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thirsty
THURSDAY
Quench your thirst for knowledge!

7 Need-to-Know Code and Regulatory Updates

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MARK YOUR CALENDAR FOR THESE OTHER UPCOMING EVENTS

NGA Glass Conference: Isle of Palms|Charleston
Feb 5-8, 2024 | Isle of Palms, SC

Building Envelope Contractors (BEC) Conference
Mar 3-5, 2024 | Nashville, TN

GPAD|Glass Processing Automation Days
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Glass & Glazing Advocacy Days
May 14-15, 2024 | Washington, D.C.

NGA Glass Conference: Milwaukee
Aug 6-8, 2024

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Wild Dunes Resort | Isle of Palms, SC

February 5-8, 2024

All Glass, Only Glass

glass.org/nga-glass-conference-IOP-2024

REGISTER NOW

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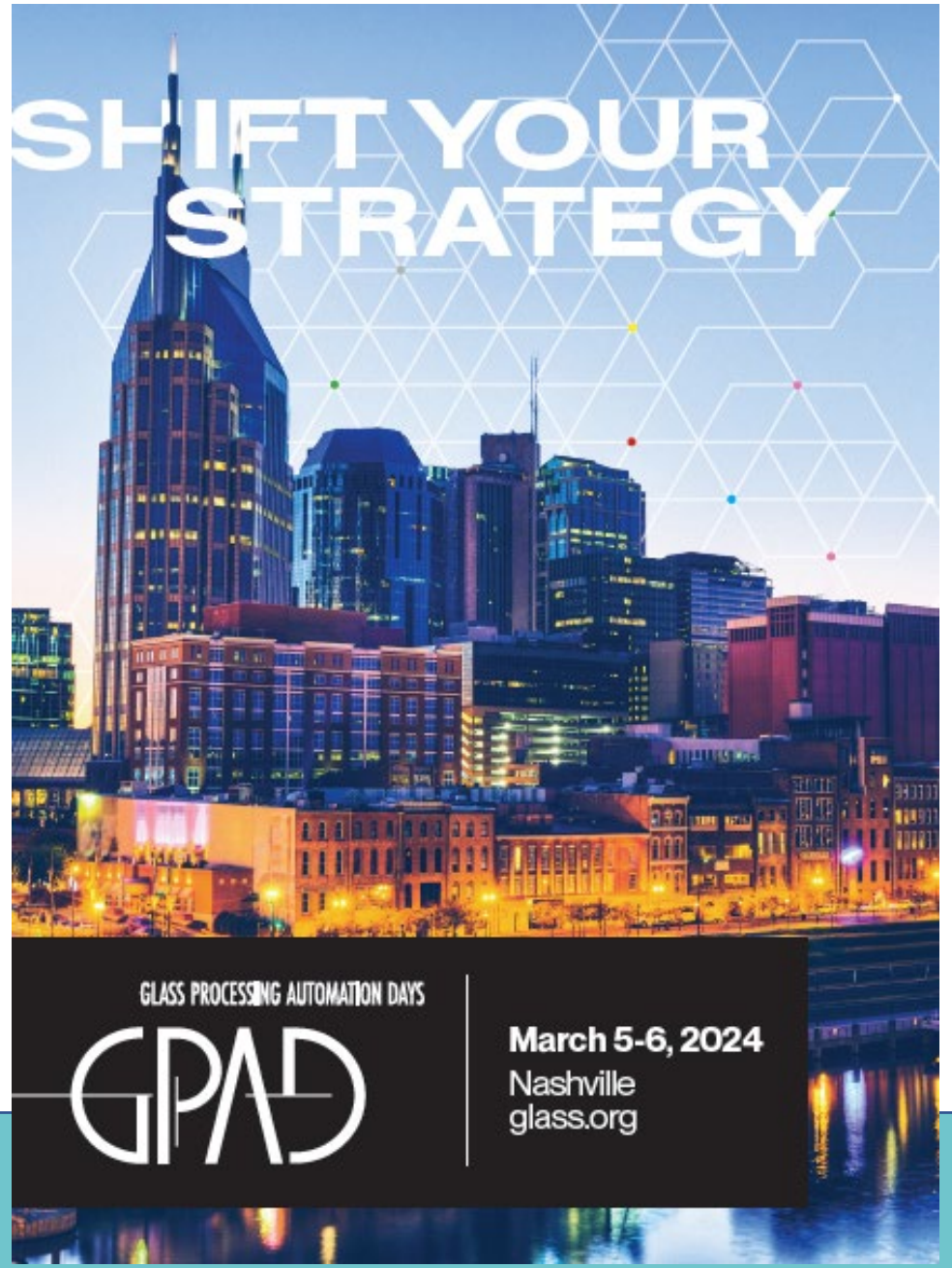

