



# Buy Clean California Act

## Legislative Report

January 1, 2022



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## Executive Summary

The Buy Clean California Act ([Public Contract Code § 3500-3505](#)) requires the Department of General Services (DGS) to submit a report to the Legislature describing the methodology used to set the maximum acceptable global warming potential (GWP) limit for four categories of construction products: structural steel, concrete reinforcing steel, flat glass, and mineral wool board insulation.

This report provides a discussion and analysis of the factors considered prior to finalizing a methodology to establish the maximum GWP limit. The Buy Clean California Act (BCCA) requires the limit to be set at the industry average of facility-specific GWP for each eligible material and be based on information contained in an environmental product declaration (EPD).

DGS found it necessary to identify subcategories of materials with their own GWP limits. The four categories of materials cover a wide variety of distinct construction products and imposing a single GWP limit would not be appropriate for each category of material; doing so would reduce the effectiveness of the BCCA.

For reasons explained in this report, DGS will leverage industrywide EPDs to determine the industry average and set the final limit for structural steel, concrete reinforcing steel, flat glass, and mineral wool board insulation.

The limits can be found at the end of this report and on the DGS [Buy Clean California webpage](#).

An **environmental product declaration (EPD)** is an independently verified and registered document that reports a product's environmental impact over its life cycle.

**Global warming potential (GWP)** is an indicator of the greenhouse gases associated with the production of construction products identified in the BCCA.

## Background

The BCCA was introduced as Assembly Bill (AB) 262 (Bonta, Chapter 816, Statutes of 2017). It addressed the greenhouse gases associated with the production of construction products used in California state public works projects. According to the author, the bill was meant to “level the playing field” and benefit those manufacturers who have made a conscious effort to lower greenhouse gas emissions in the production of materials. The bill was signed into law by Governor Edmund G. Brown Jr. on October 15, 2017. The BCCA was subsequently amended by AB 1817 (Ting, Chapter 37, Statutes of 2018) and AB 137 (Ting, Chapter 77, Statutes of 2021).

The BCCA is part of California's overall strategy to address climate change. By leveraging the state's purchasing power, the BCCA strives to lower the global warming potential of construction materials over time.

The BCCA targets carbon emissions associated with the manufacturing of structural steel, concrete reinforcing steel, flat glass, and mineral wool board insulation. State agencies that award contracts (“awarding authorities”) are responsible for ensuring that these materials, when used in public works projects, do not have a GWP that exceeds the limit set by DGS. The document used to establish the GWP limit (and ultimately determine compliance) is the EPD.

Awarding agencies include the Department of Transportation, Department of Water Resources, Department of Parks and Recreation, Department of Corrections and Rehabilitation, Military Department, Department of General Services, Regents of the University of California, Trustees of the California State University and state agencies granted authority to work on public works projects under [Management Memo 18-01](#).

An EPD is a report that discloses a product's environmental impact as determined by a life cycle assessment (LCA). The LCA is typically performed by a recognized neutral third party guided by standards set by the International Organization for Standardization (ISO), such as ISO 14025, ISO 14040, ISO 14044, and ISO 21930. EPDs are developed according to a set of requirements and guidelines known as product category rules (PCRs).

**ISO 14025** specifies the principles and procedures for the development of Type III environmental declarations.

**ISO 14040** and **14044** specify the principles, framework, and requirements for conducting a life cycle assessment.

**ISO 21930** specifies the requirements to develop environmental product declarations for construction products and services.

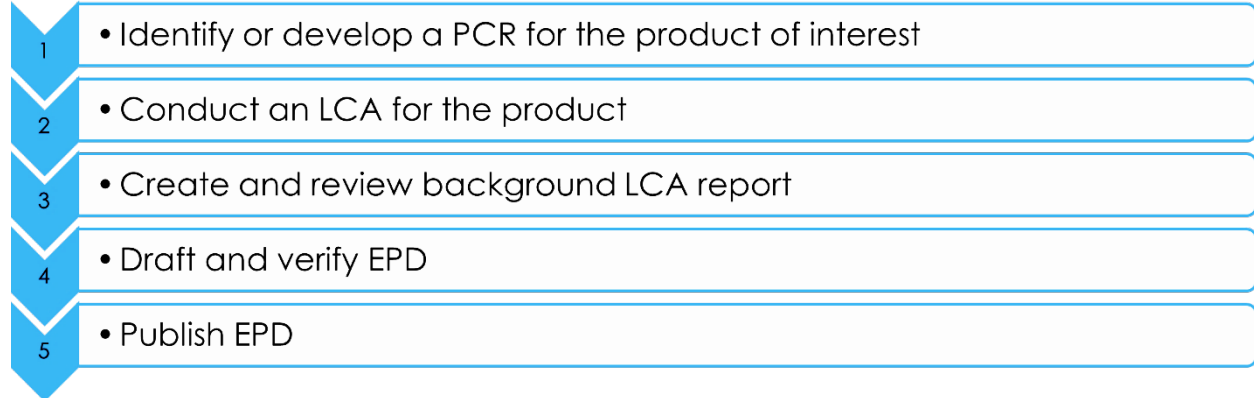
A **life cycle assessment (LCA)** is a study to determine the environmental impact of a product, process, or service over its life cycle.

