

# ENERGY AND GREEN BUILDING CODES UPDATE

**ANNUAL CONFERENCE**

JANUARY 23, 2019

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BIRCH POINT CONSULTING

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## TOPICS

- ASHRAE 90.1
- ASHRAE 189.1 → International Green Construction Code
- National Green Building Standard
- Canada MEPS
- IECC

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**+** WHAT DO WE DO?

**Defend and Promote**

- *Defend* against changes harmful to the industry
- *Promote* the positive attributes of glazing in the B&C sector

Energy and Green Codes & Standards:

- International Energy Conservation Code (IECC), ASHRAE 90.1
- International Green Construction Code (IgCC), ASHRAE 189.1
- National Fenestration Rating Council (NFRC)
- National Green Building Standard (NGBS)

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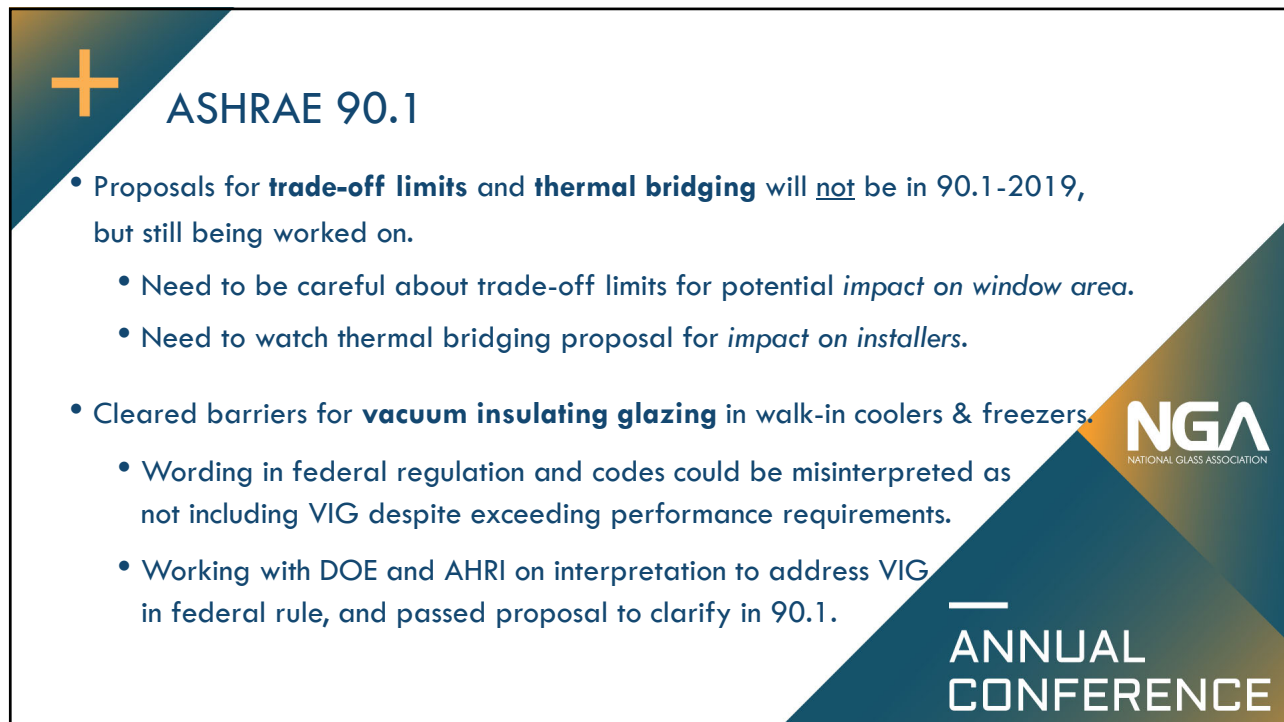
**+** ASHRAE 90.1

- Big update to **commercial fenestration requirements** voted for final publication.
- Continue to push improved framing, warm edge spacers, argon gas fill, and 4<sup>th</sup> surface low-e coatings while still being cost effective and practical ... and with no reductions in window area.
  - 5-17% reduction in U-factor; only modest reductions in SHGC.
  - In many cases, very roughly a “zone shift” between 2016 and 2019: what was required in Zone 7 will move to Zone 6, Zone 6 to Zone 5, etc.
  - 90.1 product categories will match those in IECC, without regard to material type.