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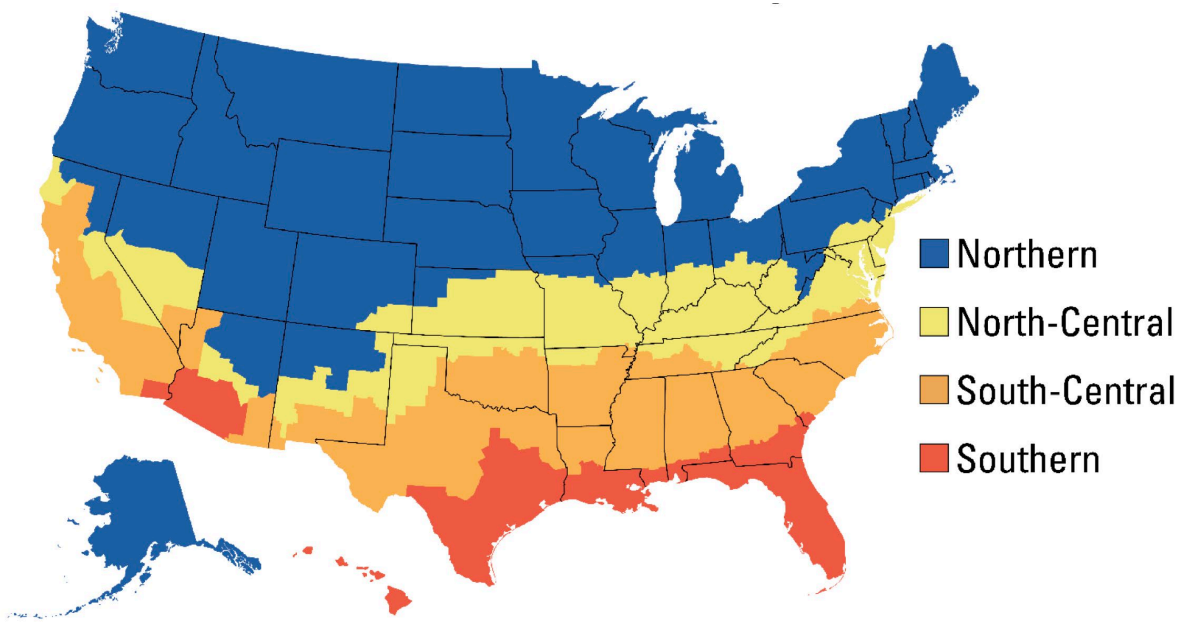
Glass & Glazing Advocacy Days

May 14-15, 2024

glass.org/advocacy/initiatives/priority-issues

#1 Energy Star Version 7

- For windows, doors, and skylights in lowrise residential buildings 3 stories or less.
- **Now in effect! (as of 10/23/23)**



Windows

Climate Zone	U-Factor[1]	SHGC[2]	
Northern	≤ 0.22	≥ 0.17	Prescriptive
	= 0.23	≥ 0.35	Equivalent Energy Performance
	= 0.24		
	= 0.25	≥ 0.40	
	= 0.26		
North-Central	≤ 0.25	≤ 0.40	
South-Central	≤ 0.28	≤ 0.23	
Southern	≤ 0.32	≤ 0.23	

Air Leakage for windows ≤ 0.3 cfm/ft²

Note: minimum SHGC in Northern zone, not max

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Energy Star Version 7

- Aggressive, especially in the North, but the technology is there:
  - 4th surface low-e
  - Triple glazing (both thin triples and normal triples)
  - Medium or higher SHGC low-e in the north.
  - Latest generation triple silver low-e in south and south-central.

- Colorado has new law requiring residential windows, doors, and skylights to meet Energy Star criteria.
  - Treated like an appliance standard – manufacturer cannot sell unless qualifies.
  - Questions about high altitude products and argon / krypton gas fill
    … but there are solutions …
    pre-equalized IG units, mylar bags for transport, flexibility from high SHGC low-e.

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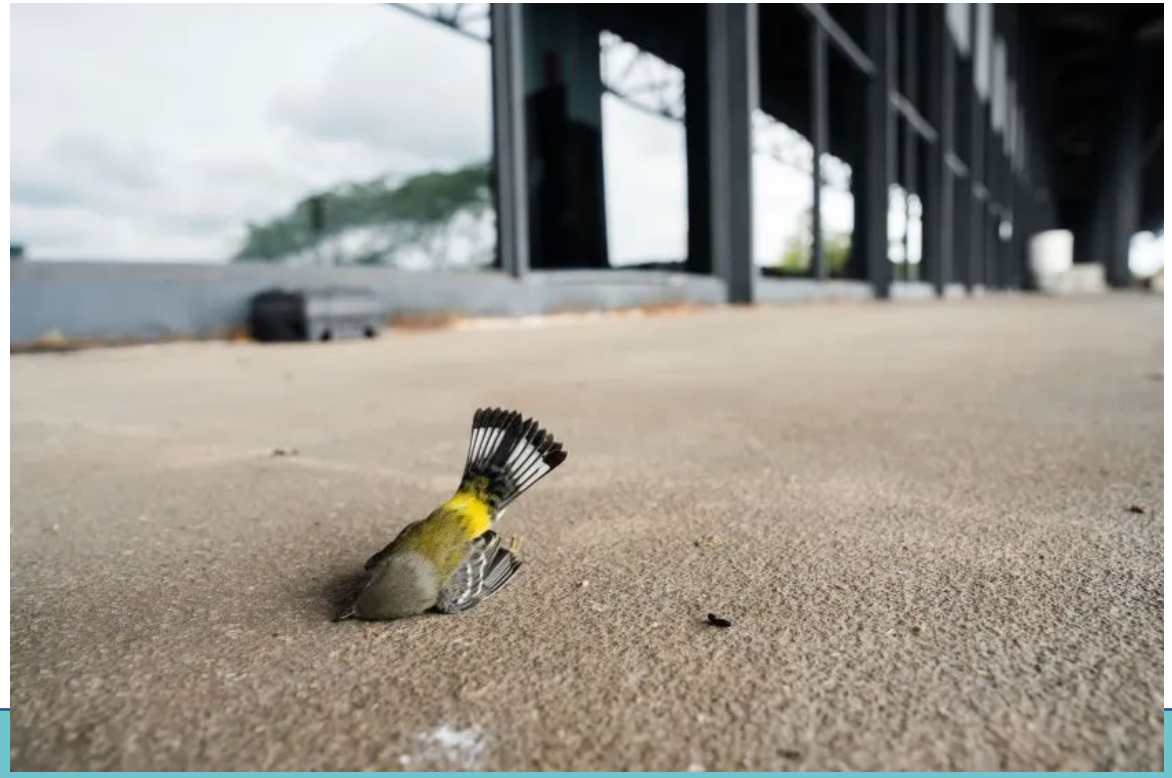
#2 Bird-Friendly Glazing Requirements