A **product category rule (PCR)** is a set of rules, requirements and guidelines used to develop an EPD for a product group.

The typical process to develop an EPD (per ISO standards) begins with identifying a PCR for the product of interest. If a PCR doesn't exist, a program operator can manage the development of a new PCR. An LCA is then conducted by an LCA practitioner in accordance with ISO standards and the selected PCR requirements. An LCA report is then generated (also known as a background report) that contains information on the entire LCA process and results. After the LCA report is reviewed, a program operator assists in the development of the EPD. Once verified by an independent third party, the EPD may be published.

A **program operator** is an independent party that operates an EPD development program.

Figure 1: Typical steps to develop an EPD per ISO standards.



The BCCA requires DGS, in consultation with the California Air Resources Board (CARB), to establish and publish the maximum acceptable GWP for each category of eligible materials by January 1, 2022. DGS created a [Buy Clean California webpage](#) to provide information on the law, outreach events, GWP limits, and other resources.

Beginning January 1, 2025, and every three years thereafter, DGS will review the maximum acceptable GWP for each material and if necessary, may only adjust the limit downward to reflect industry improvements. Facility-specific EPDs will be the focus of future GWP limit assessments.

## Discussion and Analysis

The following discussion presents various aspects that needed consideration to finalize the methodology and establish GWP limits. Each required a decision to get to the final methodology. These decisions are highlighted in the discussion below.

### Product category rules

To identify the applicable EPDs for determining the maximum acceptable GWP, DGS first reviewed available PCRs for the eligible materials.

According to ISO 14025, EPDs can be used for comparisons of products fulfilling the same function. However, EPDs based on different PCRs offer limited comparability. Therefore, it was necessary to ensure that EPDs used to establish a limit and EPDs used for compliance are developed under the same PCR.

DGS surveyed both domestic and international PCRs applicable to the BCCA eligible materials. PCRs typically are tailored for norms in the region where they were developed. **DGS chose PCRs intended for products used and/or sold in**

**North America.** DGS confirmed that sourcing materials internationally is still possible if manufacturers develop an EPD according to the selected PCR and the GWP for the material is under the limit set by DGS. PCRs are typically valid for five years after publication, just like EPDs. Prior to expiration, program operators can assemble a committee made of various stakeholders to update the PCR as required.

**The following PCRs were selected for use with the BCCA:**

- **Structural steel and concrete reinforcing steel**

PCR title: Part B: Designated Steel Construction Product EPD Requirements  
Valid through: August 26, 2025  
Version: 2.0  
Program operator: UL Environment

- **Flat glass**

PCR title: NGA PCR for Flat Glass: UN CPC 3711  
Valid through: September 30, 2025  
Version: 2  
Program operator: NSF International

- **Mineral wool board insulation**

PCR title: Part B: Building Envelope Thermal Insulation EPD requirements  
Valid through: April 10, 2023  
Version: 2.0  
Program operator: UL Environment

