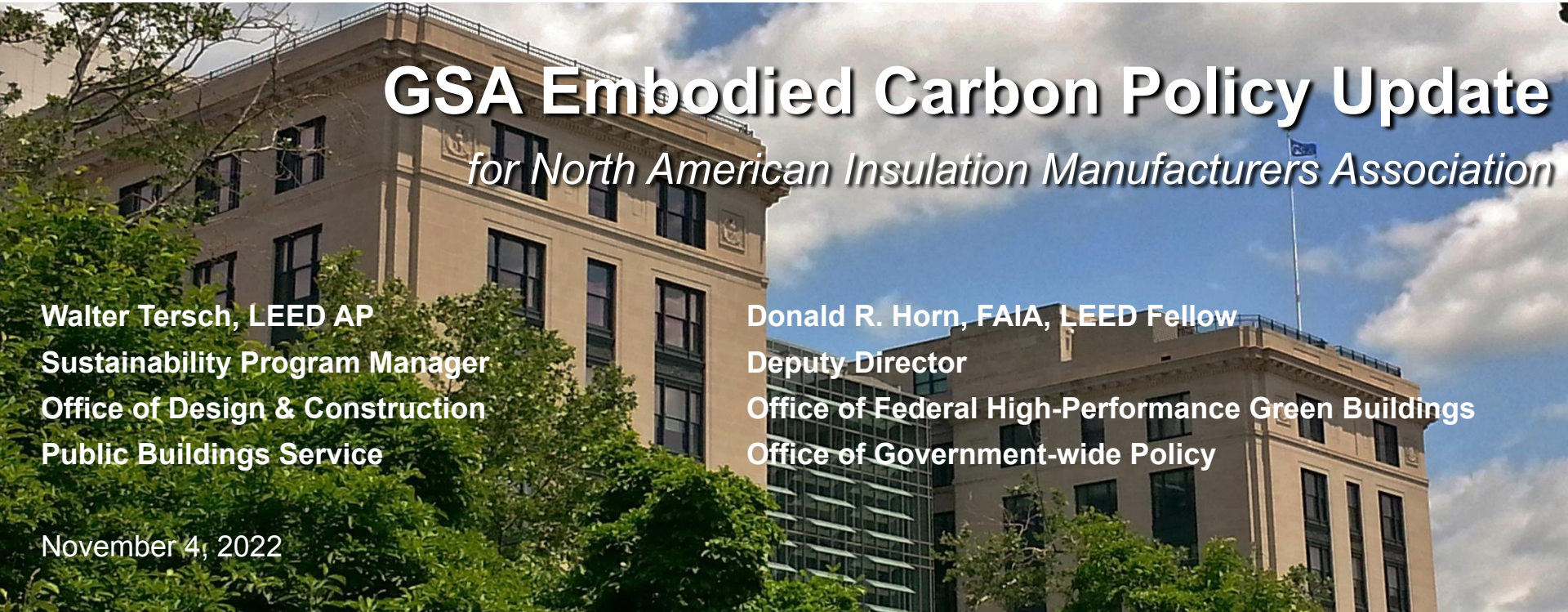
U.S. General Services Administration



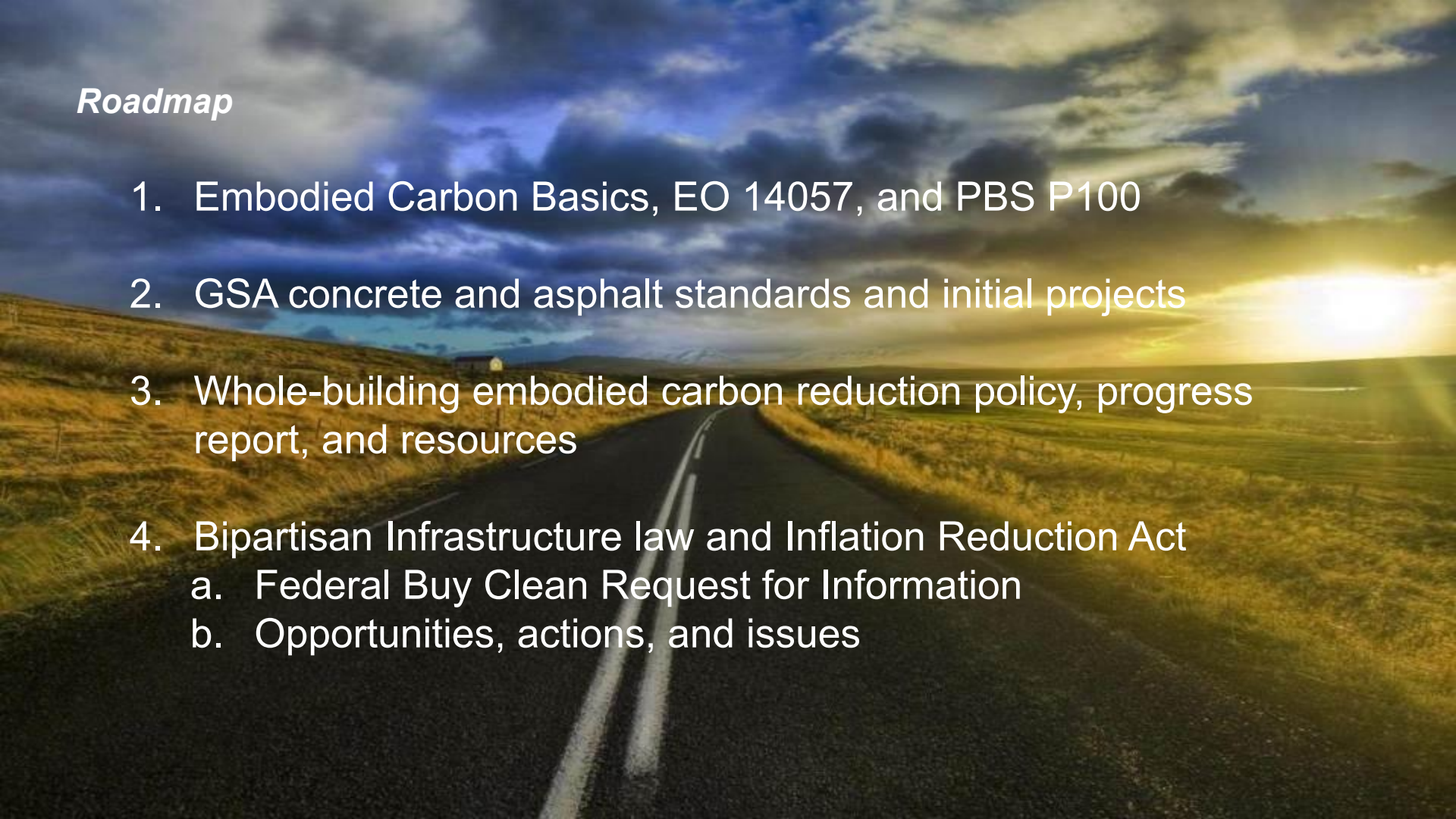
# GSA Embodied Carbon Policy Update

*for North American Insulation Manufacturers Association*


**Walter Tersch, LEED AP**
**Sustainability Program Manager**
**Office of Design & Construction**
**Public Buildings Service**

**Donald R. Horn, FAIA, LEED Fellow**
**Deputy Director**
**Office of Federal High-Performance Green Buildings**
**Office of Government-wide Policy**


November 4, 2022



***Roadmap***

1. Embodied Carbon Basics, EO 14057, and PBS P100
2. GSA concrete and asphalt standards and initial projects
3. Whole-building embodied carbon reduction policy, progress report, and resources
4. Bipartisan Infrastructure law and Inflation Reduction Act
    a. Federal Buy Clean Request for Information
    b. Opportunities, actions, and issues

*“Using domestic, lower-carbon construction materials is a triple win – creating good-paying American **jobs**, reducing greenhouse gas emissions, and ensuring a healthy **planet** for the next generation.*

*[We’ve started deploying emission-reducing standards] with **little to no additional cost** – while supporting small businesses along the way.”*

