

**24-012**

- |   |   |                                     |  |
|---|---|-------------------------------------|--|
| <input checked="" type="checkbox"/> Information | <input type="checkbox"/> Administrative | <input type="checkbox"/> Procedural | <input checked="" type="checkbox"/> Technical    |
|   |   |                                     | <input checked="" type="checkbox"/> CCR Title 24 |
|   |   |                                     | <input type="checkbox"/> Design                  |
|   |   |                                     | <input type="checkbox"/> Construction            |
|   |   |                                     | <input type="checkbox"/> Inspection              |

**Bulletin: New Title 24 Part 11 (CALGreen) Embodied Carbon Requirements**

**Effective Date:** July 1, 2024

**From:** Energy, Sustainability & Transportation

The Title 24 Part 11 (CALGreen) intervening code cycle updates went into effect on July 1, 2024. Per §5.409 Life Cycle Assessment<sup>i</sup>, embodied carbon requirements are now mandatory for all non-residential projects that meet the following criteria:

- Newly constructed buildings with a combined floor area of 100,000 square feet or greater
- Alterations to existing buildings where the combined altered floor area is 100,000 square feet or greater
- Additions to existing buildings where the total floor area combined with the existing building is 100,000 square feet or greater

Legacy embodied carbon requirements were applicable to CSU projects through Buy Clean California, detailed in Technical Bulletin 22-008<sup>ii</sup>. The California Department of General Services has confirmed that submitting environmental product declarations (EPDs) through their reporting tool<sup>iii</sup> will remain a requirement, along with the new permitting requirements detailed in this bulletin.

The new global warming potential (GWP) limits are as follows:

BUY CLEAN CALIFORNIA MATERIALS PRODUCT CATEGORY <sup>1</sup>	MAXIMUM ACCEPTABLE GWP VALUE (unfabricated) (GWP <sub>allowed</sub> )	UNIT OF MEASUREMENT
Hot-rolled structural steel sections	1.77	MT CO <sub>2</sub> e/MT
Hollow structural sections	3.00	MT CO <sub>2</sub> e/MT
Steel plate	2.61	MT CO <sub>2</sub> e/MT
Concrete reinforcing steel	1.56	MT CO <sub>2</sub> e/MT
Flat glass	2.50	kg CO <sub>2</sub> e/MT
Light-density mineral wool board insulation	5.83	kg CO <sub>2</sub> e/1 m <sup>2</sup>
Heavy-density mineral wool board insulation	14.28	kg CO <sub>2</sub> e/1 m <sup>2</sup>

Figure 1: Table 5.409.3 Product GWP Limits, Buy Clean California Materials

**New CALGreen Embodied Carbon Requirements**

Concrete, Ready-Mixed <sup>2, 3</sup>		
CONCRETE PRODUCT CATEGORY	MAXIMUM GWP ALLOWED VALUE (GWP <sub>allowed</sub> )	UNIT OF MEASUREMENT
up to 2499 psi	450	kg CO <sub>2</sub> e/m <sup>3</sup>
2500—3499 psi	489	kg CO <sub>2</sub> e/m <sup>3</sup>
3500—4499 psi	566	kg CO <sub>2</sub> e/m <sup>3</sup>
4500—5499 psi	661	kg CO <sub>2</sub> e/m <sup>3</sup>
5500—6499 psi	701	kg CO <sub>2</sub> e/m <sup>3</sup>
6500 psi and greater	799	kg CO <sub>2</sub> e/m <sup>3</sup>

Figure 2: Table 5.409.3 Product GWP Limits, Concrete, Ready-Mixed

Concrete, Lightweight Ready-Mixed <sup>2</sup>		
CONCRETE PRODUCT CATEGORY	MAXIMUM GWP ALLOWED VALUE (GWP <sub>allowed</sub> )	UNIT OF MEASUREMENT
up to 2499 psi	875	kg CO <sub>2</sub> e/m <sup>3</sup>
2500—3499 psi	956	kg CO <sub>2</sub> e/m <sup>3</sup>
3500—4499 psi	1039	kg CO <sub>2</sub> e/m <sup>3</sup>

1. The GWP values of the products listed in Table 5.409.3 are based on 175 percent of Buy Clean California Act (BCCA) GWP values, except for concrete products which are not included in the BCCA.
2. For concrete, 175 percent of the National Ready Mixed Concrete Association (NRMCA) 2022 version 3 Pacific Southwest regional benchmark values are used for the GWP allowed, except for High Early Strength.
3. Concrete High Early Strength ready-mixed shall be calculated at 130 percent of the ready-mixed concrete GWP allowed values for each product category.

