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BOABC Conference

Why is the NBC Creating Solar Heat Gain Maximums for Windows and Doors?

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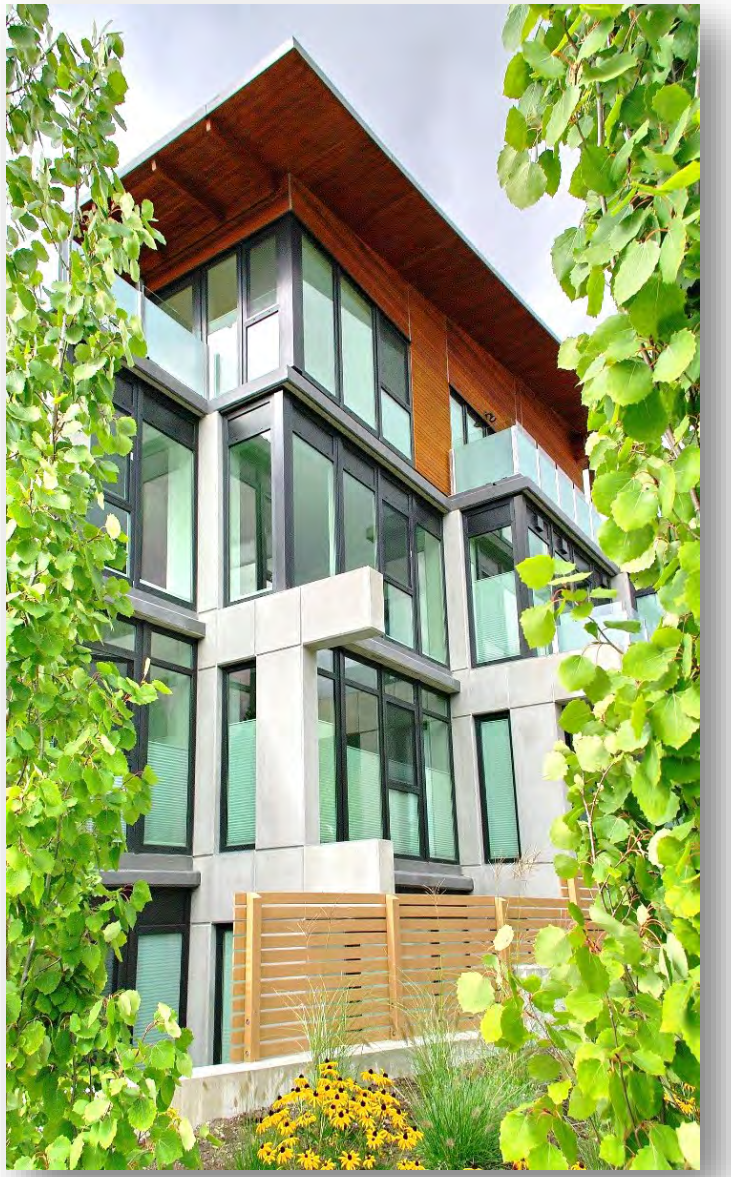

Intended Takeaways

- Understand SHGC & Heat Gain
- What Happens When We Get It Wrong
- Code Changes & Why They Matter
- What You Can Do (as Building Officials)

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Townhouse Project in Vancouver

Phase 1
30 Units

Phase 2
120 Units

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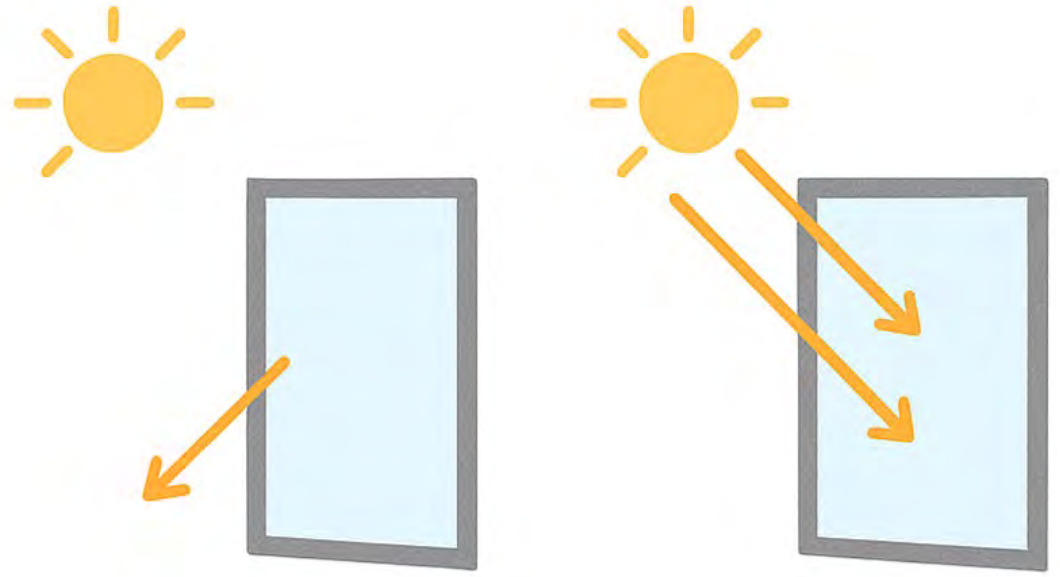
What is a “SHGC”?