- GSA Administrator Robin Carnahan

# What is Embodied Carbon?

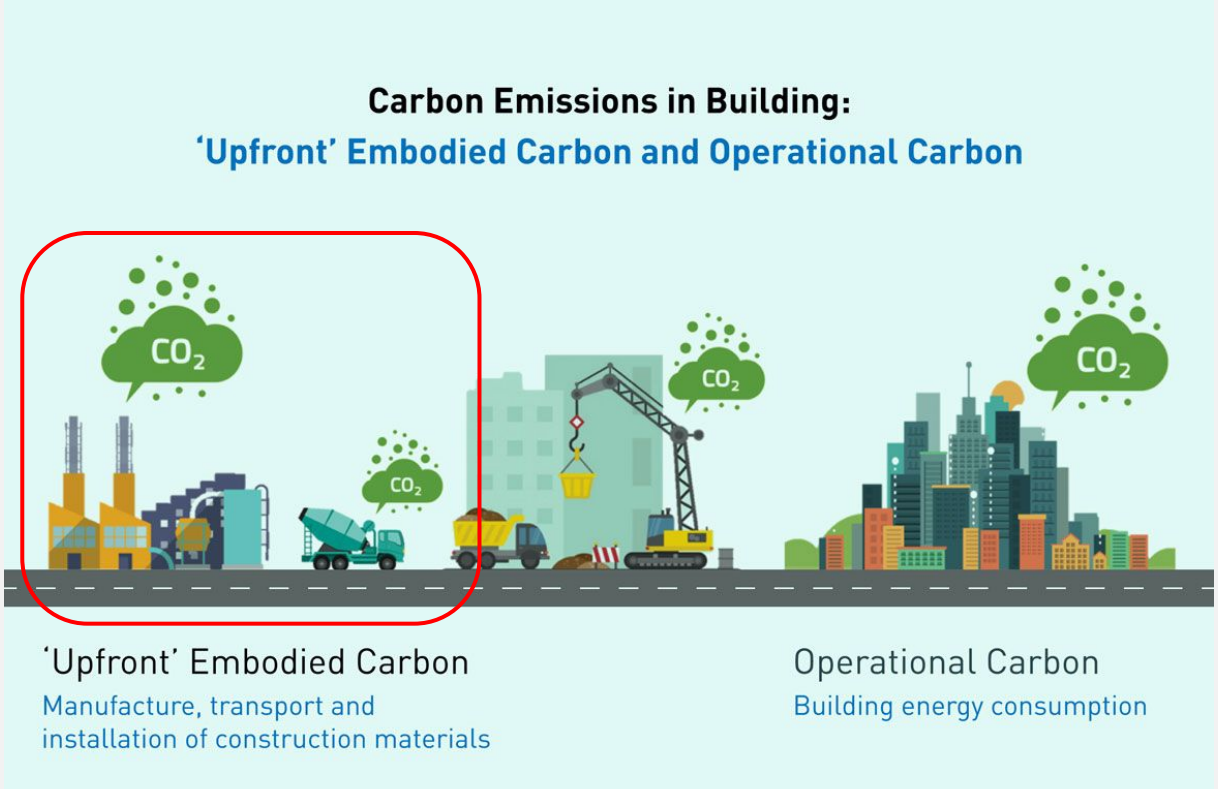


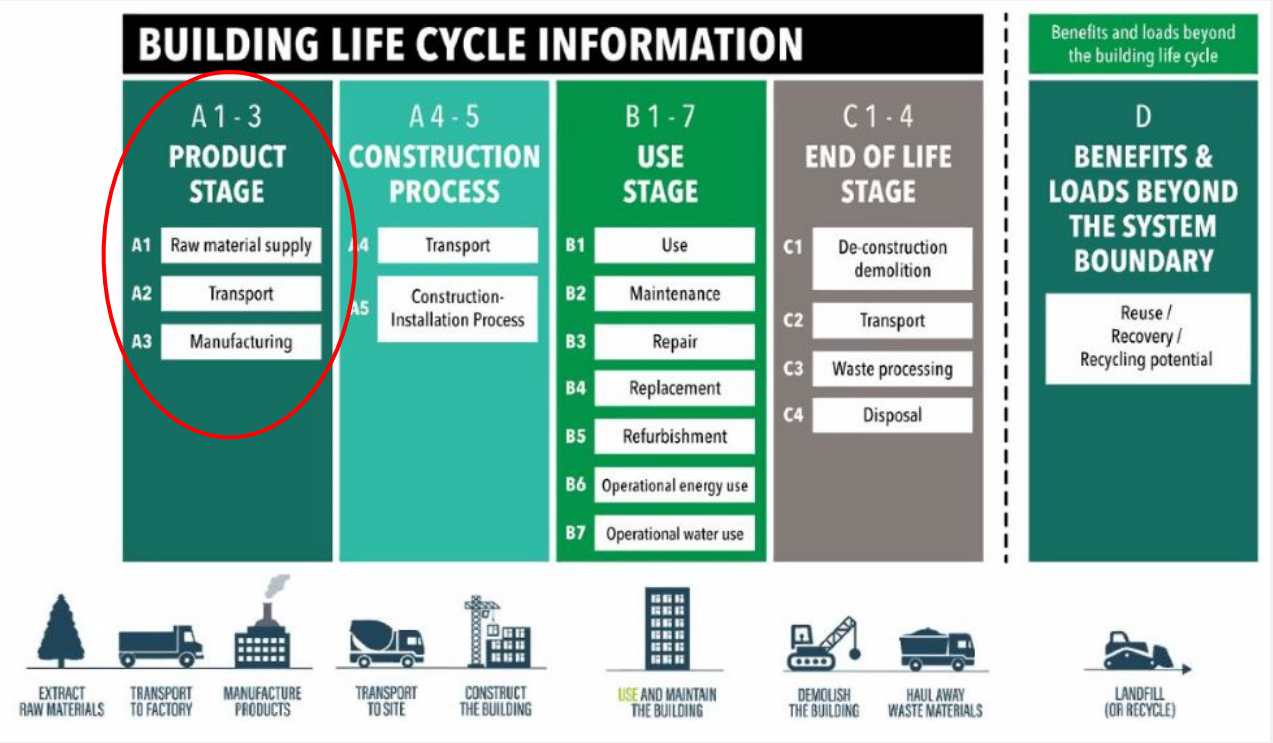

Image Credit: Building Transparency and Skanska USA

**Embodied carbon** refers to the greenhouse gas (GHG) emissions associated with the materials' extraction, production, transport, and manufacturing.

Calculated as **global warming potential** (GWP). Expressed in metric tons of carbon dioxide equivalent ($CO_2e$).

# What is an Environmental Product Declaration (EPD)?

An EPD is a standard, third-party-verified summary that lists the primary environmental impacts associated with a product's extraction, transportation, and manufacture.




**ENVIRONMENTAL IMPACTS**

**Declared Product:**
Mix PN4888 • Quivas Plant
Description: 4,000 Non-Air Entrained
Compressive strength: 4000 PSI at 28 days

**Declared Unit:** 1 $m^3$ of concrete

| | |
|---|---|
| Global Warming Potential (kg $CO_2$-eq) | 457 |
| Ozone Depletion Potential (kg CFC-11-eq) | 1.19E-5 |
| Acidification Potential (kg $SO_2$-eq) | 1.36 |
| Eutrophication Potential (kg N-eq) | 0.55 |
| Photochemical Ozone Creation Potential (kg $O_3$-eq) | 28.0 |
| Abiotic Depletion, non-fossil (kg Sb-eq) | 8.00E-6 |
| Abiotic Depletion, fossil (MJ) | 503 |
| Total Waste Disposed (kg) | 3.76 |
| Consumption of Freshwater ($m^3$) | 0.63 |

**Product Components:** natural aggregate (ASTM C33), Portland cement (ASTM C150), admixture (ASTM C494), batch water (ASTM C1602)

