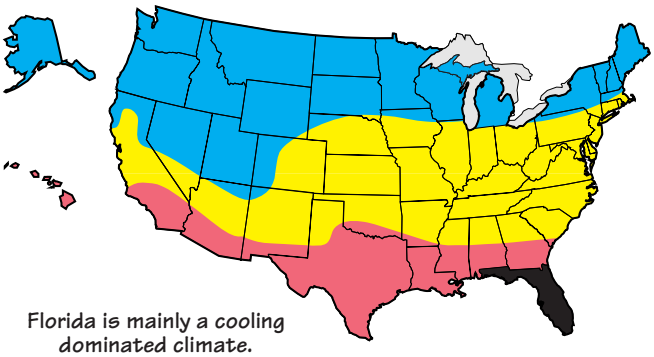
Efficient Windows Collaborative

Fact Sheet: Selecting Energy Efficient Windows in Florida

www.efficientwindows.org

October 2002



Florida is mainly a cooling dominated climate.

ENERGY STAR® Zones

- Northern Climate Zone (mostly heating)
- Central Climate Zone (heating & cooling)
- Southern Climate Zone (mostly cooling)

Benefits of High Performance Windows

Cooling and Heating Season Savings

Low-E coatings, gas-fills, and insulating spacers and frames can significantly reduce winter heat loss and summer heat gain.

Improved Daylight and View

New glazings with low-solar-gain low-E coatings can reduce solar heat gain significantly with a minimal loss of visible light (compared to older tints and films).

Improved Comfort

In both summer and winter occupant comfort is increased; window temperatures are more moderate and there are fewer cold drafts. Discomfort from strong summer sunlight is reduced.

Reduced Condensation

Frame and glazing materials that resist heat conduction do not become cold and this results in less condensation.

Reduced Fading

Coatings on glass or plastic films within the window assembly can significantly reduce the ultraviolet (UV) and other solar radiation which causes fading of fabrics and furnishings.

Lower Mechanical Equipment Costs

Using windows that significantly reduce solar heat gain means that cooling equipment costs may be reduced.

Visit www.efficientwindows.org for more information on how to select an efficient window, the benefits of efficient windows, and how windows work.

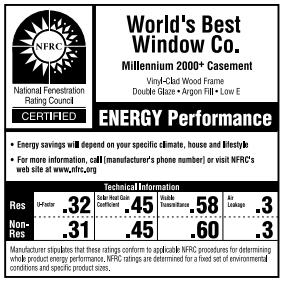
1 Look for the ENERGY STAR®

The Department of Energy (DOE) and the Environmental Protection Agency (EPA) have developed an ENERGY STAR (www.energystar.gov) designation for products meeting certain energy performance criteria. Since energy efficient performance of windows and skylights vary by climate, product recommendations are given for three U.S. climate zones. To distinguish between ENERGY STAR products, go to Step 2.

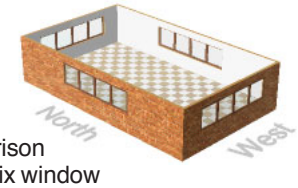
Money Isn't All You're Saving

2 Look for Efficient Window Properties on the NFRC Label

The National Fenestration Rating Council NFRC (www.nfrc.org) has developed a window energy rating system based on whole product performance. The NFRC label provides the only reliable way to determine the window energy properties and to compare products. The NFRC label appears on all fenestration products which are part of the ENERGY STAR program. See the next page for the recommended properties for this region. For typical cost savings from efficient windows in a specific location, go to Step 3.

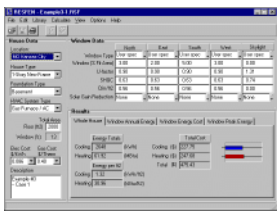


3 Compare Annual Energy Costs for a Typical House



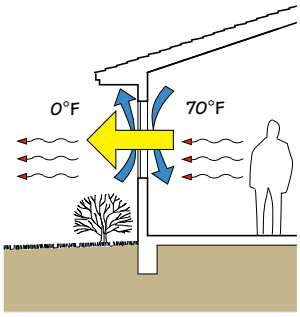
The annual energy use from computer simulations for a typical 2000 square-foot house in your region can be compared for different window options. A comparison of annual energy performance of six window types for this region begins on page 3.

