

A graphic design featuring a bright orange and yellow background on the left, with a silhouette of a water tower and a modern building facade. The text 'IT'S DALLAS HERE' is overlaid in white. The 'D' and 'S' are large and outlined, while 'IT'S', 'ALLAS', and 'HERE' are solid white.

**IT'S  
DALLAS  
HERE**



# **Glass & Glazing Codes and Standards for Architects**

**GlassBuild**   
**A M E R I C A**  
THE GLASS, WINDOW & DOOR EXPO

# Glass & Glazing Codes and Standards for Architects



*Urmilla Jokhu-Sowell*  
*VP of Advocacy and Technical*  
*Services, NGA*



*Dr. Thomas D. Culp, Ph.D.*  
*Owner of Birch Point Consulting*  
*Codes Consultant, NGA*

# Topics

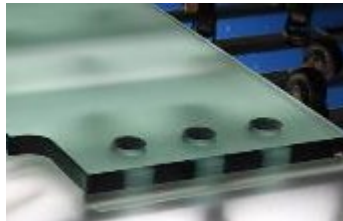
1. Introduction to National Glass Association
2. Energy Codes – IECC and ASHRAE 90.1
3. Specialized Products – VIG and BIPV
4. Buy Clean Programs
5. EPDs and NGA's EPA Grant
6. Bird-Friendly Glazing
7. School Security
8. Glass Recycling
9. Tax Credits

# National Glass Association

NGA is a not-for-profit trade association, and the only national trade association serving the entire glass and glazing industry.



PRIMARY GLASS  
MANUFACTURERS



FABRICATORS



GLAZING  
CONTRACTORS &  
FULL-SERVICE GLASS  
COMPANIES



SUPPLIERS

## NGA's Vision

We envision a future in which glass is the material of choice to enhance spaces where people live, play, learn and work.

**BLUEPRINT  
FOR COLLABORATION**

**GLASSBUILD MAINSTAGE**  
KAY BAILEY HUTCHISON CONVENTION CENTER  
DALLAS, TX



# Never settle.

ALL THINGS ARCHITECTURAL GLASS

**NGA**

NATIONAL GLASS ASSOCIATION WITH IGANA

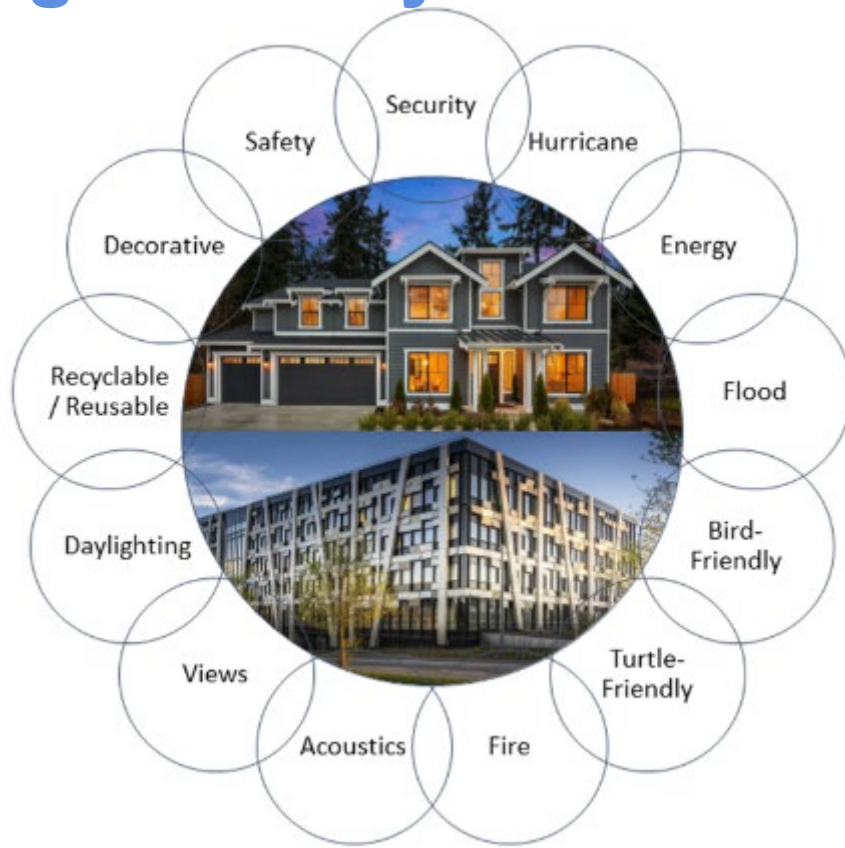
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DALLAS, TX

# Balancing the Many Functions of Glazing

- Weather protection
- Ventilation
- View
- Daylighting
- Fade resistance
- Energy efficiency
- Thermal comfort
- Solar gain
- Acoustics
- Privacy
- Human health
- Safety
- Structural protection
- Security
- Fire
- Egress



## Many Types

- Clear, low-iron, tint
- Low-e
- Heat treated
- Laminated
- Insulating
- Vacuum Insulated Glazing
- Thin glass
- Dynamic glass
- Photovoltaic
- Decorative
- Patterned, fritted, etched
- Applied films

# NGA ARCHITECT EDUCATION

- Critical Reasons to Specify Insulating Glass
- Designing with Glass for Cast and Heat-Formed
- Designing with Glass for Privacy and Translucency
- Fire-Rated Glazing Today
- Glazing to Protect
- Benefits of Laminated Glass in Design
- Reflected Solar Energy of Glazing Systems
- Understanding Applications for Heat-Treated Glass
- Benefits of Daylighting in Building Design
- *NEW!* Value-Added Performance of Coated Glass
- *NEW!* Thermal Bridging Considerations At Interface Conditions
- *NEW!* Bird-Friendly Glazing

## COMING SOON!

- Glass Inspection
- School Security Glazing
- Thermal Comfort

**AIA**  
**Continuing**  
**Education**  
**Provider**



# GLASS & GLAZING DESIGN ACADEMY

ACADEMY  
OF DIGITAL LEARNING

Focus on: Glass  
and Glazing Design

Start This Academy



Brought to you by



The Glass & Glazing Design Academy is a new initiative brought to you by NGA, the recognized voice of the glazing and glass products industry; and, Architectural Record, the leading continuing education provider to the architectural community.