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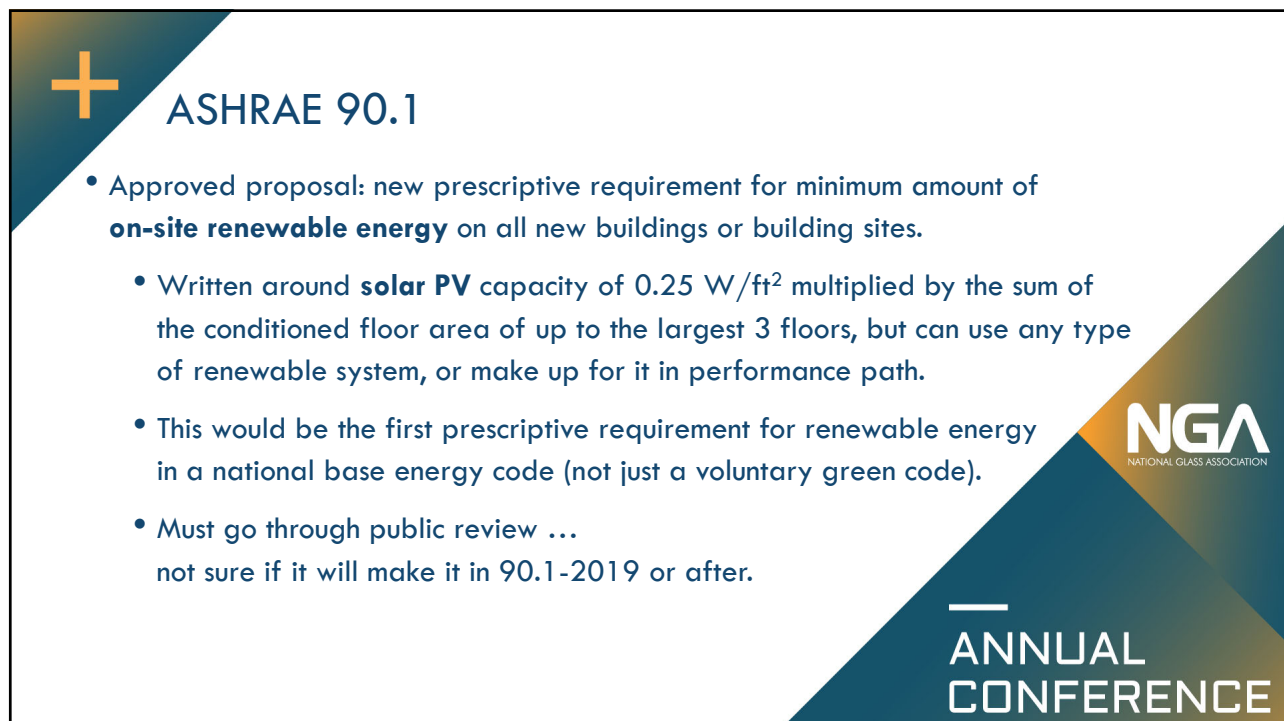
**+** ASHRAE 90.1

- Proposals for **trade-off limits** and **thermal bridging** will not be in 90.1-2019, but still being worked on.
  - Need to be careful about trade-off limits for potential *impact on window area*.
  - Need to watch thermal bridging proposal for *impact on installers*.
- Cleared barriers for **vacuum insulating glazing** in walk-in coolers & freezers.
  - Wording in federal regulation and codes could be misinterpreted as not including VIG despite exceeding performance requirements.
  - Working with DOE and AHRI on interpretation to address VIG in federal rule, and passed proposal to clarify in 90.1.