**UN CPC 3711** is the United Nations Central Product Classification Code for a group of glass and glass products.

## Materials and subcategories

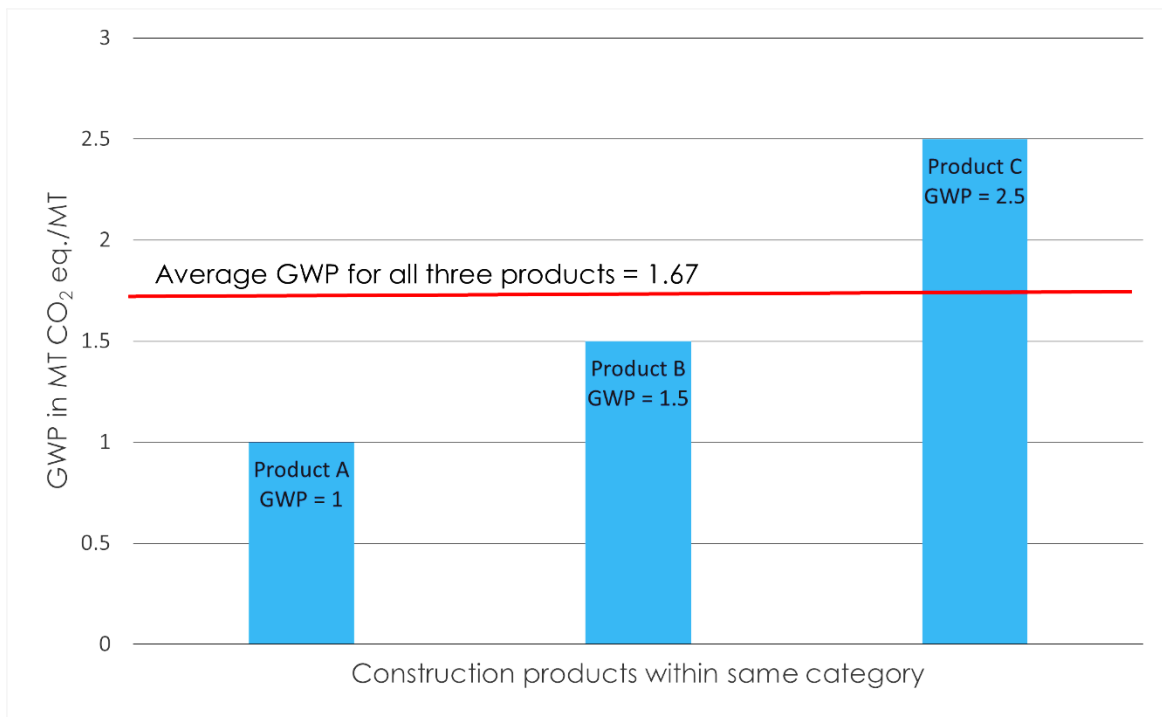
The four categories of materials identified in the BCCA cover a wide variety of distinct construction products. Often, these products can be grouped into subcategories of materials by similarity of manufacturing, materials, or function.

It was determined that the GWP could vary significantly between products within a material category. Restricting each material category to a single compliance limit could result in a figure that is not optimized for any single product within a material category.

To demonstrate this concept, Figure 2 shows three different products (A, B, and C shown in blue boxes) in the same material category with a GWP of 1, 1.5, and 2.5, respectively in metric tons (MT) CO<sub>2</sub> eq. per MT of product. If a single number equal to the mathematical average of these three numbers (i.e., 1.67) is used to establish a limit for all three products, it may not be appropriate for all products. That is, 1.67 might be too high a limit for product A, just right for product B, and too low for product C.

**CO<sub>2</sub> eq.** or carbon dioxide equivalent is a unit indicator for GWP.

Figure 2: Demonstration of the need for material subcategories with individual GWP limits.



The solution to this problem is introducing subcategories of materials and establishing a limit for each. Each limit can be tailored for each subcategory of material and change independently as industry improvements are made.

For the initial rollout of the BCCA, three subcategories under structural steel (hot-rolled sections, hollow structural sections, and plate) will have separate GWP limits. Likewise, for mineral wool board insulation, light-density and heavy-density board products will have separate GWP limits.



Flat glass and concrete reinforcing steel do not need separate subcategories because a single GWP limit can accurately represent similar products within each material category.

**A total of seven GWP limits will be established for the four eligible material categories:**

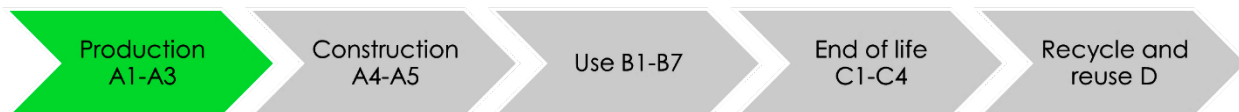
1. Structural steel: Hot-rolled sections
2. Structural steel: Hollow structural sections
3. Structural steel: Plate
4. Concrete reinforcing steel
5. Flat glass
6. Mineral wool board insulation: Light-density
7. Mineral wool board insulation: Heavy-density

**Life cycle stages and impact assessment**

Per ISO 21930, the life cycle for a construction product consists of various stages as shown in Figure 3. A PCR will identify the life cycle stages for which an EPD will report environmental impacts. Typically, reporting environmental impacts on the production stage is mandatory. Some PCRs may require an EPD to report additional life cycle stages (e.g., mineral wool board insulation). Since the BCCA focuses on manufacturing, the production stage will be the only life cycle stage considered for all eligible materials.

Environmental impacts are represented in an EPD by separate information modules (often denoted with a letter and numeral). Per ISO 21930, the production stage A1 is defined as extraction and upstream production, A2 as transportation to factory, and A3 as manufacturing.

