



2014 ASHRAE/IBPSA-USA

Building Simulation
Conference

Glazing in the Cloud

Sue Reilly, P.E., BEMP, LEED AP

Group14 Engineering, Inc.

www.group14eng.com

Learning Objectives

- Objective 1: **Access a cloud computing tool for selecting commercial windows for different building types.**
- Objective 2: **Describe the advantages and limitations of the cloud-based building energy simulation tool for selection of commercial windows.**

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Overview

- Energy Calculator
- Features
 - Window Library and Glazing Performance
- Results
- Questions



(Building) Energy Calculator

- **On-line hourly building energy simulation for comparing windows**
 - **Commercial and multifamily buildings**
 - Prototype building models
 - Defaults consistent with ASHRAE 90.1-2007, Appendix G
 - Draw from personalized window library
 - Weather data from around the world
 - Compare first costs, potential savings from down-sizing major HVAC and air distribution, and annual energy cost savings



Features

- Location
- Energy Costs
- Building Type
- Specify window area and window type by elevation
- Specify window frame and spacer
- Orientation
- Economics

Project Settings {x} Collapse

Select Project: Fuel Type:

Average Gas Cost: USD/Therm

Location: Average Electricity Cost: USD/kWh

Currency: Electric Demand Charge: USD/kW

[Delete this project and return to defaults...](#)

Building Settings {x} Collapse

Building Type: Number of Stories:

Floor Length (long axis) (ft): Floor Width (ft):

Floor-to-ceiling Height (ft): Perimeter Zone Depth (ft):

Automated Daylighting Controls:

| | Elevation 1 | Elevation 2 | Elevation 3 | Elevation 4 |
|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Window to Wall Area (0-100%) <input type="text"/> | <input type="text" value="40"/> | <input type="text" value="30"/> | <input type="text" value="60"/> | <input type="text" value="20"/> |
| Overhang (ft): <input type="text" value="0.6"/> | Same As Elevation 1 | Same As Elevation 1 | Same As Elevation 1 | Same As Elevation 1 |
| Window Type: <input type="text" value="Punched"/> | Same As Elevation 1 | Same As Elevation 1 | Same As Elevation 1 | Same As Elevation 1 |
| Window Height (ft): <input type="text" value="7"/> | Same As Elevation 1 | Same As Elevation 1 | Same As Elevation 1 | Same As Elevation 1 |
| Window Width (ft): <input type="text" value="190"/> | Same As Elevation 1 | Same As Elevation 1 | Same As Elevation 1 | Same As Elevation 1 |
| Frame Type: <input type="text" value="T/B Aluminum"/> | | | | |
| Spacer Type: <input type="text" value="Aluminum"/> | | | | |

Personalize Window Library

1. Start from Scratch or Load an Existing Glass Type | Help?

Create a new Make-up

Monolithic Double
Triple Single Laminate
IG with laminated outboard IG with laminated inboard

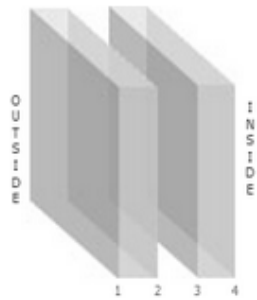
[Open a Glass Type from My Project Center](#)

2. Define and Analyze | Help?

Project Name: Unassigned ([Create Project](#)) ([Assign To Project](#))
Glass Type: **Untitled glass type 01** ([edit](#))

[Copy This Make-up](#) [Import a Make-up from My Project Center](#)

Make-up Name: Default Make-up 01 ([edit](#)) | [Help?](#)



| | | outdoor side | | |
|------|--|------------------------|---|-------------------------------------|
| LITE | Clear 5/16" = 8mm | 1 - _____ 2 - _____ | ● | + x |
| GAP | 100% Air, 1/2" = 12.7 mm | | | |
| LITE | Clear 5/16" = 8mm | 3 - _____ 4 - _____ | ● | + x |

indoor side

TOTAL THICKNESS: 1.088 in / 27.635 mm

GLAZING SLOPE: [90°](#)

[View Project Database](#)

Glazing Performance

- Customize output
- Thermal and optical performance
- Thermal stress guide
- BIM

Summary Data
Thermal Stress Guide
Contact Us

Help?
[Customize Summary Data](#)

Select the columns needed for comparison. You may have up to 16 columns selected below.