4 Customize Energy Use Calculations for a Specific House



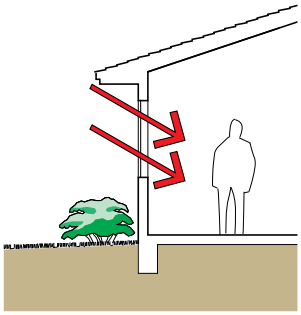
Using a computer program such as RESFEN to compare window options allows you to customize the calculations by adding heating and cooling costs for your climate, house design options, and utility rates. See the following pages for information on RESFEN.

Look for Efficient Window Properties on the NFRC Label



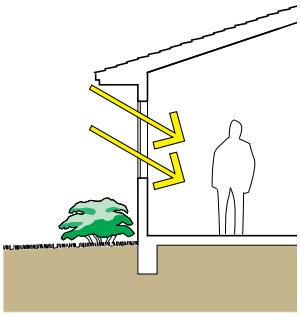
U-Factor

The rate of heat loss is indicated in terms of the U-factor (U-value) of a window assembly. The insulating value is indicated by the R-value which is the inverse of the U-value. The lower the U-factor, the greater a window's resistance to heat flow and the better its insulating value.



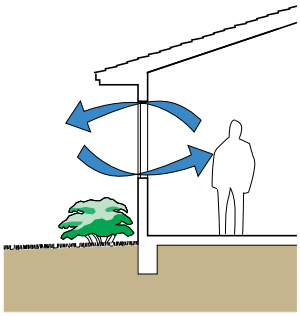
Solar Heat Gain Coefficient (SHGC)

The SHGC is the fraction of incident solar radiation admitted through a window. SHGC is expressed as a number between 0 and 1. The lower a window's solar heat gain coefficient, the less solar heat it transmits. Use a computer program such as RESFEN to understand heating and cooling trade-offs.



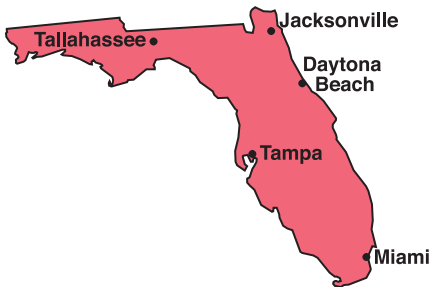
Visible Transmittance (VT)

The visible transmittance (VT) is an optical property that indicates the amount of visible light transmitted. The NFRC's VT is a whole window rating and includes the impact of the frame which does not transmit any visible light. While VT theoretically varies between 0 and 1, most values are between 0.3 and 0.8. The higher the VT, the more light is transmitted. A high VT is desirable to maximize daylight.



Air Leakage (AL)

Heat loss and gain occur by infiltration through cracks in the window assembly. AL is expressed in cubic feet of air passing through a square foot of window area. The lower the AL, the less air will pass through cracks in the assembly. While many think that AL is extremely important, it is not as important as U-factor and SHGC.



Southern Climate Zone (mostly cooling)

EWC Recommended Properties in the Southern Zone (mostly cooling)

- A low U-factor is useful during cold days when heating is needed. A low U-factor is also helpful during hot days when it is important to keep the heat out, but it is less important than SHGC in warm climates. Select windows with a U-factor lower than 0.75 and preferably lower than 0.60. Select skylights with a U-factor of 0.75 or less.
- A low SHGC is the most important window property in warm climates. Select windows with a SHGC less than 0.40. Select skylights with a SHGC of 0.40 or less.
- Select windows with a higher VT to maximize daylight and view.
- Select windows with an AL of 0.30 or less (units are cfm/sq ft).

