

Design Guidance for New Windows in a Hot Climate

Introduction

The energy impact due to windows in a home depends on several design decisions—climate, window orientation, window area, shading conditions, and window (frame and glazing) type. Homeowners and designers need to know the answers to the following questions. What is the best window type to reduce energy use in a particular location? Does window area and orientation affect energy use? Are shading devices effective in saving energy?

Unfortunately, the answers to these questions are not quite as simple as they seem. For example, there is a general perception that homes with larger window areas use more energy than homes with smaller window areas. This may be true for windows with conventional clear glazing, however, with high performance windows, a home with a large window area can use the same amount of energy or even less energy than a space with a small window area. The best option is not always obvious, so it is important for homeowners and designers to be aware of the available advanced technologies and to use calculation tools to optimize design choices for energy-efficient performance.

To provide guidance, the following pages examine the energy use impacts due to orientation, window area, and shading strategies for homes in Phoenix, Arizona. The energy use was calculated for many window design variations including 5 orientations, 3 glazing areas, 5 shading types, and 20 window

Key Issues

Orientation: Homes with windows facing predominately north use less energy than homes facing east, south, or west. With high-performance windows and shading strategies, these differences can be considerably less.

Window Area: Energy use increases with window area using windows with clear and high-solar-gain glazing. With high-performance windows, energy use may not increase at all when using a larger window area.

Shading Condition: On north-facing homes, shading devices will have little impact. On south-facing homes, overhangs can be effective to block the hot summer sun. Shading devices have less impact when using high-performance windows with low-solar-gain glazing.

types. The assumptions for these variations are shown on the next page. All simulations were performed using RESFEN and analysis was done using the Window Selection Tool. To determine actual impact of window design variations on a specific project, use the Window Selection Tool or [download RESFEN](#).

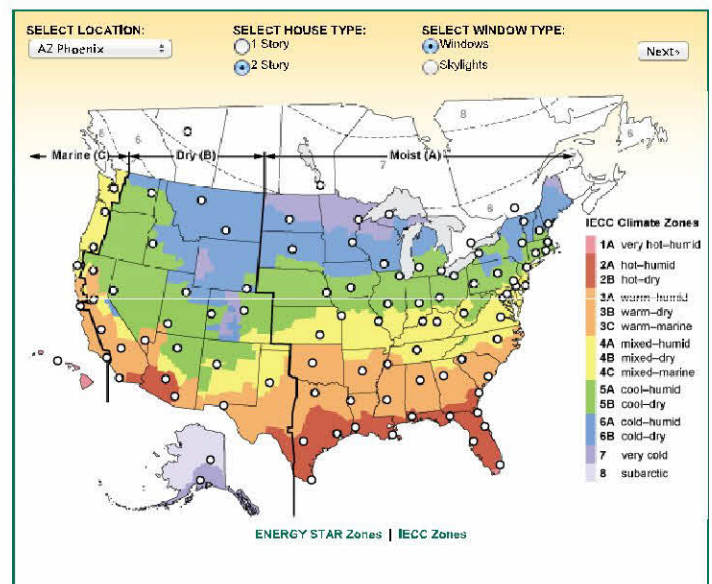
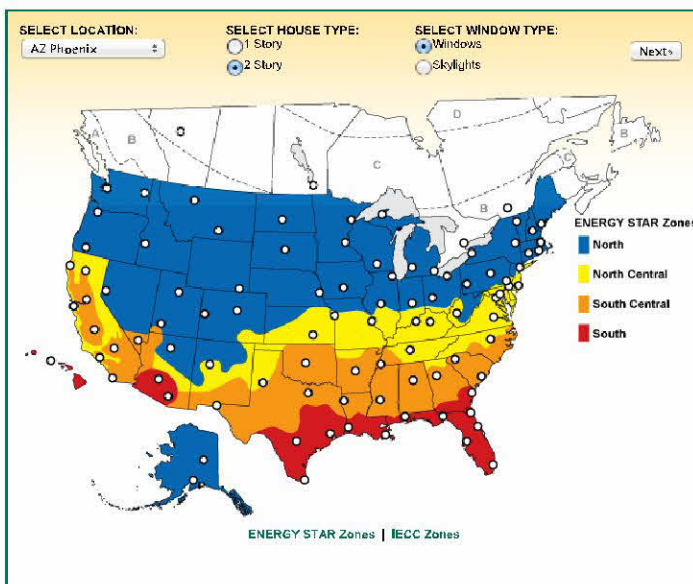


Figure 1. Opening screen of the Window Selection Tool showing the cities, house type, and window type available for selection. You can choose to see the map with the ENERGY STAR® zones or the IECC zones. The tool has options for new or replacement windows, 98 cities, 1- or 2-story home, and windows or skylights.