Make-up Description Options

Thermal Stress Guideline

Outboard Substrate & Coating

Middle Substrate & Coating

Inboard Substrate & Coating

PVB Product

Glazing Slope

Transmission

Visible Light %

Ultraviolet %

Solar Energy %

Damage-weighted Transmission % (Tdw)

Reflectance

Visible Light Out %

Visible Light In %

U-Value

Winter Nighttime

Summer Daytime

[Help?](#)

Additional Columns

Relative Heat Gain (RHG)

Shading Coefficient (SC)

Solar Heat Gain Coefficient (SHGC)

Light to Solar Gain (LSG)

Color Rendering Index (CRI)

Sound Transmission Class (STC)

Weighted Sound Reduction Index (Rw)

Outdoor Indoor Transmission Class (OITC)

R-Value

Save these column settings?

[X CLOSE](#)

| ▲ Make-up Name | Outboard Substrate & Coating | Transmission | | | Reflectance | | U-Value | | Additional Columns | | | | | |
|--------------------|------------------------------|-----------------|------|----------------|---------------|--------------|--|--|-------------------------------|------|-------------|------|--------------------------|-------------------------------------|
| | | Visible Light % | UV % | Solar Energy % | Visible Out % | Visible In % | Winter Night (Btu/hr-ft ² -F) | Summer Day (Btu/hr-ft ² -F) | RHG (Btu/hr-ft ²) | SC | SHGC | LSG | | |
| Default Make-up 01 | Clear | 79 | 45 | 61 | 15 | 15 | 0.47 | 0.49 | 169 | 0.81 | 0.70 | 1.12 | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

CALCULATION STANDARD: [NFRC 2010](#)

More Features

| | Elevation 1 | Elevation 2 |
|----------------------------------|---|---|
| Window to Wall Area (0-100%) ▾ : | <input type="text" value="40"/> | <input type="text" value="30"/> |
| Overhang (ft): | <input type="text" value="0.6"/> | Same As Elevation 1 <small>Sa</small> |
| Window Type: | <input type="text" value="Punched"/> ▾ | <input type="text" value="Curtain Wall"/> ▾ <small>Sa</small> |
| Window Height (ft): | <input type="text" value="7"/> | <input type="text" value="Punched"/> <small>Sa</small> |
| Window Width (ft): | <input type="text" value="190"/> | Same As Elevation 1 <small>Sa</small> |
| Frame Type: | <input type="text" value="T/B Aluminum"/> ▾ | |
| Spacer Type: | <input type="text" value="Aluminum"/> ▾ | |

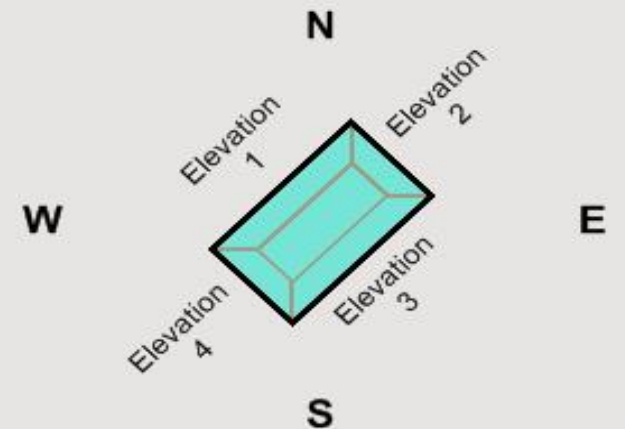
Site Orientation {x} Collapse

Elevation View



Elevation 4 ▾

Plan View



Orient Elevation 1 to Face: ▾

Results

Glass Make-up Cost (USD/ft²):

[Same As Elevation 1](#)

[Same As Elevation 1](#)

[Same As Elevation 1](#)

Calculate

Add New Glazing Scenario

Copy Glazing Scenario

Results

Comparison

Payback

Graphs

Report

| ▲ Glazing Scenario | Glass Make-up Cost (per ft²) | Building Glass Cost | Annual Building Energy Cost (Glass) | Initial HVAC Cost Compared To Baseline | Payback Period | First Year Savings (HVAC and Energy Costs) | Ten-Year Savings (HVAC and Energy Costs) |
|--------------------------------------|---|-------------------------------------|---|--|--------------------------------|--|--|
| Std Low-E: U=0.29, SHGC=0.4 | 0.00 | 0 | 218,803 | | | | |
| ↳ <i>Daylighting</i> | | | 196,290 | | | | |
| Low-E 62/27: U=0.29, SHGC=0.27 | +1.00 | +21,640 | -5,509 | -50,656 | Immediate | +34,525 | +84,110 |
| ↳ <i>Daylighting</i> | | | -5,270 | -50,711 | Immediate | +34,341 | +81,771 |

