

## Buy Clean California Act

The Buy Clean California Act (BCCA), (aka Assembly Bill 262) addresses carbon emissions associated with the production of specific products including flat glass and requires the CA Department of General Services to establish a maximum acceptable benchmark for Global Warming Potential (GWP) for the covered products.

For flat glass used in infrastructure projects in the state of California the BCCA requires that state agencies:

1. Evaluate only products with Environmental Product Declarations (EPDs).
2. Utilize products demonstrating a lower GWP than the product benchmark.



### Common Questions Around the BCCA:

This document is intended to address common questions concerning the Buy Clean California Act, reduce potential confusion around compliance with the BCCA and provide documentation that Vitro's Architectural Glass Products comply with the BCCA. Questions and subjects addressed include:

- [Vitro Flat Glass Products Compliance with the BCCA](#)
- [What is GWP?](#)
- [What is an EPD?](#)
  - Flat Glass & Processed Glass EPD's
  - Facility Specific & Product Specific EPD's
  - Type III Certified EPD's
  - BCCA GWP & EPD GWP Units Explained
- [Vitro Provided EPD's](#)
  - Flat Glass EPD
  - Process Glass EPD
- [Use Flat Glass EPD](#)
- [Which CA State Agencies Must Comply with the BCCA?](#)
- [Vitro Sustainability Programs](#)
- [Summary](#)

## Vitro Flat Glass Products Compliance with the BCCA

With a GWP of 1370 kg CO<sub>2</sub>-eq, (1.37 E+03 kg CO<sub>2</sub>-eq), Vitro's Flat Glass products are in full compliance with the published maximum acceptable Global Warming Potential (GWP) for Flat Glass of 1720 kg CO<sub>2</sub>-eq, (1.72 E+03 kg CO<sub>2</sub>-eq) and comply with the BCCA. "Carbon dioxide equivalent" is abbreviated as: "CO<sub>2</sub>-eq"

### What is GWP?

Global Warming Potential, (GWP) is a measure of Green House Gas (GHG) emissions such as CO<sub>2</sub> and other GHGs that trap heat in the earth's atmosphere. The various GHGs produced when manufacturing a product can be represented by an equivalent amount of carbon dioxide associated with the warming effect of a given quantity of GHG. This amount is the GWP and is expressed as carbon dioxide equivalent, or CO<sub>2</sub>-eq. Stakeholders and sustainability programs can utilize the GWP to better understand the environmental performance of glass and other products manufactured for buildings.



### What is an EPD?

Environmental Product Declarations (EPDs) are an internationally recognized environmental impact label, like a nutrition label on food. Specific EPDs are developed in accordance with Product Category Rules (PCRs) for that product. The PCR establishes standardized methods for quantifying the environmental impacts of manufacturing a particular product, from cradle to factory gate. EPD's integrate the full process of producing a product or material, from mining and raw materials development, through delivery of materials and manufacturing of finished product. Each product's PCR must follow the principles and framework established by the International Organization for Standardization (ISO), which sets industrial standards worldwide. Based on the type of product, EPDs are developed in accordance with a specific PCR, which accounts for the various production methods and establishes a methodology for emissions reporting. EPD's typically rely on various assumptions and estimations and therefore the accuracy will differ for any product line and reported impacts.

### Flat Glass & Processed Glass EPD's

Processed glass is flat glass that has been further processed with one or more of the following: coating, tempering, laminating, silk-screening, insulating, painting, etc. Glass that is installed in a building is almost certain to have been processed prior to installation. The installed flat glass will have been cut-to-size and typically heat-treated (fully tempered or heat-strengthened), and further processed into a fabricated glass product such as laminated, insulating, painted, etc. The GWP of Processed Glass will include the Flat Glass GWP plus any added impacts from processing into the total Processed Glass GWP. Flat Glass is the single largest contributor to the Processed Glass GWP. For example, the Flat Glass GWP accounts for approximately 75% of the total GWP for Insulated Glass Units (IGU). There are separate PCR and EPD requirements that apply to “flat glass” and “processed glass” as well as different declared units for each type. The declared unit for Flat Glass is one metric tonne of (1000kg) float glass maintained for 30 years while the declared unit for Processed Glass is 1m<sup>2</sup>. It is assumed that the processed glass products are 6mm thick, which is the most common thickness for commercial applications.



The glass facade of a public works project could contain processed glass from multiple flat glass manufacturing locations or companies. Many of the processed glass products contain multiple types of flat glass products. Many of these glass products are made at multiple facilities and due to campaign production, it is not feasible to dedicate supply of any project from one specific plant. In addition, not all glass products are made at every facility, so it is possible that the product of choice is not made at the facility specific EPD location of choice. Most building projects utilize specific products and therefore we recommend utilizing product specific EPD's. A product specific EPD also has the advantage of assuring all the production processes for the specific product are being considered and is thus more helpful in accurately selecting products with lower GWP. Third party verification of the EPD is costly and involves legal sharing of confidential data with parties outside of the manufacturer. Facility specific EPD's would result in more EPD's and thus more cost which would have to be passed down the supply chain. In glass production a product specific Flat Glass EPD is less costly and provides a more accurate picture of a particular product's GWP impact.

