



The Empire State Building Reaching for new energy efficiency heights

Transforming an American icon into a beacon of economic and environmental leadership

The Project & Approach

- The Empire State Building retrofit was motivated by the owners desire to:
 - Show how to cost effectively retrofit energy efficiency into commercial buildings.
 - Prove that energy retrofits make good business by providing a short payback and helping to attract and retain tenants.
 - Cut greenhouse gas emissions.
- Improving window performance was identified as one of eight key projects to achieve the total energy savings goal.
- Over 6,500 windows to be replaced.
- In addition to replacing weather stripping, each window will be removed and enhanced on site by suspending lightweight Heat Mirror® film between existing panes of glass and filling with krypton gas to create two super-insulating cavities.

- Heat Mirror technology creates multi-cavity performance without adding weight, enabling all existing window hardware to be reused.
- Different Heat Mirror films will be used in different window locations to optimize the overall energy use.
- This “solar tuning” approach enables high performance glass to optimally manage solar heat gain and reduce demands on the heating and cooling system.
- R-5 to R-8 window performance delivered.
- Heat Mirror technology’s 30-year track record of proven reliability was a critical factor in its being selected for such an iconic building retrofit.

Expected Results

- Reduce energy use by 38%.
- Save over \$4 million in annual energy costs.
- Eliminate a minimum of 105,000 metric tons of CO2 over the next 15 years.
- 3-year payback.
- Windows upgraded with Heat Mirror technology expected to deliver over \$400,000 in annual operating cost savings.
- Part of an integrated effort focused on improving the performance of the building envelope. Key participants include Johnson Controls, Clinton Climate Initiative, Jones Lang LaSalle, and Rocky Mountain Institute.

Heat Mirror® Technology. A 30 Year History of Innovation and Energy Conservation Breakthroughs

1980's		Heat Mirror film provides most significant advance in glass performance in 115 years. Doubles -value from 2 to 4.		1990's	Popular Science chooses Southwall Heat Mirror® film as one of the 100 Top Inventions of the Millennium.
2000's	First to develop multi-cavity technology to achieve up to R-20 insulating glass performance		2010	Chosen as core technology to upgrade window performance at the Empire State Building	

Heat Mirror® Insulating Glass

- World's first and most energy efficient low emissivity (low-e) insulating glass.
- Heat Mirror technology is based upon a thin coated film, which is suspended between panes of glass and reflects heat back to its source (outside in summer, inside in winter).
- Cuts >99% of harmful UV rays to reduce fading and protect furnishings.
- Reflects solar heat to reduce heating and cooling costs.
- Enhances comfort of homeowners and building occupants.
- Selected by Popular Science as one of the Top 100 Inventions of the Millennium.

A Wall That You Can See Through

- Glass has been the energy efficiency 'weak link' by providing R-3 insulating performance in a world where R-19 walls are the norm.
- Heat Mirror technology enables a new generation of lightweight insulating glass with the insulating performance of a transparent wall.
- One or more Heat Mirror films can be suspended between two panes of glass to create up to 4 independent, insulating cavities.
- Enables insulating performance from R-4 (single-film, dual-cavity) to R-20 (triple-film, quad-cavity) with the same weight as dual-pane, so can be used with existing window systems.

Flexible, Solar Tuning

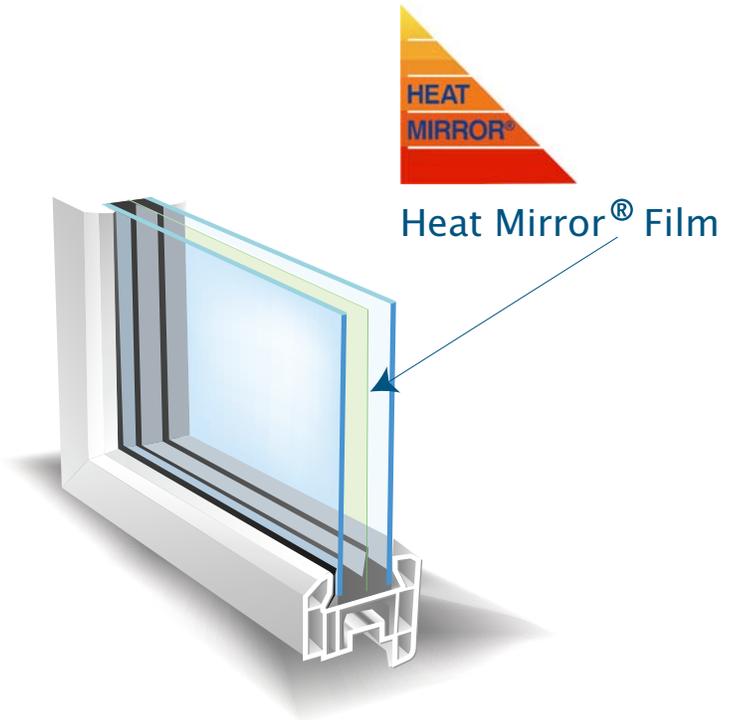
- Heat Mirror leverages 12 different films providing varying levels of visible light and solar heat control to meet the diverse requirements of the commercial and residential markets.
- Different films can be used in different window locations to reduce the demand on the heating and cooling system.
- High visible light transmission maximizes daylighting flexibility to reduce lighting costs and increase occupant productivity.

30 Year Track Record in Delivering Energy Savings

- Flexible, proven technology with a 30-year track record of success ideally suited to deliver immediate savings to businesses and consumers.
- Saving energy and reducing carbon emissions in thousands of buildings and homes worldwide.

Summary of Benefits

- Superior insulating performance reduces energy costs.
- Superior solar heat control reduces expensive cooling costs.
- Increases comfort of occupants.
- UV protection helps reduce fading.
- Acoustic barrier reduces distracting external noise.
- Future-proof path to meeting toughening energy efficiency standards and CO2 emission mandates.



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