

U. S. Department of Energy  
Fenestration Research Grant

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**Final Report**

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**Background**

A small research group at the Florida Solar Energy Center has been working for several years to perform research and other work in support of U.S. Department of Energy and State of Florida energy efficiency objectives in the area of windows, skylights, clerestories, and other glazed apertures in buildings, generically called fenestrations. This work includes not only thermal energy transfer through fenestration systems but also the controlled introduction of daylight illumination for the displacement of electric lighting energy.

Work in the last few years has focused almost entirely on providing technical support to the National Fenestration Rating Council's program to introduce energy performance rating and labelling of windows into the United States. This work has included a variety of activities.

- Annual energy performance simulations aimed at determining the relative performances of a variety of residential window and glazing options for different climates.
- Evaluation of Lawrence Berkeley Laboratory reports and software products in the area of fenestrations.
- Development of better computational tools for predicting the solar spectral irradiance incident on fenestration systems and contributing to solar radiant heat gain, and the effects of exterior shading.
- Service on various committees and task groups of the NFRC as well as participation in and technical support for ASHRAE's technical committee 4.5 on fenestrations.
- Evaluation of the daylighting potential of commercial buildings in hot humid climates.

**Accomplishments**

- We have given papers at several meetings of the American Solar Energy Society, ASHRAE, and the ACEEE Summer Study Conference over the years. These are in the areas of annual window energy performance and window physics and optics. A publications list is available on request.
- We have worked with Dariush Arasteh and Elizabeth Finlayson at LBL on their "Window" computer program and have identified some problems and made additional suggestions for improvements in the program.
- We have developed computer programs SUNSPEC and SMARTS2 that calculates clear sky solar spectral irradiance distributions and broadband irradiances and illuminances on

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