About 1,000 birds killed after colliding into McCormick Place Lakeside Center in one ‘tragic,’ deadly night

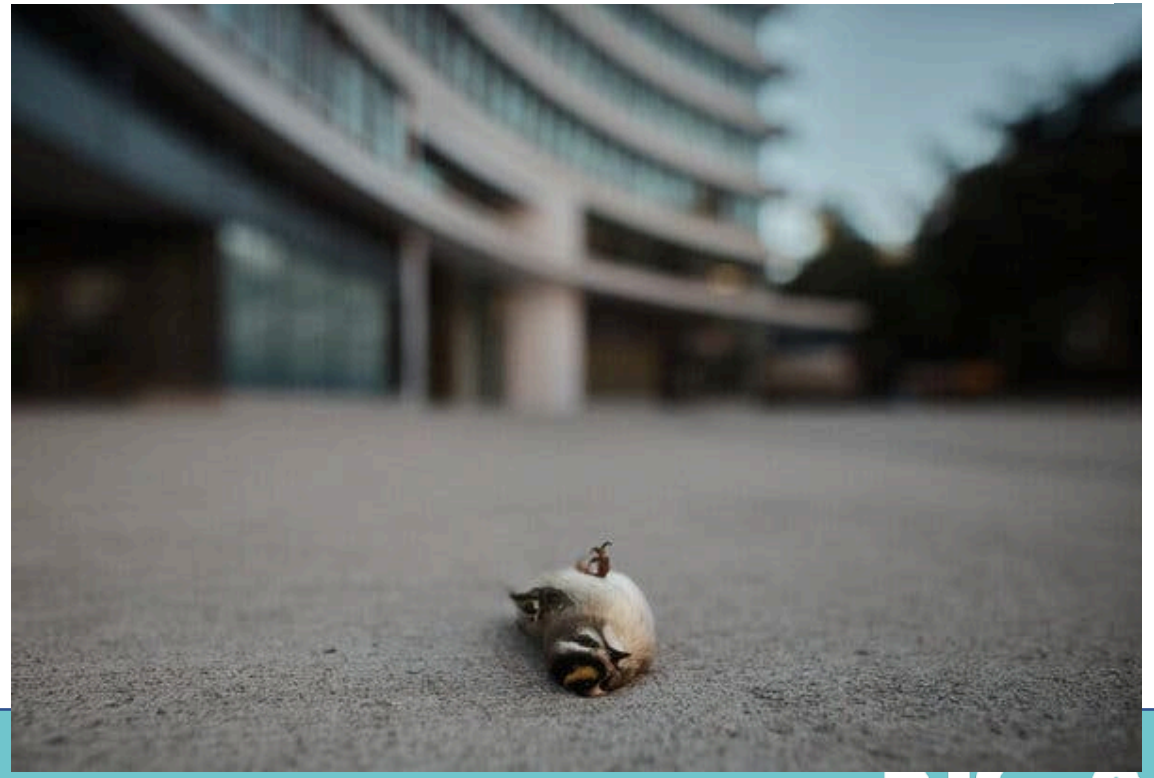
The alarming death toll is just part of a larger danger facing migrating birds.



Chicago Sun Times Oct. 6, 2023, by Kaitlin Washburn, Photo by Pat Nabong

This N.Y.C. Building Is in the Bird-Killing Hall of Shame. It Wants Out.

A shiny glass condo property in the city has become notorious for deadly crashes, so some residents are pushing for change.



New York Times Oct. 16, 2023, by Catrin Einhorn, Photo by Andres Kudacki

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#3 Embodied Carbon and EPDs

- Over 340 cities, states, and federal government have **decarbonization** policies and specific emission reduction targets.
- This has led to:
  - Updated code adoption
  - New stretch energy codes (MA, NY)
  - Expansion of Building Performance Standards (e.g. New York LL97, DC, CO, WA, St Louis, …)
  - **“Buy Clean” policies setting embodied carbon (CO2eq) / GWP limits for construction materials, requiring Environmental Product Declarations (EPDs)**

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Embodied Carbon in Federal Projects

GSA / Federal Buy Clean Initiative

- GSA setting GWP CO2eq limits for procured materials in governmental projects, including glass, asphalt, concrete, steel.
- Initially included *flat glass, processed glass,* and *IGUs,* but after hearing concerns about lack of downstream EPDs, GSA agreed to focus only on ***flat glass***.
- They also allow construction assemblies, such as a window or curtain wall, to qualify if EPDs covering 80% of the assembly cost or weight are submitted. Minor parts (sealants, hardware, fasteners, spacers, etc) can be ignored.
- **In other words, can just hand in the flat glass EPD, as that covers the bulk of the carbon impact.**
- Starting with a scaled down 6 month pilot program on 11 specific projects ($300M of material procurement) before making further adjustments.

