Green Building: Sourcing Low-Carbon Materials

Green Purchasing Roundtable

November 18, 2025

Welcome! Introduce Yourself

- **Rename yourself in Zoom**
  (name + company name)

- **If you haven't filled out the survey,**
  please do so while we gather

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SUSTAINABILITY
Local Action, Global Impact.

Agenda

- *Welcome and Housekeeping*
- ***Presentation:***
  Low-Carbon Building Materials
- ***Q&A***
- ***Questions for the group***
- *Resource Reminders and Links*
- *Evaluations and Close*

Photo credit Jeffrey Robb, Pexels

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Introducing Our Presenters

Karen Cook

Alameda County
General Services Agency

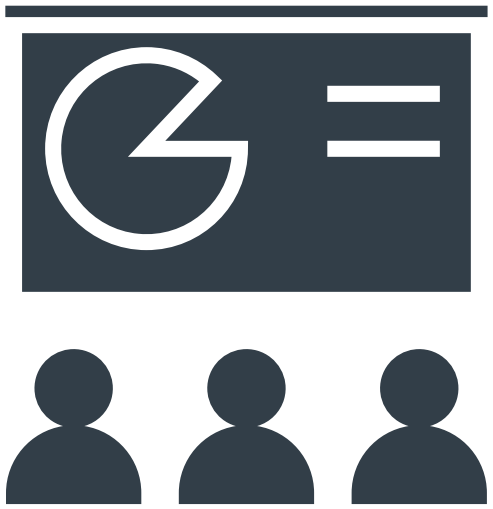
Frances Yang

Arup

Spencer Schrandt

Arup

Housekeeping



- **Participate!**
- **Use the “raise hand” feature or chat to ask or answer questions**
- Feel free to enable video
- Stay on mute if not speaking
- We will record and the recording will be shared
- Change Zoom name to: Name – Business Name

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We Will Share Links to Resources

- DRAFT Specifications for Low-Carbon Building Materials
- Recording
- Slides
- We will send to email addresses of those registered for the meeting today

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Project Partners

Plan, build, and maintain County facilities	Project consultant	Project funder

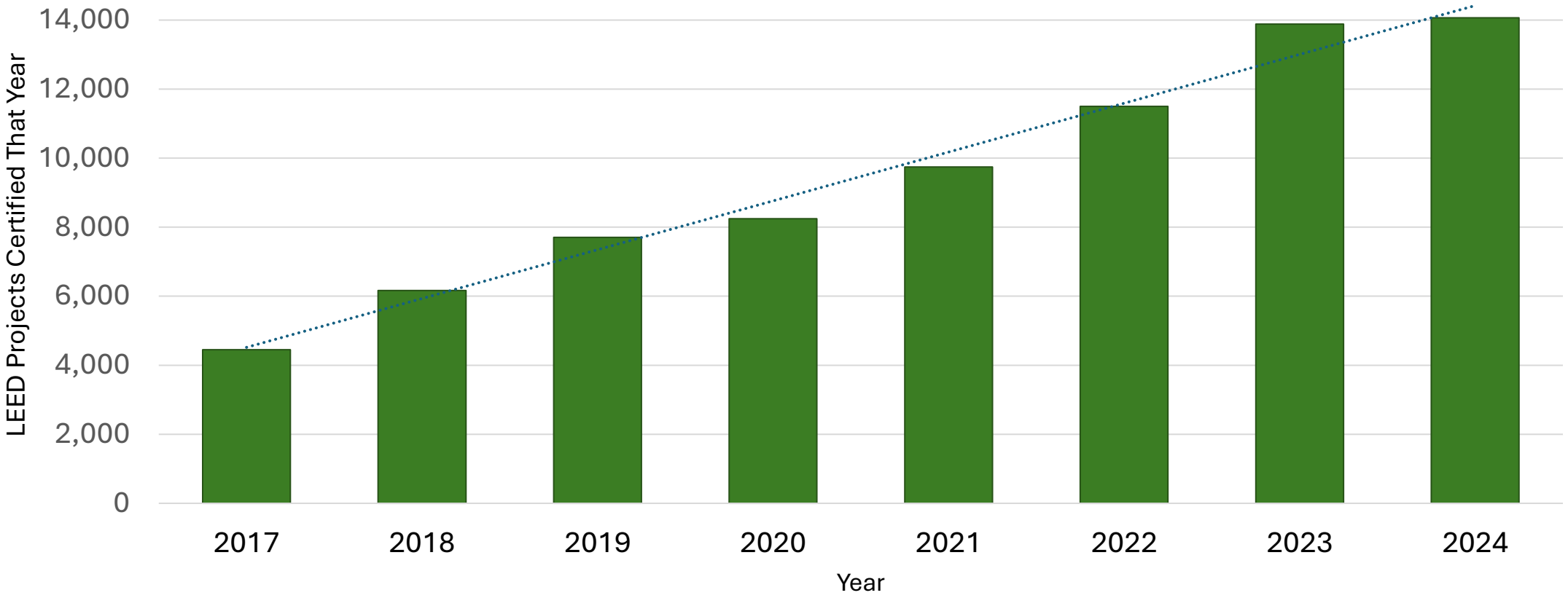
Green Building and Carbon Footprint Overview