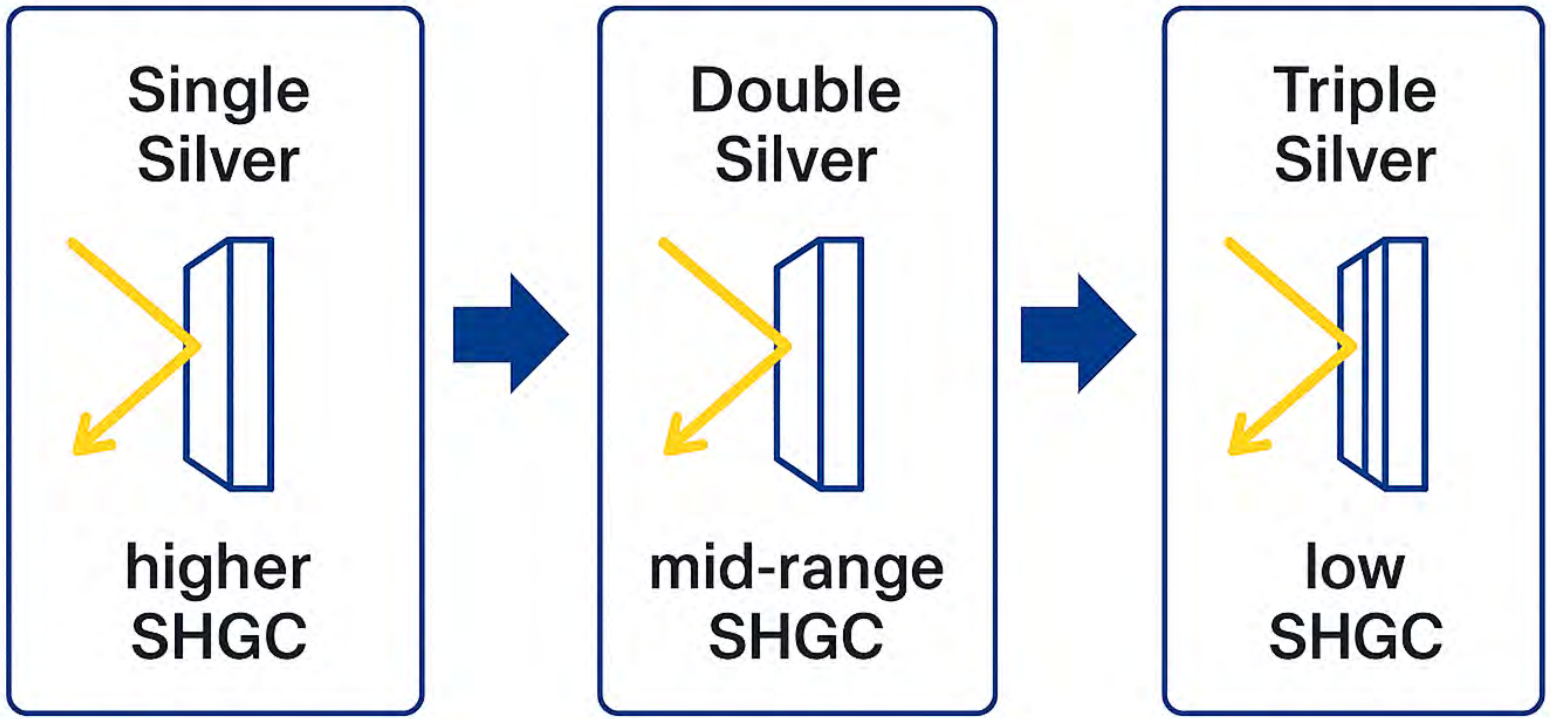
SHGC or Solar Heat Gain Coefficient is the fraction of heat represented by a number between 0 and 1