Embodied Carbon in California

- **Buy Clean California**
  - Sets maximum CO2eq limits for structural steel, **flat glass**, mineral wool board insulation in state-funded projects.
  - Flat glass only (not downstream fabricated products), but must be product-specific and facility-specific EPD.
- Just recently expanded embodied carbon requirements under **CALGreen**
  - Both public and private commercial buildings over 100,000 ft^2 and schools over 50,000 ft^2
  - Must either do whole building life cycle analysis (LCA), or meet prescriptive CO2eq limits for concrete, steel, **flat glass**, mineral wool.
  - If choose EPD path, only require EPD for unfabricated material (not downstream assembly), but must be either product-specific or factory-specific.

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Embodied Carbon in Colorado

- Using both stick and carrot.
- **Buy Clean Colorado Act**: starting Jan 1, concrete, steel, asphalt, **flat glass** procured for state-funded projects must meet max CO2eq limits.
- For private sector, also establishing a Sales and Use Tax Exemption program for qualifying building construction materials.
  - Must meet same CO2eq limits as above.
  - Considering a proportional tax exemption for assemblies (e.g. % of glass in a window).
- Both require product-specific EPDs, but not facility-specific.

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Embodied Carbon in Green Building Codes

- 2023 version of the green building code (ASHRAE 189.1 / IgCC) is also expanding EPD requirements:
  - Provide ≥ 20 EPDs for different products representing at least 25% of building material costs. Industry-wide EPD is okay.
  - Provide ≥ 10 *product-specific* EPDs representing at least 10-15% of the building material costs with GWP within 125% of the industry-wide average.
  - Allow EPDs for components to be submitted for assemblies if cover > 80% of product weight or cost.
  - Whole building LCA is also an option.

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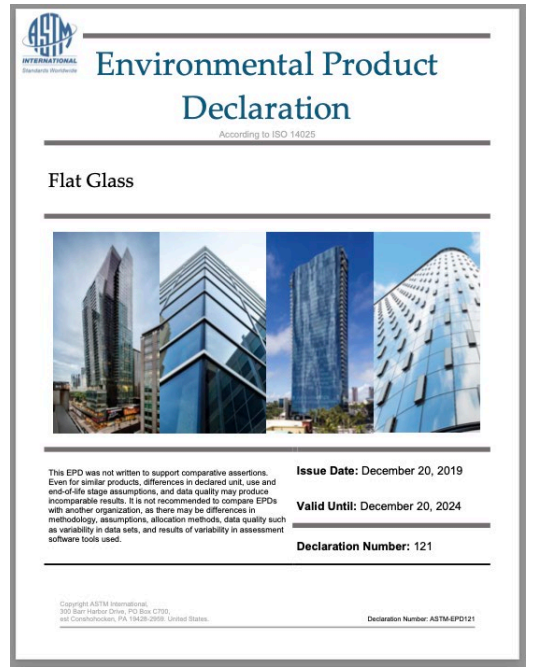
Embodied Carbon and EPDs
Bottom line … what do you need to know?

- The CO2eq number is not the issue – it's the question of EPD availability.
- When asked about embodied carbon or EPD, simply hand in the NGA industry-wide EPD for flat glass.
- If need a product-specific EPD (e.g. GSA, CO, CA), simply hand in the EPD from your primary glass supplier.
- If need one for framing, the Aluminum Extruders Council also has an industry-wide EPD for aluminum extrusions with thermal breaks and different finishes.



Environmental Product Declaration

According to ISO 14025

Flat Glass

This EPD was not written to support comparative assertions. Even for similar products, differences in declared unit, use and end-of-life stage assumptions, and data quality may produce incomparable results. It is not recommended to compare EPDs with another organization, as there may be differences in methodology, assumptions, allocation methods, data quality such as variability in data sets, and results of variability in assessment software tools used.

Issue Date: December 20, 2019

Valid Until: December 20, 2024

Declaration Number: 121

Declaration Number: ASTM-EPD121

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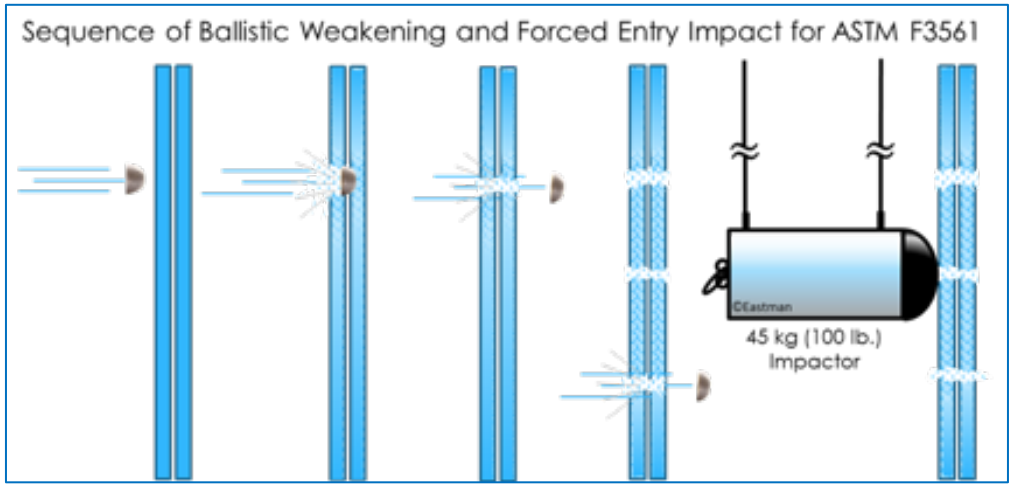
#4 School Security

Enhanced Forced Entry Standards – Voluntary

ASTM F3561 – glass is weakened with ballistic attack, then impacted multiple times with a 100 lb. impactor.