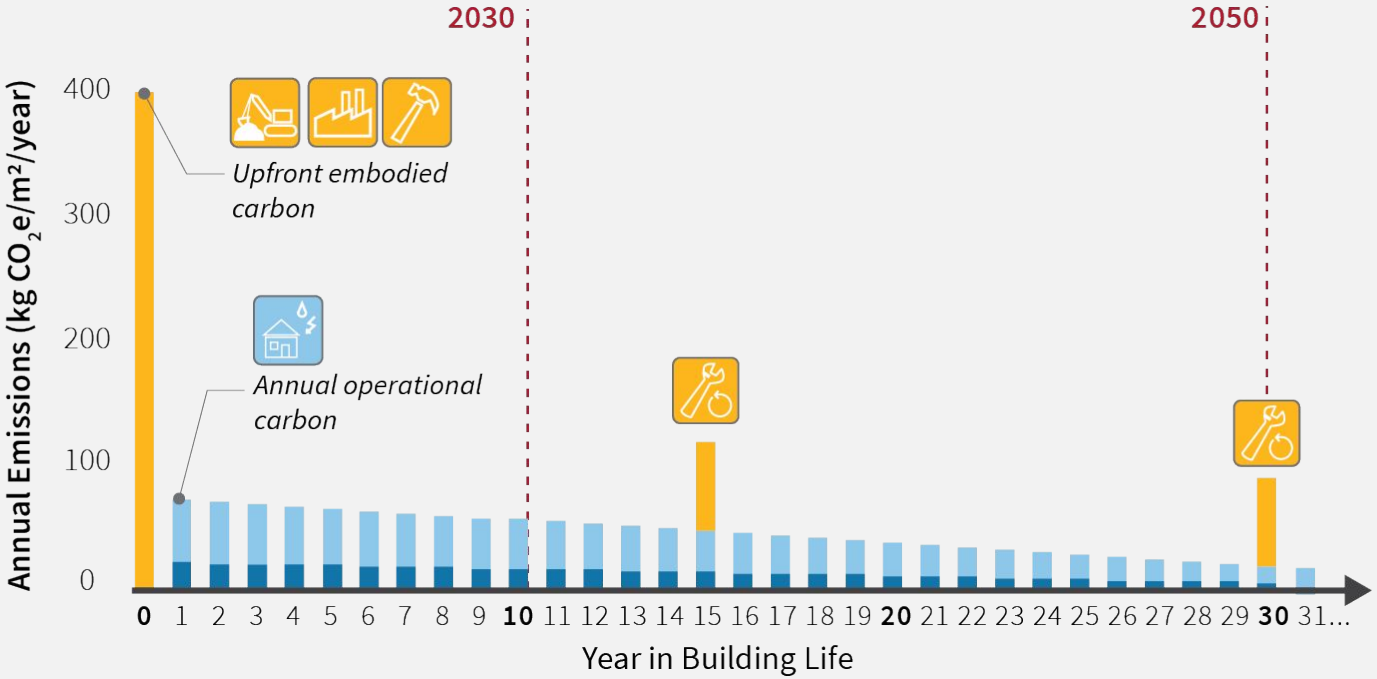
Additional detail and impacts are reported on page three of this EPD

{ Cradle to Gate }

{ Cradle to Grave }

{ Cradle to Cradle }

# Why is Embodied Carbon Important?




Embodied carbon

Scenario 1: Standard performance building

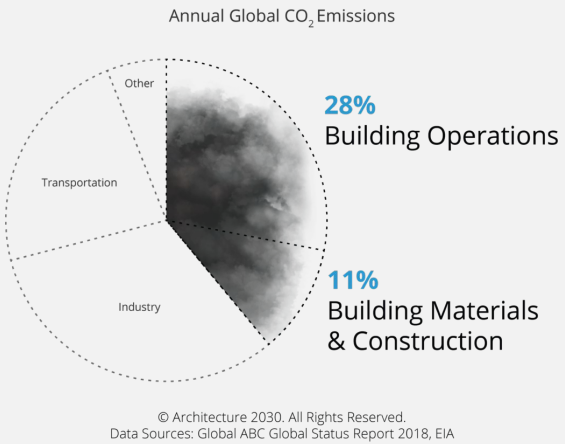
Scenario 2: High-performance building

| | 2030 | 2050 |
|---|---|---|
| EC | 67% | 56% |
| OC | 33% | 44% |

Embodied carbon contributes **more climate-changing emissions than 30 years of operating a** high-performance (e.g. typical new GSA) **building**!

***Image Source:*** *AIA-Carbon Leadership Forum Embodied Carbon Toolkit for Architects, 2021*

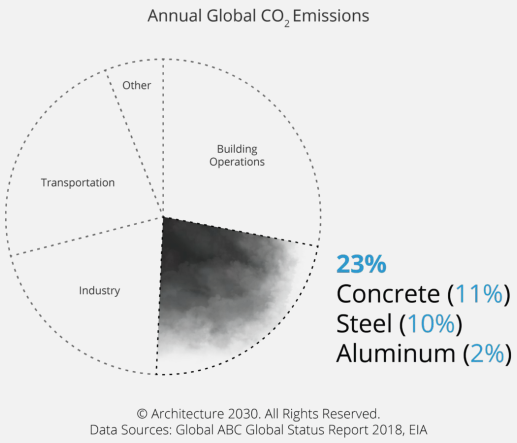
# Why these materials?




*"Buildings generate nearly 40% of annual global $CO_2$ emissions.*

*Of that total, building **operations are responsible for 28%** annually, while building materials and construction (typically referred to as **embodied carbon**) are responsible for an **additional 11%** annually."*

-AIA Architecture 2030




- Concrete is the most widely used building material, with over half a billion tons produced in the U.S. each year.
  - Carbon intensive: limestone needs to be heated to ~2700 degrees F to make clinker for Portland cement.
- And over 90% of U.S. paved roads are asphalt-surfaced, with about 420 million tons of asphalt produced in the U.S. each year.
- These widespread materials present an opportunity to lighten the environmental footprint of GSA's building and paving projects, including along America's northern and southern borders.

# Key excerpts of Executive Order 14057

Executive Order (EO) 14057 *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability* (December 8, 2021) requires Federal government agencies to, among other things:

1. Reduce Scope 1 and 2 **greenhouse gas (GHG) emissions** (onsite combustion and purchased energy) 65% by 2030, compared to a 2008 baseline;

2. Use 100% **carbon pollution-free electricity** on a net annual basis by 2030;

3. Pursue building **electrification** strategies in conjunction with carbon pollution-free energy, efficiency, and space reduction/ consolidation;

4. Design new construction and modernization projects greater than 25,000 GSF to be **net zero ready** (able to achieve net-zero operational emissions) by 2030; and

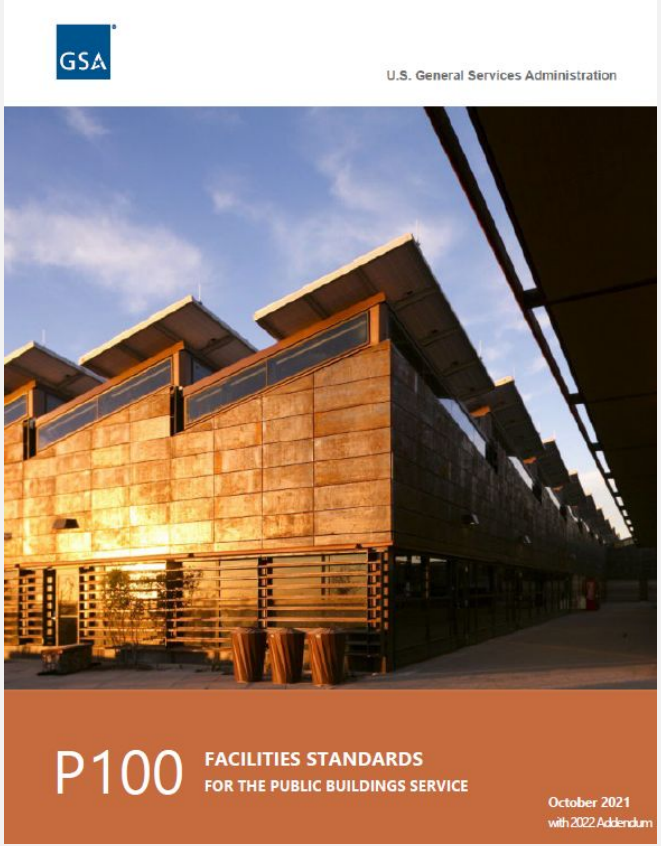
5. Move toward net-zero emissions from Federal procurement, including through a **Buy Clean** policy promoting use of construction materials with lower embodied GHG emissions; and

6. Modernize the federal buildings portfolio to **reach net-zero emissions by 2045**, including a 50 percent reduction in building emissions by 2032.