0.2 or 20%

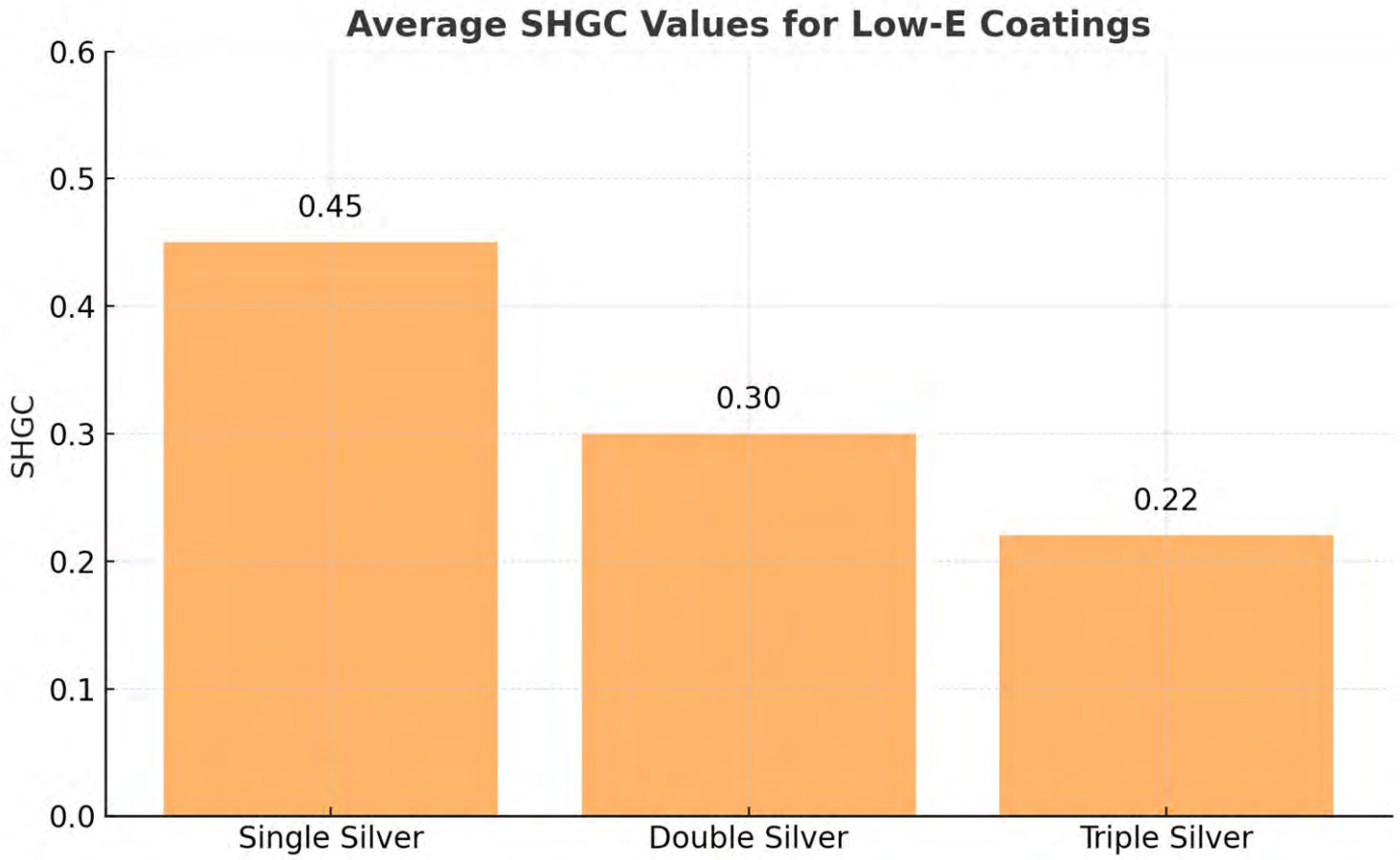
0.6 or 60%

Using Silver to block Solar Heat