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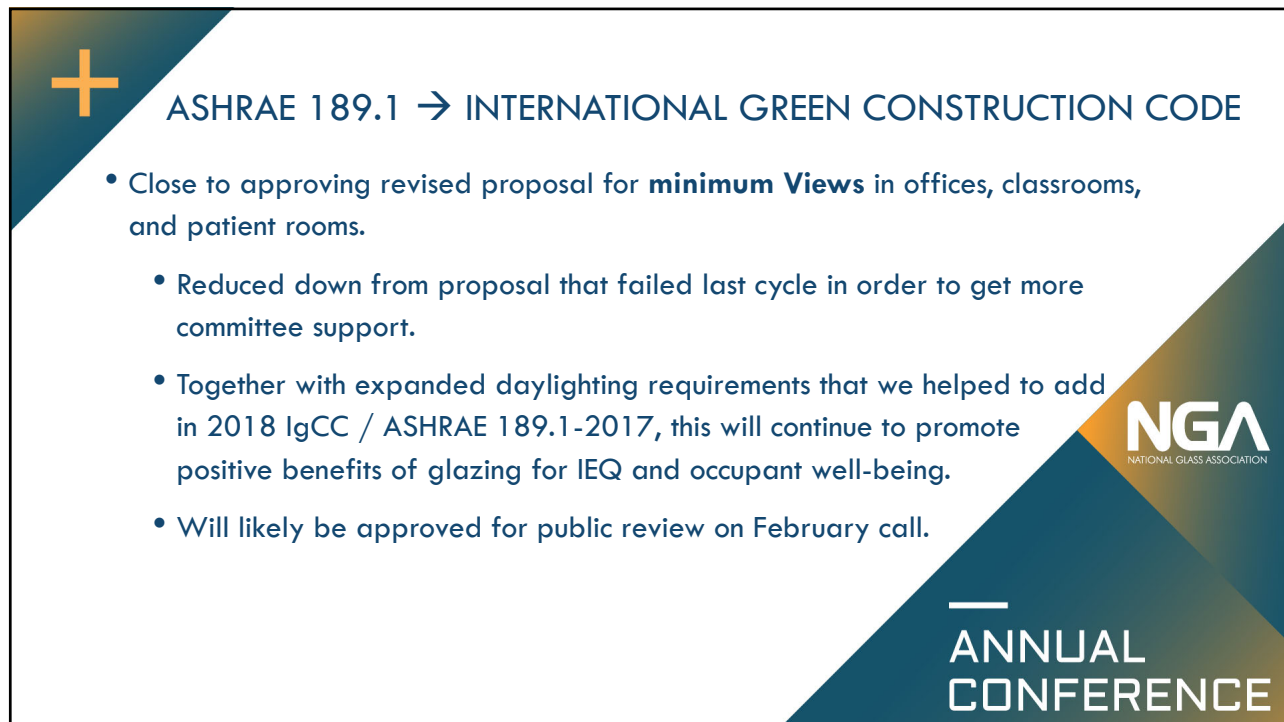
**+** ASHRAE 90.1

- Approved proposal: new prescriptive requirement for minimum amount of **on-site renewable energy** on all new buildings or building sites.
  - Written around **solar PV** capacity of 0.25 W/ft<sup>2</sup> multiplied by the sum of the conditioned floor area of up to the largest 3 floors, but can use any type of renewable system, or make up for it in performance path.
  - This would be the first prescriptive requirement for renewable energy in a national base energy code (not just a voluntary green code).
  - Must go through public review ...  
not sure if it will make it in 90.1-2019 or after.

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**+** ASHRAE 189.1 → INTERNATIONAL GREEN CONSTRUCTION CODE

- Close to approving revised proposal for **minimum Views** in offices, classrooms, and patient rooms.
  - Reduced down from proposal that failed last cycle in order to get more committee support.
  - Together with expanded daylighting requirements that we helped to add in 2018 IgCC / ASHRAE 189.1-2017, this will continue to promote positive benefits of glazing for IEQ and occupant well-being.
  - Will likely be approved for public review on February call.

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**+** NATIONAL GREEN BUILDING STANDARD

- NGBS is a **residential green building standard**, co-sponsored by the NAHB and ICC
  - Rapid increase in use, and expanding to cover *mixed use* (commercial + residential) and *highrise residential* buildings.
  - In proposed 2020 standard for public review, we included updates for single family homes, and revisions to make the standard more appropriate for mixed use and highrise residential.
  - Includes option to use IgCC/ ASHRAE 189.1.