LEARN HOW TO BUILD BETTER WITH GLASS



NGA  
NATIONAL GLASS ASSOCIATION

Architectural Record

CONTINUING EDUCATION CENTER  
ARCHITECTURE + CONSTRUCTION





# NGA Glass & Glazing Advocacy Days

May 14-15, 2024  
Washington, DC

**NGA**  
NATIONAL GLASS ASSOCIATION



Event Recap: [glass.org/event/2024-glass-glazing-advocacy-days](https://glass.org/event/2024-glass-glazing-advocacy-days)

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DALLAS, TX



Dr. Zack Valdez, Advisor to the Department of Energy's Office of Manufacturing and Energy Supply Chains



Representative Buddy Carter, Republican, Georgia



Jeff Grove, Vice President of Global Policy, ASTM

Marc LaFrance, Windows Technology Lead, Department of Energy

Marek Laco, Professional Staff Member, House Committee on Education and the Workforce

Doug Anderson, Manager of the Energy Star Windows Program, Environmental Protection Agency



*Edward*

**FOR COLLABOR**

# CODES & STANDARDS | ADVOCACY

NGA works with standards and codes bodies to promote and defend the use of glass in the built environment.



GLASS.ORG/ADVOCACY



GLAZING  
INDUSTRY  
CODE  
COMMITTEE



ASTM GLASS &  
GLAZING  
STANDARDS  
COMPILATION



ADVOCACY ONE-  
PAGERS



# Members-Only Codes & Standards Help Center

## Have Questions? Get Answers.



Glass is complicated—NGA is here to help.

**Exclusively for NGA members**, we have compiled answers to nearly 40 tough technical codes and standards questions in an easy-to-use, online help center.

Available now (member login required).





Browse  
Technical  
Publications

## 92 Glass Technical Papers free to download

members.glass.org/cvweb/cgi-bin/utilities.dll/openpage?wtp=productsearch.htm

Q DIRECTORY STORE NEWS MY DASHBOARD OUR OTHER SITES LOGIN

NGA NATIONAL GLASS ASSOCIATION with GANA  
FOR BOUNDLESS IDEAS  
IT'S ALL ABOUT GLASS 2022

ABOUT NGA MEMBERSHIP RESOURCES EVENTS

### PRODUCT SEARCH

VIEW ALL PRODUCTS VIEW CART

Product Name: Enter any part of the product name

Type: (All)

Topic: (All), Contract Glazing, Decorative, Energy, Fabrication, Fire-Rated, Flat Glass, Insulating, Laminating/Heat-Strengthened, Mirror, Protective Glazing, Safety, Tempering

NGA NATIONAL GLASS ASSOCIATION with GANA

OUR OTHER SITES  
Glass Magazine  
GlassBuild America  
MyGlassClass.com  
WorldofGlassMap.com

BLUEPRINT  
FOR COLLABORATION

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KAY BAILEY HUTCHISON CONVENTION CENTER  
DALLAS, TX

# Energy Codes – IECC and ASHRAE 90.1

## International Energy Conservation Code (IECC)

- The 2024 IECC is now complete and published.
- *No changes in window area limits.*
- Marginal improvements in commercial fenestration U-factor, nothing dramatic.
  - For example, zone 4-5 went from 0.36 to 0.34, zone 3 from 0.42 to 0.38. No changes in SHGC.
- Credit for high performance windows, increased daylight area, automated shading, PV and BIPV.
- New requirements for **on-site renewable energy (PV, BIPV)** with off-site options if can't be done on-site.



# Energy Codes – IECC and ASHRAE 90.1

## ASHRAE 90.1

- ASHRAE 90.1 is the most important code affecting commercial and highrise residential buildings, also referenced in federal law.

### Climate Zones

- All building criteria (U-factor, SHGC) are set based on project's building location and climate zone.
- Climate zones range from zone 0 (extremely hot) to zone 8 (subarctic / arctic)
- As the climate changes, the zones move ... and the ASHRAE 90.1 map is changing again ...

# ASHRAE 90.1

## Climate Zone Map – ASHRAE 90.1-2013 and before

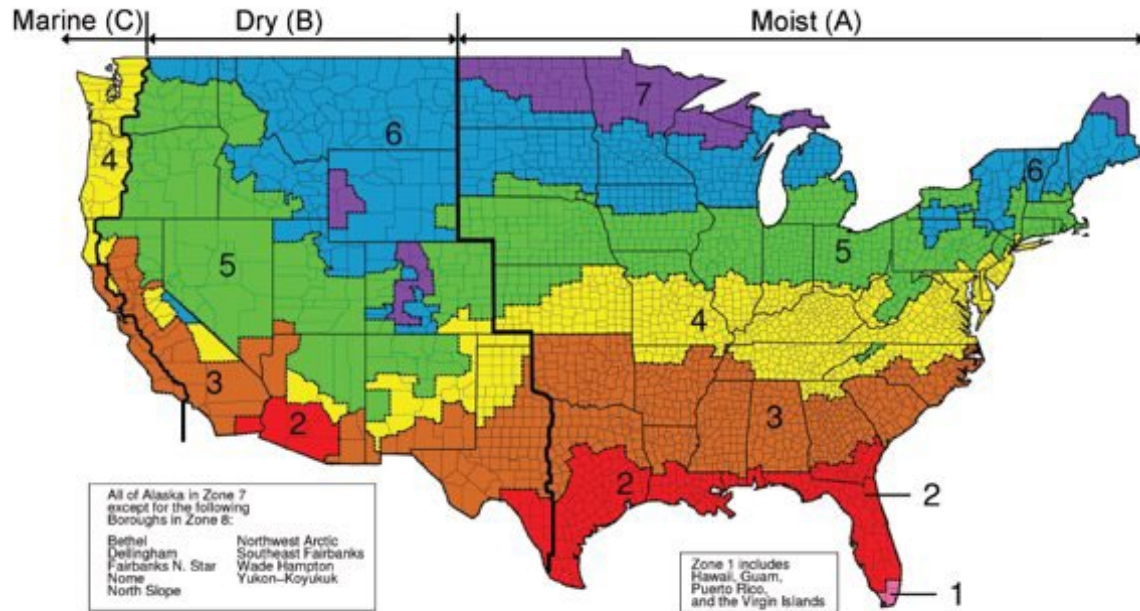
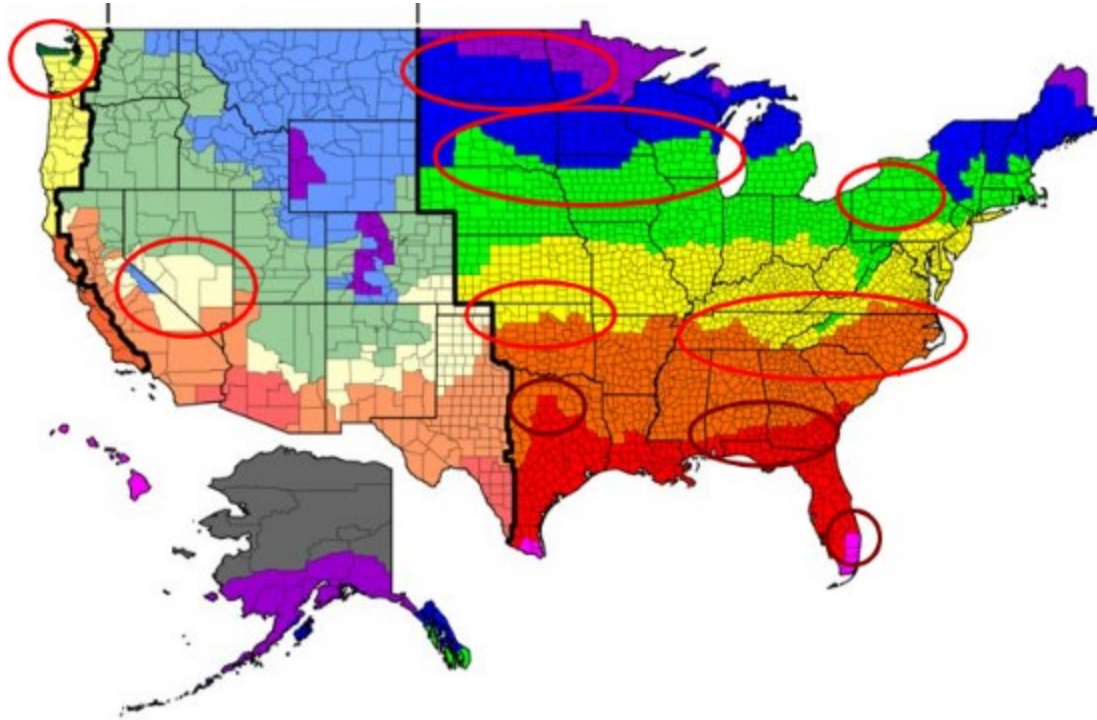