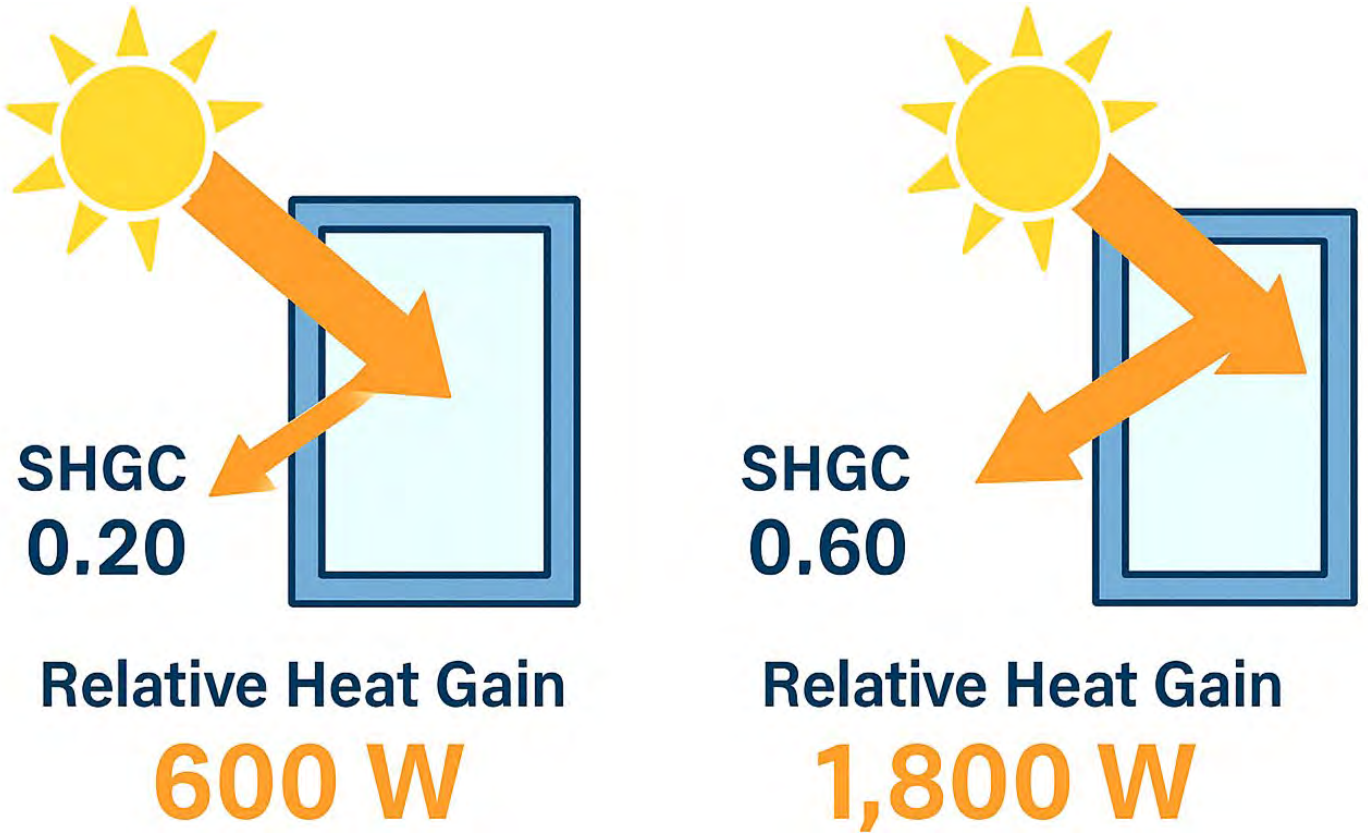


How 1, 2, and 3 layers of silver affect SHGC