# 2022 Addendum to GSA's P100 Facilities Standards

- Exceed ASHRAE 90.1-2019 energy efficiency by 30%
- **All-electric space** and water heating operation
- New material sustainability provisions:
  - **Concrete and asphalt** standards
  - **Whole-building life-cycle assessment**
  - ***Buy Clean* requirements for interior finishes** including environmental product declarations
  - EPA SNAP (Significant New Alternatives Policy) "acceptable" **refrigerants**
- Electric vehicle chargers

All GSA projects' design contracts signed 10/1/2022 and later must use this version of the P100. See gsa.gov/p100



# GSA *Buy Clean* Product Standards

## P100 § 1.2.9.10

**Additional environmental product declaration** (EPD) requirements for the following interior finish categories (P100 § 3.4 “Interior Performance Table”):

- All **resilient flooring** categories (vinyl composition tile, sheet vinyl, rubber tile, linoleum, luxury vinyl tile, and wall base);
- broadloom **carpet** and carpet tile;
- acoustical **ceiling tile**;
- **gypsum** board; and
- **porcelain** tile.

**ENVIRONMENTAL IMPACTS**

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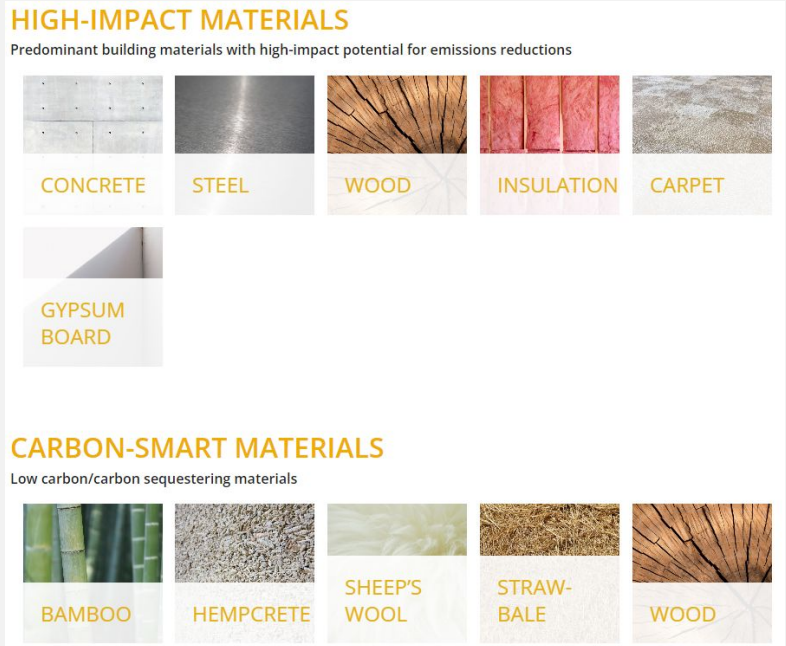



*Image is from Architecture 2030's [Carbon Smart Materials Palette]*

# GSA's New Concrete and Asphalt Standards

## P100 §§ 4.8.5 and 4.8.6

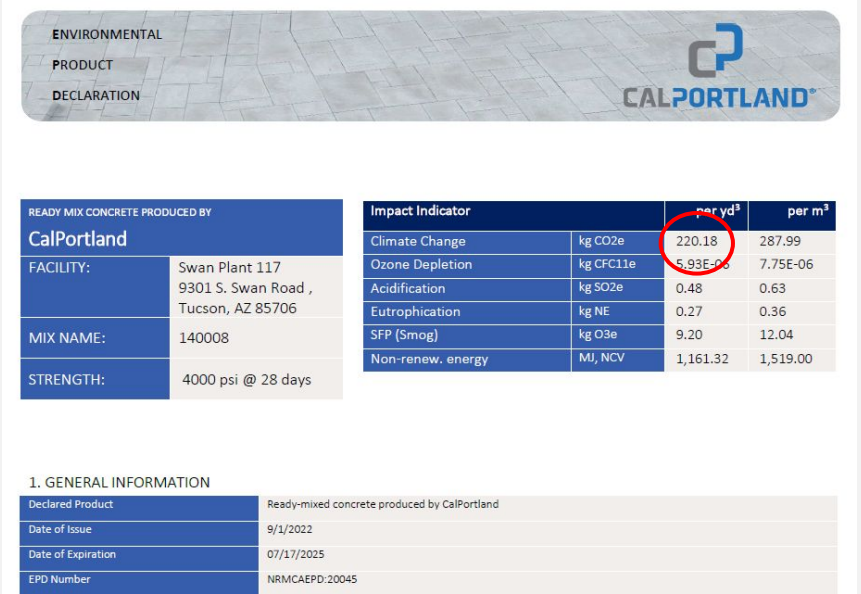
- Our national performance-based standards were announced in March 2022. They're posted at gsa.gov/p100
- Apply to **all GSA projects that use at least ten (10) cubic yards of a mix**, e.g. more than one truck full
- GSA's concrete and asphalt standards were informed by input received from over 130 replies to our February 2022 requests for information. Most respondents said environmentally-preferable material costs the same or less
- Where compliant material is available, GSA projects have met the new standards without schedule or workability issues -- nor any additional costs to taxpayers
- A **waiver process** exists where no material with an EPD is available, or GSA's concrete global warming potential limits can't be met

| | Maximum Global Warming Potential Limits for GSA Low Embodied Carbon Concrete (kilograms of carbon dioxide equivalent per cubic meter - $CO_2e$ kg/m³) | | |
|---|---|---|---|
| Specified compressive strength (f'c in PSI) | Standard Mix | High Early Strength | Lightweight |
| up to 2499 | 242 | 314 | 462 |
| 2500-3499 | 306 | 398 | 462 |
| 3500-4499 | 346 | 450 | 501 |
| 4500-5499 | 385 | 500 | 540 |
| 5500-6499 | 404 | 526 | N/A |
| 6500 and up | 414 | 524 | N/A |

These numbers reflect a 20% reduction from GWP ($CO_2e$) limits in proposed code language: "Lifecycle GHG Impacts in Building Codes" by the New Buildings Institute, January 2022.

# How to Comply

- Concrete: Obtain environmental product declaration(s) where possible. Ensure global warming potential is within GSA's limits.
- Asphalt: Obtain EPD(s) where possible. Identify which two or more of the practices on the standard's qualitative menu of options are being used, and whether an EPD is available.
- Our project managers and/or prime contractors submit mix designs, volumes, EPDs, etc. to central office for logging and approval
    - Building a baseline of our materials' GWPs, even where no EPD is available.



ENVIRONMENTAL
PRODUCT
DECLARATION

CALPORTLAND®

| READY MIX CONCRETE PRODUCED BY | |
|---|---|
| CalPortland | |
| FACILITY: | Swan Plant 117<br>9301 S. Swan Road ,<br>Tucson, AZ 85706 |
| MIX NAME: | 140008 |
| STRENGTH: | 4000 psi @ 28 days |

| Impact Indicator | | per yd³ | per m³ |
|---|---|---|---|
| Climate Change | kg CO2e | 220.18 | 287.99 |
| Ozone Depletion | kg CFC11e | 5.93E-06 | 7.75E-06 |
| Acidification | kg SO2e | 0.48 | 0.63 |
| Eutrophication | kg NE | 0.27 | 0.36 |
| SFP (Smog) | kg O3e | 9.20 | 12.04 |
| Non-renew. energy | MJ, NCV | 1,161.32 | 1,519.00 |

1. GENERAL INFORMATION

| | |
|---|---|
| Declared Product | Ready-mixed concrete produced by CalPortland |
| Date of Issue | 9/1/2022 |
| Date of Expiration | 07/17/2025 |
| EPD Number | NRMCAEPD:20045 |

**Proposed Mix Designs**

Proposed - Total Volume of Concrete in the Building

| | Weight (lbs) | Acidification Potential (kgSO2eq) | Eutrophication Potential (kgNeq) | Global Warming Potential (kgCO2eq) | Ozone Depletion Potential (CFC-11eq) | Smog Formation Potential (kgO3eq) | Non-renewable Energy Demand (MJ) | |
|---|---|---|---|---|---|---|---|---|
| Impact of All Concrete | | 72 | 6 | 33098 | 0.0000 | 1569 | 245598 | |
| Total CY of All Concrete in Building | 124 CY | | | | | | | |