Figure 3: Table 5.409.3 Product GWP Limits, Concrete, Lightweight Ready-Mixed

Similar to Title 24 Part 6 (California Energy Code), there is a performance and a prescriptive path of complying with these requirements.

Should campus choose to follow the prescriptive method, each applicable product shall not exceed the maximum GWP values specified in Table 5.409.3 above. However, exceptions can be made for concrete through the methodology outlined in §5.409.3.1<sup>iv</sup>.

To demonstrate compliance with the prescriptive approach, the following documents must be included in the 95% CD package for permitting:

- Calculations to demonstrate compliance
- Environmental Product Declarations (EPDs) for all applicable materials
- Worksheet WS-5, signed by the design professional of record

## New CALGreen Embodied Carbon Requirements

Campus may also elect to comply via the performance method by conducting a whole building lifecycle assessment using software with approved protocols. Approved software tools include ones from the Athena Sustainable Materials Institute<sup>v</sup>, OneClick LCA-Planetary<sup>vi</sup>, Spera GaBi Solutions<sup>vii</sup>, SimaPro<sup>viii</sup>, OneClick LCA<sup>ix</sup>, and Tally for Revit<sup>x</sup>. The first two tools are free, whereas the remainder are not.

To demonstrate compliance with the performance approach, the following documents must be included in the 95% CD package for permitting:

- Summary of the GWP analysis produced by the software
- Applicable maintenance and training information (include in the operation and maintenance manual)
- Worksheet WS-4, signed by the design professional of record
- Worksheet WS-9

Please reach out to University Engineer Rachel Patterson, [rpatterson@calstate.edu](mailto:rpatterson@calstate.edu), Systemwide Construction Manager Jeremy Gomoljak, [jgomoljak@calstate.edu](mailto:jgomoljak@calstate.edu), or Chief of Energy Sustainability & Transportation Lindsey Rowell, [lrowell@calstate.edu](mailto:lrowell@calstate.edu) with any questions.

### Attachments:

- CALGreen §5.409 Code Language
- Prescriptive Compliance Worksheet WS-5
- Performance Compliance Worksheet WS-4
- Performance Compliance Worksheet WS-9

### Applicability:

All Structures owned or occupied by the State including Auxiliary Services. Design Services, Permit Process, Construction Services, Public-Private Partnerships, Lease and Acquisitions.

Plan Check Services.

End of Bulletin

- 
- i <https://up.codes/viewer/california/ca-green-code-2022/chapter/5/nonresidential-mandatory-measures#5.409>
  - ii <https://www.calstate.edu/csu-system/doing-business-with-the-csu/capital-planning-design-construction/Documents/CPDC%20BU%2022-008%20-%20Buy%20Clean%20CA.pdf>
  - iii <https://pdbcca.azurewebsites.net/>
  - iv <https://up.codes/viewer/california/ca-green-code-2022/chapter/5/nonresidential-mandatory-measures#5.409.3.1>
  - v <https://calculatelca.com/software/impact-estimator/>
  - vi <https://oneclicklca.com/resources/planetary>
  - vii <https://spera.com/solutions/product-stewardship/life-cycle-assessment-software-and-data/lca-for-experts/>
  - viii <https://simapro.com/>
  - ix <https://oneclicklca.com/>
  - x <https://apps.autodesk.com/>

## California Green Building Code 2022

### Section 5.409 Life Cycle Assessment

(Reserved)

#### Section 5.409 Life Cycle Assessment

Effective: 07-01-2024

#### 5.409.1 Scope

Effective: 07-01-2024

**[BSC-CG]** Effective July 1, 2024, projects consisting of newly constructed building(s) with a combined floor area of 100,000 square feet or greater shall comply with either Section 5.409.2 or Section 5.409.3. Alteration(s) to existing building(s) where the combined altered floor area is 100,000 square feet or greater shall comply with either Section 5.105.2, 5.409.2, or 5.409.3. Addition(s) to existing building(s) where the total floor area combined with the existing building(s) is 100,000 square feet or greater shall comply with either Section 5.105.2, Section 5.409.2, or Section 5.409.3. Effective January 1, 2026, the combined floor area shall be 50,000 square feet or greater.