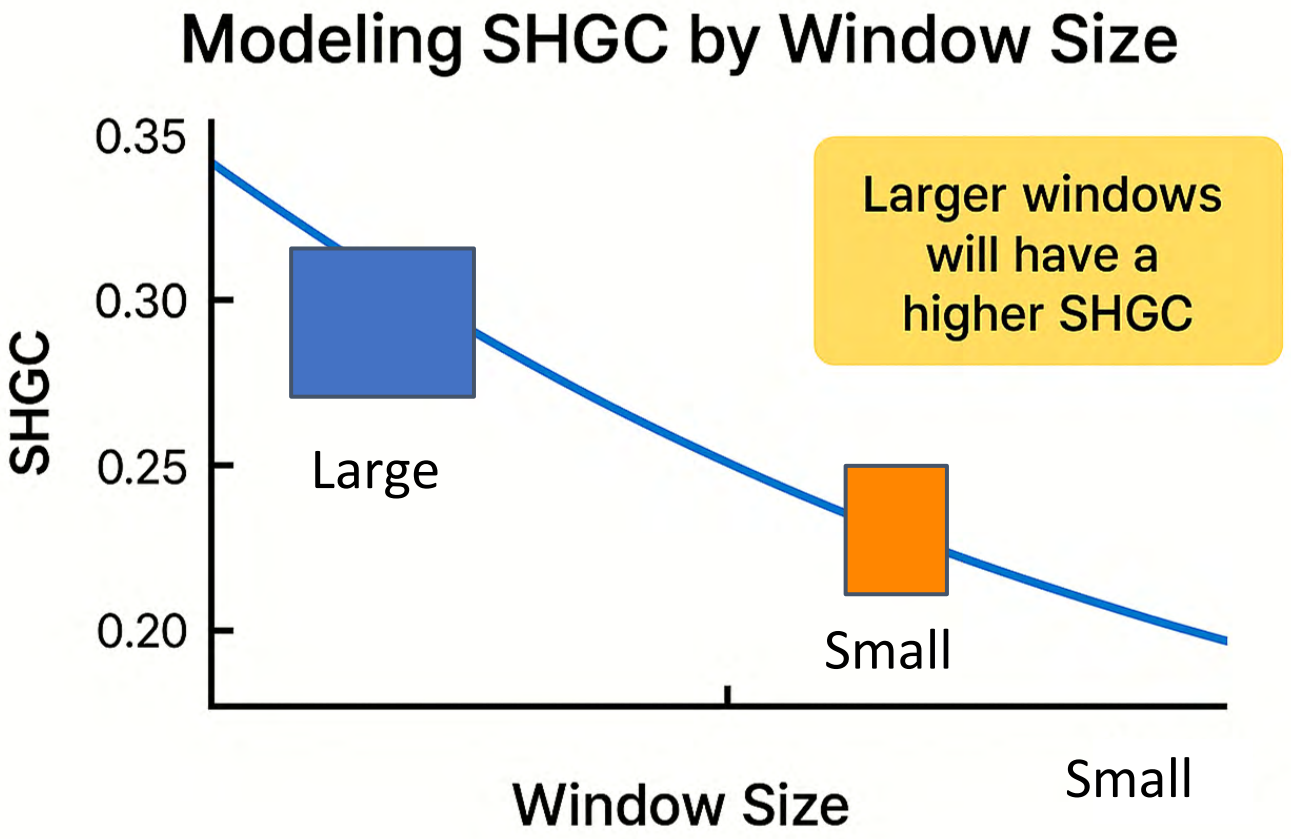
SHGC is not a dial and additional LowE coatings are cheap