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#5 Energy Efficiency: Building Performance Standards and Stretch Codes

- ASHRAE 90.1 and IECC continue to advance towards their net-zero energy goals in 2030-2031.
- However, some states and cities are moving *much* more aggressively and quickly.
  - **Building Performance Standards** affecting existing buildings.
  - **Stretch Energy Codes** affecting new construction.
- How will these affect our industry – good, bad, or both?

Building Performance Standards *expanding rapidly!*

Local requirements setting **energy use limits on EXISTING BUILDINGS**.

- Building Performance Standards have been enacted in:
  - New York City (carbon limits starting 2024)
  - St. Louis (energy use limits starting 2025)
  - Boston (carbon limits starting 2025)
  - Washington State (energy use limits starting 2026)
  - District of Columbia (energy use limits starting 2026)
  - Colorado (limits still in development, but targeting 2025)

Replacement glazing
Replacement windows
Secondary glazing
Low-e storm windows

Fines start 2025-2026 … but building owners have already started planning

Large incentive to upgrade existing buildings; improves economics of envelope retrofits.

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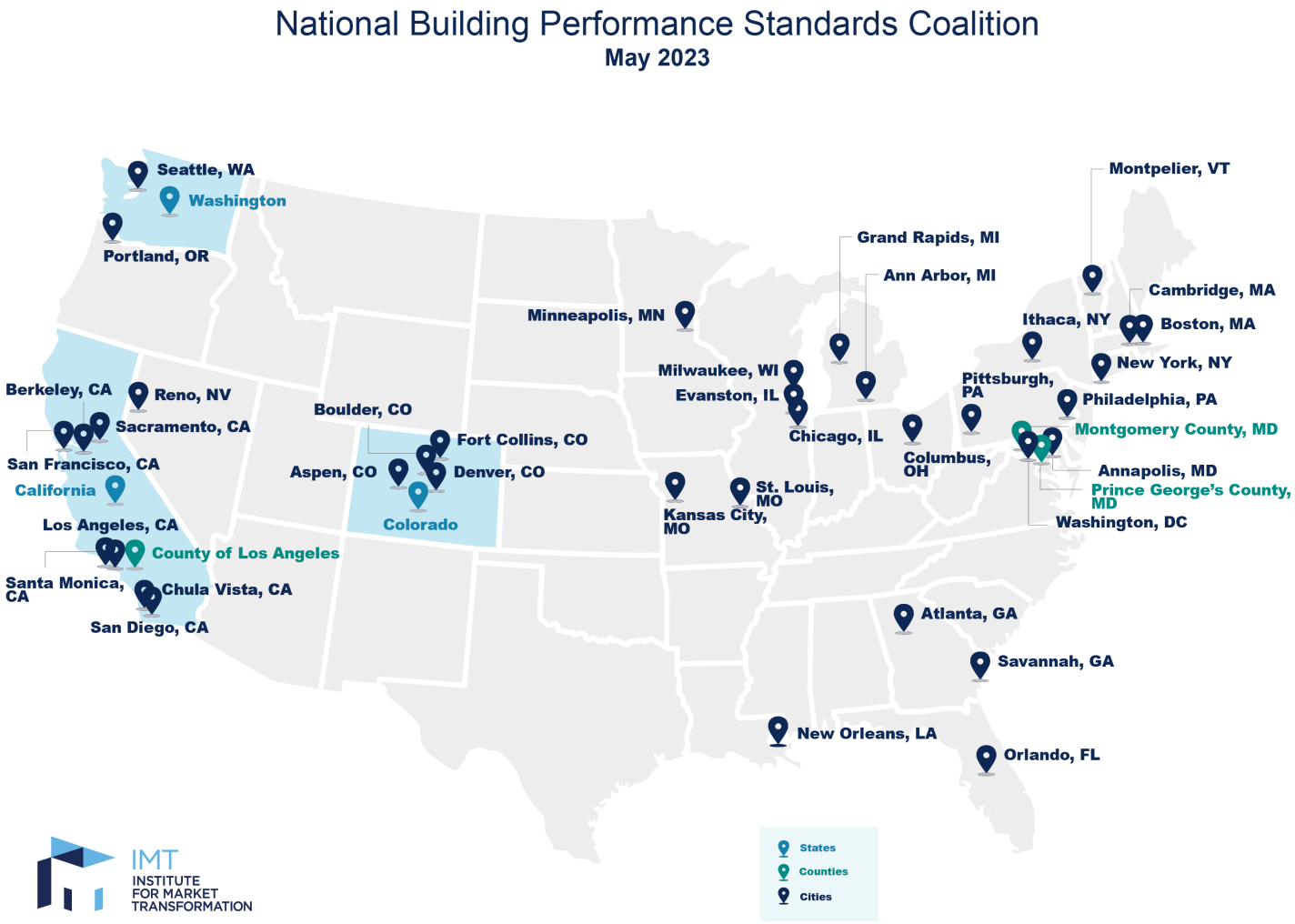
National Building Performance Standards Coalition

- Expanding rapidly.
- These locations are trying to pass a building performance policy by Earth Day 2024.
- Good opportunities for envelope retrofit projects.