Efficient Windows Collaborative

This fact sheet was produced with funding from the Windows and Glazings Program at the U.S. Department of Energy (www.eren.doe.gov) in support of the EWC. For more information, contact:

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Washington, D.C. 20036
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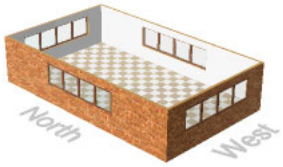
www.ase.org
www.efficientwindows.org

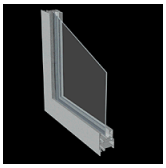
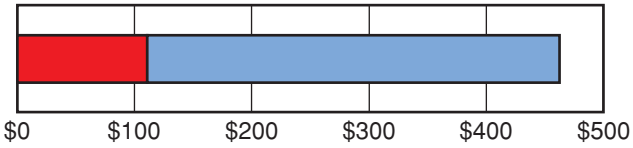
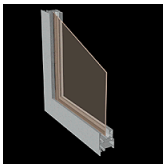
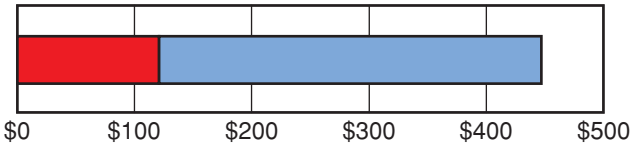
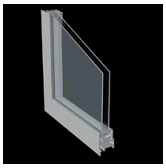
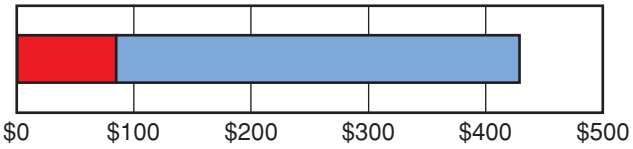
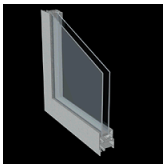
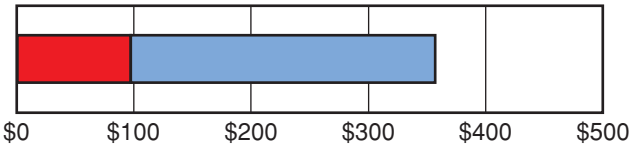
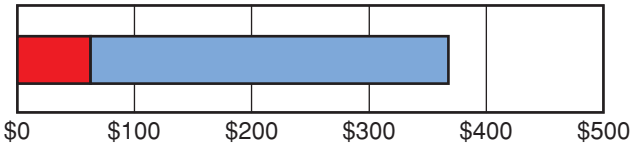
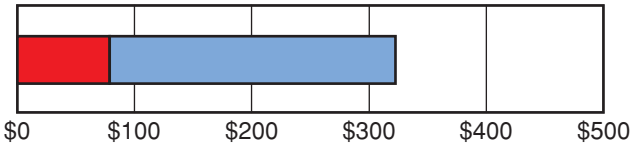
Residential Windows Book

Carmody, J., S. Selkowitz, D. Arasteh, and L. Heschong. *Residential Windows: New Technologies and Energy Performance, 2nd ed.* New York, NY: W.W. Norton & Company, 2000.

Comparing Window Performance in Daytona Beach, Florida

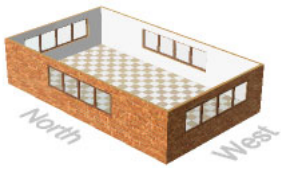


The annual energy performance figures shown here were generated using RESFEN for a typical, new 2000 sq. ft. house with 300 sq. ft. of window area (15% of floor area). The windows are equally distributed on all four sides of the house and include typical shading (interior shades, overhangs, trees and neighboring buildings). *