Green Building: What and Why

- A green building is a structure designed and built to be environmentally responsible and resource-efficient throughout its entire life cycle, from siting to deconstruction.

The focus of green building has changed over time…

LEED Project Certifications Increasing Each Year



KRON4

Livermore temperatures smash records during Labor Day heat wave

by: Tori Gaines
Posted: Sep 5, 2022 / 07:31 PM PDT
Updated: Sep 6, 2022 / 09:47 PM PDT

The Mercury News

Record high of 116 degrees in Livermore, Travis Air Force Base hits 117 as power outages remain a threat

Slight cool-down coming Wednesday, with chance of rain over the weekend, experts say

REUTERS®

4 minute read · March 22, 2023 4:44 PM PDT · Last Updated a month ago

Storm-weary California lashed with 12th 'atmospheric river' cloudbursts

« Back | Title: Winter Storms Advisory

2023-01-04 14:30:52 PST

This is an AC Alert from Alameda County. Due to the storms, saturated soils and current runoff, the County of Alameda highly recommends you leave your residence if you live on Kilkare Road, Palomares Road, and on Niles Canyon Road in advance of these storms.

Climate change impacts are harming our community, especially the most vulnerable.

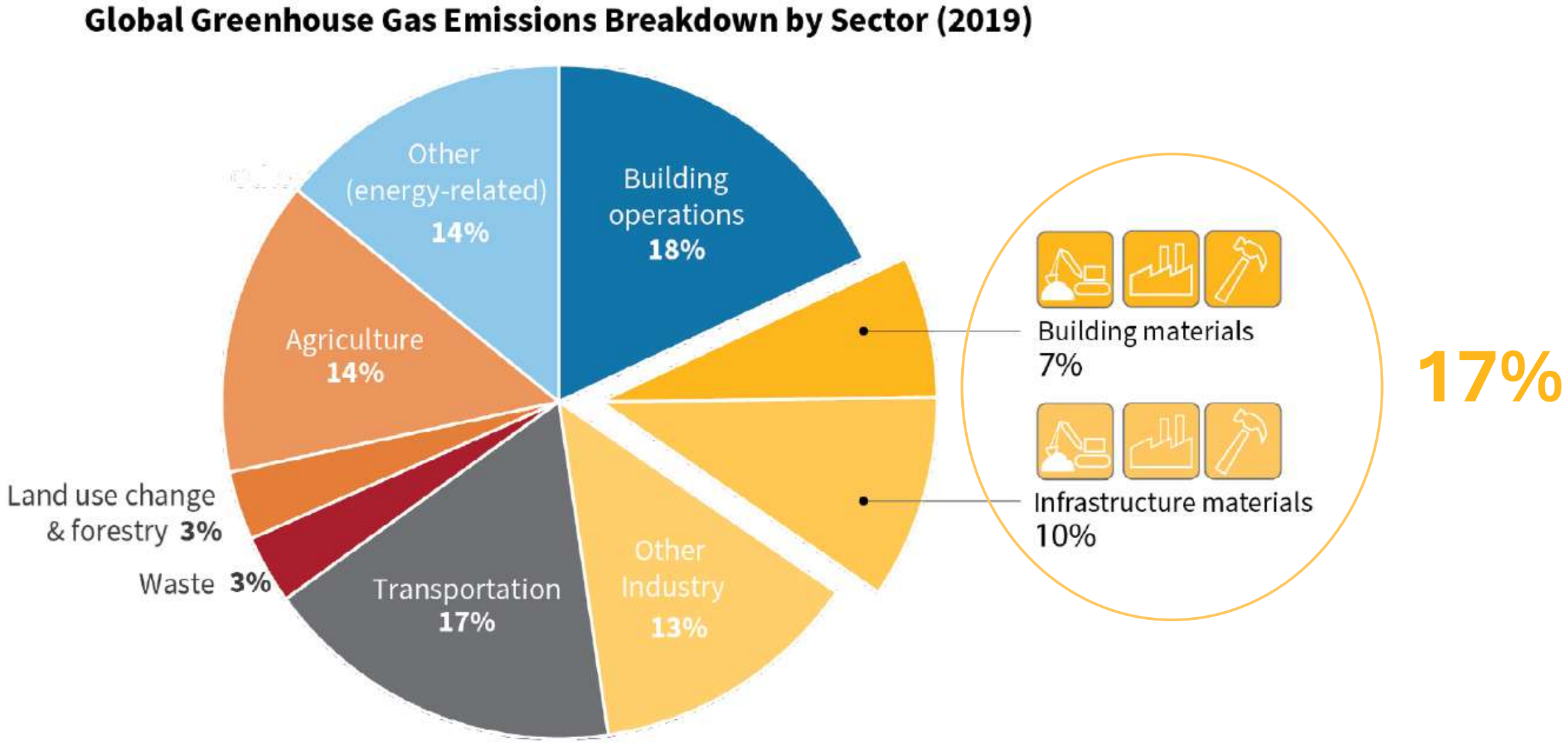


Figure 2. Global end-use greenhouse gas emissions breakdown by sector in 2019. Emissions from building and infrastructure materials comprise 17% of global greenhouse gas emissions.

CLF Carbon Leadership Forum

Reducing Embodied Carbon

1. Low-Carbon Materials
2. Reuse Materials
   - Onsite (deconstruction)
   - Offsite sources

Carbon Leadership Forum

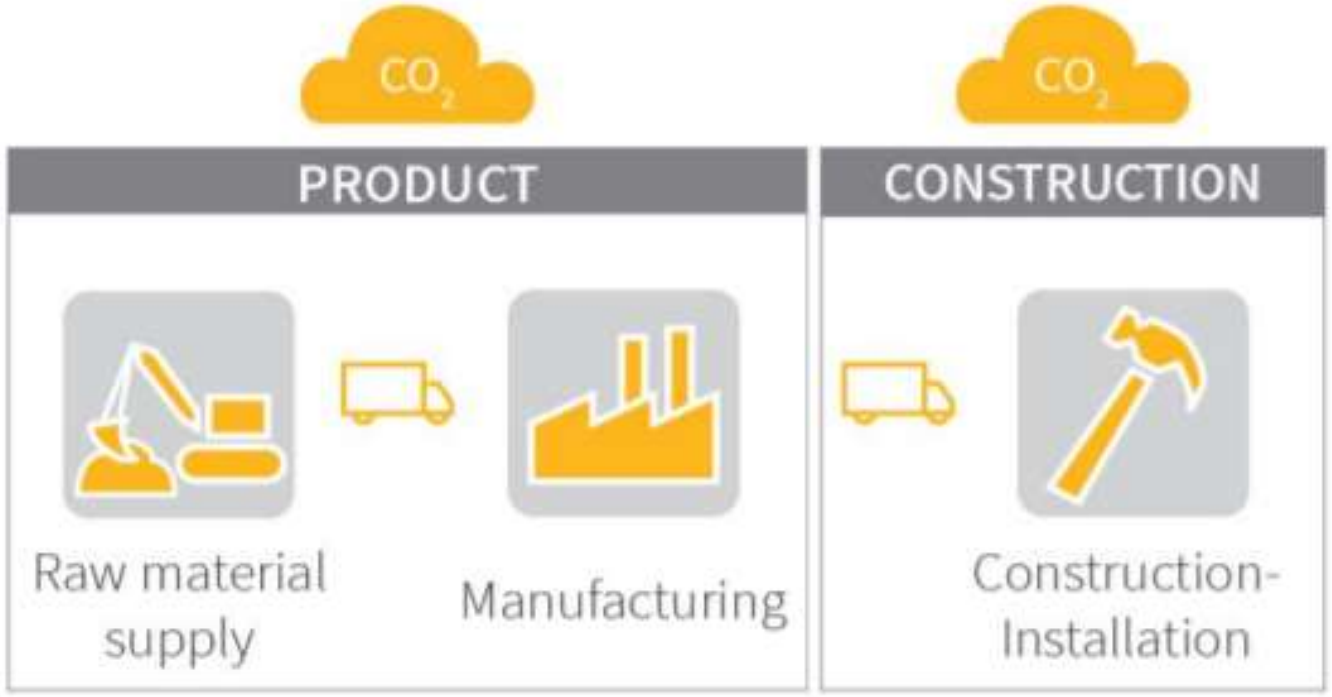
Low-Carbon Materials Performance Specification

