

2012 WSEC Code Proposals for Glazing Vertical WWR Percentage - 2009 WSEC as the Baseline

Section C402.3.1.1



Glazing Cost vs Energy Savings Table

Glazing Cost vs Energy Savings Table		Vertical Glazing Performance Properties							Vertical Wall Cost Data				Energy Modeling & Energy Payback Data (Note 6)							
Description	Climate Zones	Glazing Description	Code Maximum Vertical WWR Glazing Percentage	Proposed Building Vertical WWR Glazing Percentage	Metal Framed Glazing Max. U-Value	Metal Framed Glazing Max. SHGC	Metal Framed Glazing Min. VT	VT/SHGC Ratio	Vertical Glazing Cost (\$/SF)	Opaque Wall Cost (\$/SF)	Total Vertical Skin Cost (\$/SF)	% Cost Change from 2009 WSEC Baseline	Electrical Utility Cost (\$/kWh)	Annual Energy Usage (1000 kWh)	% Change in Annual Energy Usage from 2009 WSEC	Building Annual Energy Cost (\$)	Annual Energy Cost Diff. (\$)	Energy Savings & Cost Recap	Simple Payback (years)	Notes
2009 WSEC Code 0-40%WWR Baseline Glazing Criteria	1	Curtainwall, Double Pane, 4 Sided Captures Glass with Argon Fill	40%	40%	0.40	0.40	n/a	n/a	\$ 78.00	\$ 90.00	\$ 85.20	Baseline	\$ 0.077	4447.2	Baseline	\$ 342,432	Baseline	Baseline	Baseline	Notes 1, 5, 8
2012 WSEC Code 0-30%WWR Baseline Glazing Criteria	5 and 4M	Curtainwall, Double Pane, 4 Sided Structural Silicon Glazing with Argon Fill	30%	30%	0.38	0.40	0.40	1.00	\$ 82.50	\$ 94.50	\$ 90.90	6.7%	\$ 0.077	4350.6	2.17%	\$ 334,993	\$ (7,440)	Moderate Cost Add, Moderate Energy Savings over 2009 WSEC	145.9	Notes 1, 3, 5
2012 WSEC Code 40%WWR Daylighting Option Glazing Criteria	5 and 4M	Curtainwall, Double Pane, 4 Sided Structural Silicon Glazing with Argon Fill	40%	40%	0.38	0.40	0.44	1.1	\$ 82.50	\$ 94.50	\$ 89.70	5.3%	\$ 0.077	4422.0	0.57%	\$ 340,495	\$ (1,937)	First Cost Slightly less than 2012 WSEC 30% WWR, Less Energy Efficient due to More Glazing	442.3	Notes 1, 2, 5
2012 WSEC Code 40%WWR Adjusted Daylighting Option Code Proposal Glazing Criteria	5 and 4M	Curtainwall, Double Pane, 4 Sided Structural Silicon Glazing with Argon Fill	40%	40%	0.38	0.40	0.50	1.25	\$ 84.00	\$ 96.00	\$ 91.20	7.0%	\$ 0.077	4418.0	0.66%	\$ 340,184	\$ (2,248)	First Cost Slightly Higher than 2012 WSEC Daylighting Path due to better VT, Slightly More Efficient due to better VT	508.1	Notes 1, 2, 5, 7
2012 WSEC Target UA 40% WWR Glazing Criteria using Target UA	5 and 4M	Curtainwall, Double Pane, 4 Sided Structural Silicon Glazing, 30MM Isolated Strut and Double Low E Coating	30%	40%	0.30	0.30	0.40	1.33	\$ 94.00	\$ 106.00	\$ 102.40	20.2%	\$ 0.077	4344.4	2.31%	\$ 334,518	\$ (7,914)	High First Cost, Significant Energy Savings	413.8	Notes 1, 5
2012 WSEC Code Proposal 40% Max Alternate Option Glazing Criteria (Similar Criteria Proposed for 2009 SEC)	5 and 4M	Curtainwall, Double Pane, 4 Sided Structural Silicon Glazing with Low E Coating	30%	40%	0.34	0.32	0.50	1.5	\$ 92.00	\$ 104.00	\$ 100.40	17.8%	\$ 0.077	4380.3	1.50%	\$ 337,280	\$ (5,153)	First Cost Slightly Less than 40% WWR UA, with Slightly Less Energy Savings than the 30% WWR Building	561.6	Notes 1, 3, 5

Notes:

- Based on current UA calculation experience glazing thermal performance is typically more efficient than the code default to compensate for thermal bridging in opaque wall assemblies.
- Default values for 0-30% WWR or Up to 40% when 50% Daylighting Criteria is met. For Daylighting option the glazing assembly VT must be equal or greater than the SHGC * 1.1.
- The 2012 WSEC, 30% glazed building option was simulated 4 times, rotating it by 90 degrees each time. The swing between the high and low energy orientations is about 0.7% of total building energy.
- Cost data for opaque wall assembly assumes a curtainwall assembly with insulated spandrel panel with R-10 continuous insulation and a 3.5" metal stud wall with R-13 insulation.
- Cost data was developed by Turner Construction Company working with Rushing and Vulcan, Inc. Turner averaged cost data from four glazing contractors to develop average assembly cost and type for each glazing option above.
- Energy Modeling utilized a 25 story core shell office tower. The same floorplate was assumed on each floor. Modeling was performed in eQuest/DOE 2.2.
The simplified energy model used a continuous band of glazing around the building perimeter. The model was broken into 15 foot deep exterior zones that received daylighting controls.
Up to 75% of the lights in the perimeter zones could be controlled with continuous dimming down to 30%.
Model utilized glazing properties above, plug loads of 0.75 watts/sf of misc equipment, and code lighting levels.
The only modification between each run were the WWR glazing percentage and the vertical glazing properties.
- Simplified Energy Model did not assume any corrections for the daylight zone depth or daylight zone to conditioned floor vs adjusted conditioned floor ratio for this modeling run.
- Simple payback calculation assumes that 2009 WSEC is the baseline and it takes 146 years to payback the change to 30% WWR in 2012 WSEC.