Case Studies	Properties	Annual Energy Use	Costs
 **CASE 1** single glazing clear glass aluminum frame	U = 1.25 SHGC = 0.76 VT = 0.74		Heating $111.38 Cooling $357.23 Total $468.61
 **CASE 2** single glazing tinted glass aluminum frame	U = 1.25 SHGC = 0.65 VT = 0.56		Heating $122.81 Cooling $326.57 Total $449.38
 **CASE 3** double glazing clear glass aluminum frame	U = 0.79 SHGC = 0.68 VT = 0.67		Heating $84.62 Cooling $341.70 Total $426.32
 **CASE 4** double glazing low-E coating (low solar gain) aluminum frame	U = 0.60 SHGC = 0.38 VT = 0.57		Heating $99.81 Cooling $259.94 Total $359.75
 **CASE 5** double glazing low-E coating (high solar gain) argon gas fill vinyl/wood frame	U = 0.36 SHGC = 0.52 VT = 0.53		Heating $60.78 Cooling $306.83 Total $367.61
 **CASE 6** double glazing low-E coating (low solar gain) argon gas fill vinyl/wood frame	U = 0.32 SHGC = 0.30 VT = 0.50		Heating $79.88 Cooling $243.67 Total $323.55

*Note: U-factor, SHGC, and VT are for the total window including frame. Energy use and savings between different window options will typically be higher for homes which are not as well insulated as typical new homes. The costs shown here are annual costs for space heating and space cooling only and thus will not correlate to utility bills. Costs for lights, appliances, hot water, cooking, and other uses are not included in these figures. The mechanical system uses a gas furnace for heating and air conditioning for cooling. These figures are based on typical energy costs for this region (natural gas, $1.394/therm and electricity, $0.085/kWh). Natural gas prices are from Table 21: Average Price of Natural Gas Delivered to Residential Consumers, and the electric prices are from Table 55: Estimated U.S. Electric Utility Average Revenue per Kilowatt-hour. These tables are provided by the Energy Information Administration (www.eia.doe.gov). RESFEN is computer program for calculating the annual cooling and heating energy use and costs due to window selection. It is available from Lawrence Berkeley National Laboratory (windows.lbl.gov/software/resfen).

Comparing Window Performance in Jacksonville, Florida



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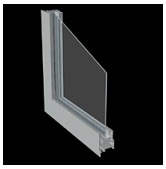
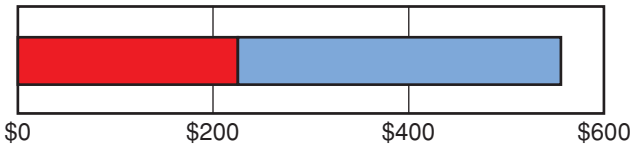
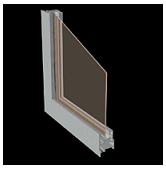
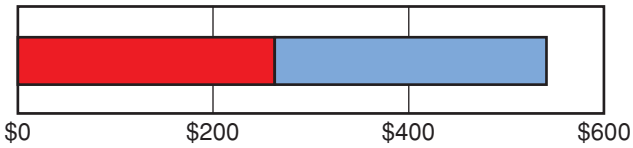
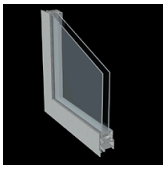
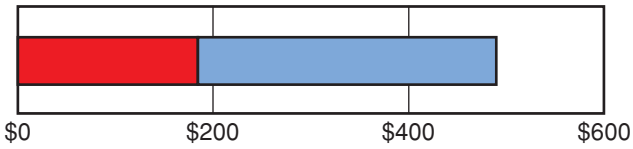
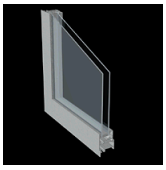
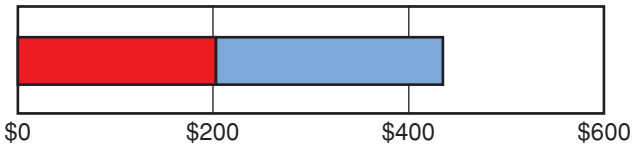
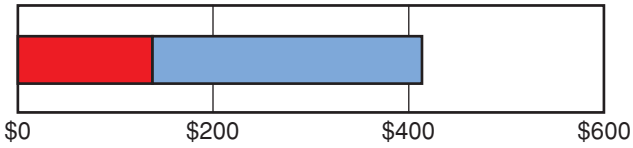
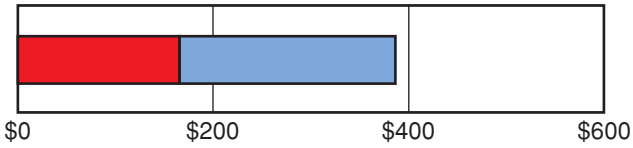
 **CASE 1** single glazing, clear glass, aluminum frame	U = 1.25 SHGC = 0.76 VT = 0.74		Heating $226.80 Cooling $327.19 Total $553.99
 **CASE 2** single glazing, tinted glass, aluminum frame	U = 1.25 SHGC = 0.65 VT = 0.56		Heating $243.95 Cooling $298.96 Total $542.91
 **CASE 3** double glazing, clear glass, aluminum frame	U = 0.79 SHGC = 0.68 VT = 0.67		Heating $181.08 Cooling $310.53 Total $491.61
 **CASE 4** double glazing, low-E coating (low solar gain), aluminum frame	U = 0.60 SHGC = 0.38 VT = 0.57		Heating $201.71 Cooling $235.00 Total $436.71
 **CASE 5** double glazing, low-E coating (high solar gain), argon gas fill, vinyl/wood frame	U = 0.36 SHGC = 0.52 VT = 0.53		Heating $138.84 Cooling $276.32 Total $415.16
 **CASE 6** double glazing, low-E coating (low solar gain), argon gas fill, vinyl/wood frame	U = 0.32 SHGC = 0.30 VT = 0.50		Heating $167.42 Cooling $218.61 Total $386.03