Figure B1-1 U.S. climate zone map (ASHRAE Transactions, Briggs et al., 2003).

# ASHRAE 90.1

## Climate Zone Map – ASHRAE 90.1-2016 to 2022

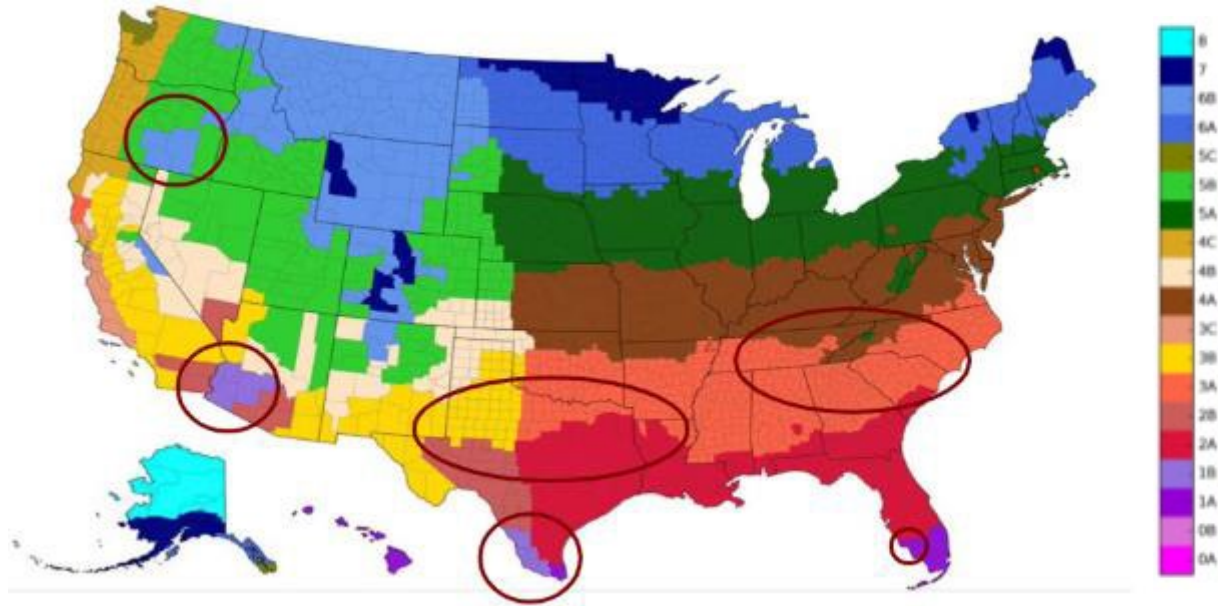


10% of counties moved to warmer climate zone

Standard 169-20xx Climate Zones			
Zone 0A Extremely Hot Humid	Zone 4B Mixed Dry	Zone 5A Cool Humid	Zone 6A Cold Humid
Zone 0B Extremely Hot Dry	Zone 4C Mixed Marine	Zone 5B Cool Dry	Zone 6B Cold Dry
Zone 1A Very Hot Humid	Zone 5C Cool Marine	Zone 6C Cold Humid	Zone 7 Very Cold
Zone 1B Very Hot Dry	Zone 6A Cold Humid	Zone 6B Cold Dry	Zone 8 Subarctic/Arctic
Zone 2A Hot Humid	Zone 6C Cold Humid	Zone 6D Cold Marine	
Zone 2B Hot Dry	Zone 6E Cold Dry		
Zone 3A Warm Humid			
Zone 3B Warm Dry			
Zone 3C Warm Marine			
Zone 4A Mixed Humid			

# ASHRAE 90.1

## Climate Zone Map – ASHRAE 90.1-2025



9% of counties moved to warmer climate zone

3% of counties moved to cooler climate zones

# ASHRAE 90.1

## Fenestration Criteria

- Worked for last 2 years on next step in fenestration criteria for 90.1-2025.
  - Very detailed life cycle cost effectiveness analysis. Some new aspects also examined such as HVAC downsizing, social-cost-of-carbon, different baselines.
  - Once we see what passes / fails, then negotiate the final values looking at product impacts and overall targets.
  - *Some want to see big changes; some want no change -- and we usually end up somewhere in-between.*
- Good news ... after negotiation, we came to consensus with the proposal receiving unanimous support by the committee. Positive for our members.
- Just completed first public review Sep 9.  
Only 3 public comments received, which will only result in small tweaks.
- *So, what's in it?*

# ASHRAE 90.1

## Vertical Fenestration Criteria

- *No reduction in window area.*
- Comprehensive changes in fixed windows, operable windows, skylights / sloped glazing. No changes to glazed entrance doors.
- **Roughly 3-13% changes in U-factor.**  
SHGC already mostly optimized so main change is extending the 0.23 SHGC up to zone 2, although comments from WDMA, FGIA on this.