Making Solar Heat Tangible: Relative Heat Gain



Modelling SHGC by Window Size



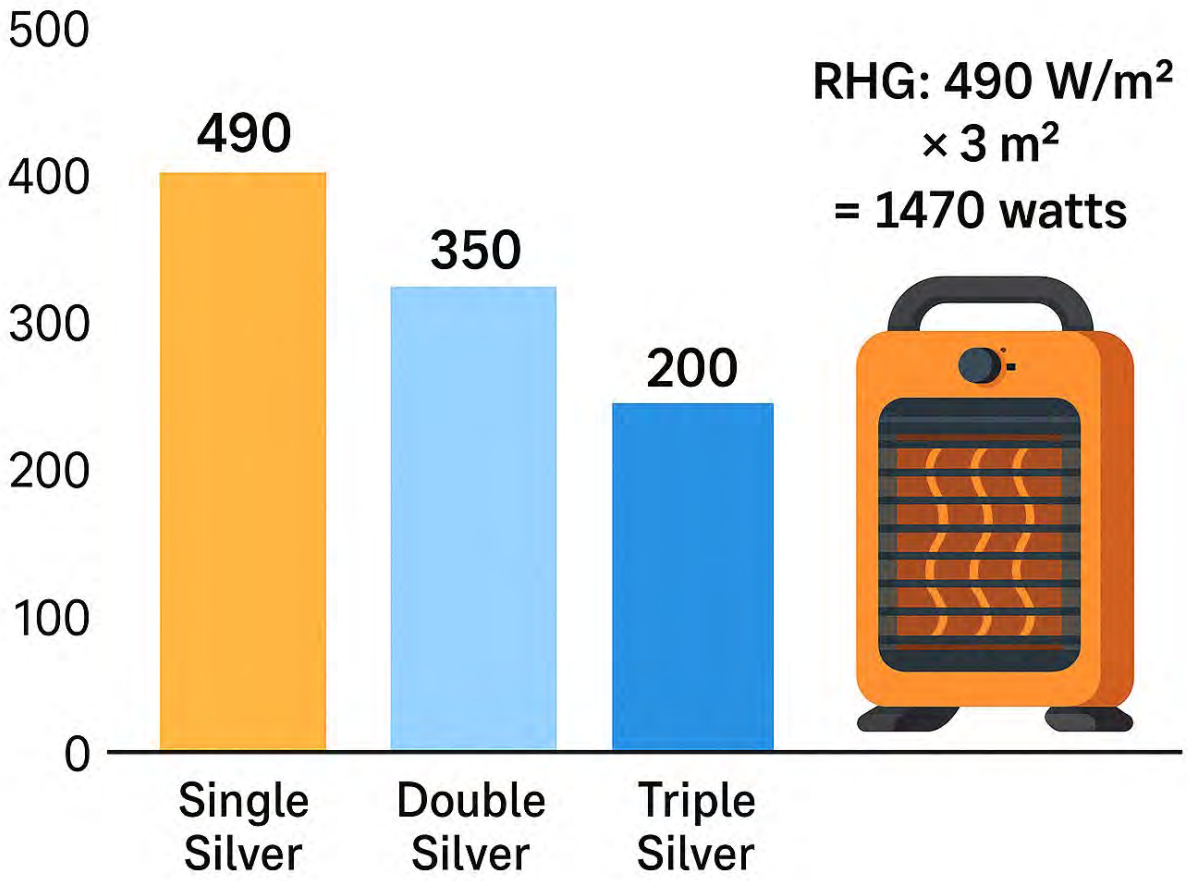
City of Vancouver will require size-specific modeling in Sept.

Fenestration Canada is releasing a tool to support this.

Value Engineering out Comfort

Planned Design	As-Built (Post-Value Engineering)
• Exterior shading (solar fins)	❌ Removed
• Operable exterior blinds	❌ Removed
• Passive House-level envelope	✅ Maintained
• Triple glazing w/ SHGC target 0.35	⚠️ May vary due to glass spec
• Cooling system	❌ Removed (but rough-in preserved)

How Much Heat Are We Talking About?