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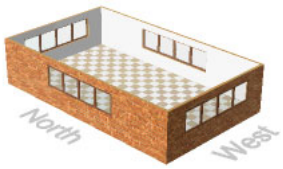
Comparing Window Performance in Miami, Florida



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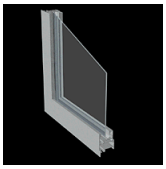
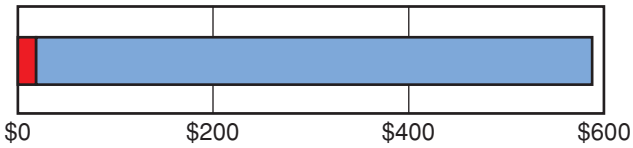
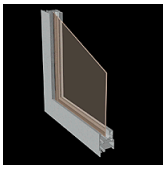
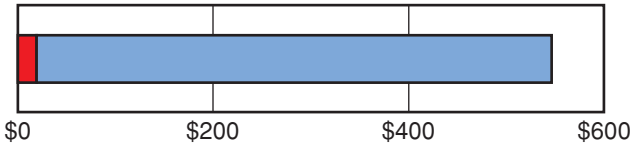
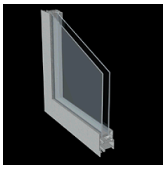
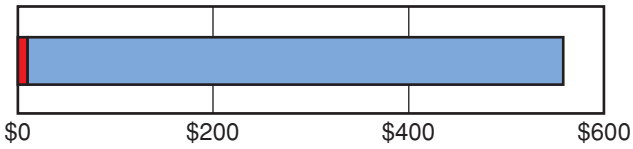
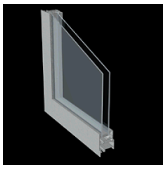
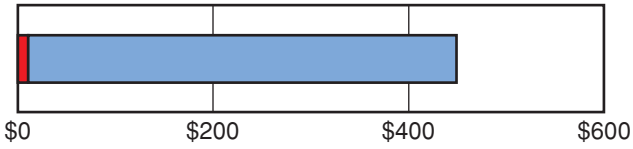
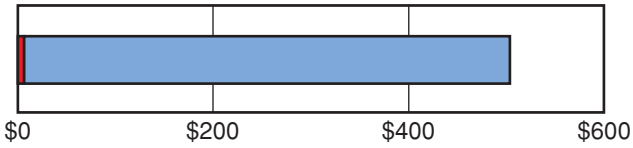
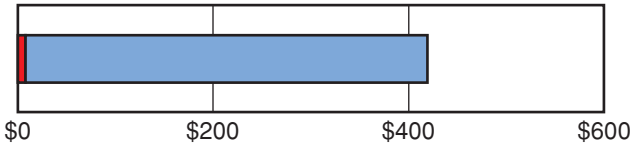
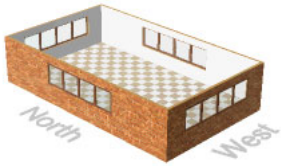
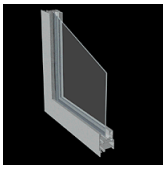
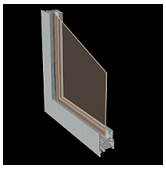
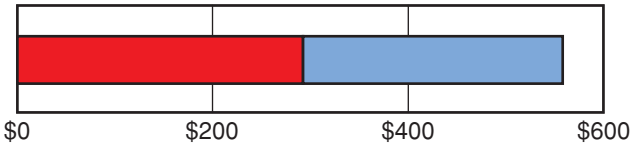
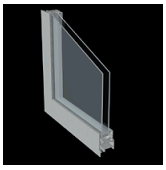
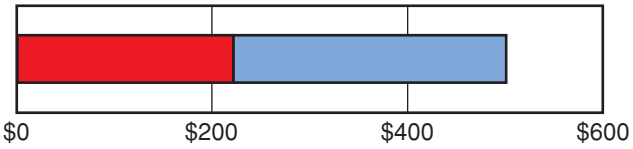
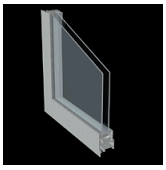
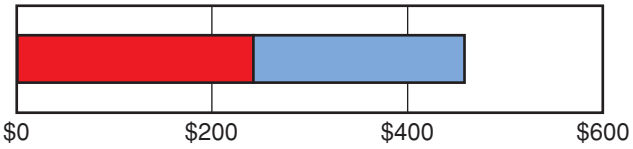