Both NONRESIDENTIAL and RESIDENTIAL

Zone	U-FACTOR		SHGC	
	Fixed	Operable	Fixed	Operable
9	0.62	0.62	0.23	0.23
8	0.62	0.62	0.23	0.23
7	0.62	0.62	0.23	0.23
6	0.62	0.62	0.23	0.23
5	0.62	0.62	0.23	0.23
4	0.62	0.62	0.23	0.23
3	0.62	0.62	0.23	0.23
2	0.62	0.62	0.23	0.23
1	0.62	0.62	0.23	0.23

Continued incremental advancement.  
Increases use of thermally broken frames in all zones.  
More 4<sup>th</sup> surface low-e, higher performance thermal breaks,  
argon, warm edge spacers in northern zones.  
Cost effective, feasible. 👍

# ASHRAE 90.1

## Skylight Criteria

- Also, separate & less stringent requirements for semi-heated spaces (e.g., warehouses)
- *Based on public comments, some of the northern U-factors in zones 4-7 may be a little too aggressive, and likely to be changed.*

**SKYLIGHTS / SLOPED GLAZING** in Conditioned Spaces (Nonres and Res)

Zone	90.1-2022	2025 prop.	90.1-2022	2025 prop.
	U	U	SHGC	SHGC
8	0.41	0.40	NR	NR
7	0.44	0.44	NR	NR
6	0.47/0.50	0.45	0.40	0.40
5	0.50	0.46	0.40	0.40
4	0.50	0.49	0.40	0.40
3	0.55	0.55	0.30	0.30
2	0.65	0.65	0.30	0.30
1	0.70	0.68	0.30	0.30
0	0.70	0.68	0.30	0.30

# ASHRAE 90.1

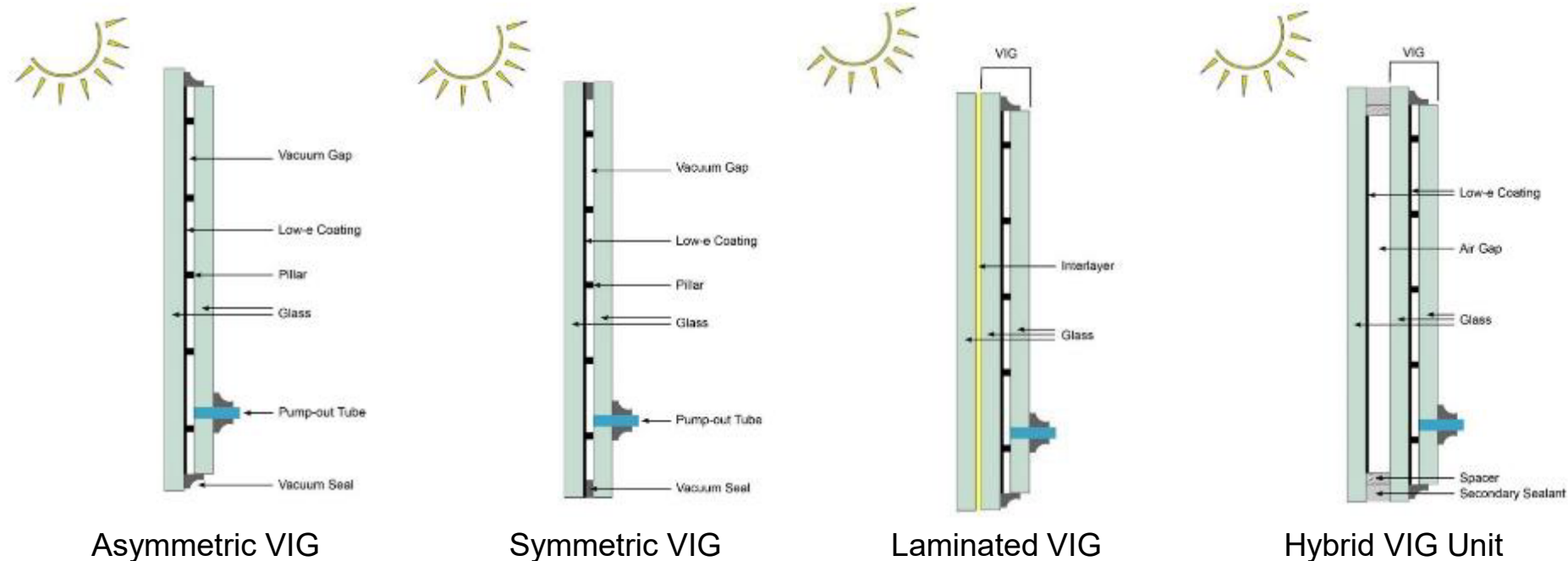
## Other Items

- Proposal to allow credit for **dynamic glazing** and **automated shading** in Ch 12 performance path similar to what is already in Appendix G performance path. No comments, so approved for publication.
- Proposal to **increase on-site renewable energy (PV, BIPV)** requirement from 0.50 to 0.75 W/ft<sup>2</sup>. This one is a little more controversial.
- Clean up of **existing building** language.
- New **net-zero operational carbon** appendix being finalized.
  - Prescriptive appendix that jurisdictions can optionally adopt as a net-zero energy and net-zero carbon code. Pushed by IRA funding and overall policy goals.
  - Set efficiency a notch higher (~10-15%), then determine how much renewable energy is required to get to net-zero.
  - We made sure it does not lower the window area limit as some were initially proposing.
  - *Pushes higher performance glazing, and glass in PV, BIPV.*



# Specialized Products incentivized by the Codes

## Vacuum Insulated Glazing (VIG)



# Specialized Products incentivized by the Codes

## Vacuum Insulated Glazing (VIG)

### ***What do the energy codes say about VIG?***

- Not much *directly*
- Only place VIG is directly mentioned is for **reach-in glass doors in walk-in coolers and freezers**, where we worked with DOE and AHRI to clarify.
- But get *credit* for using it ...

# Specialized Products incentivized by the Codes

## Vacuum Insulated Glazing (VIG)

- For envelope, none of the prescriptive criteria directly require VIG (lowest U is 0.25), but *get credit for products going beyond code minimum.*
  - Performance Path Compliance
  - Additional Energy Credits, now in both ASHRAE 90.1-2022 and 2024
    - Must demonstrate compliance with main code AND earn extra points, choosing from advanced options across envelope, HVAC, lighting, renewable energy, etc.
    - Advanced performance products beyond the base code will help architect earn points and give them more flexibility in overall design.
  - New Net-Zero Operational Carbon options
    - Optional appendices that can be adopted by local jurisdictions to achieve net-zero buildings
    - Aggressive but achievable building efficiency + renewable energy. VIG will help.

# Specialized Products incentivized by the Codes

## Vacuum Insulated Glazing (VIG)

Overall, the codes don't explicitly drive VIG yet, but they do give credit for higher performance in the glass and/or frame components.