**[DSA-SS]** Projects consisting of newly constructed building(s) with a combined floor area of 50,000 square feet or greater shall comply with either Section 5.409.2 or Section 5.409.3. Alteration(s) to existing building(s) where the combined altered floor area is 50,000 square feet or greater shall comply with either Section 5.105.2, 5.409.2, or 5.409.3. Addition(s) to existing building(s) where the total floor area combined with the existing building(s) is 50,000 square feet or greater shall comply with either Section 5.105.2, Section 5.409.2, or Section 5.409.3.

#### 5.409.2 Whole Building Life Cycle Assessment

Effective: 07-01-2024

Projects shall conduct a cradle-to-grave whole building life cycle assessment performed in accordance with ISO 14040 and ISO 14044, excluding operating energy, and demonstrating a minimum 10-percent reduction in global warming potential (GWP) as compared to a reference baseline building of similar size, function, complexity, type of construction, material specification, and location that meets the requirements of the *California Energy Code* currently in effect. Software used to conduct the whole building life cycle assessment, including reference baseline building, shall have a data set compliant with ISO 14044, and ISO 21930 or EN 15804, and the software shall conform to ISO 21931 and/or EN 15978. The software tools and data sets shall be the same for evaluation of both the baseline building and the proposed building.

#### Notes:

1. Software for calculating whole building life cycle assessment is available for free at Athena Sustainable Materials Institute (<https://calculatelca.com/software/impact-estimator/>) and OneClick LCA-Planetary ([www.oneclicklca.com/planetary](http://www.oneclicklca.com/planetary)). Paid versions include, but are not limited to, Sphera GaBi Solutions ([gabi.sphera.com](http://gabi.sphera.com)), SimaPro ([simapro.com](http://simapro.com)), OneClick LCA ([www.oneclicklca.com](http://www.oneclicklca.com)) and Tally for Revit ([apps.autodesk.com](http://apps.autodesk.com)).
2. ASTM E2921-22 "Standard Practice for Minimum Criteria for Comparing Whole Building Life Cycle Assessments for Use with Building Codes, Standards, and Rating Systems" may be consulted for the assessment.

3. In addition to the required documentation specified in Section 5.409.2.3, Worksheet WS-9 may be required by the enforcing entity to demonstrate compliance with the requirements.

### 5.409.2.1 Building Components

Effective: 07-01-2024

Building enclosure components included in the assessment shall be limited to glazing assemblies, insulation, and exterior finishes. Primary and secondary structural members included in the assessment shall be limited to footings and foundations, and structural columns, beams, walls, roofs, and floors.

### 5.409.2.2 Reference Study Period

Effective: 07-01-2024

The reference study period of the proposed building shall be equal to the reference baseline building and shall be 60 years.

### 5.409.2.3 Verification of Compliance

Effective: 07-01-2024

A summary of the GWP analysis produced by the software and Worksheet WS-4 signed by the design professional of record shall be provided in the construction documents as documentation of compliance. A copy of the whole building life cycle assessment which includes the GWP analysis produced by the software, in addition to maintenance and training information, shall be included in the operation and maintenance manual and shall be provided to the owner at the close of construction. The enforcing agency may require inspection and inspection reports in accordance with Sections 702.2 and 703.1 during and at completion of construction to demonstrate substantial conformance. Inspection shall be performed by the design professional of record or third party acceptable to the enforcing agency.

### 5.409.3 Product GWP Compliance—Prescriptive Path

Effective: 07-01-2024

Each product that is permanently installed and listed in Table 5.409.3 shall have a Type III environmental product declaration (EPD), either product-specific or factory-specific.