Figure 3: Life cycle stages and associated information modules for a construction product.



There are many different types of environmental impacts that can be reported in an EPD; for example, an EPD may report ozone depletion, water pollution,

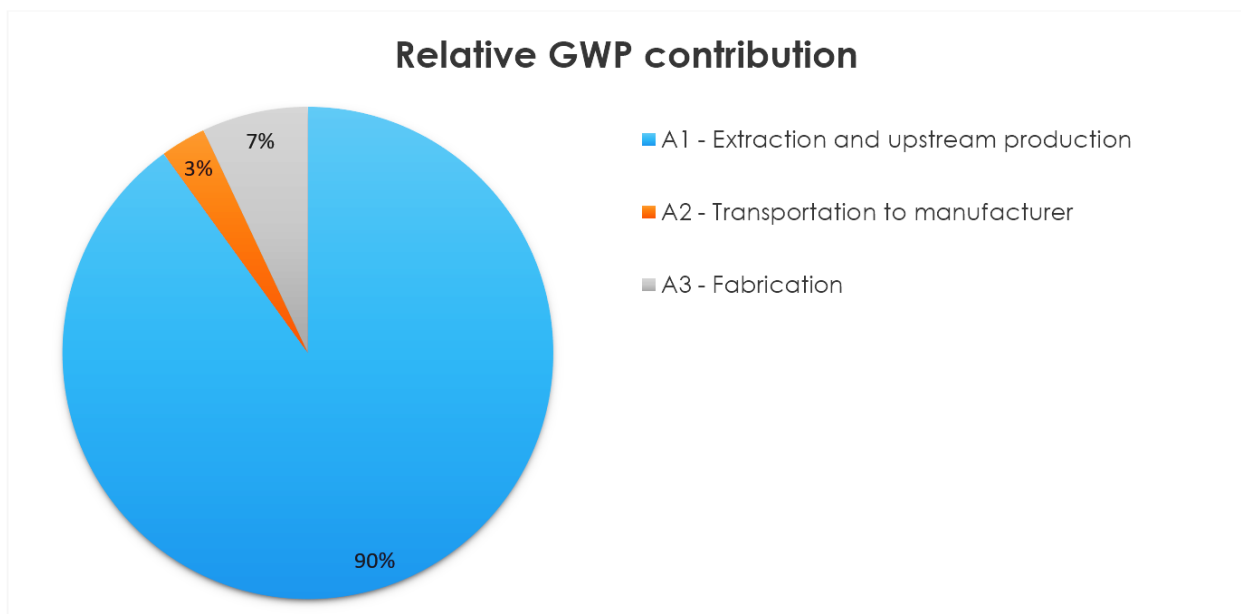
water use, energy use, human toxicity, hazardous waste disposed, and nonhazardous waste disposed. A PCR will indicate which impacts are required to be reported.

**For the BCCA, the environmental impact of interest is the production-stage GWP.**

### Exclusion of emissions due to fabrication

The BCCA allows DGS to exclude emissions that occur during fabrication stages when setting the initial GWP limit. Fabrication refers to the processing of materials in preparation for use at the construction jobsite (e.g., bending, cutting, drilling, and painting). Examination of structural steel and concrete reinforcing steel EPDs show the GWP contribution due to fabrication is typically 10% or less of the overall reported GWP.

Figure 4: Example of relative GWP contribution (approximated) for fabricated hot-rolled structural sections.\*



\*Source: American Institute of Steel Construction EPD, issued January 1, 2021, declaration number 4789556099.102.1, UL Environment.

Fabrication, especially in the case of concrete reinforcing steel, is typically accomplished by small to medium size businesses. Including the fabrication stage in the calculation of the GWP limits could require these businesses to develop multiple EPDs over time due to a changing supply chain. This would involve significant costs to an entity that produces less than 10% of the total GWP.

A fabrication stage is not typically represented in flat glass and mineral wool board insulation EPDs. For flat glass EPDs, the PCR states that the end gate is the dock where glass is stored for shipment to fabricators. For mineral wool board insulation EPDs, the final manufacturing step includes the process of cutting board into the appropriate shape as ordered by the customer.