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## + CANADIAN MINIMUM ENERGY PERFORMANCE STANDARD

- Natural Resources Canada is proposing to regulate residential windows under **minimum energy performance standards (MEPS)**, like appliances and equipment.
  - Important distinction: building owner is liable for meeting building codes, but manufacturer is directly liable for any products sold that are regulated by MEPS.
  - Discussion document proposes very aggressive aspirational targets: U-0.28 in 2022, U-0.21 in 2025, U-0.14 in 2030 (and parallel changes in ER).
  - Lowrise residential, but proposed scope also covers small nonresidential buildings (<600 m<sup>2</sup>). Problem for commercial entrance doors and storefront systems in small businesses & retail.
  - Also need to clarify that glazing-only replacements not included.
  - Regulation will be developed over 2020-2021 timeframe.

\* Note: Canada is not part of my scope of work for NGA, but I filed comments to ensure we are included as a key stakeholder.

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## + INTERNATIONAL ENERGY CONSERVATION CODE

- On behalf of GICC, four proposals submitted for **2021 IECC**:
  - Proposal to align the IECC **commercial fenestration values** with ASHRAE 90.1, jointly submitted by GICC, WDMA, AAMA, AEC, and Chris Mathis.
  - Proposal to clarify **area-weighted averaging** in the commercial energy code. Will help clarify compliance for overall facades such as curtain walls with both fixed lites and operable awnings/vents.
  - Two proposals to update the requirements for walk-in coolers and freezers to help ensure **vacuum insulating glazing** can be used in the door glazing. (Also coordinating with AHRI.)

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## OVER THE LAST 10 YEARS ...

**Defend**

- Stopped multiple attempts to **reduce window area** (Not just WWR and the “Battle for the Wall”, much more)
- Stopped proposals with **misapplication of products** (conflicts with other building requirements, cost prohibitive or impractical, favor one technology over another, etc.)
- Stopped proposals that **restrict compliance flexibility** (performance path limits, etc)

**Promote**

- Expanded **daylighting requirements** in more spaces
- Advanced requirements to promote **energy efficient products** where cost effective and practical.
- Increased compliance flexibility for **existing building retrofits**
- Improved **credits for shading, dynamic glazing, BIPV**

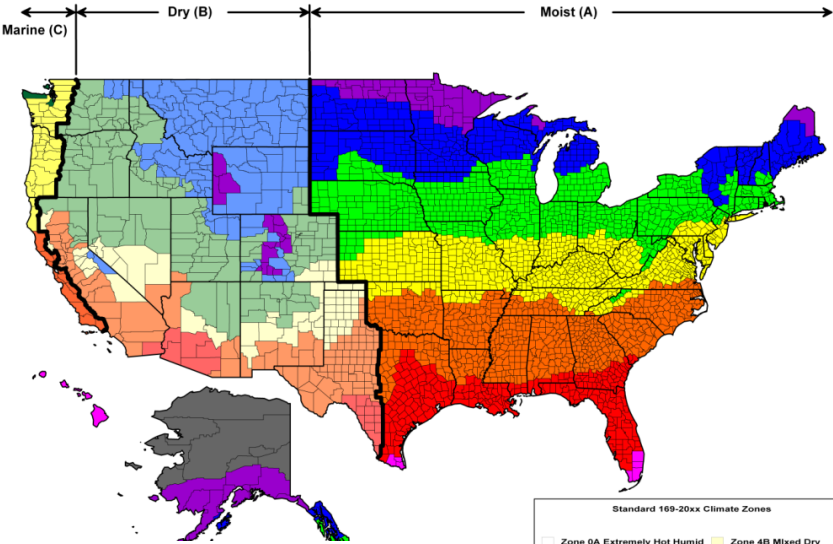


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## CLIMATE ZONE MAP (ASHRAE 90.1-2016, 2019)