**TABLE 5.409.3  
PRODUCT GWP LIMITS**

BUY CLEAN CALIFORNIA MATERIALS PRODUCT CATEGORY <sup>1</sup>	MAXIMUM ACCEPTABLE GWP VALUE (unfabricated) (GWP <sub>allowed</sub> )	UNIT OF MEASUREMENT
--	---	---------------------

Hot-rolled structural steel sections	1.77	MT CO <sub>2</sub> e/MT
Hollow structural sections	3.00	MT CO <sub>2</sub> e/MT
Steel plate	2.61	MT CO <sub>2</sub> e/MT
Concrete reinforcing steel	1.56	MT CO <sub>2</sub> e/MT
Flat glass	2.50	kg CO <sub>2</sub> e/MT
Light-density mineral wool board insulation	5.83	kg CO <sub>2</sub> e/1 m <sup>2</sup>
Heavy-density mineral wool board insulation	14.28	kg CO <sub>2</sub> e/1 m <sup>2</sup>
<b>Concrete, Ready-Mixed<sup>2, 3</sup></b>		
CONCRETE PRODUCT CATEGORY	MAXIMUM GWP ALLOWED VALUE (GWP <sub>allowed</sub> )	UNIT OF MEASUREMENT
up to 2499 psi	450	kg CO <sub>2</sub> e/m <sup>3</sup>
2500—3499 psi	489	kg CO <sub>2</sub> e/m <sup>3</sup>
3500—4499 psi	566	kg CO <sub>2</sub> e/m <sup>3</sup>
4500—5499 psi	661	kg CO <sub>2</sub> e/m <sup>3</sup>
5500—6499 psi	701	kg CO <sub>2</sub> e/m <sup>3</sup>
6500 psi and greater	799	kg CO <sub>2</sub> e/m <sup>3</sup>
<b>Concrete, Lightweight Ready-Mixed<sup>2</sup></b>		
CONCRETE PRODUCT CATEGORY	MAXIMUM GWP ALLOWED VALUE (GWP <sub>allowed</sub> )	UNIT OF MEASUREMENT
up to 2499 psi	875	kg CO <sub>2</sub> e/m <sup>3</sup>
2500—3499 psi	956	kg CO <sub>2</sub> e/m <sup>3</sup>
3500—4499 psi	1039	kg CO <sub>2</sub> e/m <sup>3</sup>

1. The GWP values of the products listed in Table 5.409.3 are based on 175 percent of Buy Clean California Act (BCCA) GWP values, except for concrete products which are not included in the BCCA.
2. For concrete, 175 percent of the National Ready Mixed Concrete Association (NRMCA) 2022 version 3 Pacific Southwest regional benchmark values are used for the GWP allowed, except for High Early Strength.
3. Concrete High Early Strength ready-mixed shall be calculated at 130 percent of the ready-mixed concrete GWP allowed values for each product category.

**5.409.3.1**



Products shall not exceed the maximum GWP value specified in Table 5.409.3.

**Exception:** Concrete may be considered one product category to meet compliance with this section. A weighted average of the maximum GWP for all concrete mixes installed in the project shall be less than the weighted average maximum GWP allowed per Table 5.409.3 using Exception Equation 5.409.3.1. Calculations shall be performed with consistent units of measurement for the material quantity and the GWP value. For the purposes of this exception, industry-wide EPDs are acceptable.

#### Exception EQUATION 5.409.3.1

$$GWP_n < GWP_{allowed}$$

where

$$GWP_n = \sum (GWP_n)(v_n)$$

and

$$GWP_{allowed} = \sum (GWP_{allowed})(v_n)$$

and

$n$  = each concrete mix installed in the project

$GWP_n$  = the GWP for concrete mix  $n$  per concrete mix EPD, in kg CO<sub>2</sub>e/m<sup>3</sup>

$GWP_{allowed}$  = the GWP potential allowed for concrete mix  $n$  per Table 5.409.3

$v_n$  = the volume of concrete mix  $n$  installed in the project, in m<sup>3</sup>

#### 5.409.3.2 Verification of Compliance

Effective: 07-01-2024

Calculations to demonstrate compliance, Type III EPDs for products required to comply, if included in the project, and Worksheet WS-5 signed by the design professional of record shall be provided on the construction documents. Updated EPDs for products used in construction shall be provided to the owner at the close of construction and to the enforcement entity upon request. The enforcing agency may require inspection and inspection reports in accordance with Sections 702.2 and 703.1 during and at completion of construction to demonstrate substantial conformance. Inspection shall be performed by the design professional of record or third party acceptable to the enforcing agency.