Stretch Local Energy Codes

New York Advanced Energy Code (still under development)

- They keep changing, but likely U-0.28 fixed, U-0.32 operable (compared to 0.34 fixed, 0.45 operable in 2024 IECC)

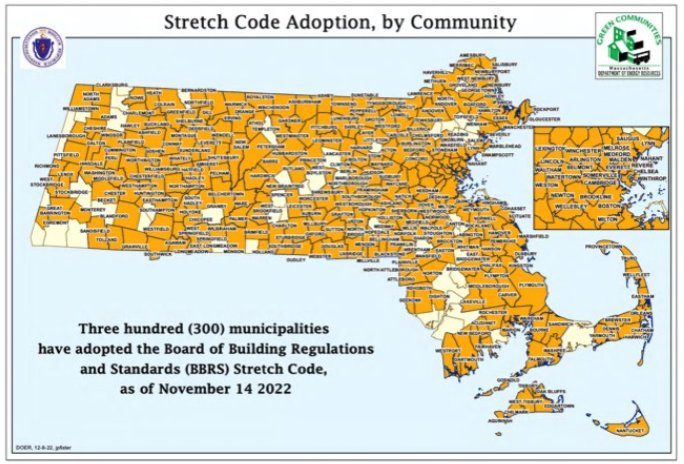
→ Aggressive but achievable:

  - Triple glazing in a normal thermally broken aluminum frame, or
  - Double glazing with two low-e coatings (#2 and #4 surfaces) in a higher performance thermally broken frame.

- Does include flexibility for trade-offs in performance path

Stretch Local Energy Codes

Massachusetts Stretch Code



- Other than commercial buildings < 20,000 ft^2, must demonstrate very aggressive overall building performance and glazed wall systems must meet <u>mandatory</u> 0.25 U-factor.
  (compared to 0.34 fixed, 0.42 operable in 2024 IECC and 9.1-2022)
- *Can't be traded off* even if show equivalent overall energy performance.

→ In most cases, triple glazing in high performance thermally broken frame, as well as high performance spandrel.

- NGA is a Leaders Circle sponsor of research with the Charles Pankow Foundation to improve modeling of spandrel performance involving SGH, MH, RDH, ORNL, LBNL.

CHARLES PANKOW FOUNDATION
Building Innovation through Research

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Stretch Local Energy Codes

Seattle

- Base requirement U-0.34 fixed, U-0.36 operable for curtain wall, storefront, AW windows. (U-0.26 for nonmetal windows)

  That part is easy ***… BUT …***

- 20% of fenestration area must meet higher performance level of U-0.22 fixed, U-0.26 operable (U-0.20 for nonmetal windows)

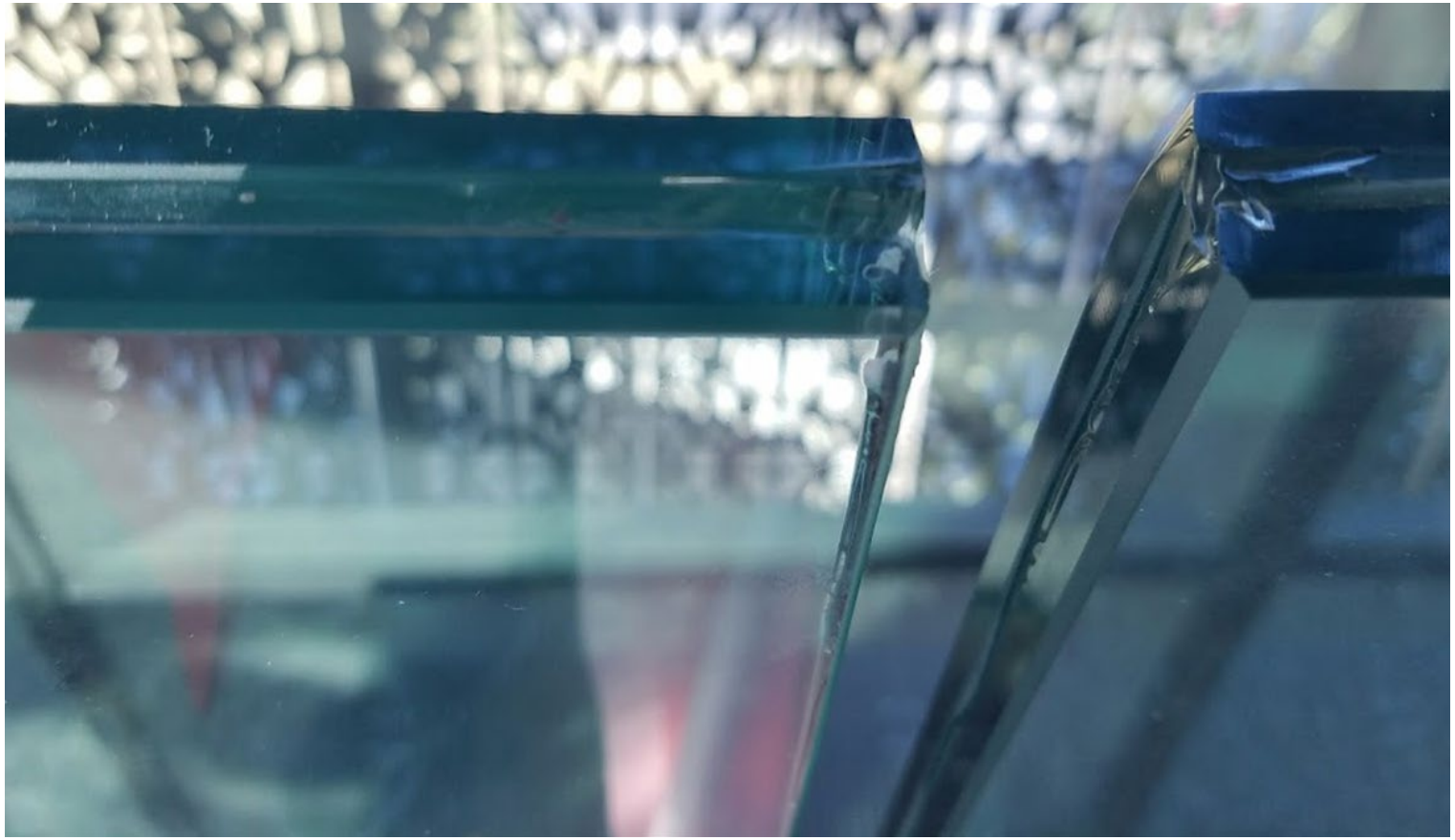
- Still required even in performance path.