Standard 169-20xx Climate Zones

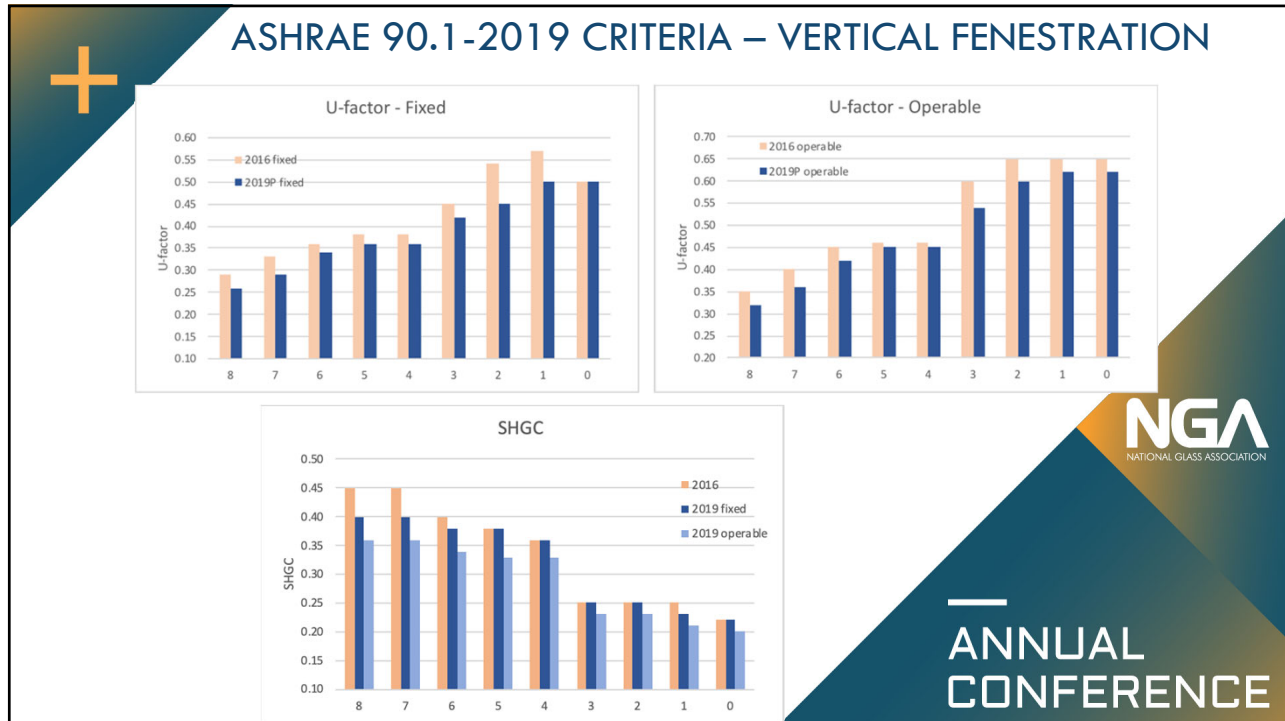
Zone 0A Extremely Hot Humid	Zone 4B Mixed Dry
Zone 0B Extremely Hot Dry	Zone 4C Mixed Marine
Zone 1A Very Hot Humid	Zone 5A Cool Humid
Zone 1B Very Hot Dry	Zone 5B Cool Dry
Zone 2A Hot Humid	Zone 5C Cool Marine
Zone 2B Hot Dry	Zone 6A Cold Humid
Zone 3A Warm Humid	Zone 6B Cold Dry
Zone 3B Warm Dry	Zone 7 Very Cold
Zone 3C Warm Marine	Zone 8 Subarctic/Arctic
Zone 4A Mixed Humid	



NOTE: IECC as well as previous versions of ASHRAE 90.1 use the older climate zone map. It is likely states will make local amendments to resolve differences between IECC and 90.1.

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## ASHRAE 90.1-2019 CRITERIA NONRESIDENTIAL AND HIGHRISE RESIDENTIAL

U-FACTOR	Fixed		Operable		Entrance Door		SHGC		
	90.1-2016	2019 prop.	90.1-2016	2019 prop.	90.1-2016	2019 prop.	90.1-2016	2019 proposal	
Zone	U	U	U	U	U	U	SHGC	SHGC-fixed	SHGC-oper
8	0.29	0.26	0.35	0.32	0.68	0.63	0.45	0.40	0.36
7	0.33	0.29	0.40	0.36	0.68	0.63	0.45	0.40	0.36
6	0.36	0.34	0.45	0.42	0.68	0.63	0.40	0.38	0.34
5	0.38	0.36	0.46	0.45	0.68	0.63	0.38	0.38	0.33
4	0.38	0.36	0.46	0.45	0.68	0.63	0.36	0.36	0.33
3	0.45	0.42	0.60	0.54	0.77	0.68	0.25	0.25	0.23
2	0.54	0.45	0.65	0.60	0.83	0.77	0.25	0.25	0.23
1	0.57	0.50	0.65	0.62	1.10	0.83	0.25	0.23	0.21
0	0.50	0.50	0.65	0.62	0.83	0.83	0.22	0.22	0.20