- More flexibility in the overall product design to meet the U-factor requirements
- Gives the architect and building owner more allowable window area
- Gives the architect more options to meet the new additional energy credit requirements
- Potential tax incentives for the building owner (e.g. expanded 179D credit)

# Specialized Products

## Building-Integrated Photovoltaics (BIPV)

- We will see more use of solar on buildings, both traditional rooftop solar as well as BIPV in spandrel area, sunshades, canopies, and even vision area.
- New on-site renewable energy requirements in 90.1-2022 and 2024 IECC.
- New net-zero operational carbon appendix.
- New “additional energy credits” requirement.



# 'Buy Clean' Initiatives

## Federal 'Buy Clean'

- Biden Administration launched Buy Clean Task Force and Initiative in 2021.
- In 2023, launched Federal-State Buy Clean Partnership with 12 leading states (CA, CO, HI, IL, ME, MD, MA, MI, NJ, NY, OR, WA)

# 'Buy Clean' Initiatives



## Federal 'Buy Clean'

- \$2.15B appropriated through GSA for procurement of low-embodied carbon construction materials on federal projects.
- GSA setting GWP CO<sub>2</sub>eq limits for procured materials in governmental projects, including **flat glass**, asphalt, concrete, steel.
- 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, for now, can just hand in the flat glass EPD, as that covers the bulk of the carbon impact.**

# 'Buy Clean' Initiatives

## State 'Buy Clean'

- Legislative spreadsheet available as members-only resource
- State, materials covered, description, bill number, etc.
- [www.glass.org](http://www.glass.org)

State	Materials Covered	Flat Class (FY20)	FFP Limit for FY20 (FY20)	Description	Bill No.	Reference	Notes
CA	steel, glass, mineral wool, concrete, aggregate, masonry, EPDM roofing, tires, future expansion	Y	5430	The single projects with contracts signed on or after July 1, 2020, contractors must submit facility-specific material or product DPOs before the material will be accepted for installation. The Environmental Product Declaration must show that the facility uses the global warming potential of the material or product does not exceed maximum global-warming potential (GWP) value as published by the Department of General Services Environment.	Public Contract Code sections 2500-2600	<a href="https://www.sds.com/Products/Environmental-Product-Declarations">https://www.sds.com/Products/Environmental-Product-Declarations</a> <a href="https://www.dir.ca.gov/Dir/OSHA/OSHA-2019-11-13-0001.htm">https://www.dir.ca.gov/Dir/OSHA/OSHA-2019-11-13-0001.htm</a>	
CO	Asphalt, cement, reinforced glass, steel, wood	Y	1000	Applies to state public projects for which the project cost exceeds \$500k, and for which an agency of government issues a solicitation on or after Jan 1, 2024. Includes any construction, alteration, repair, demolition, or improvement of any land, building, structure, facility, road, or bridge that is intended to promote public safety. Requires the Office of the State Architect to establish a maximum acceptable GWP level for each category of eligible materials.	C.R.S. 24-49-007	<a href="https://www.colorado.gov/legislature/bills-amendments">https://www.colorado.gov/legislature/bills-amendments</a>	
TX							
MD	CONCRETE/ CONCRETE MIX	N					
MA	Concrete	N					
MA							





# Environmental Product Declarations (EPDs)

Voluntary declarations providing quantified and verified data regarding a product's environmental impact over its partial or entire life cycle.

- Produced using a PCR
- Based on LCA data following ISO 14040 standards
- 4 categories
  - Industry wide
  - Product specific
  - Supply chain specific
  - Facility specific

# Flat Glass PCR

- NGA PCR for Flat Glass was published by NSF describing requirements for LCAs and EPD of flat glass
- Valid through Sept. 30, 2025

[https://www.glass.org/sites/default/files/2021-10/pcr\\_flat\\_glass\\_2020.pdf](https://www.glass.org/sites/default/files/2021-10/pcr_flat_glass_2020.pdf)

## Product Category Rule for Environmental Product Declarations

NGA PCR for Flat Glass: UN CPC 3711



### Program Operator

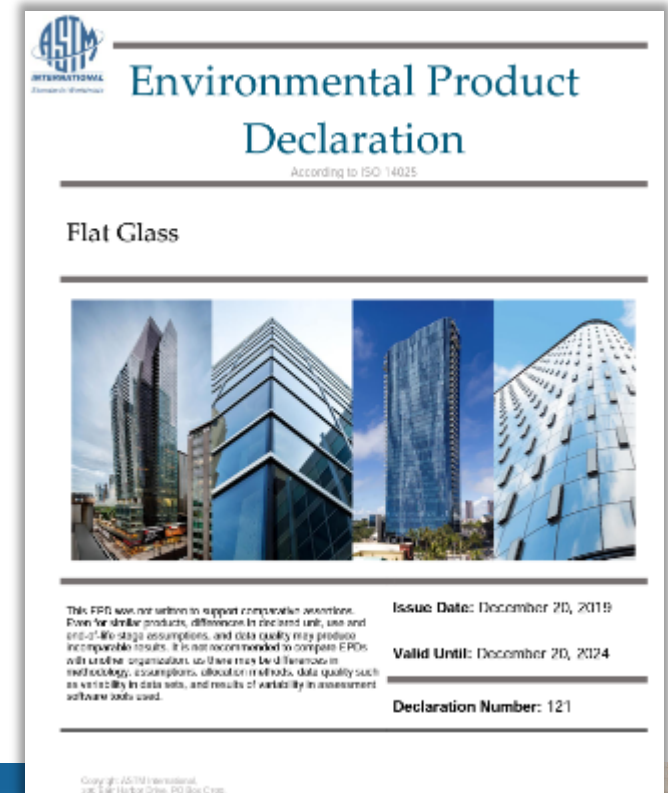
NSF International  
National Center for Sustainability Standards  
Valid through September 30, 2025  
noss@nsf.org

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# Flat Glass EPD: Industry Average

- NGA flat glass member companies (members of Forming Committee) published an industry average EPD for flat glass produced in the US in December 2019.
  - Average GWP is 1,430 kg CO<sub>2</sub> eq
- Valid through Dec. 20, 2024

[https://www.glass.org/sites/default/files/2019-12/NGA EPD 2019 12 16 signed.pdf](https://www.glass.org/sites/default/files/2019-12/NGA_EP_D_2019_12_16_signed.pdf)