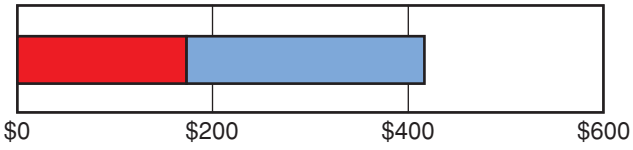
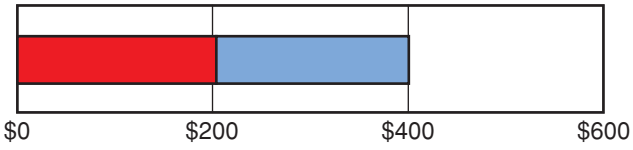
 **CASE 1** single glazing clear glass aluminum frame	U = 1.25 SHGC = 0.76 VT = 0.74		Heating $14.08 Cooling $573.07 Total $587.15
 **CASE 2** single glazing tinted glass aluminum frame	U = 1.25 SHGC = 0.65 VT = 0.56		Heating $15.61 Cooling $531.78 Total $547.39
 **CASE 3** double glazing clear glass aluminum frame	U = 0.79 SHGC = 0.68 VT = 0.67		Heating $9.48 Cooling $549.75 Total $559.23
 **CASE 4** double glazing low-E coating (low solar gain) aluminum frame	U = 0.60 SHGC = 0.38 VT = 0.57		Heating $10.18 Cooling $439.19 Total $449.37
 **CASE 5** double glazing low-E coating (high solar gain) argon gas fill vinyl/wood frame	U = 0.36 SHGC = 0.52 VT = 0.53		Heating $5.44 Cooling $499.88 Total $505.31
 **CASE 6** double glazing low-E coating (low solar gain) argon gas fill vinyl/wood frame	U = 0.32 SHGC = 0.30 VT = 0.50		Heating $6.69 Cooling $415.07 Total $421.76