SKYLIGHTS / SLOPED GLAZING				
Zone	90.1-2016	2019 prop.	90.1-2016	2019 prop.
	U	U	SHGC	SHGC
8	0.41	0.41	NR	NR
7	0.50	0.44	NR	NR
6	0.50	0.47	0.40	0.40
5	0.50	0.50	0.40	0.40
4	0.50	0.50	0.40	0.40
3	0.55	0.55	0.35	0.30
2	0.65	0.65	0.35	0.30
1	0.75	0.70	0.35	0.30
0	0.75	0.70	0.35	0.30

In many cases, this is close to a "zone shift" between 2016 and 2019, although coincidence - the numbers were not developed that way.

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## VERTICAL FENESTRATION – OVERALL SHGC

Climate Zone	0	1	2	3	4	5	6	7	8		
SHGC		0.25	0.25	0.25	0.40	0.40	0.40	0.45	0.45	90.1-2007	2009 IECC
										90.1-2010	2012 IECC
										90.1-2013	2015 IECC
	0.22	0.25	0.25	0.25	0.36	0.38	0.40	0.45	0.45	90.1-2016	2018 IECC
Fixed:	0.22	0.23	0.25	0.25	0.36	0.38	0.38	0.40	0.40		
Operable:	0.20	0.21	0.23	0.23	0.33	0.33	0.34	0.36	0.36	90.1-2019	

- These are the main SHGC requirements for the overall building, but there are variations based on *external shading* and *orientation*.
- Both 90.1 and IECC give credit towards SHGC for exterior shading from overhangs, **sun shades** based on *projection factor* (PF).
  - 90.1 uses multipliers for credit
  - IECC directly lists required SHGC for given PF
- Both ASHRAE and IECC have allowances for *north-facing glazing*.
- ASHRAE has extra provisions to encourage lower SHGC or shading on *east / west sides*.



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## ROUGHLY WHAT IS NEEDED TO MEET U-FACTOR FOR 90.1-2016?

- **Zone 1:** Low-e, double glazing
- **Zones 2-3:** Low-e double glazing, thermally broken frame
- **Zones 4-5:** Low-e, thermally broken frame and **pick 1:**
  - argon
  - high performance thermal break
  - two low-e coatings (#2 / #4)
- **Zone 6:** Low-e, thermally broken frame and **pick 2:**
  - argon
  - warm edge spacer
  - high performance thermal break
  - two low-e coatings (#2 / #4)
- **Zone 7:** Low-e, thermally broken frame and **pick 3:**
  - argon
  - warm edge spacer
  - high performance thermal break
  - two low-e coatings (#2 / #4)
- **Zone 8:** all of the above in double glazing, or more likely, go to triple



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**ROUGHLY** WHAT IS NEEDED TO MEET U-FACTOR FOR 90.1-2019?

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- **Zone 1:** Low-e, double glazing + **lower 0.23 SHGC**
- **Zones 2-3:** Low-e double glazing, thermally broken frame  
*Thrm. improved + argon or WE (Z2)  
Standard TB + air (Z2, Z3)*
- **Zones 4-5:** Low-e, thermally broken frame and ~~pick 1:~~ + **pick 2**
  - argon
  - high performance thermal break
  - two low-e coatings (#2 / #4)
  - **warm edge spacer**
- **Zone 6:** Low-e, thermally broken frame and ~~pick 2:~~ + **pick 3**
  - argon
  - warm edge spacer
  - high performance thermal break
  - two low-e coatings (#2 / #4)
- **Zone 7:** Low-e, ~~thermally broken frame and pick 3:~~ **all of these in double glazing, or go to triple**
  - argon
  - warm edge spacer
  - high performance thermal break
  - two low-e coatings (#2 / #4)
- **Zone 8:** ~~all of the above in double glazing, or more likely,~~ go to triple

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