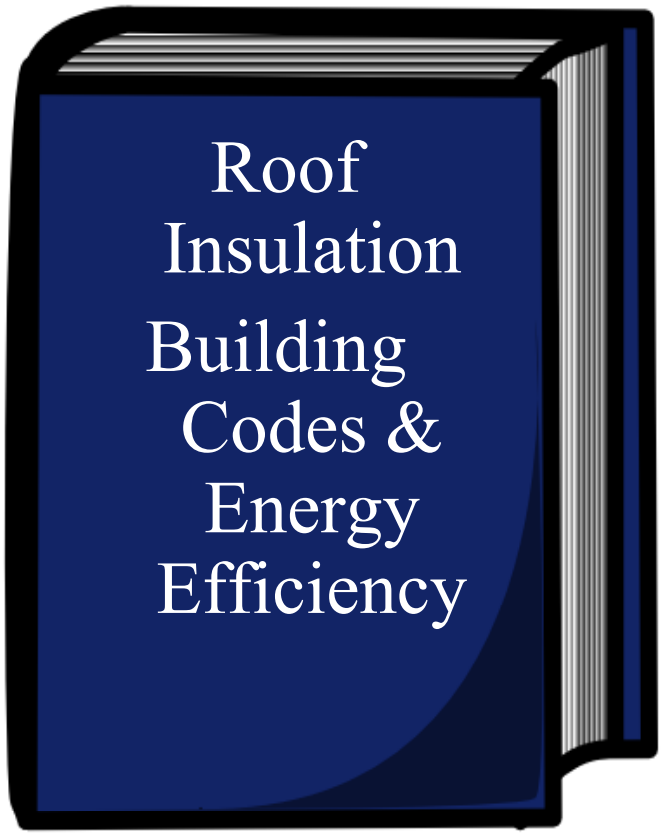
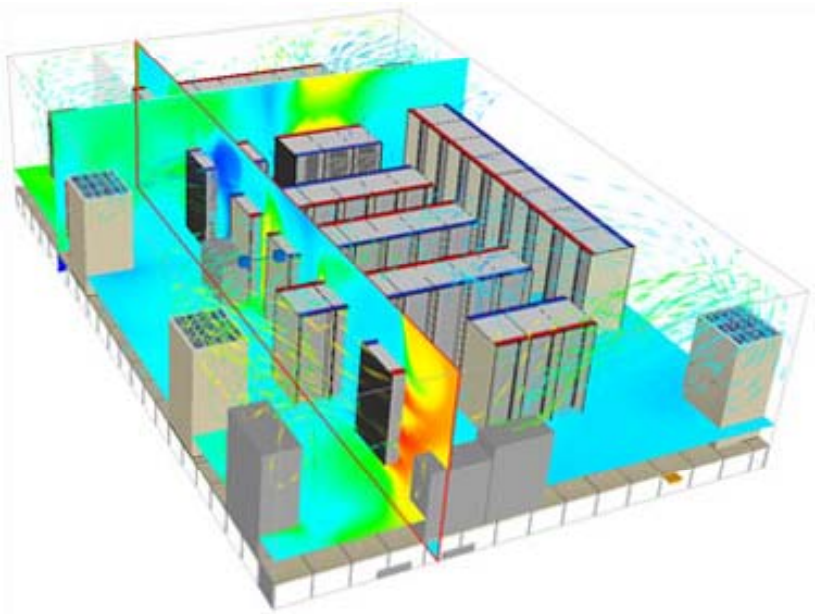
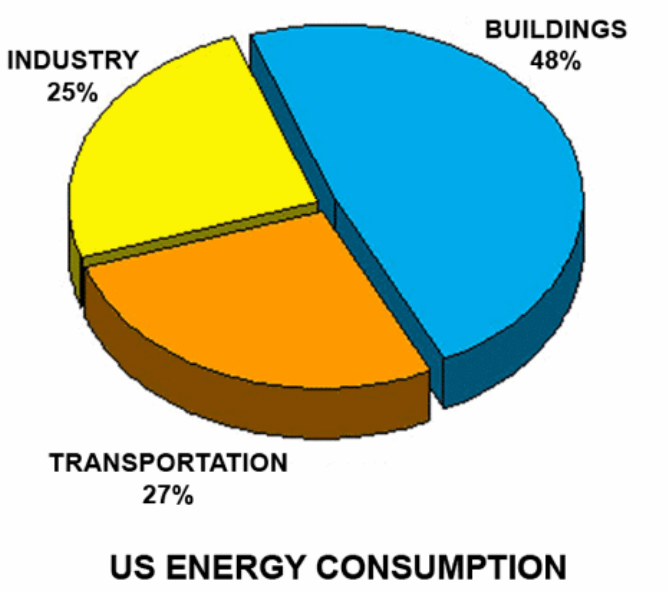