Results

Results

Comparison

Payback

Graphs

Report

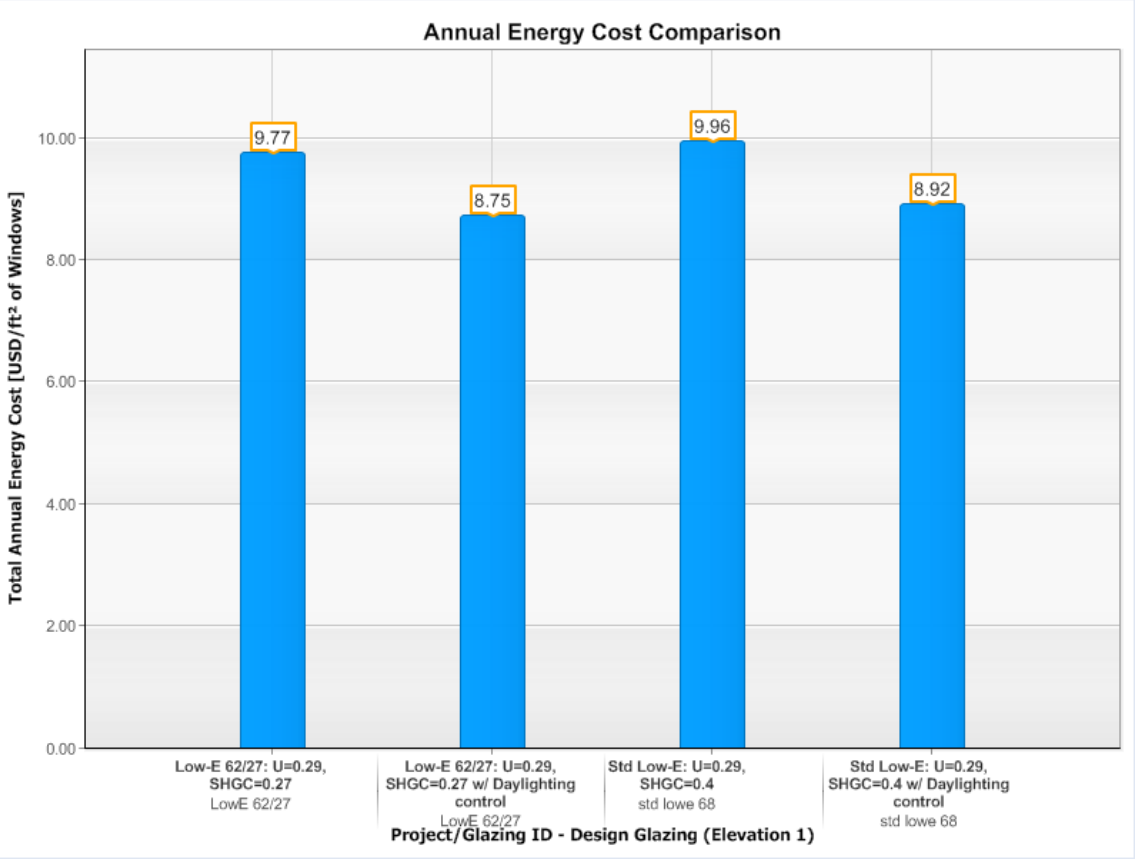
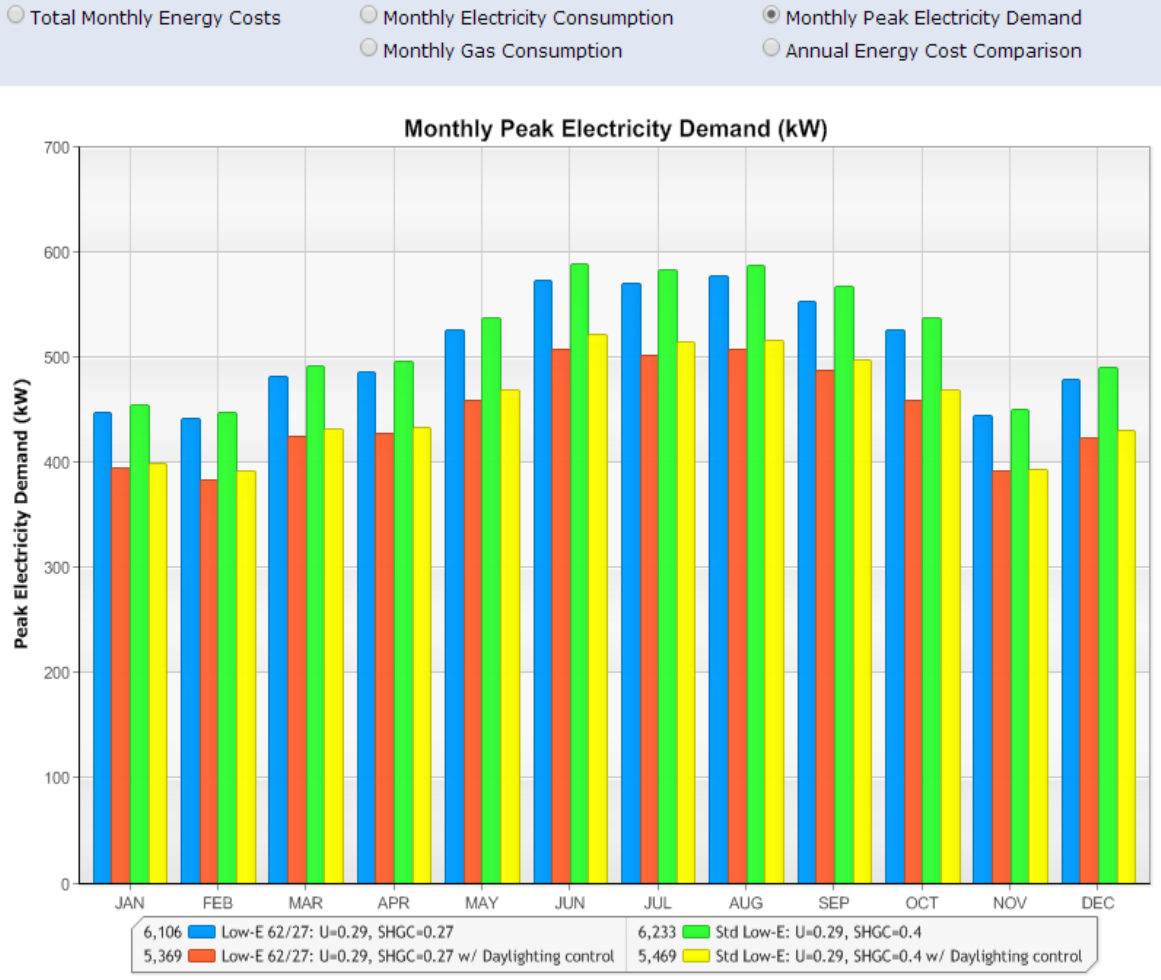
Baseline Glazing Scenario: Std Low-E: U=0.29, SHGC=0.4 ▼