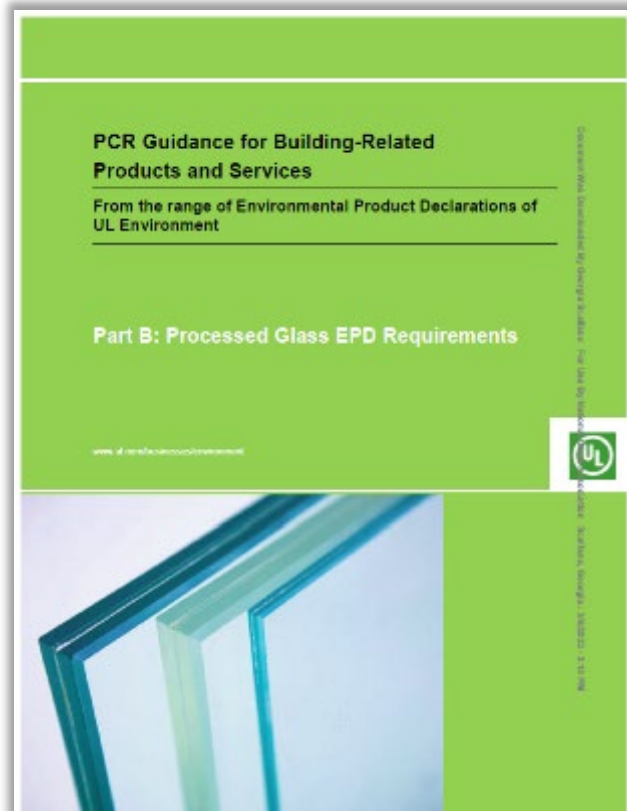
# Processed Glass PCR

- PCR Guidance for Building-Related Products and Services Part B: Processed Glass EPD Requirements (Established Aug. 2016)
  - Original expiration date Dec. 6, 2023 extended to June 2024

## Updates

- UL is working with industry stakeholders to update. EPA PCR requirements. EPA Grant

<https://www.shopulstandards.com/ProductDetail.aspx?UniqueKey=35842>



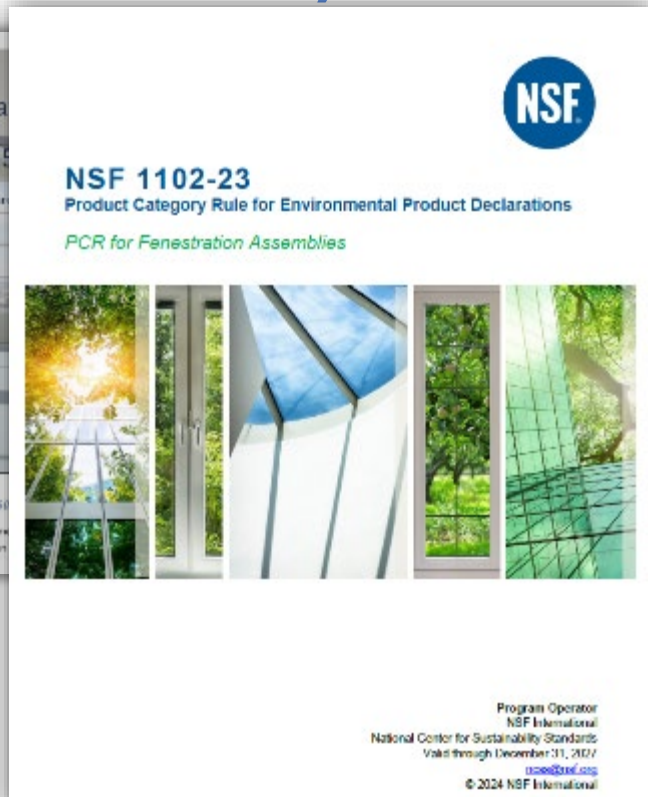
# Windows PCR (Fenestration PCR)

- Windows PCR established September 10, 2015

## Updates

- Updated draft PCR reviewed by LCA expert panel
- NSF Fenestration PCR published Jan. 2024

<https://d2evkimvhatqav.cloudfront.net/documents/PCR-Product-Category-Rules/fenestration-assemblies-nsf-1102-23.pdf?v=1707165191>



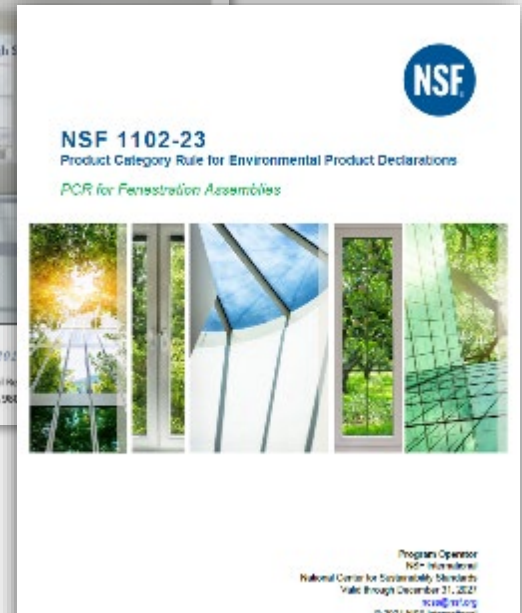
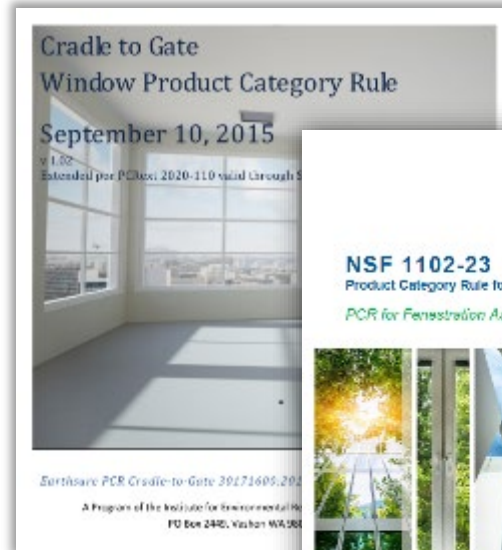
# Windows PCR (Fenestration PCR)

- **Windows PCR Scope**

- Provide detailed method for developing EPD to support comparable, informed, and objective sustainable purchasing of windows.
- Includes residential windows and ribbon/curtain wall windows.

- **Fenestration PCR Scope**

- Provide detailed method for developing EPD to support comparable, informed, and objective sustainable purchasing of windows.
- Includes exterior-grade, finished, assembled fenestration assemblies that selectively permit the passing of air, daylight, or people. Includes skylights, windows, curtain walls, storefronts, and doors.



# Other NGA Sustainability Resources

**NGA** NATIONAL GLASS ASSOCIATION WA CANA | **ADVOCACY**

## Flat Glass Global Warming Potential

The request:

When states or jurisdictions compile global warming potential for flat glass, we request setting the Global Warming Potential (GWP) limit for flat glass to:

1716 kg CO<sub>2</sub> eq.

The request of 20% above the industry-average referenced in Declaration Number ASTM-EPD121 is due to the inherent uncertainty of the life cycle assessment process and the inclusion of esthetic variables and assumptions including, but not limited to, weight averages, up/downstream transportation and building service life.

The issue: The strategy:

Stakeholders and sustainability programs want to better understand the environmental performance of glass products manufactured for buildings.