Materials and Quantity Minimums

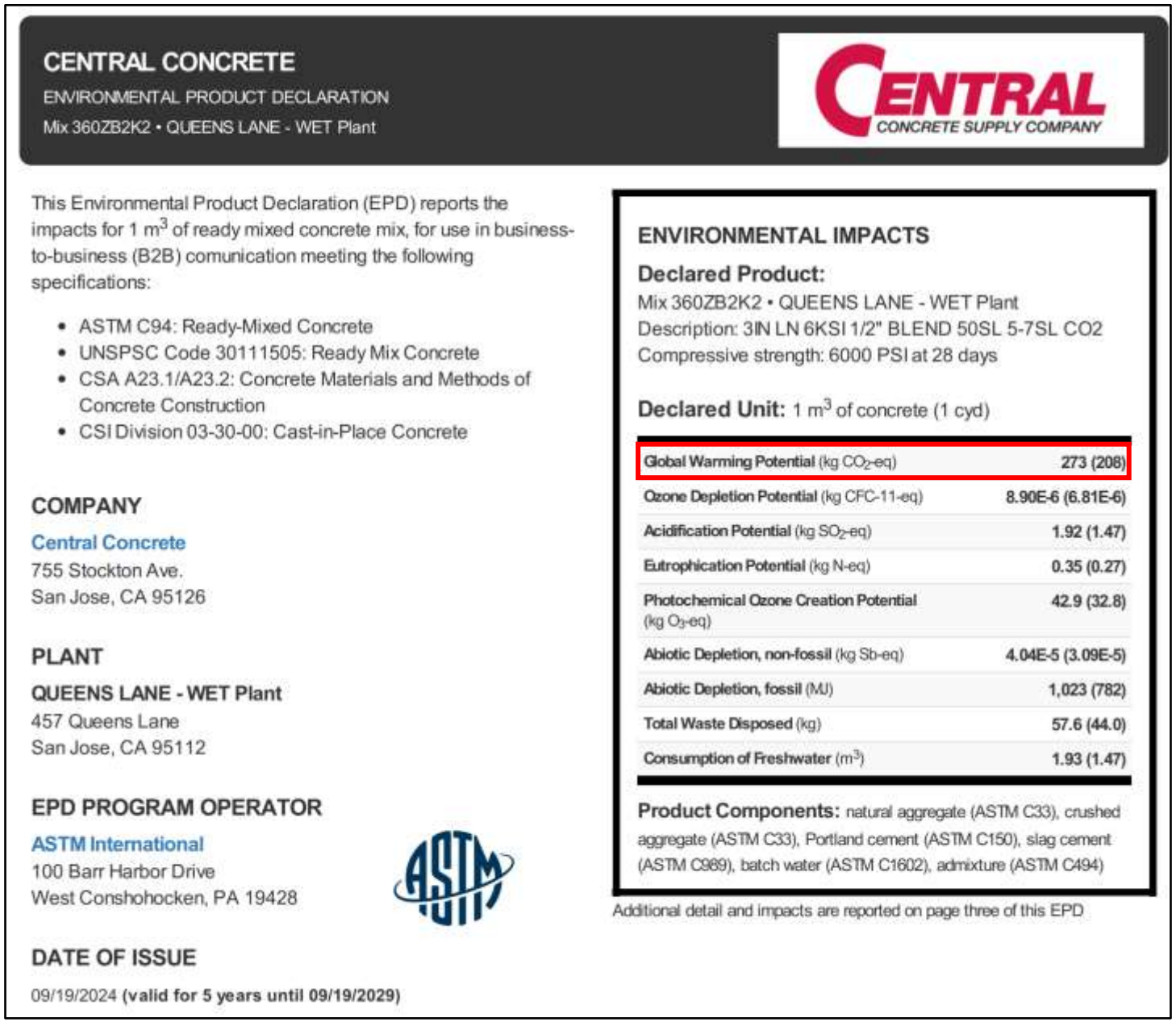
Product Type	Quantity Minimum		Quantity Comparison
Asphalt	10	cyd per mix	1 concrete truck
Flat glass (annealed, uncoated)	2,000	sf per manufacturer	3 floors 50’x50’ ground floor parking wall infill
CMU	2,000	sf	10’ high, 50’x50’ ground floor parking wall infill
Concrete (precast)	2,000	sf per manufacturer	10’ high, 50’x50’ perimeter tilt-up wall
Concrete (cast-in-place)	50	cyd per mix	5 concrete trucks
Below grade insulation	4,000	sf per manufacturer	2 floors 50’x50’ or single floor 100’x150’ with WWR < 0.4
Curtainwall spandrel insulation	4,000		
Exterior continuous insulation	4,000		
Exterior stud wall cavity insulation	4,000		
Roof insulation	4,000		
Hot-rolled structural steel sections	5,000	lbs per mill	300 sf of new steel framed construction or 8 beams for retrofit
Hollow structural sections	5,000		
Steel plate	5,000		
Steel deck	30,000		1,800 sf of new steel framed construction or 48 beams for retrofit
Rebar	20,000		4,000 sf assuming 2% reinforced 6” SOG