Comparison Glazing Scenario: Low-E 62/27: U=0.29, SHGC=0.27 ▼

| | Total Annual Energy Cost (USD) | Annual Electricity Cost (USD) | Annual Gas Cost (USD) | Annual Electricity Consumption (kWh) | Annual Gas Consumption (Therm) | Peak Electricity Demand (W) | CO ₂ Emissions (kg) |
|---|--------------------------------|-------------------------------|-----------------------|--------------------------------------|--------------------------------|-----------------------------|--------------------------------|
| Std Low-E: U=0.29, SHGC=0.4 | 218,803 | 213,561 | 5,241 | 1,729,558 | 7,372 | 598,200 | 1,440,058 |
| Low-E 62/27: U=0.29, SHGC=0.27 | 213,293 | 207,976 | 5,317 | 1,686,807 | 7,479 | 580,900 | 1,405,997 |
| SAVINGS | 5,509 | 5,585 | (76) | 42,751 | -107 | 17,300 | 34,060 |
| Low-E 62/27: U=0.29, SHGC=0.27 with Daylighting Controls | 191,019 | 185,041 | 5,978 | 1,523,589 | 8,408 | 514,000 | 1,278,720 |
| SAVINGS | 27,783 | 28,520 | (736) | 205,969 | -1,036 | 84,200 | 161,338 |

Display values as: Total building ▼

Results



Questions?

Sue Reilly
sreilly@group14eng.com