Results of the Flat glass industry-average EPD:

- The industry-average Global Warming Potential for flat glass is:

ASTM Product Category Rule (PCR) for Flat Glass was published by NSF in 2018 detailing the requirements for life cycle assessment (LCA) and environmental product declaration (EPD) of flat glass.

NGA Flat Glass™ member companies published an industry-average EPD for flat glass sold in the US in December 2019 (ref. ASTM-EPD121).

The EPD scope includes raw material production, transport of materials, manufacturing process, product packaging, on-site storage and manufacturing waste (crude to glass).

Focus areas of the GWP contribution:

Relative contribution of manufacturing inputs and outputs to Global Warming Potential

Raw Glass (68%)
Energy (12%)
Manufacturing (10%)
Transportation (8%)
Other (2%)

**NGA** NATIONAL GLASS ASSOCIATION WA CANA

## RECYCLABILITY OF ARCHITECTURAL GLASS (FB40-14) | DOWNLOADABLE

Product Details

Price: \$0.00

Quantity: 1

Total: \$0.00

Downloadable

- *Download from NGA Store:*
  - FB40-14 (2021) [Recyclability of Architectural Glass](#)
  - FM06-20 [General EPD Education](#)
  - FM07-21 [Flat Glass Industry Environmental Transparency Documents](#)
- *Download from glass.org*
  - [NGA One-Pager Flat Glass Global Warming Potential](#)
- <https://www.glass.org/advocacy/initiatives/sustainability>

# EPA Grant to Assist in EPD Development

- NGA is an EPA grant selectee – finalizing grant details now.
- \$2.1 million over 5 years
- 38 proposals selected, 14 material types
- NGA is the **only glass representative**





# EPA Grant to NGA

## *Four Subprojects*

### 1. Primary Flat Glass LCI Data Aggregation (\$333k)

Provide support to improve granularity of primary flat glass LCI data, as well as PCR update.

### 2. EPD Generator Tool for Processed Glass (\$379k)

Develop robust generator tool capable of producing both LCA data reports and full 3<sup>rd</sup> party reviewed EPDs for processed glass products in conformance with ISO.

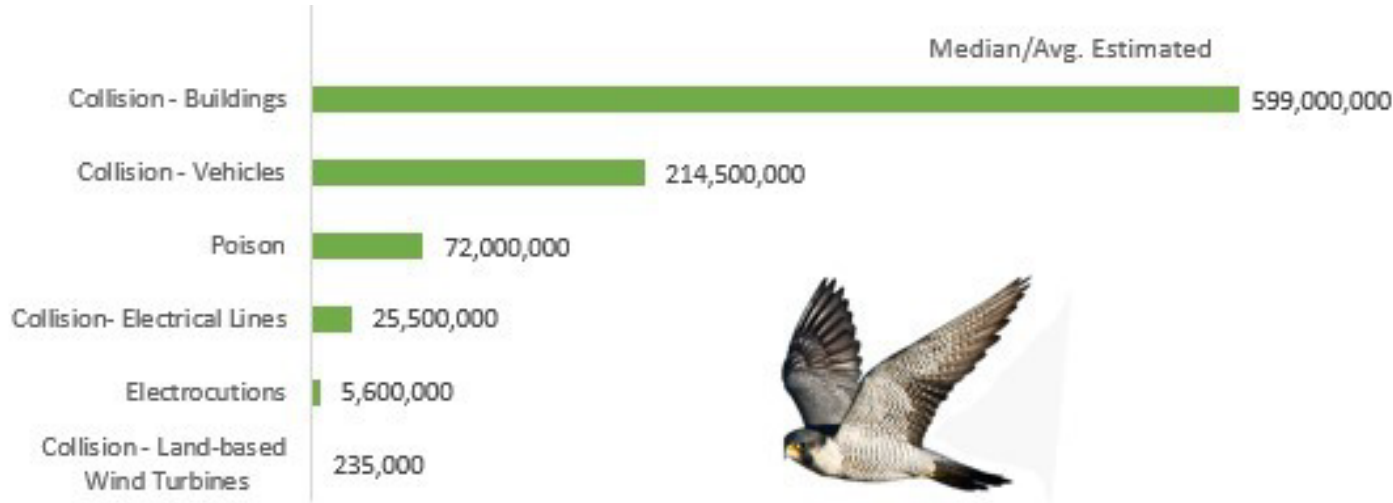
### 3. EPD Development Assistance for Glass Fabricators (\$1.2M)

Provide technical, educational, and financial assistance to glass fabricator members for EPD development.

### 4. End-of-life LCA data collection on architectural glass recycling (\$226k)

Improve understanding about glass end-of-life and quality of LCA part D data, quantify glass recovery rates and track end-use outcomes for recycled glass on 1-3 deconstruction projects.

# Bird Friendly Solutions



Annual estimated bird mortality from selected anthropogenic causes in the U.S.