Global Warming Potential (GWP)

The total greenhouse gas emissions directly associated with the production of a product. This includes the upstream activities of extraction and transport of raw materials. Can be thought of as the carbon footprint of a product.



Environmental Product Declaration (EPD)



CENTRAL CONCRETE

ENVIRONMENTAL PRODUCT DECLARATION

Mix 360ZB2K2 • QUEENS LANE - WET Plant

CENTRAL CONCRETE SUPPLY COMPANY

This Environmental Product Declaration (EPD) reports the impacts for 1 m^3 of ready mixed concrete mix, for use in business-to-business (B2B) comunication meeting the following specifications:

- ASTM C94: Ready-Mixed Concrete
- UNSPSC Code 30111505: Ready Mix Concrete
- CSA A23.1/A23.2: Concrete Materials and Methods of Concrete Construction
- CSI Division 03-30-00: Cast-in-Place Concrete

COMPANY

Central Concrete
755 Stockton Ave.
San Jose, CA 95126

PLANT

QUEENS LANE - WET Plant
457 Queens Lane
San Jose, CA 95112

EPD PROGRAM OPERATOR

ASTM International
100 Barr Harbor Drive
West Conshohocken, PA 19428

DATE OF ISSUE

09/19/2024 **(valid for 5 years until 09/19/2029)**

ENVIRONMENTAL IMPACTS

Declared Product:
Mix 360ZB2K2 • QUEENS LANE - WET Plant
Description: 3IN LN 6KSI 1/2" BLEND 50SL 5-7SL CO2
Compressive strength: 6000 PSI at 28 days

Declared Unit: 1 m^3 of concrete (1 cyd)

Global Warming Potential (kg CO_2-eq)	**273 (208)**
Ozone Depletion Potential (kg CFC-11-eq)	**8.90E-6 (6.81E-6)**
Acidification Potential (kg SO_2-eq)	**1.92 (1.47)**
Eutrophication Potential (kg N-eq)	**0.35 (0.27)**
Photochemical Ozone Creation Potential (kg O_3-eq)	**42.9 (32.8)**
Abiotic Depletion, non-fossil (kg Sb-eq)	**4.04E-5 (3.09E-5)**
Abiotic Depletion, fossil (MJ)	**1,023 (782)**
Total Waste Disposed (kg)	**57.6 (44.0)**
Consumption of Freshwater (m^3)	**1.93 (1.47)**

Product Components: natural aggregate (ASTM C33), crushed aggregate (ASTM C33), Portland cement (ASTM C150), slag cement (ASTM C989), batch water (ASTM C1602), admixture (ASTM C494)

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

A standardized report that discloses a product's Life Cycle Assessment (LCA) – from raw material extraction to end-of-life disposal.

GWP is included in the EPD.

Product-specific: Manufacturer specific assessment for specific product

Industry-wide: Average environmental footprint across multiple manufactures within the industry

We set low-carbon targets using **GWP limits** and use **EPDs to disclose and verify** those values.