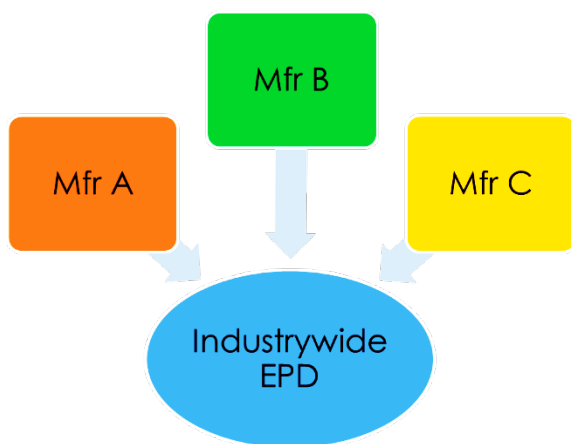
**When determining GWP limits, DGS will exclude emissions due to fabrication for structural steel, concrete reinforcing steel, flat glass, and mineral wool board insulation.**

### Facility-specific EPD

The BCCA specifies the use of “facility-specific EPDs.” This term is not defined in existing ISO standards for developing EPDs. Research of EPD databases revealed three distinct types of EPDs: An industrywide (also known as an industry average) EPD; a companywide (i.e., representing multiple facilities) EPD; and more infrequently, a single-facility EPD.

The difference between each type of EPD is important to understand before deciding if the EPD can be used to set the GWP limit for each eligible material. Industrywide EPDs typically represent a group of manufacturers and facilities in a geographic region. GWP results are often production-weighted among the manufacturers. The minimum number of participants required for an industrywide EPD is specified in a PCR. Therefore, the GWP impact of individual manufacturing facilities cannot be identified in an industrywide EPD.

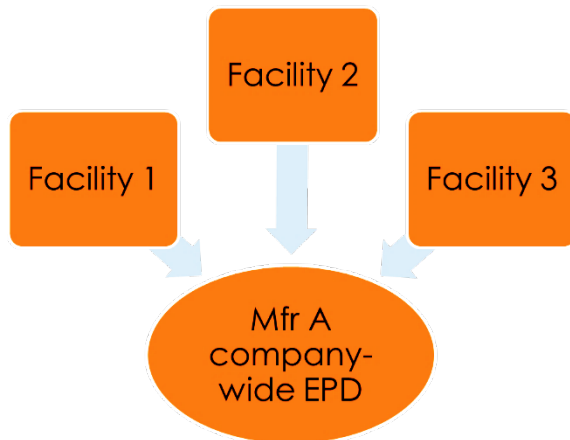
Figure 5: Example of an industrywide EPD.



Companywide EPDs report the average GWP for a number of facilities whose results are often production-weighted. The GWP impact of individual manufacturing facilities therefore cannot be identified in a companywide EPD.

After a survey of North American EPD databases, it appears that companywide EPDs are more common than single-facility EPDs.

Figure 6: Example of a companywide EPD.

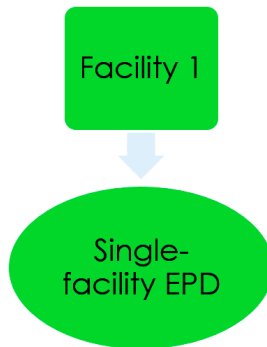


Single-facility EPDs provide the most unambiguous representation of a facility's environmental impact and eliminate the need for production-weighting the GWP result, as with industrywide or companywide EPDs.

For example, observation of single-facility concrete reinforcing steel EPDs revealed that the main source of information came from primary data (actual measured data from the facility) as opposed to secondary data (average industry data from life cycle inventory [LCI] datasets) for the development of the EPD.

**A life cycle inventory (LCI) dataset** is a quantitative accounting of input and output energy and material flows for a particular process.

Figure 7: Example of a single-facility EPD.



Attempting to use all three types of EPDs described above to calculate an average without knowing the actual production-weighting would provide a mathematically incorrect result. Production-weighting is not disclosed in industrywide or companywide EPDs. The ideal solution is to create an industry average from a collection of single-facility EPDs.

**For the BCCA, DGS has defined a facility-specific EPD as a product EPD in which the environmental impacts can be attributed to a single manufacturer and manufacturing facility.**

### Factors that can affect reported GWP in EPDs

EPDs report the environmental impact based on data typically collected over a period of one year. The reported GWP represents a snapshot in time and there are many factors that can impact the reported results in an EPD such as:

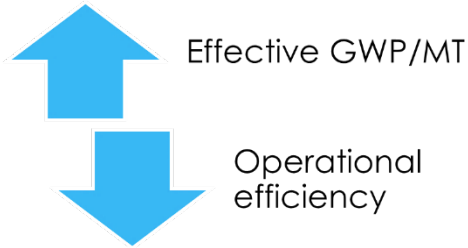
#### Data quality

The age of data used in an LCA may lag significantly behind the published date of the EPD. The selected PCRs indicate primary data (measured) to be no older than five years and secondary data (industry averaged) to be no older than 10 years.