*Note: U-factor, SHGC, and VT are for the total window including frame. Energy use and savings between different window options will typically be higher for homes which are not as well insulated as typical new homes. The costs shown here are annual costs for space heating and space cooling only and thus will not correlate to utility bills. Costs for lights, appliances, hot water, cooking, and other uses are not included in these figures. The mechanical system uses a gas furnace for heating and air conditioning for cooling. These figures are based on typical energy costs for this region (natural gas, $1.394/therm and electricity, $0.085/kWh). Natural gas prices are from Table 21: Average Price of Natural Gas Delivered to Residential Consumers, and the electric prices are from Table 55: Estimated U.S. Electric Utility Average Revenue per Kilowatt-hour. These tables are provided by the Energy Information Administration (www.eia.doe.gov). RESFEN is computer program for calculating the annual cooling and heating energy use and costs due to window selection. It is available from Lawrence Berkeley National Laboratory (windows.lbl.gov/software/resfen).

Comparing Window Performance in Tallahassee, Florida

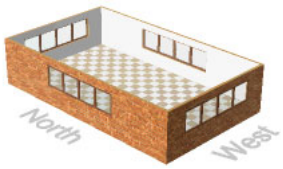


The annual energy performance figures shown here were generated using RESFEN for a typical, new 2000 sq. ft. house with 300 sq. ft. of window area (15% of floor area). The windows are equally distributed on all four sides of the house and include typical shading (interior shades, overhangs, trees and neighboring buildings). *

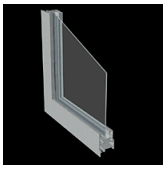
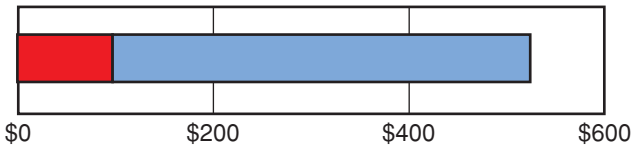
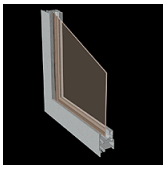
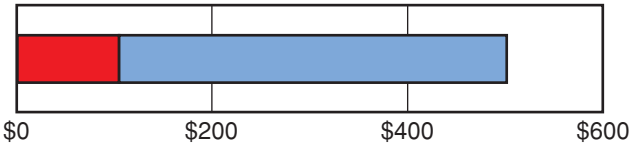
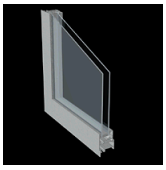
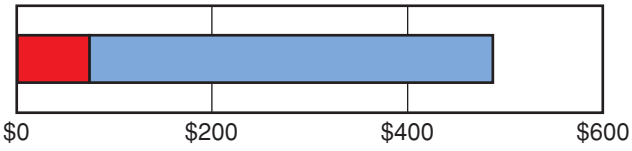
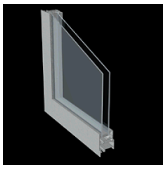
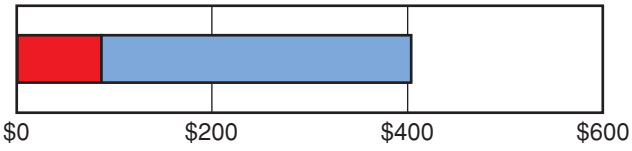
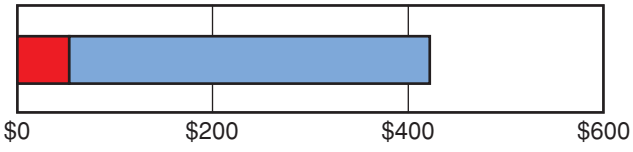
Case Studies	Properties	Annual Energy Use	Costs
 **CASE 1** single glazing, clear glass, aluminum frame	U = 1.25 SHGC = 0.76 VT = 0.74		Heating $271.55 Cooling $295.47 Total $567.02
 **CASE 2** single glazing, tinted glass, aluminum frame	U = 1.25 SHGC = 0.65 VT = 0.56		Heating $291.07 Cooling $269.51 Total $560.58
 **CASE 3** double glazing, clear glass, aluminum frame	U = 0.79 SHGC = 0.68 VT = 0.67		Heating $220.81 Cooling $280.21 Total $501.02
 **CASE 4** double glazing, low-E coating (low solar gain), aluminum frame	U = 0.60 SHGC = 0.38 VT = 0.57		Heating $245.07 Cooling $210.41 Total $455.48
 **CASE 5** double glazing, low-E coating (high solar gain), argon gas fill, vinyl/wood frame	U = 0.36 SHGC = 0.52 VT = 0.53		Heating $172.16 Cooling $247.82 Total $419.98
 **CASE 6** double glazing, low-E coating (low solar gain), argon gas fill, vinyl/wood frame	U = 0.32 SHGC = 0.30 VT = 0.50		Heating $205.48 Cooling $195.37 Total $400.85