Setting Material Standards

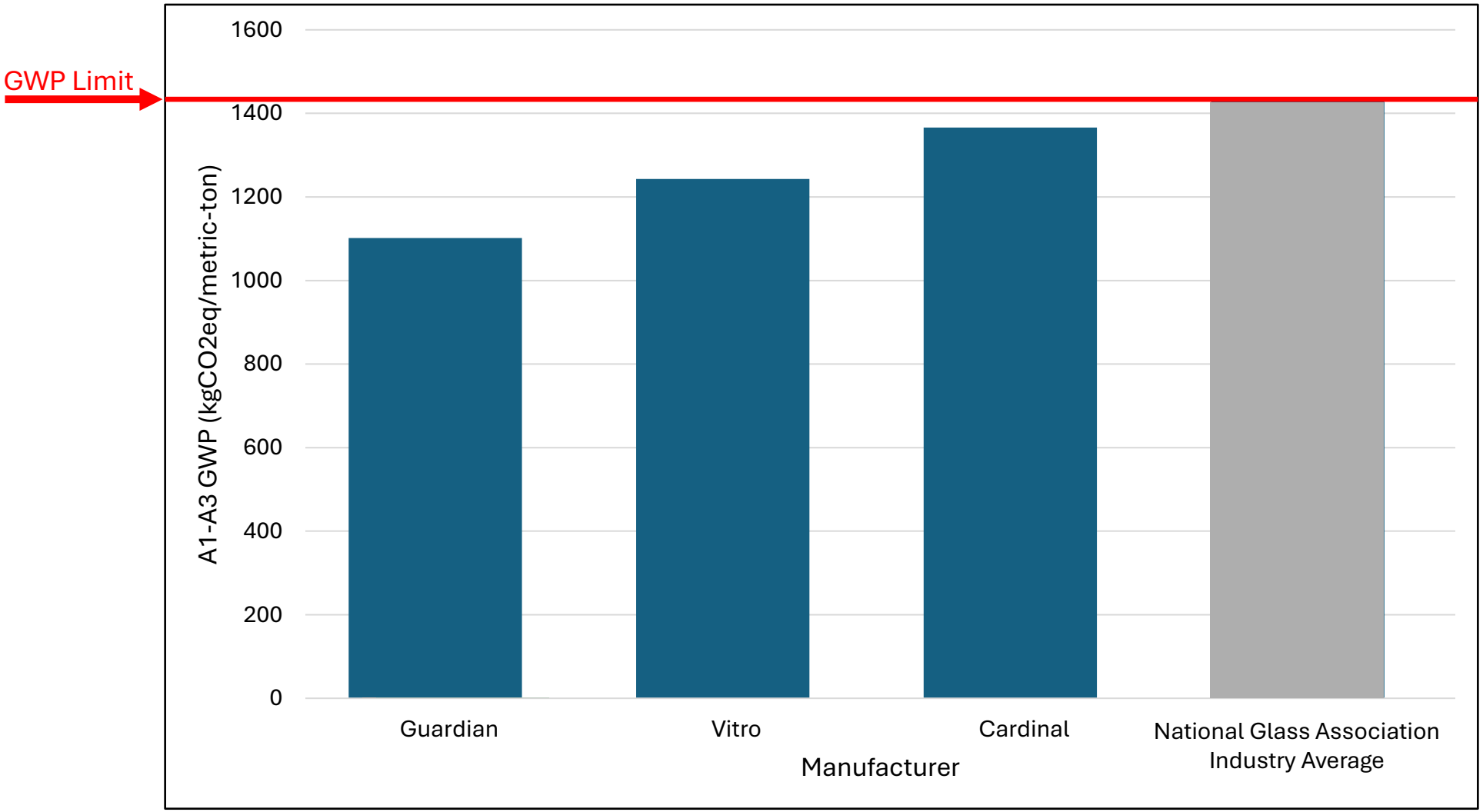
- ✓Align with state and/or local thresholds
- ✓Align with LEED requirements
- ✓Available in the local marketplace
- ✓Preparing for future reach codes