#### Manufacturing operational efficiencies

There is a minimum amount of GWP produced by the consumption of energy and other resources associated with the operation of a factory, whether it is at 10% or 100% capacity utilization. A lower capacity utilization (i.e., lower operational efficiency) will generally result in a higher GWP per MT of product produced. That is, operational efficiency and GWP have an inverse relationship as shown in Figure 8 below.

Figure 8: Effective GWP in relation to operational efficiency.



### Variability in LCAs

Through research, DGS discovered that there is a level of variability associated with conducting LCAs. While ISO standards and PCRs offer guidance to conduct an LCA, there is some judgement left to the LCA practitioner. The choice of life cycle modeling, assumptions made, LCA analysis software, and LCI datasets used can create variability in environmental results reported from one LCA practitioner to another.

### PCR revisions

PCRs are renewed on a five-year cycle. The requirements for calculating GWP may change over time to reflect the most current method of determining GWP (e.g., use of a different life cycle impact methodology). For example, the PCR for steel construction products was updated in August 2020. It calls for the use of a more recent version of impact assessment data for GWP. Anecdotally, this would change the reported GWP by 2% to 3% if compared to the guidance in the previous version of the PCR.

**In summary, the GWP reported in an EPD is a snapshot in time. Any of the factors (data quality, manufacturer operational efficiencies, variability in LCAs, and PCR revisions) could impact the results of the reported GWP without any process or technology change by a manufacturer. However, based on the statute requirements and recommendation from CARB, these factors will not be considered when setting the maximum GWP limit.**

### Options to determine industry average GWP

Based on our analysis, there are two viable options to determine the industry average GWP:

#### Option 1

Mathematically calculate an average of reported GWP from only facility-specific EPDs.

## Option 2

Leverage the reported GWP from an industrywide EPD.

The industry average GWP for each eligible material will be determined as described below.

### Structural steel

There are very few facility-specific EPDs for structural steel hot-rolled sections, hollow structural sections, and plate that would allow adequate representation of the industry today. However, new industrywide EPDs were published in 2021 for each of these structural steel subcategories sponsored by two trade organizations (American Institute of Steel Construction and the Steel Tube Institute).

At the time of publication, the industrywide EPD for hot-rolled sections represented 90% of the domestic production from three major manufacturers. The industrywide EPD for hollow structural sections represented 60% of the domestic production from seven manufacturers. The industrywide EPD for plate represented 90% of the domestic production (used in bridge and building construction) from three major manufacturers.

The U.S. is a large importer of steel. The amount of carbon emissions associated with those imports varies widely depending on the country of origin. With few exceptions, the carbon emissions associated with steel production is generally higher outside of North America. It should be noted that the 2021 industrywide EPDs for hot-rolled sections, hollow structural sections, and plate do not currently reflect steel production outside of North America. However, the BCCA specifies:

*“If the department determines that the facility-specific environmental product declarations available do not adequately represent the industry as a whole, it may use industrywide environmental product declarations based on domestic production data in its calculation of the industry average.”*

**DGS will establish the industry average GWP by leveraging the 2021 industrywide structural steel EPDs for hot-rolled sections, hollow structural sections and plate from the American Institute of Steel Construction and the Steel Tube Institute.**

### Concrete reinforcing steel

Many fabricator facility-specific EPDs that DGS reviewed reported GWP from primary data (actual measured data from the facility). A majority of these EPDs reported the GWP data separately into information modules A1, A2, and A3. The A1 module represents the manufacturing stage at the mill level, which captures

90% or more of the GWP emissions reported in an EPD. Unfortunately, in these EPDs it was determined that the A1 data came from a single manufacturer. Using these EPDs to calculate an industry average GWP would not be representative of the industry.

**DGS will establish the industry average GWP by leveraging the industrywide EPD sponsored by the Concrete Reinforcing Steel Institute. The EPD represents data from four manufacturers at 24 manufacturing facilities and covers 75% of the total U.S. concrete reinforcing steel production. Since this EPD does not report GWP into separate information modules, use of the LCA background report will be necessary to identify the manufacturer's GWP contribution.**

### **Flat glass**

The glass industry currently has three companywide EPDs in the marketplace that were developed according to the expired North American PCR (V1). There are no facility-specific EPDs to calculate an industry average GWP, however, an industrywide EPD exists.

**DGS will establish the industry average GWP limit by leveraging the industrywide EPD sponsored by the National Glass Association (NGA).**

The NGA represents over 80% of the flat glass manufacturing in the United States. The industrywide EPD was developed according to the previous flat glass PCR (V1). DGS has confirmed with the program operator (NSF International) that the GWP calculation will not change with the revised PCR (V2). Therefore, the GWP value reported in the current industrywide EPD will still be relevant to establish an industry average. The GWP encompassing the impacts from raw materials acquisition and production will be summed to determine an average.