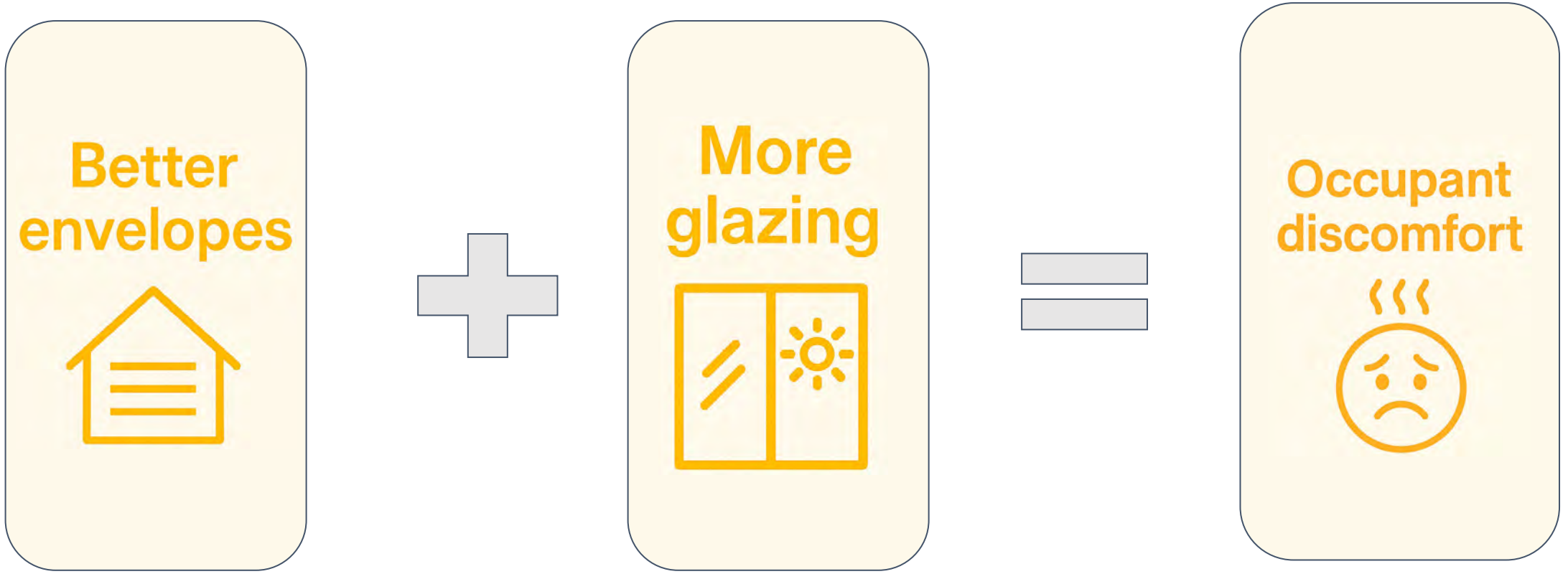


And Overheating Happens Anyway

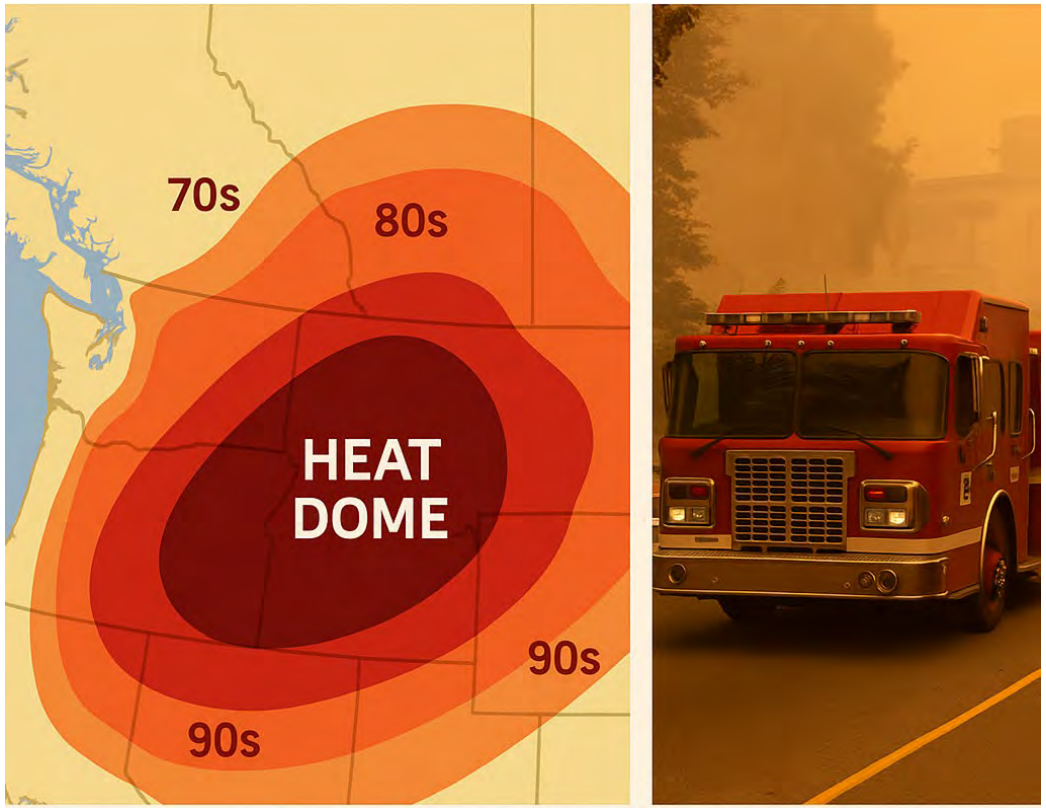
Phase 2

120 Units

Performance on Paper Isn’t Enough

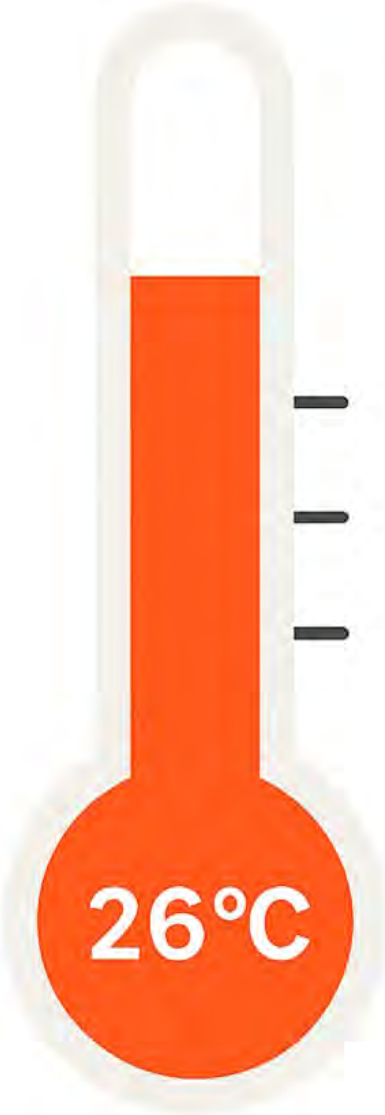


Vancouver Heat Dome (June 25th - July 1st 2021)



- 619 deaths
- Historical Environmental Data (87-16)
- High Performance Buildings are not immune
- Solar exposure + airtight envelopes = thermal trap

BC Response



26C
MAXIMUM INDOOR TEMP

- BC Housing design guideline (2022)
- Indoor temps should not exceed 26°C
- More than 20 hours annually
- New social housing, publicly-funded buildings

Code Response: PCF 1823

PCF 1823 proposes maximum SHGC values for windows, doors, and skylights in the 2025 NBC.

Table [9.36.2.7.-B]
Solar Heat Gain Coefficient of Fenestration and Doors
Forming Part of Sentence [9.36.2.7.] 9.36.2.7.([3] 2)

Fenestration and Door Area to Gross Wall Area Ratio (FDWR)	Heating Degree-Days of Building Location (1) in Celsius Degree-Days					
	Maximum Solar Heat Gain Coefficient ~~of fenestration and doors~~					
	Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000 to 4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 > 7000
FDWR ~~<~~≤ 17%	0.35	0.40	0.45	0.50	0.55	0.60
17% < FDWR ~~<~~≤ 22%	0.30	0.35	0.40	0.45	0.50	0.55
22% < FDWR ~~>~~≤ ~~22~~30%	0.26	0.30	0.35	0.40	0.45	0.50
FDWR > 30%	0.26					

Research Behind PCF 1823

BUILDING ENERGY SIMULATIONS

Impact of SHGC on the thermal performance of detached houses in different Canadian climate zones

AVFQ
Association de vitrerie et fenestration du Québec

Code Response: PCF 2061

PCF 2061 introduces a maximum modelled temperature for the entire dwelling unit.

[9.33.3.] 9.33.3. Design Temperatures

[9.33.3.1.] 9.33.3.1. Indoor Design Temperatures