Proposed Mix - Slabs - 4000 psi NRMCA - FA

| | | |
|---|---|---|
| Application | Slabs | |
| Mix Design #/Name | FA | |
| Strength (psi) | 4000 psi NRMCA | |
| Total CY of Mix in Building | 40 | cubic yard |
| SCM Ratio (of SCM+Cement) | 17.4 | % |
| % SCM (of Total Mix) | 3.2 | % |
| % Cement (of Total Mix) | 15.0 | % |

| | Mix Design Weight per 1 CY of Mix (lbs) | Acidification Potential (kgSO2eq) | Eutrophication Potential (kgNeq) | Global Warming Potential (kgCO2eq) | Ozone Depletion Potential (CFC-11eq) | Smog Formation Potential (kgO3eq) | Non-renewable Energy Demand (MJ) | kg/m3 |
|---|---|---|---|---|---|---|---|---|
| Cement | 559 | 0.56 | 0.04 | 256.09 | 0.0000 | 11.89 | 1594.88 | 331.64 |
| Fly ash | 118 | 0.02 | 0.00 | 10.76 | 0.0000 | 0.35 | 109.72 | 70.01 |
| Slag | 0 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.00 | 0.00 | 0.00 |
| Coarse Aggregate | 1,496 | 0.01 | 0.00 | 1.47 | 0.0000 | 0.26 | 22.53 | 887.54 |
| Lightweight Aggregate | 0 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.00 | 0.00 | 0.00 |
| Fine Aggregate (Sand) | 1,274 | 0.05 | 0.00 | 25.02 | 0.0000 | 1.35 | 410.87 | 755.83 |
| Water | 292 | 0.00 | 0.00 | 0.04 | 0.0000 | 0.00 | 0.34 | 173.24 |
| Steel Reinforcement | 0 | 0.00 | 0.00 | 0.00 | 0.0000 | 0.00 | 0.00 | 0.00 |
| Air Content | 5 | | | | | | | |
| Per 1 CY of MIX | 3739 | 0.64 | 0.06 | 293.40 | 0.0000 | 13.85 | 2138.34 | 2218 |
| Total Impact | 149560 | 25 | 2 | 11734 | 0.0000 | 554 | 85534 | 88730 |

Scroll down to add more mix designs

# What if no EPD is available in the area?

1) Double-check.
   a) For concrete, GSA created a map showing concrete plants with EPDs published on EC3, plus our agency's Bipartisan Infrastructure Law construction/ modernization and paving projects
   b) For asphalt, asphaltepd.org lists published EPDs by state and company

2) Ask the subcontractor if they can develop an EPD

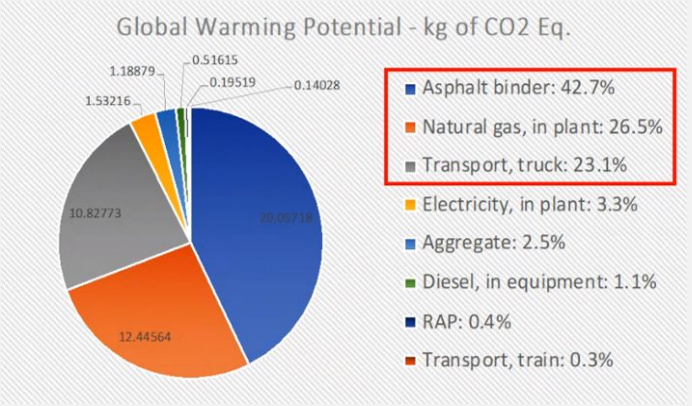
3) If all else fails, submit a P100 waiver request. Include the mix's global warming potential as estimated with a tool like FHWA's LCA Pave Tool or Athena Pavement LCA.


Athena Pavement LCA

# Initial Experience (asphalt)

- Lukeville, AZ (press release) - PM Steven Jeffers
  - *“Lukeville Land Port of Entry had already solicited proposals via Region 9's IDIQ when GSA's new standard took effect in late March.*
  - *The contractor reached out to their subcontractor and **made a modification to their means and methods in order to accommodate this change at no additional cost**.*
  - *The project was completed ahead of schedule with great satisfaction from all stakeholders.”*
  - *U.S. Small Business Administration “8a” (small disadvantaged business) vendor*

- Denver Federal Center Roads and Grounds - PM Mike Golenda, RCA Jason Sielcken
  - *“This project was also underway when GSA’s standards came out in Spring 2022. Rather than taking the waiver route, Mike worked with his General Contractor and supplier to find out what was entailed in obtaining an EPD, and if an EPD could be received in a time-frame that would not impact the project's schedule. As a result, Mike and his team **obtained an EPD in a little over a month.**” - GSA Region 8 internal newsletter story “PBS Region 8 Doesn’t Take the Easy Road and It Pays Off”*



# Initial Experience (asphalt)

- R2 paving projects (Champlain, Massena, Fort Covington, Chateaugay, Overton Corners, and Mooers) - (press release) - PM/ SME Tom Lucas
  - *No cost impact. Simply included the mid-March 2022 version of GSA's asphalt standard in our RFP. New York state DOT only allows a maximum of 20% reclaimed asphalt pavement content, whereas GSA's standard calls for at least 21%. So the vendor was able to slightly increase the amount of reclaimed content in base layer mixes.*

  - *Also used improved **plant efficiency** (natural gas), and milling and removing existing asphalt to be reclaimed and reused at other sites*

# Initial Experience (concrete)

- Deconcini Courthouse ABBAS Access Ramps - PM James Broscheid
  - *“We included the concrete standard in the award package as the project went out for solicitation prior to the new standard being rolled out.*
  - ***The new concrete standard has had a negligible impact on material cost,*** *as CalPortland is already configured for this standard (1 of 2 suppliers in the Tucson area I believe). It would be interesting to compile cost data throughout R9 for comparison purposes.*
  - *As far as implementation of the standard for this application, it was ultimately the flexibility of the GSA Contracting Team and the contractor that we were able to ‘roll with the punches’ on this project!”*

# Ways to reduce concrete's carbon footprint

1. Consider the design strength and curing time of concrete mixes to optimize the amount of portland cement needed to meet the design's specifications. Longer curing times help reduce GWP.

2. Use a whole-building approach to "right-size" the design of buildings to use less concrete, and maximize structural efficiency.

3. Use blended cements, such as "portland-limestone cement" (PLC, or "Type 1L" cement) instead of conventional portland cement to reduce concrete's carbon footprint by about 10%.

4. Reduce the amount of portland cement in the concrete by using supplementary cementitious materials (SCMs) such as fly ash, slag, and pozzolans from natural sources or recycled glass.

5. Use admixtures, e.g. carbon nanotube-infused concrete mixtures.

6. Reduce the clinker content of cement, e.g. through "carbon mineralized concrete" that uses impounded CO2 to enhance strength and durability, or biocement that replaces a traditional kiln with bacteria in a bioreactor to make cement.

7. Use locally sourced components such as aggregates to reduce transportation emissions.

8. Select concrete from a plant with an Energy Performance Indicator (EPI) and that meets the ENERGY STAR benchmark for industrial plant energy performance.

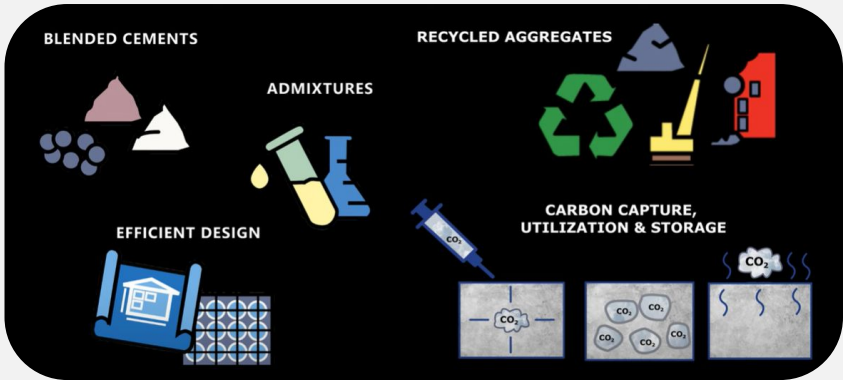



*Image credit: Girl Scout Troops #1477 & #1952 from Wisconsin*

# Whole Building Life Cycle Assessment Approach for Large Projects

## P100 § 1.9.2.9

Project teams should give careful consideration to the use of high embodied carbon items like concrete and steel. Consider alternate lower embodied carbon materials such as biobased materials like wood. See the Carbon Smart Materials Palette.