→ Extremely aggressive: triple glazing in highest performance thermally broken frame, or nonmetal.

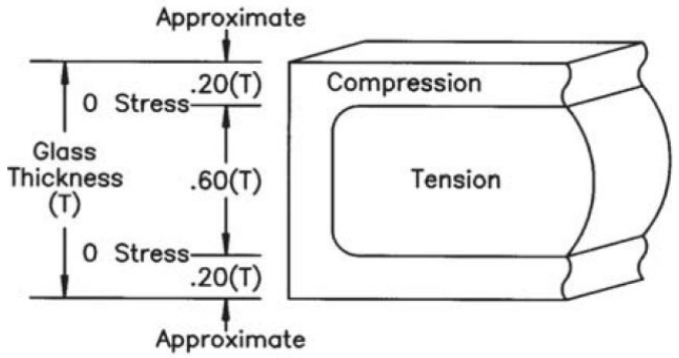
How will architects and building owners respond?

- Help transition the market to triple glazing and vacuum glazing? (Will building owners pay for it?)
- Or cause some to reduce windows and do bad building design in terms of ‘new age brutalism’?
- What is the future of net-zero buildings: Jetsons or Flintstones?

#6 Heat Treatment and Edge Grinding



- ASTM C1048: fabrication techniques that alter the glass surface, thickness or edge shall be performed prior to heat treating to avoid a reduction in glass strength
- ASTM C1172: fabrication techniques should be performed prior to heat treatment
- NGA GTP *Heat-treated Laminated Glass Exposed Edges*
- NGA GTP *The Importance of Fabrication Prior to Heat-Treatment*



Heat-Treated Glass Compression and Tension Zones

NGA Study: Test Procedure for Edge Grinding of Laminates Post-Tempering

Does post-tempering edge grinding actually reduce laminate strength?

What depth of post-tempering edge grinding preserves laminate strength?

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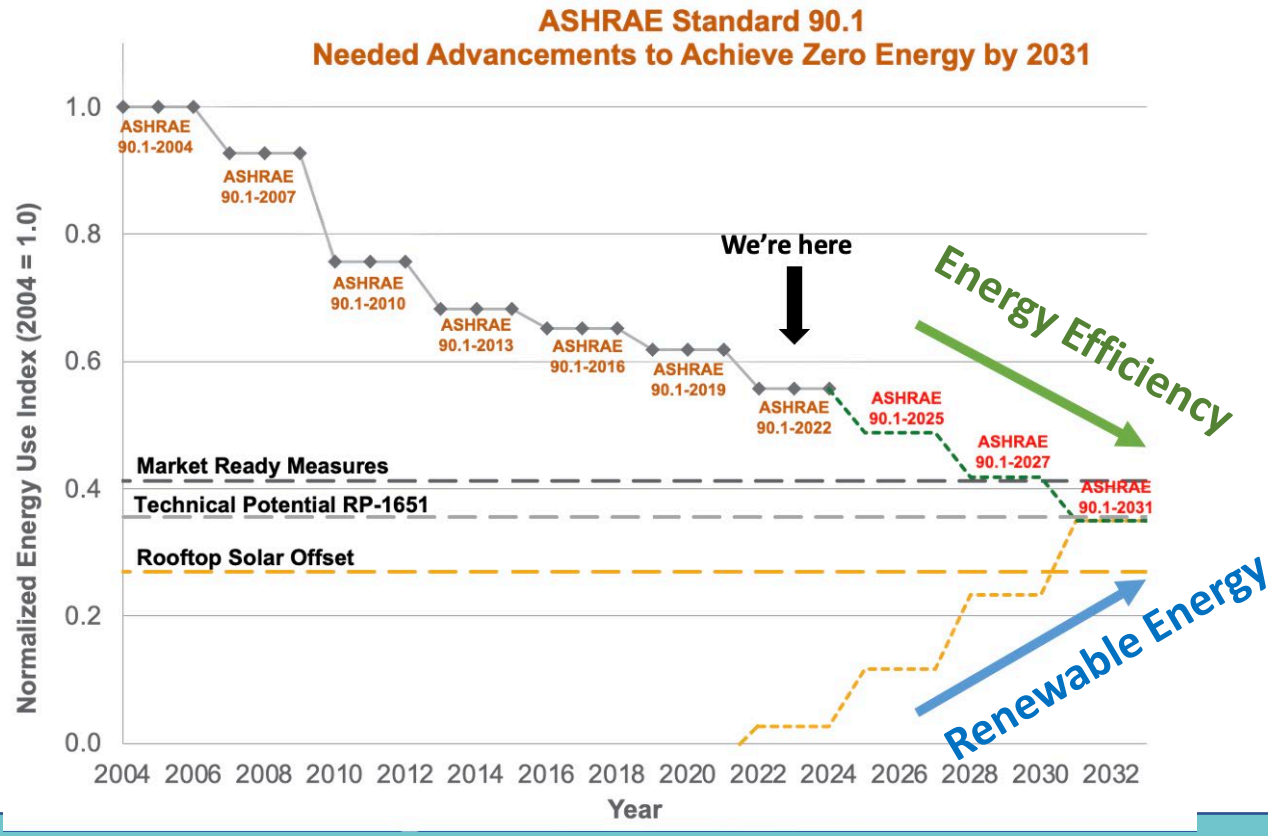
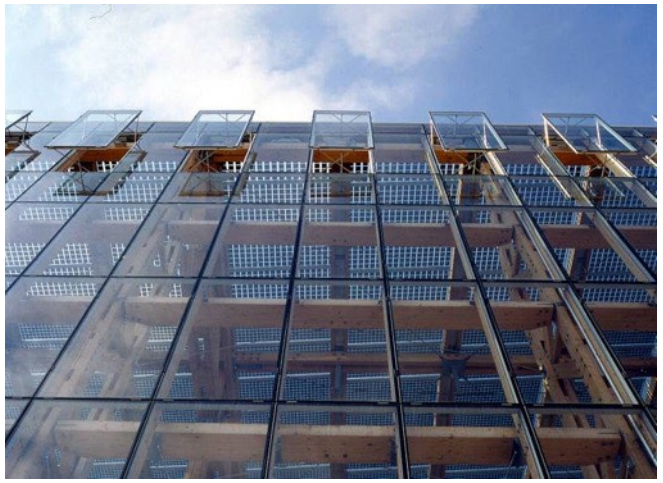
#7 On-Site Renewable Energy

