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# A High Albedo Moisture-Retaining Foam Roof System for Energy Savings and Urban Heat Mitigation

## Background

Buildings are planned and constructed with the aim to provide livable interior conditions for its inhabitants regardless of the conditions in the ambient environment. Achieving this often requires large amounts of energy when it involves contradicting the climate of the exterior environment surrounding the structure. There has been work to improve roofing technology and materials to minimize the amount of energy necessary to effectively maintain ideal interior conditions, and such work has produced various materials and technologies in use today.

There are two main technologies utilized to optimize maintenance of a desired internal climate and use of energy. High albedo roofing is highly reflective but fails to effectively retain moisture, while vegetated green roofing retains moisture well but does not reflect excess rays. Both reflection and moisture absorption are crucial in optimizing energy use in interior climate maintenance, but both qualities have not yet been effectively employed simultaneously. Therefore, it is necessary to develop materials and technology that combine these two properties to decrease overall energy consumption when heating and cooling interiors.

## Invention Description

Researchers at Arizona State University have developed a new hybrid roofing technology that maintains ideal conditions in both hot and cool, and wet and dry climates. This hybrid technology combines the main benefits of the two existing technologies: vegetated green roofs and high albedo roof coatings. The green roof element of the technology provides moisture retention capabilities, and the high-albedo coating is a reflective membrane.

The material combination is a foam that closely resembles current green roof technologies but is modified to be highly reflective. This particular combination therefore is able to provide energy savings in the maintenance of the indoor climate while simultaneously enabling less heat convection into the outside atmosphere. The foam is also manufactured to be resistant to UV radiation and other various outdoor elements to prevent the material from showing signs of aging over time.

### Potential Applications

- Architecture
- Construction
- Urban planning fields

### Benefits and Advantages

- Efficient: Reduces HVAC energy demand in buildings more effectively than green roofs and high albedo roofs
- Novel: Inventors have optimized a unique combination of materials
- Versatile: Effective in all United States representative climates
- Cost-effective: Reduces heating costs in many climates and reduces cooling costs in all climates