### **Mineral wool board insulation**

The mineral wool board insulation industry has one companywide EPD in the marketplace that was developed according to the current PCR. This EPD represents two facilities and using it to calculate an industry average GWP would not represent the whole industry.

**DGS will establish the industry average GWP by leveraging the industrywide EPD for light-density and heavy-density mineral wool board sponsored by the North American Insulation Manufacturers Association (NAIMA).**

NAIMA represents a majority of mineral wool producers in North America. The GWP encompassing the impacts from raw material acquisition, transport, and manufacturing will be summed to determine an average.



## Setting the maximum acceptable GWP limit

The BCCA calls for the GWP limit to be set at the industry average of facility-specific GWP for eligible materials. The BCCA also allows DGS to exclude emissions that occur during fabrication stages and make reasonable judgements aligned with the PCR.

**DGS will exclude emissions that occur during the fabrication stages to establish the final limit.**

### Maximum acceptable GWP limits for structural steel

The industrywide EPDs used for establishing the average GWP are as follows:

- Fabricated Hot-Rolled Structural Sections, issued January 1, 2021, declaration number 4789556099.102.1, American Institute of Steel Construction.
- Hollow Structural Sections, issued July 1, 2021, declaration number 4790021087.101.1, Steel Tube Institute.
- Fabricated Steel Plate, issued January 1, 2021, declaration number 4789556099.101.1, American Institute of Steel Construction.

Since two of these industrywide EPDs report the GWP to produce 1 MT of fabricated product, an additional calculation step will be necessary to obtain the GWP for 1 MT of unfabricated material. In the fabrication process, there is some material that goes to waste. Therefore, more than 1 MT of unfabricated material is required to produce 1 MT of fabricated product. The industry standard figure for structural steel waste is about 7%.

Therefore, the GWP for 1 MT of unfabricated product is determined by taking the GWP reported in information module A1 and dividing this figure by 1.07.

For fabricated hot-rolled structural sections,  $A1 = 1.08 \text{ MT CO}_2 \text{ eq}$ . The unfabricated GWP for 1 MT of material is then  $1.08/1.07 = 1.01 \text{ MT CO}_2 \text{ eq}$ .

For fabricated steel plate,  $A1 = 1.59 \text{ MT CO}_2 \text{ eq}$ . The unfabricated GWP for 1 MT of material is then  $1.59/1.07 = 1.49 \text{ MT CO}_2 \text{ eq}$ .

For hollow structural sections, the industrywide EPD represents unfabricated material and does not need the additional calculation step described above. The GWP is the sum of information modules A1-A3 or  $1.71 \text{ MT CO}_2 \text{ eq}$ .

Maximum Acceptable GWP Limit (unfabricated):

Hot-rolled sections: 1.01 MT CO<sub>2</sub> eq./MT or 1,010 kg CO<sub>2</sub> eq./MT.

Hollow structural sections: 1.71 MT CO<sub>2</sub> eq./MT or 1,710 kg CO<sub>2</sub> eq./MT.

Plate: 1.49 MT CO<sub>2</sub> eq./MT or 1,490 kg CO<sub>2</sub> eq./MT.

### **Maximum acceptable GWP limit for concrete reinforcing steel**

The industrywide EPD used for establishing the average GWP is as follows:

- Fabricated Steel Reinforcement, issued August 29, 2017, declaration number 70, Concrete Reinforcing Steel Institute.

Since the industrywide EPD reports the GWP to produce 1 MT of fabricated product, an additional calculation step will be necessary to obtain the GWP for 1 MT of unfabricated material. In the fabrication process, there is some material that goes to waste. Therefore, more than 1 MT of unfabricated material is required to produce 1 MT of fabricated product. The industry standard figure for concrete reinforcing steel waste is about 3%.

Therefore, the GWP for 1 MT of unfabricated product is determined by taking GWP reported in the background report for information module A1 and dividing this figure by 1.03.

For fabricated concrete reinforcing steel, A1 = 0.92 MT CO<sub>2</sub> eq. The unfabricated GWP for 1 MT of material is then  $0.92/1.03 = 0.89$  MT CO<sub>2</sub> eq.

Maximum Acceptable GWP Limit (unfabricated):

Concrete reinforcing steel: 0.89 MT CO<sub>2</sub> eq./MT or 890 kg CO<sub>2</sub> eq./MT.

### **Maximum acceptable GWP limit for flat glass**

The industrywide EPD used for establishing the average GWP is as follows:

- Flat Glass, issued December 20, 2019, declaration number 121, NGA.

