

Recent Developments in Low-Cost Vacuum Insulated Glazing (VIG) Technology

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Heat loss through windows consumes approximately 3.9 quads (1 quad=1015 BTU or 1 EJ) of primary energy in the US during the winters alone. Compared to the walls of a building which typically have R-values between 3.6 to 5.2 m²-K/W, single-pane windows and more advanced double pane windows have R-values between 0.18 to 0.52 m²-K/W and are often the cause of poor building thermal performance. Higher insulation values can be achieved by introducing additional glazing layers but at higher thickness, weight, and cost. Vacuum Insulated Windows (VIGs) provide an alternative approach to obtaining high R-values. VIGs are thin and can use slimmer, lighter frames. VIGs also offer excellent soundproofing and condensation resistance. Although the VIG concept was patented by Zoller in 1924, the first commercially successful VIG was only developed by the University of Sydney in 1989. They used two glass panes separated by cylindrical support pillars and glass frit edge seals. This VIG design is sold by NSG and is available in the market under the SPACIA brand. The cost of VIGs remains prohibitively expensive, however, due to high initial capital costs of the large ovens. The U. of Maryland with support by the Dept. of Energy has developed methods to produce VIGs using room temperature processes that should help lower costs by a factor of 5 thus stirring wide adoption.