*Note: U-factor, SHGC, and VT are for the total window including frame. Energy use and savings between different window options will typically be higher for homes which are not as well insulated as typical new homes. The costs shown here are annual costs for space heating and space cooling only and thus will not correlate to utility bills. Costs for lights, appliances, hot water, cooking, and other uses are not included in these figures. The mechanical system uses a gas furnace for heating and air conditioning for cooling. These figures are based on typical energy costs for this region (natural gas, $1.394/therm and electricity, $0.085/kWh). Natural gas prices are from Table 21: Average Price of Natural Gas Delivered to Residential Consumers, and the electric prices are from Table 55: Estimated U.S. Electric Utility Average Revenue per Kilowatt-hour. These tables are provided by the Energy Information Administration (www.eia.doe.gov). RESFEN is computer program for calculating the annual cooling and heating energy use and costs due to window selection. It is available from Lawrence Berkeley National Laboratory (windows.lbl.gov/software/resfen).

Comparing Window Performance in Tampa, Florida



The annual energy performance figures shown here were generated using RESFEN for a typical, new 2000 sq. ft. house with 300 sq. ft. of window area (15% of floor area). The windows are equally distributed on all four sides of the house and include typical shading (interior shades, overhangs, trees and neighboring buildings). *

Case Studies	Properties	Annual Energy Use	Costs
 **CASE 1** single glazing, clear glass, aluminum frame	U = 1.25 SHGC = 0.76 VT = 0.74		Heating $98.14 Cooling $431.39 Total $529.53
 **CASE 2** single glazing, tinted glass, aluminum frame	U = 1.25 SHGC = 0.65 VT = 0.56		Heating $106.92 Cooling $396.89 Total $503.81
 **CASE 3** double glazing, clear glass, aluminum frame	U = 0.79 SHGC = 0.68 VT = 0.67		Heating $74.58 Cooling $411.74 Total $486.32
 **CASE 4** double glazing, low-E coating (low solar gain), aluminum frame	U = 0.60 SHGC = 0.38 VT = 0.57		Heating $85.59 Cooling $318.76 Total $404.35
 **CASE 5** double glazing, low-E coating (high solar gain), argon gas fill, vinyl/wood frame	U = 0.36 SHGC = 0.52 VT = 0.53		Heating $53.39 Cooling $370.22 Total $423.61
 **CASE 6** double glazing, low-E coating (low solar gain), argon gas fill, vinyl/wood frame	U = 0.32 SHGC = 0.30 VT = 0.50		Heating $68.45 Cooling $298.45 Total $366.90

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