GSA's Whole-Building Embodied Carbon Reduction measure requires our new construction and major modernization projects to:

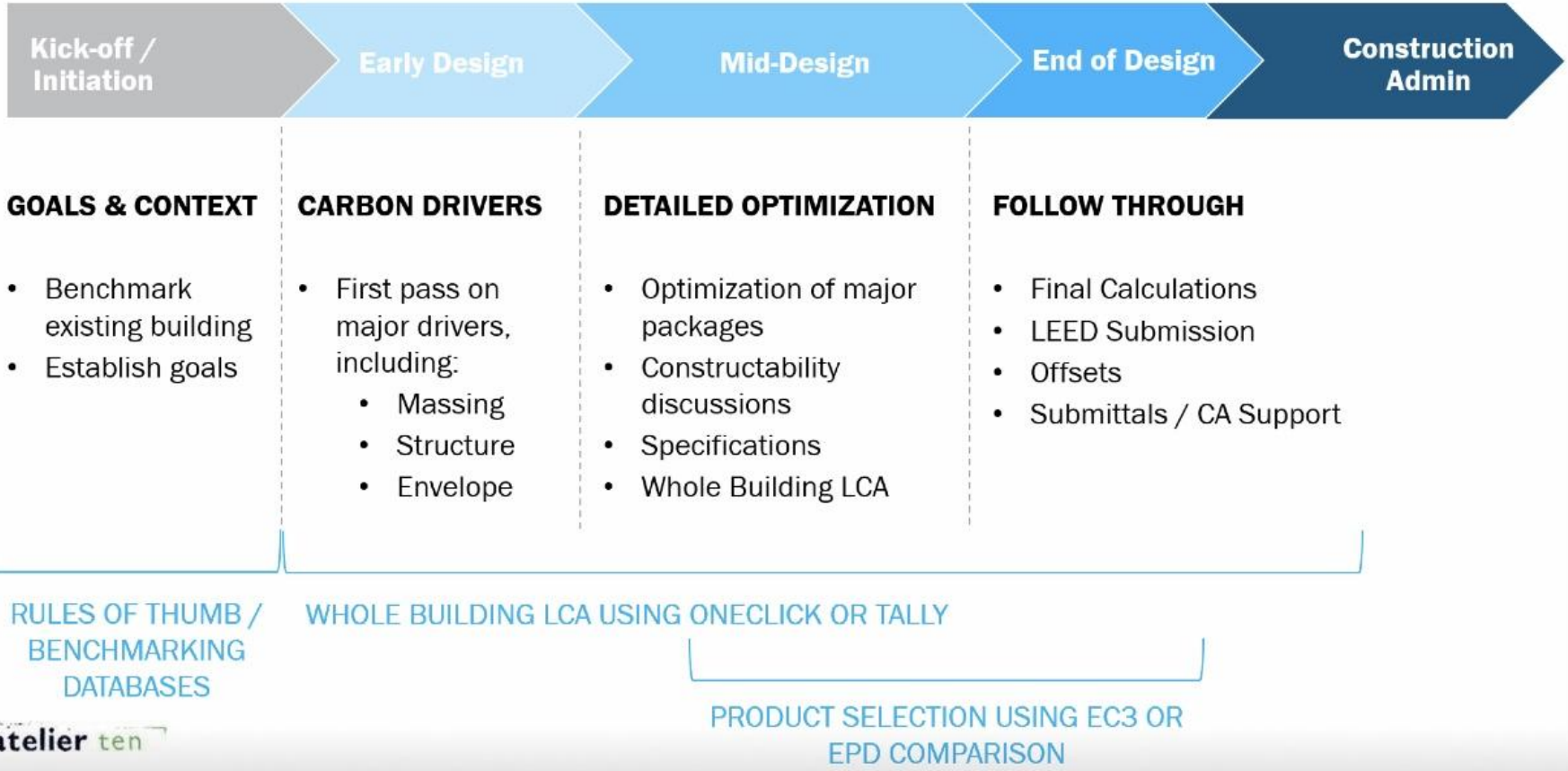
1. **Target a 20% reduction in the project's whole-building embodied carbon from materials,** compared to an equivalent conventional building project, using a GSA-approved estimation tool; and

2. Earn at least one **Building Life-Cycle Impact Reduction** **LEED BD+C: New Construction point**, using *whole-building life-cycle assessment* to conduct cradle-to-grave life-cycle assessment of structure and enclosure.






# Embodied Carbon Reduction: Design Process for New Construction

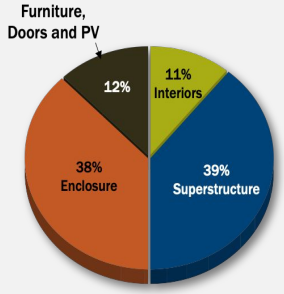



atelier ten

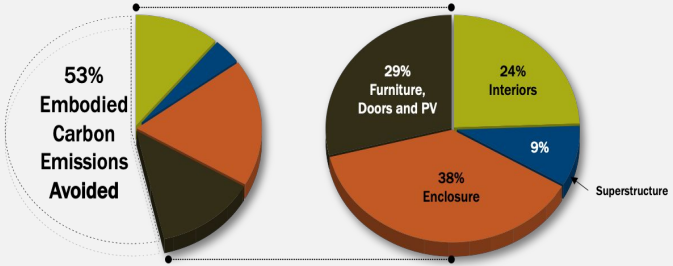
# Baselining Embodied Carbon

A project manager who attended GSA's June 2021 Embodied Carbon Roundtable has incorporated both core Green Building Advisory Committee Policy Recommendations for Procurement of Low Embodied Energy and Carbon Materials by Federal Agencies into three pilot projects now underway:

- Building Modernization - Adaptive Reuse
- Building Renovation - Historic Preservation
- New Construction

