ECOLOGIC

A window of opportunity to address climate change globally

Windows provide our connection to the world outside and are becoming an increasingly important component in sustainable building design. Most energy flows in and out of a building through its windows, but with smart design and technological innovation they can be used to provide cool and light interiors.

Optimising energy performance of windows is the first consideration in passive architectural design. Flow of light and heat can be controlled through appropriate size and solar orientation. Larger the window more the potential to gain heat than smaller windows, and south-facing windows let through more heat and light than north-facing windows. Awnings and overhangs can be incorporated with window design to allow sun control.

In many countries around the world, windows are energy rated based on aspects such as U-Value or thermal transmittance, SHGC (Solar Heat Gain Coefficient) and AL 50 (Air Leak Measure). These ratings don't take into account the passive design aspects of size and orientation, but are generally a good indicator of overall performance.

Today's window design has two components – the frame and glazing. The materials used for these significantly contribute to the overall performance of the window. Wood frames are energy efficient, but aren't sustainable in our country. They're also expensive and tough to maintain. Aluminum frames are inexpensive but conduct heat easily and are therefore less energy efficient than other options. One of the most popular materials in the market today for framing is PVC, also called uPVC. These are made from vinyl and are inexpensive, energy efficient and low maintenance.

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When it comes to glazing, the most energy efficient windows are double glazed units (DGU) with two or more panes of glass separated by an air gap to slow heat transfer and also provide noise insulation. Traditionally air or dry nitrogen was used between the panes, but recent models use low conductance gas fills of argon or krypton that gives even better thermal performance and significantly lowers the U-value. Another new development in glass technology is Low Emittance coating also known as 'low-e'. Microscopically thin layers of metal or metallic oxide are coated onto the window glazing to lower heat flow through the window.

Spacers are used in between the layers of glass in a typical DGU, to hold them together at the required distance. Aluminum is typically used for these spacers, however due to their high conductivity they provide poor thermal insulation and create condensation problems around the edges. New spacer products have been developed from materials that have a low conductivity rate and high thermal efficiency from materials like fiberglass, vinyl, silicone foam and reinforced thermoplastic.

Window technology has undergone a revolution in the last two decades. Using a combination of gas filled double-glazing, glass coatings, thermally improved edge spaces and PVC framing it is now possible to adjust solar gain, reduce condensation, prevent air leakage and improve comfort of an indoor environment while offering huge savings in energy and money. More importantly, energy efficient windows reduce carbon emissions and help to address global climate change!