Responsible Designer's Declaration Statement:

I attest that prescriptive compliance has been performed according to the requirements of Section 5.409.3 and products have met the minimum 10 percent reduction in global warming potential as specified in Table 5.409.3. Furthermore, I will ensure during construction that the material specifications will be reviewed for substantial conformance with the global warming potential limits indicated on the approved plans so at the close of construction the minimum 10 percent reduction in global warming potential is thereby secured.

Signature:	
Company:	Date:
Address:	License:
City/State/Zip:	Phone:



**WORKSHEET (WS-4)**  
**Section 5.409.2 WHOLE BUILDING LIFE CYCLE ASSESSMENT**

Responsible Designer's Declaration Statement:

I attest that the Whole Building Life Cycle Analysis has been performed according to the requirements of Section 5.409.2 and has met the minimum 10 percent reduction in global warming potential as compared to a reference baseline building of similar size, function, complexity, type of construction, material specification, and location that meets the requirements of the California Energy Code currently in effect. Furthermore, I will ensure during construction that the material specifications will be reviewed for substantial conformance with the life cycle assessment indicated on the approved plans so at the close of construction the minimum 10 percent reduction in global warming potential is thereby secured.

Signature:	
Company:	Date:
Address:	License:
City/State/Zip:	Phone:

## WORKSHEET (WS-9)

### Section 5.409.2 and Section A5.409.2 WHOLE BUILDING LIFE CYCLE ASSESSMENT

#### CALGreen Whole Building LCA Reporting Template

LCA model run	User input	Units	Overall scope included (select all that apply)	
LCA Modeler (company) <i>[private]</i>			Structure (required)	<input type="checkbox"/>
Date of Model Run (mm/yyyy)			Enclosure (required)	<input type="checkbox"/>
Project Phase at Model Run			Interiors (optional)	<input type="checkbox"/>
Reference Study Period (years)			MEP (optional)	<input type="checkbox"/>
Software and Version Used*			Site/Landscaping (optional)	<input type="checkbox"/>
Biogenic Carbon Included* (y/n)			FFE (optional)	<input type="checkbox"/>
Model Floor Area		m2		

#### Mandatory Scope Items

Please break out the following in per element emissions by life cycle in kgCO<sub>2</sub>e. Leave blank any sections that were not calculated separately from Whole Building GWP

	Upfront Carbon			Use Phase	End of Life	Total
	A1-3	A4	A5	B1-5	C1-4	
Baseline Structure GWP (kgCO <sub>2</sub> e):						
Baseline Enclosure GWP (kgCO <sub>2</sub> e):						
<b>Baseline Whole Building GWP (kgCO<sub>2</sub>e):</b>						
Proposed Structure GWP (kgCO <sub>2</sub> e):						
Proposed Enclosure GWP (kgCO <sub>2</sub> e):						
<b>Proposed Whole Building GWP (kgCO<sub>2</sub>e):</b>						

#### A1-A3\*

(A1) Raw Material Supply, (A2) Transport to Factory, and (A3) Manufacturing

#### A4\*

(A4) Transportation to site

#### A5\*

(A5) Construction Installation or "on-site energy use". Leave blank if unknown

#### Percent Reduction

Mandatory	
Tier 1	
Tier 2	

#### C1-C4\*

(C1) Deconstruction/Demolition, (C2) Transport to Waste Processing/Disposal, (C3) Waste Processing, (C4) Disposal of Waste

#### B1-B5\*

(B1) Use, (B2) Maintenance, (B3) Repair, (B4) Replacement, (B5) Refurbishment

#### D\*

(D) Reuse-Recovery & Recycling Potential

#### Optional Items - Proposed Design ONLY

Please break out the following in per element emissions by life cycle in kgCO<sub>2</sub>e. Leave blank any sections that were not calculated separately from Whole Building GWP

	Upfront Carbon			Use Phase	End of Life	Total
	A1-3	A4	A5	B1-5	C1-4	
Interiors GWP (kgCO <sub>2</sub> e):						
MEP GWP (kgCO <sub>2</sub> e):						
Site/Landscaping GWP (kgCO <sub>2</sub> e):						
FF&E GWP (kgCO <sub>2</sub> e):						