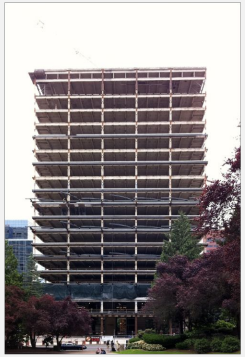



New Replacement Building




Edith Green-Wendell Wyatt As Built

Existing 1974 Building – April 2009

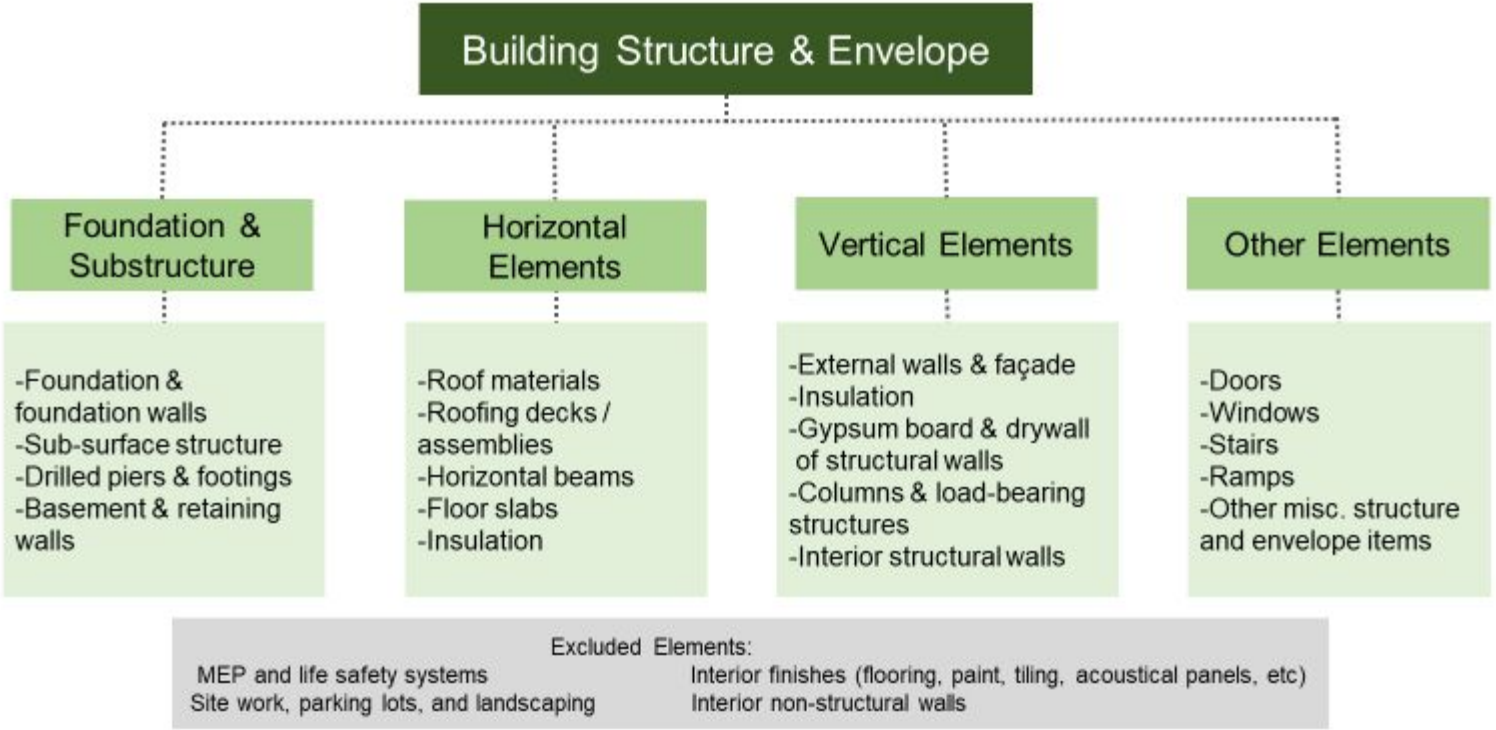


Demolition Complete – June 2011

(Re)Construction Complete - 2013

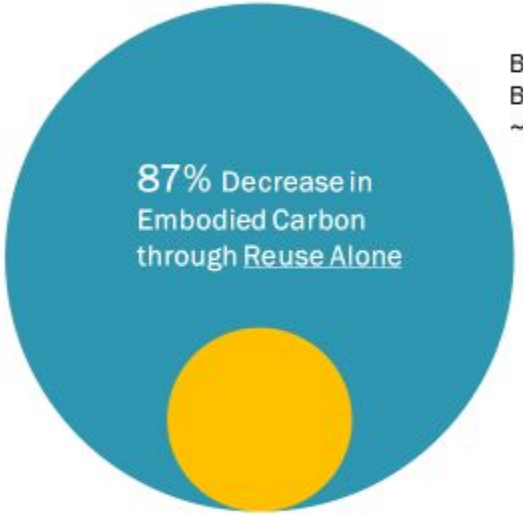
# Denver Federal Center Building 48: Adaptive Reuse Case Study

## Included Building Elements



# Denver Federal Center Building 48: Adaptive Reuse Case Study

## B48 Embodied Carbon Reduction




Baseline Brand New Building
**~19.7 million kg CO2e**

Adaptive Reuse Design
**~2.6 million kg CO2e**

The carbon savings from Building 48's adaptive reuse are equivalent to approximately:

- **43 million miles** driven by an average gasoline powered passenger vehicle
- **3,300** homes' electricity use for 1 year
- **116 acres** of U.S. forests saved from conversion to cropland

*Source: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator*

This does not account for any improvements from material selection – both design and baseline used industry standard materials. This is the savings simply from using materials that were already there!

# Denver Federal Center Building 48: Adaptive Reuse Case Study

## Lessons Learned


### Advanced Planning is Key

- Identify embodied carbon analysis as a goal early in design
  - Opportunity to incorporate advanced design ideas, such as adaptive reuse and novel material use
  - Evaluate different structure options (steel vs. concrete vs. wood)
  - Allows design team to plan for details in Revit models
- Consider local market opportunities and limitations when setting goals around material selection
  - Do local manufacturers provide good options for meeting embodied carbon product goals? Do they have the necessary documentation?

### Adaptive Reuse is a Universal Win

- Reusing the structure and enclosure of a building is the universally best option to reduce the embodied carbon of a building – the impact is not tied to local manufacturer options
- Design and construction team buy-in is critical for success for adaptive reuse to be successful
- Building operations staff will also be critical to ensure that reused (and new) materials are properly maintained to minimize the necessity for repair and replacement

# Moss SLC Courthouse: Adaptive Reuse Case Study

The Moss Renovation indicates an overall 57% reduction of embodied carbon of structure, enclosure and interior build out as compared to constructing a New Replacement Building. The structure and enclosure alone indicate a reduction of 64%, however it is marginally offset by the increase of 20% in the Moss Renovation interior GWP compared to the New Replacement Building.

| | GWP kgCO2e | | |
|---|---|---|---|
| | **Structure and Enclosure** | **Interiors** | **Total** |
| **Moss Renovation** | 3,611,798 | 1,184,022 | 4,795,820 |
| **New Replacement Building** | 10,063,176 | 989,607 | 11,052,783 |
| **multiple** | 2.8 | 0.8 | 2.3 |
| **% decrease ("-" = increase)** | 64% | -20% | 57% |

*Table 3: GWP kgCO2e results*

In terms of carbon sequestration, renovating Moss Courthouse has a savings of embodying the same amount of carbon (6,256,963 kgCO2e) as it takes 7,405 acres of US forest to sequester in one year's time. This is equivalent to 5,610 football fields of forest.

The results from this study confirm that the reuse of an existing structure like the Frank E Moss Courthouse saves embodied carbon, and thus is often the more sustainable option than constructing a new replacement building.

To reduce embodied carbon on a project the most direct strategy is to reduce the amount of new material being generated. As is evident by the Moss Renovation, there is approximately 81% less total mass (see table below) of new structural and enclosure material being generated which yields approximately 64% less embodied carbon, as seen in Table 3 above.

*Material breakdown*

Of the structure and enclosure materials, concrete and metals are the largest contributing resource types to the overall GWP. From Figure 7.3 below it can be seen that of the concrete it is the shotcrete that has the greatest impact, and from the metals it is the rebar, structural steel, and aluminium.

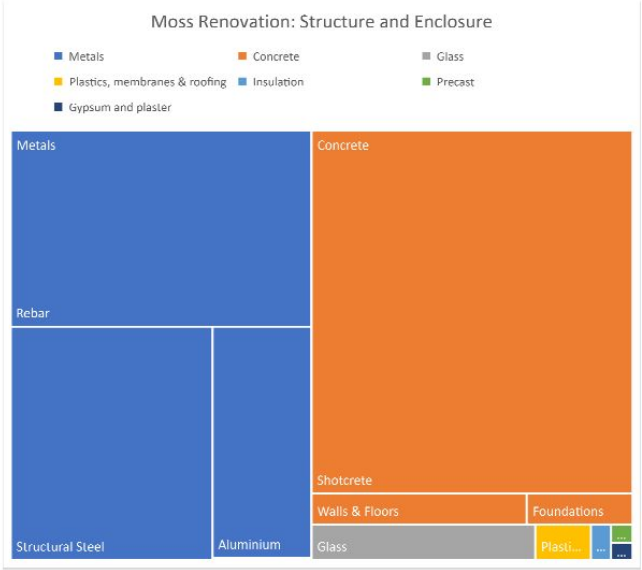



*Figure 7.3 Moss Renovation material breakdown*

The following Table 1 show the top 5 contributing materials and the associated use:

| **Material** | **% of the A1-A3** | **Usage** |
|---|---|---|
| Shotcrete | 42% | strengthening of exisiting walls |
| Reinforcement | 23% | reinforcement of concrete elements |
| HSS steel framing | 14% | structural framing |
| Aluminum extrusions | 9% | enclosure |
| Hot-roll structural steel | 4% | structural framing |

*Table 1: Top 5 most contributing material to GWP*

# Buy Clean Request for Information

- GSA's Federal Buy Clean RFI on Construction Materials with Substantially Lower Embodied Carbon closed last night.
- Gathered manufacturer insights on the **availability, cost, durability**, documentation etc. on a wide variety of building materials. Asked whether respondents were small/disadvantaged businesses, "made in America" etc.
- Contact Walter and Don at embodiedcarbon@gsa.gov to help inform Buy Clean actions
- Sought info on:
  1. **Concrete**, including pre-fabricated products
  2. **Steel**, including structural and rebar
  3. Flat **glass**, including window assemblies
  4. **Asphalt**
  5. **Aluminum**, including curtain walls and storefronts
  6. **Insulation**, including enclosure, equipment, piping, and acoustical
  7. **Roofing** materials
  8. **Gypsum** board
  9. Structural **engineered wood**, including mass timber and cross-laminated timber

