

Progress

SkyCool – extraordinary paint on a hot tin roof

An invention by Conrad Wojtyasiak, an industrial chemist with a passion for paint and solving problems, has led to a new roof coating that almost defies the conventional laws of physics. SkyCool™ provides a profound cooling effect that can halve the running costs of mechanical air-conditioning in buildings with metal roofs.

Rex Lehmann, of Lehmann Pacific Solar Pty Ltd, who has taken the roof coating from clever invention to commercial product, says it is a water-based, non-toxic, acrylic polymer matrix that eliminates the solar heat entering through roofs.

Results of tests conducted by Professor Geoff Smith, of the University of Technology, Sydney, and Professor John Bell, of the Queensland University of Technology, show that the coating eliminates heat gains through roofs due to an unusual combination of two properties. The coating has both high solar reflectance (85%) and high thermal emittance (more than 94%). The high solar reflectance means that only a small fraction of incoming solar energy is converted to heat by the roof, the rest being reflected. High

thermal emittance results in a lot of heat being lost by radiation from the roof.

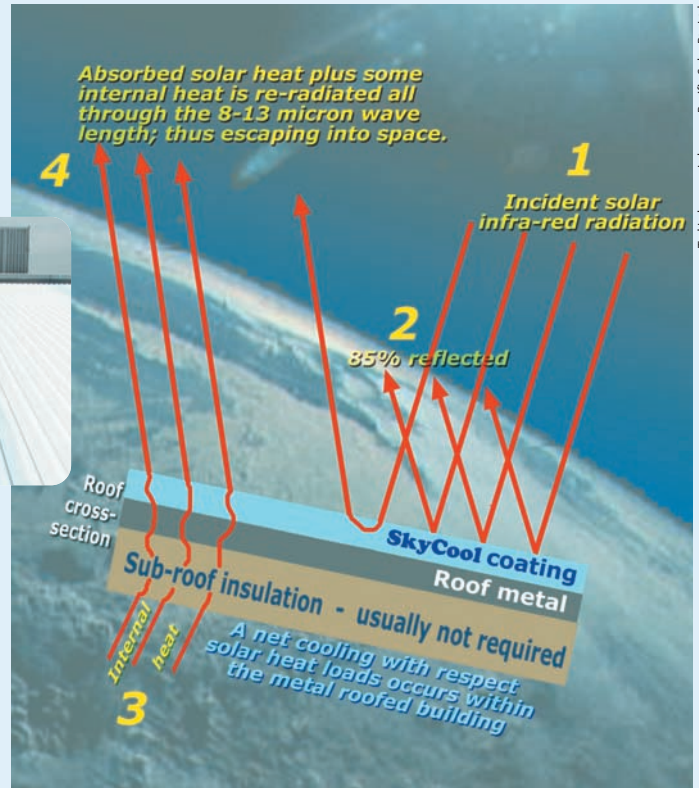
This unique combination of properties has, until now, proved elusive because coatings with high thermal emittance are



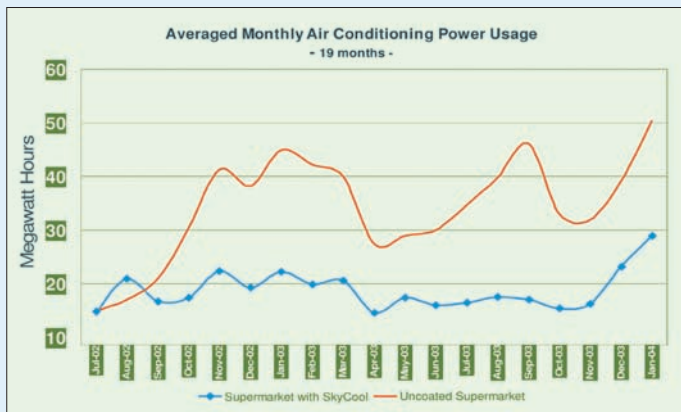
usually black or dark coloured. SkyCool, however, has a split personality. Unusually, it is 'white' at solar wavelengths (low solar absorbance) and 'black' at thermal wavelengths (high radiative capacity).

The coating acts as a 'passive heat pump', cooling the roof and taking the building's interior to below ambient temperature – just by being there. This radiative cooling occurs both day and night, provided the sky is clear.

When the university researchers put the coating through its paces, it performed remarkably well. In a 12-month trial involving two similar supermarkets in southern



SkyCool is white at solar wavelengths and reflects direct heat, but has cooling efficiency through working internally as a heat pump.



SkyCool applied on a roof (blue line) has been returning a 40% reduction in air-conditioning power consumption for over 12 months, when compared to a standard building without the coating (red line).

Queensland, one with the roof coating and one without, the building with the coating showed a annual saving in power consumption for air-conditioning of just over 40%. Over the hot summer months, SkyCool reduced air-conditioning operating costs by more than 50% (see graph).

The difference in seasonal efficiency shows that although the coating reduces cooling costs, its properties can increase heating costs in cold weather. However, Australian Greenhouse Office data show that cooling costs for commercial buildings are double the heating costs – 28% of total building energy use, as against 13% for heating.

'A key issue in achieving sustainability in the built environment is reducing the rapidly growing demand for air-conditioning of buildings, which is in

turn increasing the already large greenhouse gas emissions generated by cooling of buildings,' says Professor Bell.

Notably, energy savings by the 'coated' supermarket under study are equivalent to 162 tonnes of greenhouse gases a year. This would suggest that a SkyCool coating, with its unusual thermal properties, has a novel and perhaps integral part to play in improving the sustainability of new and existing metal-roofed buildings.

SkyCool has been on the Australian Market since July 2003 and distribution licences for both Australia and overseas markets are currently being negotiated.

• Steve Davidson

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