### Facility Specific & Product Specific EPD's

The glass facade of a public works project could contain processed glass from multiple flat glass manufacturing locations or companies. Many of the processed glass products contain multiple types of flat glass products. Many of these glass products are made at multiple facilities and due to campaign production, it is not feasible to dedicate supply of any project from one specific plant. In addition, not all glass products are made at every facility, so it is possible that the product of choice is not made at the facility specific EPD location of choice. Most building projects utilize specific products and therefore we recommend utilizing product specific EPD's. A product specific EPD also has the advantage of assuring all the production processes for the specific product are being considered and is thus more helpful in accurately selecting products with lower GWP. Third party verification of the EPD is costly and involves legal sharing of confidential data with parties outside of the manufacturer. Facility specific EPD's would result in more EPD's and thus more cost which would have to be passed down the supply chain. In glass production a product specific Flat Glass EPD is less costly and provides a more accurate picture of a particular product's GWP impact.

### Type III Certified EPD's

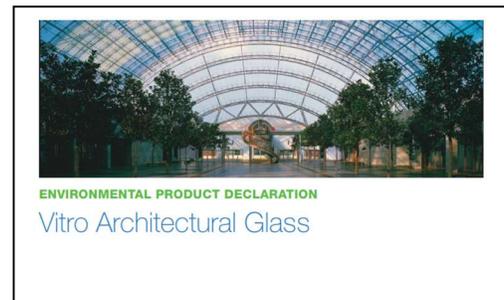
The BCCA requires an independently verified and registered EPD that reports a product's environmental impact over its life cycle. Vitro Architectural Glass has two EPD's and both EPD's are Type III EPDs that are certified and registered by ASTM International (ASTM) as conforming to the requirements of ISO 14025. ASTM has determined that the Flat Glass Life Cycle Assessment, (LCA) information fulfills the requirements of ISO 14044 in accordance with the instructions listed in the Flat Glass Product Category Rules, (PCR).

### BCCA GWP & EPD GWP Units Explained

The BCCA specifies the GWP units as 1.72E+03 kg CO<sub>2</sub>-eq per 1 metric ton of glass. While this can be confusing, the +03 is known as an exponential designation and is the equivalent of multiplying the number by 1000. In this case, the 1.72E+03 kg CO<sub>2</sub>-eq is equivalent to 1720 kg CO<sub>2</sub>-eq. The Vitro EPDs are published using the full number designation, i.e., 1370 kg CO<sub>2</sub>-eq per 1 metric ton of glass. In exponential designation, the Vitro GWP is 1.37E+03 kg CO<sub>2</sub>-eq per 1 metric tonne of glass.

### Vitro Provided EPD's

Vitro was the first North American manufacturer to publish third-party verified EPD's. Vitro currently has EPD's published for Flat Glass and Processed Glass products. These documents provide detailed data about the life cycle impacts of Vitro Glass products on the environment and may be used as credentialing for LEED<sup>®</sup> and other green building certification programs such as the Buy Clean California Act.



### Vitro Flat Glass EPD

The Flat Glass EPD is valid for all Vitro Glass products including clear, low-iron, and uncoated tinted glass. The declared products that were submitted for evaluation were uncoated and unprocessed flat glass products as defined by NSF GANA Product Category Rule (PCR) for Flat Glass – UNCPC 3711. The declared unit for Flat Glass is 1 metric tonne of (1000kg) float glass maintained for 30 years. The Life Cycle Assessment Results (LCA) from the Vitro Flat Glass EPD are shown below and on Vitro’s Sustainability website at: <https://www.vitroglazings.com/media/nf0nm25r/vitro-epd-flat-glass-products.pdf>