NAIMA
NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION

November 1, 2022

General Services Administration
Acquisition Services Division
1800 F Street NW
Washington, DC 20405

RE: Federal Buy Clean Request for Information

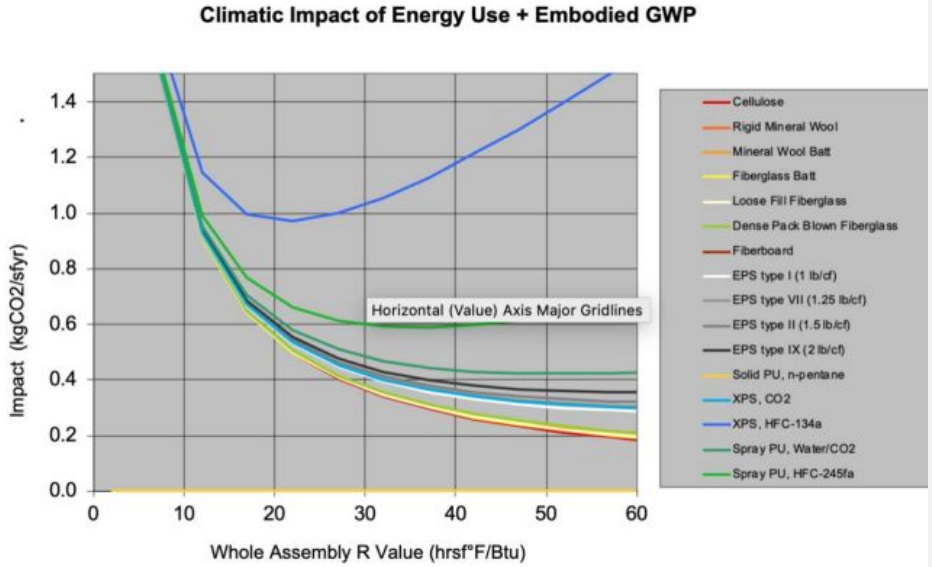
To Whom It May Concern:

The North American Insulation Manufacturers Association ("NAIMA") submits the following comments in response to the General Service Administration's request for information on low global warming potential (GWP) building materials. NAIMA is the trade association for the North American manufacturers of fiber glass and rock and slag wool insulation products.

**Do you currently offer construction materials or products that are substantially -- and demonstrably -- lower in embodied carbon, compared to industry averages for similar materials or products?**

Insulation is unique among building materials and products in that its primary purpose is to lower building energy use. The reduction of building energy also delivers significant reductions in air pollutants, including greenhouse gases. A study commissioned by the Alliance to Save Energy calculated that fiber glass and mineral wool insulation save more than twelve times the energy used in its manufacture in the first year of installation. Over its lifetime, these insulation products save hundreds of times more than the energy used in their manufacture. *("Green and Competitive - The Energy, Environmental, and Economic Benefits of Fiber Glass and Mineral Wool Insulation Products" by Energy Conservation Management, Inc., Alliance to Save Energy, and Barakat & Chamberlin, Inc.).* The energy savings and resulting carbon savings during insulation's use phase should be given proper recognition in all federal regulatory tools guiding low carbon construction and material selection.

There are many types of insulation materials. Cellulose, expanded polystyrene (EPS), extruded polystyrene (XPS), fiber glass, mineral wool, polyisocyanurate and spray foam insulation are the insulation products that are widely commercially available. Extruded polystyrene and closed cell spray foam insulation products historically contained hydrofluorocarbon (HFC) blowing agents with high global warming potential but are rapidly phasing out their use. Other insulation products do not contain HFC blowing agents and have low global warming potential. Fiber glass insulation, manufactured with up to 50 percent recycled glass cullet, has a low global warming potential compared to industry averages for similar materials. Mineral wool, manufactured with 75 to 90 percent recycled slag, also has a low global warming potential. Fiber glass and mineral wool products rank among the lowest impact insulation materials commercially available. The chart below displays that even with the addition of more insulation R-value (x-axis), the reduction in operational carbon outpaces the increase in embodied carbon for all major insulation types (a particular type of XPS-excepted).




Given the generally small variance in GWP between most insulation materials, inconsequential contribution to building embodied carbon, and significant use phase contributions to operational carbon reductions, we believe Buy Clean regulation should require insulation product Environmental Product Declarations (EPDs) only for the purpose of transparency. Buy Clean regulation should not set maximum GWP thresholds for insulation products. This allows the marketplace to determine the best fit for specific construction projects.

**What, if any, are the technical, economic, or regulatory obstacles to reducing the embodied carbon of more of your materials or products?**

While selecting a building material with lower global warming potential relative to competitor products may be possible in many applications, life safety considerations should not be compromised. In addition to having a low global warming potential compared to many other insulation material types, mineral wool insulation is noncombustible, which is particularly important in high-rise construction. It is commonly used as firestopping material and wall and floor assemblies with high fire resistance ratings. Fiber glass insulation also does not contribute to flame spread and is commonly used in wall and floor assemblies meeting stringent fire resistance ratings.

LAND PORTS OF ENTRY PROGRAM

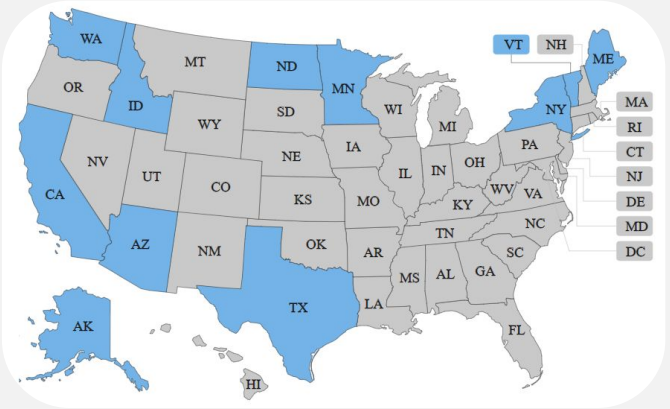
# Bipartisan Infrastructure Law


- BIL appropriates $3.4B to GSA to modernize land ports of entry. Enacted 11/15/2021
  - The law's four major focuses: **transportation**; **climate**/ energy/ environment; **broadband** internet; and environmental **remediation**

- GSA has begun work at several of our **26 BIL projects in 11 states**
  - Some projects are already done. (Pictured: Lukeville Arizona port of entry)

- **Sustainability Achievement Plans** help ensure P100 and EO requirements are included in GSA's BIL requests for proposal, so that our designers pursue GSA's key sustainability goals. One of several project sustainability checkpoints

- GSA's six BIL objectives:
  1. Support a **secure** and well-managed border
  2. Facilitate **trade** and mitigate future supply chain challenges
  3. Create **jobs** and grow the economy
  4. Improve the **human experience**
  5. Strengthen community **livability** and advance community goals
  6. Become a model for **sustainability** and innovation



# Inflation Reduction Act

- IRA appropriates $3.375B to GSA. Enacted 8/16/2022
  - $2.15B of GSA's IRA funding is for **construction materials with "substantially lower levels of embodied greenhouse gas emissions"** as determined by EPA
  - $975M for "**emerging and sustainable technologies**, and related sustainability and environmental programs" and
  - $250M for "measures necessary to convert [GSA] facilities to **high-performance green buildings**"

- GSA is working with White House Executive Office of the President, EPA, OMB, and CEQ to **determine eligible materials and a selection/ qualification approach**. Starting to carefully **select projects**.
  - We're estimating how much of projects' costs may align with eligible low carbon material
  - One potential idea: material-agnostic approach where a product-specific EPD's global warming potential is compared to a regional industry average EPD for that same product type.

- GSA IRA Vision: Successfully deploy low embodied carbon materials and emerging sustainable technologies to strategically **transition the Federal portfolio to net zero emissions**.

- GSA's four IRA objectives:
  - Reduce Harmful **Emissions**
  - Create Good-Paying **Jobs**
  - Catalyze American **Innovation**
  - Improve **Efficiency** And Reduce Long-Term Costs

- We hope to use IRA funding to sustainably address crucial repair and alteration needs on important public buildings while "supercharging" existing projects with lower-carbon materials

# Discussion

**NAIMA members' actions, concerns, comments**

walter.tersch@gsa.gov

donald.horn@gsa.gov