Environment friendly e-library

Building Code Driver

•Buildings consumer almost 50% of all energy.



•Experts believe that a 30% increase in building efficiency is obtainable and cost effective with current technology.

Summary of Pending Codes and Mandates

•The American Clean Energy Act passed by Congress in 2009 establishes a Federal Building Code that mandates an immediate 30% increase in new or substantial renovated buildings.

•Executive Order 13423 (E.O.), *Strengthening Federal Environmental, Energy, and Transportation Management*, establishes a 30% improvement in building efficiency by 2015.

•ASHRAE, (*American Society of (Heating Refrigeration Air Conditioning Engineers)* in conjunction with the USGBC LEED *(U.S. Green Building Council - Leadership in Energy and Environmental Design)* standards are developing ASHRAE 189.1 which establishes a 30% increase in building efficiency.

Energy Efficiency and Commercial Roofs

•One of the most significant opportunities to increase building energy efficiency lies within the commercial roofing sector, where over 50 billion square feet of flat roofs are currently available for retrofit.

•ASHRAE 189.1 establishes a High R Roof value to help achieve the 30% building efficiency improvement.

•If the insulation levels in commercial roofs are upgraded from their current R-value to the high performance levels embodied in High R Roofs, annual energy savings would exceed $2 billion.

Energy Efficiency and Commercial Roofs

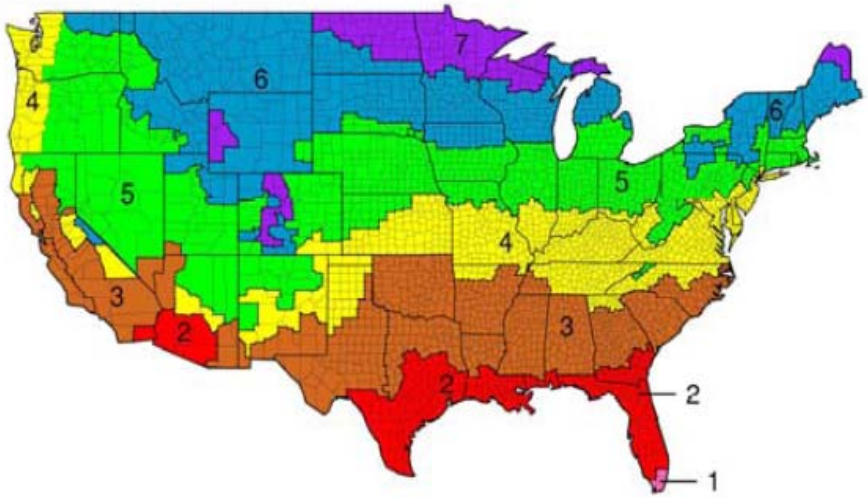
In addition to the long-term potential for energy savings, the commercial roofing market provides a significant multiplier effect to accelerate energy efficiency efforts. For every new roof installed on a new building, approximately three additional roofs are installed on existing buildings to replace older, less energy-efficient systems. As a result, the reach of the roofing industry greatly exceeds new commercial construction by a factor of three, accounting for over 4 billion square feet of total commercial roof installations annually.

Consequently, including high performance energy initiatives targeted at the existing commercial roofing market can accelerate energy savings much faster than similar initiatives that only target new construction.

Energy Efficiency and Commercial Roofs

What is a High R Roof?