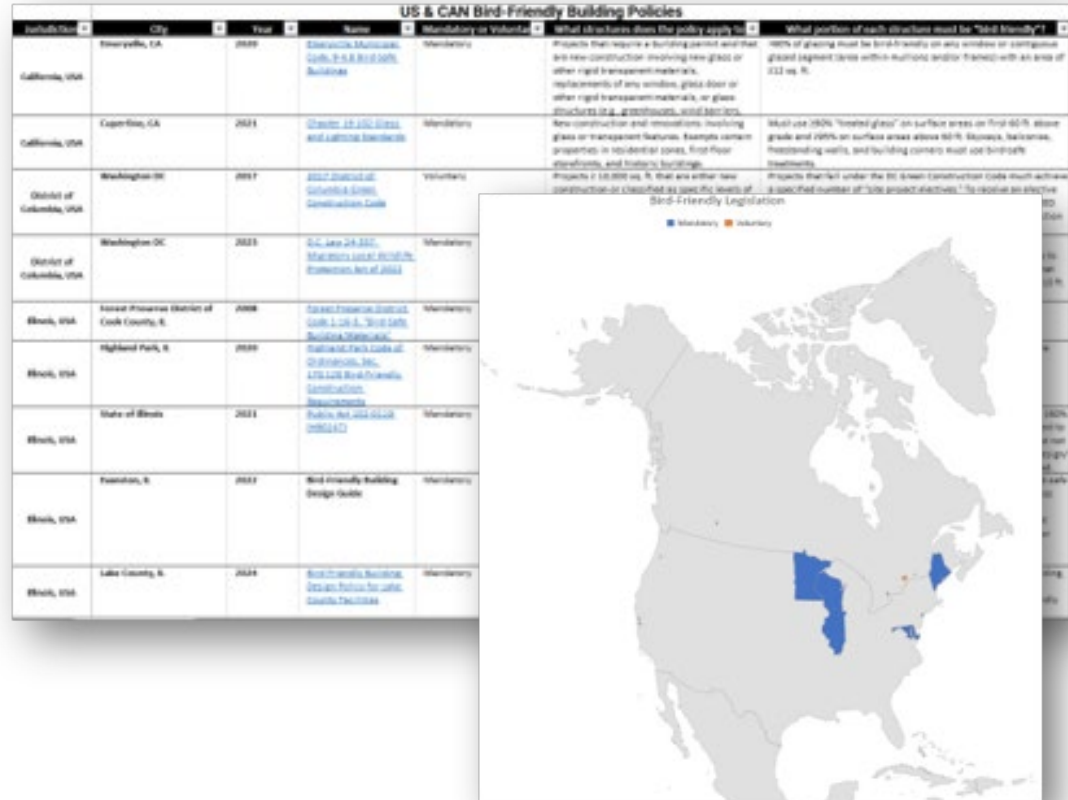
Source: U.S. Fish and Wildlife Service

- NGA pushing to get Federal Bird Safe Buildings Act (H.R. 3781) reintroduced and passed to support implementation of bird-friendly design strategies.

# Bird Friendly Solutions

## Bird-Friendly

- NGA members' resource – bird-friendly legislation tracking
- State and local ordinances
- [www.glass.org](http://www.glass.org)



# School Security: How secure are schools?

- Most US schools are around 40-50 years old  
(*National Center for Educational Statistics- 2011*)
  - 45% built 1950-1969
  - 28% built before 1950
- ANSI Z97.1 – Voluntary Safety Glazing Standard
  - created in 1966
- CPSC 16 CFR 1201 – Federal Mandate for Safety Glazing
  - adopted in 1977



# School Security

## School Security

*ASTM F3561 Standard Test Method for Forced-Entry-Resistance of Fenestration Systems After Simulated Active Shooter Attack*

Tennessee bill SB 0274 (HB 0322)

- Requires TN public school buildings and charter school buildings constructed or remodeled after July 1, 2023, to have installed a **clear, bullet-resistant or entry-resistant film** on the glass panel of each exterior entry or basement level window and door to prevent individuals from entering the school building without authorization by breaking the glass.

Texas School District Subchapter CC. Commissioner's Rules

- Except when inside an exterior secured area, all ground-level windows near exterior doors that are of a size and position that permits entry from the exterior if broken shall be constructed or modified such that the glass cannot be easily broken and allow an intruder to enter through the window frame (ex. Using forced entry-resistant film)

# School Security



- **Glazing Industry Code Committee**
- ICC Code Proposal



# Glass Recycling

## Recycling

- Recycling rates are trending positive
- Majority of recycled glass is post-industrial
- Highest recycling rates occur with clean glass cullet
- Demand for recycled cullet is increasing

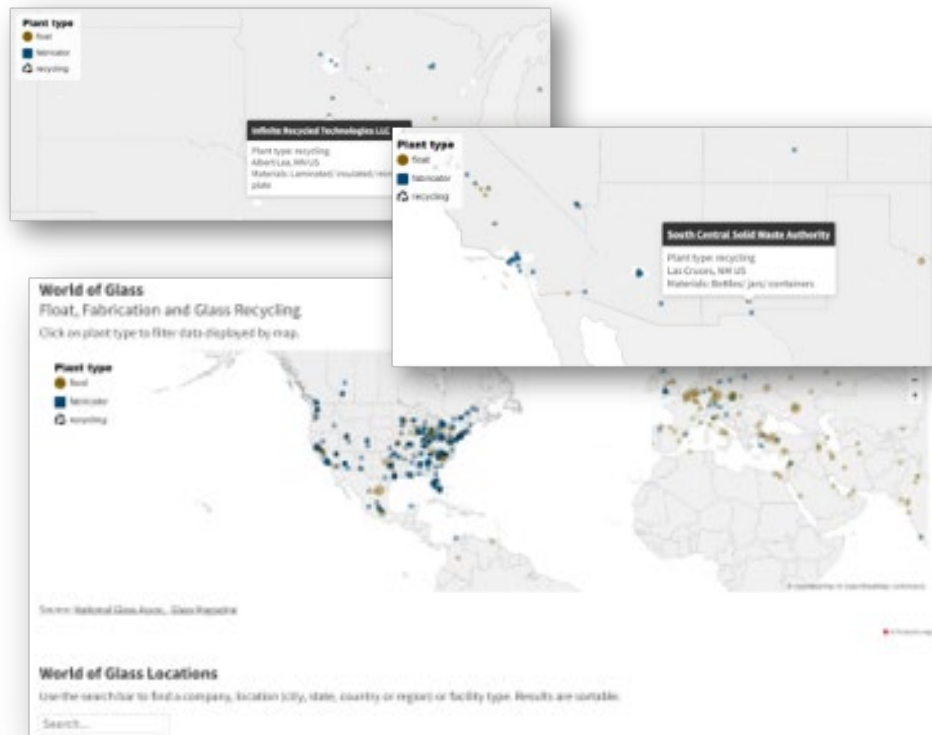
## Why Recycle?

- Manufacturing new glass requires 15-16% more raw material, whereas manufacturing using cullet is 1:1
- Cullet melts at lower temperature -- Every 10% of cullet used in place of raw material saves 3% energy and 5% CO2 emissions
- Melting cullet results in longer furnace life – cullet is less corrosive and higher temps are unnecessary

# Glass Recycling

## Recycling

- World of Glass Map
  - Updated data for North American glass fabrication & float plants
  - New category: Recycling Plants
    - North American recyclers
    - Info on types of materials to be accepted
    - Proximity to float/fabrication plants
    - Available in October





# Glass Recycling

## Recycling – Strategies for Sustainability

- **Reducing Embodied Carbon**
  - Cullet vs raw material
  - Oxy-fuel technology in production
  - Other potential future technologies – hydrogen, carbon capture
- **Improve Operational Carbon**
  - High performance glazing to reduce building energy use / operational carbon emissions.
  - Glass in PV / BIPV helps support renewable vs. fossil fuel energy
- **Increase Recycling and Reuse**
  - Extending lifetime of existing buildings
  - Designing for disassembly

# Tax Credits

## IRC Section 48

- Energy tax credit for commercial investments in renewable energy property, including **electrochromic glass**.
- However, narrowly defined – does not include other dynamic glazing technologies or high performance fenestration (e.g. triple, VIG).
- Also, very short lived – construction must start by end of this year.
- NGA members and staff met with legislators both at NGA's Glass and Glazing Advocacy Days and recently to discuss potential fixes.



# *QUESTIONS?*

**BLUEPRINT  
FOR COLLABORATION**



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Share Your Thoughts!





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**THANK YOU**

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THE GLASS, WINDOW & DOOR EXPO