**Life Cycle Assessment Results (TRACI 2.1) Vitro Architectural Flat Glass**

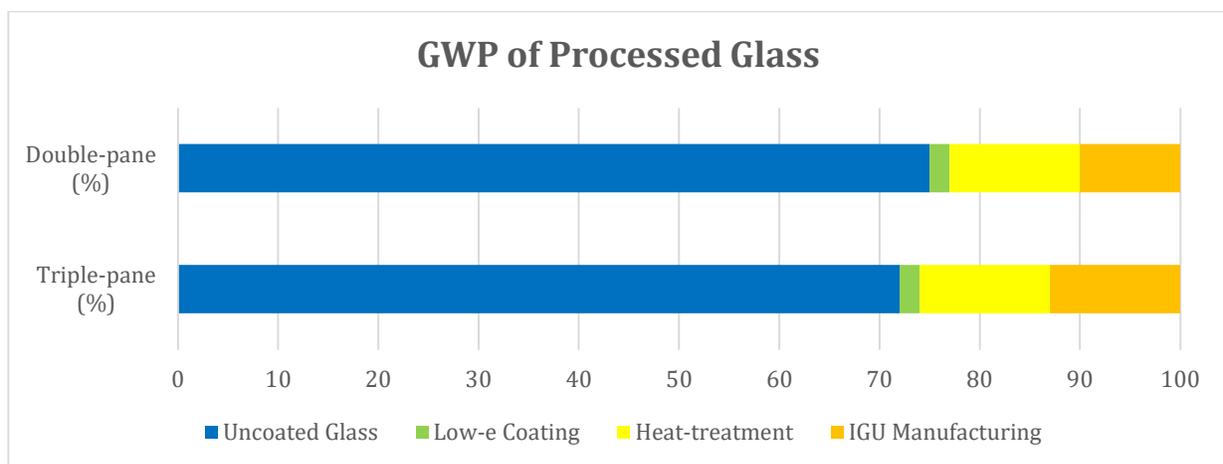
EVALUATION VARIABLE	UNIT PER METRIC TONNE	TOTAL	RAW MATERIALS	PRODUCTION
Primary Energy, non-renewable	MJ	19,600	4,870	14,800
Primary Energy, renewable	MJ	695	227	468
Global Warming Potential	kg CO <sub>2</sub> eq.	1,370	350	1,020
Ozone Depletion Potential	kg CFC-11 eq.	1.10E-07	2.96E-08	8.06E-08
Acidification Potential	kg SO <sub>2</sub> eq.	8.02	0.909	7.11
Eutrophication Potential	kg N eq.	0.461	0.0501	0.411
Smog Formation Potential	kg O <sub>3</sub> eq.	212	16.6	195
Mineral Resource Depletion Potential (ReCiPe 1.08)	kg Fe eq.	12.3	6.23	6.09

### Vitro Processed Glass EPD

The Processed Glass EPD is valid for all coated and/or heat-treated glasses manufactured by Vitro whether they are used monolithically (in single-pane windows) or combined with other Vitro products in double or triple-pane IGUs. Vitro’s Processed Glass EPD is typical of the industry but may be slightly different from other fabricators and can be found on Vitro’s Sustainability website at: <https://www.vitroglazings.com/media/x4ajs3s2/vitro-epd-processed-glass-products.pdf>. The declared unit for Processed glass is 1m<sup>2</sup> and it assumed that the processed glass products are 6mm thick, which is the most common thickness sold.

## Use Flat Glass EPD

The Processed Glass utilizes the upstream data including the Flat Glass EPD which results in the manufacturing of the float glass being the single largest contributor to the GWP for all Processed Glass. Take for example, a Double-pane IGU in which the Flat Glass accounts for 75% of the total GWP as shown in the figure below while in a Triple-pane IGU's the Flat Glass accounts for 72% of the total GDP.



Current studies<sup>1</sup> of embodied carbon of building materials show that exterior windows contribute less than 2% of the overall carbon impact of a building. Since, the single largest contributor to the GWP of insulating glass units comes from the flat glass manufacturing with the flat glass GWP accounting for approximately 75% of the total GWP of the insulated glass units. This results in the glass embodied carbon contribution of a building to be estimated as less than 1.5%. Therefore, it is reasonable to use the GWP from the Vitro Flat Glass EPD to demonstrate compliance to the BCCA GWP requirement.

## Which State Agencies Must Comply with the BCCA?

The awarding authorities that must comply with the BCCA include: 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](#).

<sup>1</sup> Reference: Embodied Carbon: Key Considerations for Key Materials, Nov 1, 2020, Anthony Pak, Priopta Innovations Inc.

## Summary

On January 1, 2021, the California DGS published the maximum acceptable GWP for Flat Glass at 1.72 E+03 kg CO<sub>2</sub>-eq (1720 kg CO<sub>2</sub>-eq). Vitro's Flat Glass products easily meet this published maximum acceptable GWP with a declared GWP of 1.37 E+03 kg CO<sub>2</sub>-eq (1370 kg CO<sub>2</sub>-eq). Vitro's Flat Glass products are approximately 4% lower than the published industry-wide flat glass GWP of 1.43 E+03 kg CO<sub>2</sub>-eq (1430 kg CO<sub>2</sub>-eq) and more than 20% below the published BCCA GWP requirement.

## Vitro Sustainability Programs

For further information on Vitro's commitment to the environment, Cradle2Cradle Certified products, and sustainability, please visit Vitro's Sustainability website at:

<https://www.vitroglazings.com/design-resources/sustainability-resources-downloads/>