[1] 1) At the outside winter design temperature, required heating facilities shall be capable of maintaining an indoor air temperature of not less than

[a] a) 22°C in all living spaces,

[b] b) 18°C in unfinished *basements*,

[c] c) 18°C in common *service rooms*, ancillary spaces and *exits* in houses with a *secondary suite*, and

[d] d) 15°C in heated crawl spaces.

[2] --) Except as provided in Sentence (3), at the outside summer design temperature, permanently installed cooling facilities shall be capable of maintaining an indoor air temperature of not more than 26°C in at least one living space in each *dwelling unit*.

[3] --) Optional comfort cooling facilities shall be designed using the indoor design temperature specified in CSA F280, "Determining the required capacity of residential space heating and cooling appliances", or applicable documents referenced in Article 9.33.4.1.

What Could Have Prevented This?

Design Intentions	What Would Have Made the Difference
✓ SHGC-specified glazing (0.35 target)	Keep exterior shading (or integrate passive solutions)
✓ Passive House envelope	Retain active cooling (not just rough-in)
✓ Cooling system (originally included)	Coordinate glazing SHGC with real conditions
✓ External shading devices	Give QPs/designers override authority for overheating risk
✓ Operable blinds	Model against real climate data + orientatior

Where Building Officials Can Add Value

- Stay educated on changes to Solar Heat Gain
- Check for substituted glazing products
- Provide feedback when code and function differ

Where We Go From Here

★ New Codes are Coming

★ The tools are improving

★ Let’s make this better before things get worse

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Thank-you!

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