GWP Limits & Compliant Product Availability

Product Type	GWP Limits		Number of Compliant Products, %, and Suppliers
Asphalt	No limit	-	n/a
Flat glass (annealed, uncoated)	1.430	kg CO2e/kg	5 [100%], Vitro, Guardian, Cardinal
CMU	See next slides		
Concrete (cast-in-place)	See next slides		
Concrete (precast)	No limit	-	n/a
Below grade insulation	12.0	kg CO2e/m2 @ RSI-1	7 [70%], Owens Corning, Kingspan, Soprema
Curtainwall spandrel insulation	3.6		17 [17%], Knauf, CertainTeed, Johns Manville, Owens Corning
Exterior continuous insulation	2.2		57 [77%], GAF, Kingspan, Owens Corning, DuPont
Exterior stud wall cavity insulation	7.9		56 [87.5%], Owens Corning, Knauf
Roof insulation	8.5		47 [76%], Owens Corning, Aeroflex, Saudi Rock Wool, DuPont, GAF
Hot-rolled structural steel sections	1.25	kg CO2e/kg	14 [82%], Nucor, Gerdau, Steel Dynamics
Hollow structural sections	2.14		34 [68%], Nucor, Mariuchi, Atlas Tube, Alliance, Bull Moose Tube
Steel plate	1.84		11 [52%], Nucor, Alliance Steel Fabrication, Cleveland-Cliffs
Steel deck	2.90		27 [96%], Nucor, Canam, New Millennium, AEP Span, ASC Steel Deck
Rebar	0.94		4 [80%], Nucor, Cascade, Gerdau

Flat Glass: Manufacturers Comparison

Annealed, Un-Coated



Low-Carbon Concrete

Cast-in-place

Table of Concrete GWP Limits		
Minimum specified compressive strength f'_c (psi) at X days[1]	GWP Limit kg CO2e/m3	EPD count [% compliant]
up to 2500	260	152 [43%]
3000	289	837 [55%]
4000	313	1,405 [51%]
5000	338	1,683 [52%]
6000	356	573 [43%]
7000	394	160 [44%]
7500 and above	433	124 [60%]
up to 3000 LW	578	66 [97%]
4000 LW	626	169 [96%]
4500 LW and above	675	44 [98%]

Suppliers:

- Central
- Cemex
- GraniteRock

Concrete Masonry Unit (CMU)

CMU GWP is based on the assembly, which includes block and grout.

This means that by picking a low embodied carbon block, contractors may have more options available to pick from when looking for grout, and vice versa.

CMU GWP = (%Block in assembly * Block GWP) + (%Grout in assembly * Grout GWP)

%Block in assembly = 1- %Grout in assembly

Excludes rebar, mortar, and misc materials

Insulation

Categories per IBC	Industry-wide Benchmark	Roof insulation	Ext continuous insulation	Ext stud wall cavity insulation	Curtainwall spandrel insulation	Below grade
	kg CO2e/m2 @ RSI-1					
Light density mineral wool (assuming batt)	2.68			x	x	
Heavy-density mineral wool (assuming board)	6.82	x	x		x	
EPS Type I	2.53	x	x			x
Polyiso - wall	4.1		x			x
Polyiso - roof - GRF facer	2.11	x	x			
Polyiso - roof - CFG facer	2.95	x	x			
XPS+	22.26	x	x			x
Fiberglass board	5.02					
Fiberglass blanket unfaced	1.01			x	x	
Fiberglass blanket faced	1.06			x	x	
Closed cell spray polyurethane foam - medium density	3.47		x	x		
Closed cell spray polyurethane foam - roofing	4.05	x				
Closed cell spray polyurethane foam - 2K-LP	3.12			x		
Open-cell spray polyurethane foam	1.05			x		
Loose-fill cellulose	0.487			x		
Loose-fill mineral wool	1.89			x		
Loose-fill fiberglass	0.988			x		
Phenolic foam	3	*	*			*
Timber board	-8.5	*	*	*		
Loose fill timber	1.52			*		
	Average	6.8	6.3	1.8	2.9	9.6
	125% over	**8.5**	**7.9**	**2.2**	**3.6**	**12.0**

+GWP from CLF Material Baseline Report due to lack of industry average EPD

Legend

x *Product is applicable to this category and is used in determining average GWP*

* *Product is applicable to this category but is NOT used in determining average GWP*

PROPOSED PROJECT TIMELINE: Low Carbon Materials

COUNTY ISSUES RFP → **DESIGN BUILDER (PRIME)** → **SUBCONTRACTORS**

- Set minimum performance requirements for using low embodied carbon construction materials
- Include in RFP a template Low Carbon Materials Compliance Form for use by Prime and subcontractors

- Make a plan for meeting the requirements and identify potential suppliers
- Incorporate GWP limits and reporting requirements into the technical specifications
- Complete a draft of the Preliminary Compliance Check on the Low Carbon Materials Compliance Form