This industrywide EPD represents 1 MT of unfabricated flat glass. The GWP is the sum of the information modules for raw material acquisition and production or 1.43 E+03 kg CO<sub>2</sub> eq.

Maximum Acceptable GWP Limit (unfabricated):

Flat glass: 1.43 E+03 kg CO<sub>2</sub> eq./MT or 1.43 MT CO<sub>2</sub> eq./MT.

## Maximum acceptable GWP limits for mineral wool board insulation

The industrywide EPD used for establishing the average GWP for light and heavy density mineral wool board insulation is as follows:

- Mineral Wool Board, issued November 7, 2018, declaration number 4788703029.101.1, NAIMA.

This industrywide EPD represents 1 m<sup>2</sup> of unfabricated mineral wool board insulation with an average thermal resistance (R<sub>SI</sub>) of 1 m<sup>2</sup>-K/W.

**Thermal resistance** is a measure of how well an insulating material resists heat flow and is commonly known as a “R-value” (imperial units) or “R<sub>SI</sub>” (metric units). In imperial units, the R-value is expressed in ft<sup>2</sup>-F-hr/Btu (square foot x degrees Fahrenheit x hours per British thermal unit). In metric units, the R<sub>SI</sub> is expressed in m<sup>2</sup>-K/W (square meters x degrees Kelvin per watt).

For light-density mineral wool board, the GWP is a sum of information modules A1-A3 or 3.33 kg CO<sub>2</sub> eq.

For heavy-density mineral wool board, the GWP is a sum of information modules A1-A3 or 8.16 kg CO<sub>2</sub> eq.

Maximum Acceptable GWP Limit (unfabricated):

Light-density mineral wool board insulation: 3.33 kg CO<sub>2</sub> eq./1 m<sup>2</sup>.

Heavy-density mineral wool board insulation: 8.16 kg CO<sub>2</sub> eq./1 m<sup>2</sup>.

## Conclusion

This report explains the methodology DGS used to set the maximum acceptable GWP limit for each eligible material of the BCCA as required by statute. The limits are summarized in Table 1 and posted on the DGS [Buy Clean California webpage](#).

Table 1: Maximum Acceptable GWP limit summary

<b>Eligible material</b>	<b>Maximum acceptable GWP limit (unfabricated)</b>
Hot-rolled structural steel sections	1.01 MT CO <sub>2</sub> eq./MT
Hollow structural sections	1.71 MT CO <sub>2</sub> eq./MT
Steel plate	1.49 MT CO <sub>2</sub> eq./MT
Concrete reinforcing steel	0.89 MT CO <sub>2</sub> eq./MT
Flat glass	1.43 MT CO <sub>2</sub> eq./MT
Light-density mineral wool board insulation	3.33 kg CO <sub>2</sub> eq./1 m <sup>2</sup>
Heavy-density mineral wool board insulation	8.16 kg CO <sub>2</sub> eq./1 m <sup>2</sup>

## Glossary

### **Environmental product declaration**

An environmental product declaration (EPD) is an independently verified and registered document that reports a product's environmental impact over its life cycle.

### **Global warming potential**

Greenhouse gases (GHGs) are those that trap heat in the earth's atmosphere. Carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs) are types of GHGs. While all GHGs have the effect of trapping heat, each gas has a different amount of impact. The various GHGs produced when manufacturing a product, for example, can be represented by an equivalent amount of carbon dioxide associated with the warming effect of a given quantity of a GHG. This amount is known as global warming potential and is expressed in carbon dioxide equivalent (CO<sub>2</sub> eq.).

### **ISO 14025<sup>1</sup>**

This document specifies the principles and procedures for the development of Type III environmental declarations.

### **ISO 14040<sup>2</sup>**

This document specifies the principles and framework for conducting a life cycle assessment.

### **ISO 14044<sup>3</sup>**

This document specifies the requirements and guidelines for conducting a life cycle assessment.

### **ISO 21930<sup>4</sup>**

This document specifies the requirements to develop environmental product declarations for construction products and services.

### **Life cycle assessment**

A study to determine the environmental impact of a product, process, or service over its life cycle.

### **Life cycle inventory dataset**

A quantitative accounting of input and output energy and material flows for a particular process.

### **Product category rules**

A document specifying the requirements for developing an environmental product declaration.

### **Program operator**

An independent party that operates an EPD development program.

### **References**

1. ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures
2. ISO 14040:2006, Environmental management – life cycle management – Principles and framework
3. ISO 14044:2006, Environmental management – life cycle assessment – Requirements and guidelines
4. ISO 21930:2017, Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services