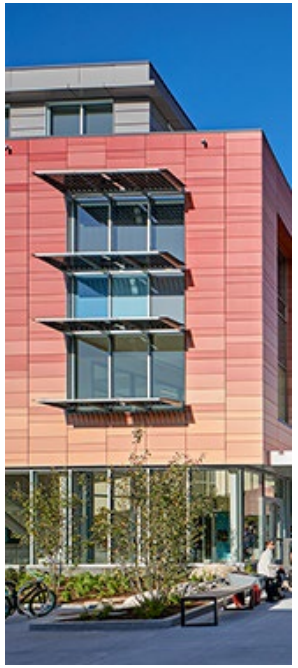
- To reach net-zero energy, need both **energy efficiency** *and* **on-site renewable energy**.
- ASHRAE 90.1-2022 and 2024 IECC now have minimum requirements and credits for on-site renewable energy.
- Green codes require even more.
- Includes photovoltaics: rooftop solar, ground based PV, and BIPV

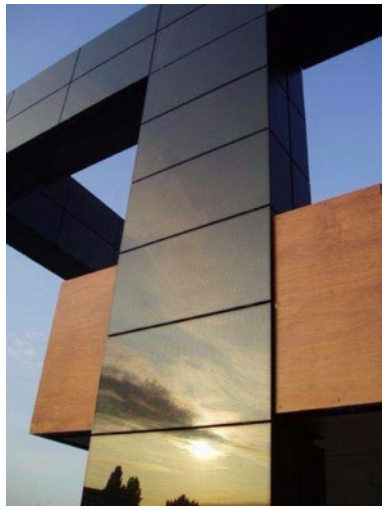


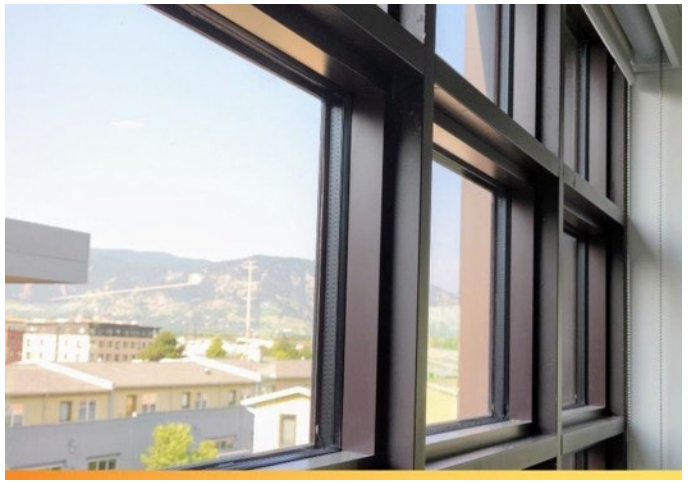
Glazing for On-Site Renewable Energy Production

- **BIPV (Building Integrated Photovoltaics)** in overhead glazing, opaque spandrel, sun shades, and ***now vision glazing!***









→ Look for opportunities to include and promote BIPV in your products and projects.

Session Key Points

#1 Energy Star Version 7

#2 Bird-Friendly Glazing Requirements

#3 Embodied Carbon and EPDs

#4 School Security

#5 Energy Efficiency: Building Performance Standards and Stretch Codes

#6 Heat Treatment and Edge Grinding

#7 On-Site Renewable Energy

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