- ASHRAE 90.1-2007 is now the current minimum standard for roof insulation levels.
- The ASHRAE 90.1 standard raised the minimum insulation value of commercial roofs insulated above the deck to R-20 for most climate zones except Zone 1.



Energy Efficiency and Commercial Roofs

What is a High R Roof?

- ASHRAE 189.1 sets the standard about 30% higher than ASHRAE 90.1
- Poly isocyanurate insulation has an approximate R value of 6 per inch. To achieve the ASHRAE 189.1 standard a typical flat roof will require about 4.5 inches of insulation.

Energy Efficiency and Commercial Roofs

Why Poly Isocyanurate Insulation?

•Polyiso is a rigid foam insulation used in over 70% of commercial roof construction, in commercial side wall construction and in residential construction.

The Benefits of using Polyiso include:

- *Highest R-value per inch of thickness*
- *Excellent fire test performance*
- *Moisture resistant*
- *Dimensional stability*
- *Superior compressive strength*
- *Extensive building code approvals*
- *Cost effective*
- *Recycled content*
- *Zero ozone depletion potential*
- *Virtually no global warming potential*
- *Preferred insurance ratings*
- *Nationwide availability*
- *Thinner walls and roofs with shorter fasteners*
- *Compatible with most roofing systems*

Energy Efficiency and Commercial Roofs

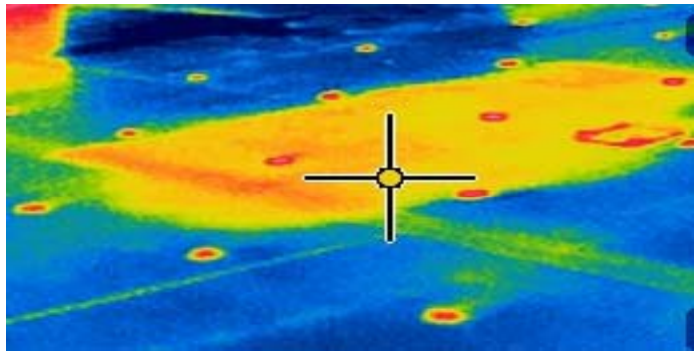
Insulation, to be effective, must be installed properly

•Always use at least two layers. The bottom layer can be mechanically attached while the top layer should be adhered with adhesive.

•Joints between layers should be staggered and taped.

•Using this installation method eliminates thermal bridging a condition where heat or cold escape the insulation.

•Thermal bridging can reduce the efficiency of insulation by up to 5%.



Energy Efficiency and Commercial Roofs

Insulation, to be effective, must be installed properly

Effective Moisture Barrier Design

•For buildings in regions with cold winter climates or with high internal levels of moisture or humidity, an analysis should be conducted to determine if the temperature within any portion of the roofing system will fall below the dew point temperature. If the analysis suggests that moisture could condense within the roofing system, the use of a vapor retarder should be considered. Current practice leaves this decision to the project's design professional.

The Oak Ridge National Laboratory has a vapor barrier calculator

http://www.ornl.gov/sci/roofs+walls/calculators/wetroof/

Energy Efficiency and Commercial Roofs

Insulation, to be effective, must be installed properly

•Insulation needs to be covered with tarps prior to installation.

•Crushed insulation looses efficiency and may negatively impact roof system performance. Use a high density cover board over the poly iso insulation and install walkway pads in high traffic areas.

Energy Efficiency and Commercial Roofs

Roof inspections need to be performed regularly. Water infiltration greatly reduces insulation efficiency.

•Many of the most frequent locations of moisture intrusion into a roofing system are located at the interfaces between the roofing system and other building elements, including parapet walls, roof edges, penetrations, and elevated roof curbs. All such areas should be inspected by a roofing professional and any deficiencies should be corrected immediately.

Energy Efficiency and Commercial Roofs

To determine the ROI, *(return on investment),* of additional insulation your roofing contractor can use the NRCA's, National Roofing Contractors Association, SpecRight software.

•SpecRight is a free web based software program that allows designers to build various roof configurations and calculate the energy cost produced by each system.