- Source products meeting the minimum performance spec
- Submit the Low Carbon Materials Compliance Form within 30 days of bid award for compliance check before proceeding
- Within 6 weeks of completion of all work with covered materials, submit the final Form and EPDs for each product used

PRELIMINARY COMPLIANCE CHECK								AS-BUILT COMPLIANCE CHECK				
Mix name	Design strength, f'c **per spec** (psi)	Early strength?	GWP Limit **per Code** ($kgCO_2e/m^3$)	Used for (e.g. foundation, retaining wall, shotcrete, etc.)	Volume Estimated (cyd)	Link to EPD	Max GWP **per spec** ($kgCO_2e/m^3$)	Volume Supplied (cyd)	Concrete Supplier Name	Concrete Batch Code	Link to EPD	GWP **reported on EPD** ($kgCO_2e/m^3$)
(1)	(2)	(3)	(4)	(5)	(6)	(12)	(7)	(8)	(9)	(10)	(12)	(11)
A	*4000*	*Y*	*407*	*Foundation*	*35*		*290*	*37*	*ABC*	*1234*		*268*
			0				0	0				0
			0				0	0				0

Prime contractor completes draft with assumed quantities and potential materials during design

Sub-contractor updates final product information within 30 days of contract award; submits EPDs

Sub-contractor completes As-Built information within 6 weeks after construction; submits EPDs

PRELIMINARY COMPLIANCE CHECK								AS-BUILT COMPLIANCE CHECK				
Mix name	Design strength, f'c **per spec** (psi)	Early strength?	GWP Limit **per Code** ($kgCO_2e/m^3$)	Used for (e.g. foundation, retaining wall, shotcrete, etc.)	Volume Estimated (cyd)	Link to EPD	Max GWP **per spec** ($kgCO_2e/m^3$)	Volume Supplied (cyd)	Concrete Supplier Name	Concrete Batch Code	Link to EPD	GWP **reported on EPD** ($kgCO_{2e}/m^3$)
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(12)*	*(7)*	*(8)*	*(9)*	*(10)*	*(12)*	*(11)*
A	*4000*	*Y*	*407*	*Foundation*	*35*		*290*	*37*	*ABC*	*1234*		*268*
			0				0	0				0
			0				0	0				0

Q & A

Question #1

When sourcing low-carbon materials:

1. What barriers might you encounter?
2. What information do you need?
3. What more do you need to know to compete successfully as a subcontractor for projects?

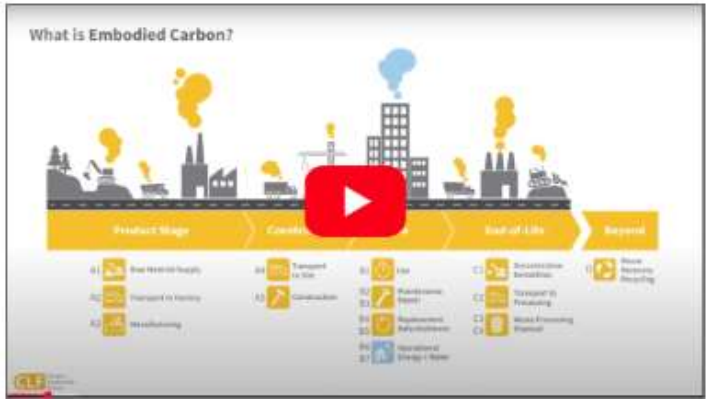
Question #2

How might we provide resources or information for you and other interested small contractors to ensure successful projects using low-carbon materials?

1. What channels of information would reach you?
2. How do you usually hear about new products or market opportunities?

Embodied-Carbon Videos

- Carbon Leadership Forum:
  - https://carbonleadershipforum.org/
  - https://carbonleadershipforum.org/embodied-carbon-video-training-series/
- BuildWell Project:
  - https://buildwell.site/



Additional Resources

Policies:

- Buy Clean California Act
- Embodied Carbon Policy Tracking Map
- Low Carbon Concrete Code | StopWaste - Home, Work, School

General Guides*

- Carbon Smart Materials Palette – Actions for reducing embodied carbon at your fingertips
- City of Nelson - Materials Guide Final
- EC3 – EPD Database

*Any specific GWP values may be outdated since manufacturers are always changing (and mostly improving!) their products.

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Thank You!