

Lessons Learned from California Buy Clean



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Takeaways

In 2017, California signed into law the Buy Clean California Act (BCCA), a procurement policy designed to mitigate embodied carbon by prioritizing the use of low-carbon materials in public works projects. In light of the Biden Administration's recent executive actions to establish a similar federal policy, stakeholders can learn a lot from California's experience and use these lessons to implement an effective federal program that could:

- become a template for Buy Clean efforts across all levels of government;
- facilitate consistency in procurement requirements across jurisdictions, reducing regulatory uncertainty;

- and engender buy-in and support among stakeholders like labor unions and manufacturers to reduce embodied carbon across entire sectors and increase American competitiveness.

Scaling Up a Commitment to Buy Clean

Back in 2017, the state of California signed into law a then-novel policy to address industrial emissions, an often overlooked and hard-to-abate piece of the climate puzzle. The idea was to use its considerable procurement power to “Buy Clean,” thereby incentivizing manufacturers of common construction materials like concrete and steel to produce fewer emissions in the manufacturing of their products. If they wanted to compete for state infrastructure projects, they would be required to disclose the embodied carbon of their materials, or the total amount of emissions produced over their lifecycle, and compete on the basis of climate impact in addition to cost.

Since then, other states (including Washington, Oregon, Colorado, Minnesota, New York, and New Jersey) have advanced state Buy Clean or Buy Clean-related policies, and local governments and many organizations in the private sector have also developed ambitious procurement practices to mitigate embodied carbon. But as the single largest purchaser of these materials, the federal government is uniquely positioned to accelerate the growth of the low-carbon product market by implementing a federal Buy Clean program.

Over the past year, the Biden Administration has made important strides in getting us there. As part of its December 2021 Executive Order on federal sustainability, it created the first-ever federal Buy Clean Task Force to convene leaders from across the government and make recommendations to guide cleaner procurement efforts. The good news is that we do not have to start from scratch. As cataloged in this memo, California encountered numerous opportunities and challenges from which federal administrators can learn while developing and implementing a federal Buy Clean program. We can leverage these lessons learned into a more efficient, effective procurement policy that benefits both the climate and US manufacturers, who in many cases produce cleaner materials than major foreign competitors.

Background on California Buy Clean

The Buy Clean California Act (BCCA) was signed into law in October 2017 with subsequent amendments in 2018 and 2021. BCCA enables the state to leverage its purchasing power in order to lower the Global Warming Potential (GWP) of construction materials used in public works projects. GWP is a measure of the embodied greenhouse gas (GHG) emissions associated with covered materials. These are emissions that occur during the raw material extraction, upstream production,

transportation, and manufacturing stages before the material is used for construction purposes. The policy focuses on reducing cradle-to-gate embodied emissions through disclosure and setting GWP limits. The bill is crafted to benefit those manufacturers who have made a conscious effort to lower embodied GHG emissions in the production of construction materials, starting with structural steel (hot-rolled sections, hollow structural sections, and plate), concrete reinforcing steel, flat glass, and mineral wool board insulation.

The State's Department of General Services (DGS), in consultation with the California Air Resources Board, is tasked with establishing the GWP limits that awarding state agencies must not exceed in the procurement of these materials. Environmental Product Declarations (EPDs), third-party verified reports based on ISO (International Organization for Standardization) standards that disclose a product's environmental impact as determined by a Life Cycle Assessment (LCA), are used to establish the GWP limits and to determine compliance. EPDs are developed according to a set of requirements and guidelines known as Product Category Rules (PCRs). The GWP limits for BCAA were set at the industry average for each covered material using data from facility-specific EPDs or industry-wide EPDs based on domestic production data.

DGS published the maximum acceptable GWP per unit for each category of eligible material on January 1, 2022. Awarding authorities will begin assessing GWP compliance as criteria in the procurement process on July 1, 2022. DGS will review the maximum acceptable GWP for each material commencing January 2025 and every three years thereafter. It may only adjust GWP limits downward to reflect industry improvements. Also, commencing in January 2025, only facility-specific EPDs will be used in GWP limit assessments. Facility-specific EPDs will provide a much more accurate indication of the GWP for a product being manufactured at a particular plant, compared to those using broader industry average data, enhancing the State's ability to procure products with the lowest possible GWP.

DGS was delayed in publishing the GWP limits from the original plan, and therefore compliance with GWP limits was pushed back from July 1, 2021 to July 1, 2022. The delay was due to feedback from climate NGOs to California's Government Operations Department, which oversees DGS, that the GWP limits were not stringent enough to make an appreciable impact on mitigating embodied carbon in the targeted manufacturing sectors.

The purpose of this document is to discuss nine specific aspects of the DGS methodology, as identified by the agency, and issues that the State encountered in its implementation of the BCCA that can help inform other Buy Clean implementation efforts at the federal or state levels. We base our assessment on a summary of findings included in [DGS's BCCA Legislative Report](#) dated January 1, 2022, as well as information included in the Carbon Leadership Forum's analysis, titled [Buy Clean California Limits](#), also published in January 2022. In addition, we conducted interviews with California state employees involved in the management or implementation of the BCCA program and have included their feedback in this report.

1. Product Category Rules

Although ISO standards state that EPDs can be used for comparisons of products fulfilling the same function, EPDs based on different PCRs offer limited comparability. DGS found it necessary to ensure that EPDs used to establish GWP limits and to measure compliance to those limits be developed under the same PCR. PCRs specify what gets measured in an LCA, what data is used in LCA calculations, and what data is reported in EPDs. They reflect the norms of the region in which they are developed. These norms are represented in Life Cycle Inventories (LCIs), which specify the energy and resource requirements for producing various materials and include parameters, such as the carbon content of the electricity grid, fuels, chemicals, resins, and transportation.

DGS chose PCRs intended for products used and/or sold in North America, although if international manufacturers develop EPDs using the North American PCRs, their products could be eligible for consideration.

In the context of a federal Buy Clean program, it will be critical to ensure that EPDs for specified products are generated using relevant and consistent LCA and LCI data. This could be accomplished through PCRs or potentially project specifications. At a minimum, identifying which LCA and LCI data was used in the generation of EPDs would provide meaningful insight into EPD comparability. Mandating use of the Federal LCA Commons and US LCI database, curated and managed by the federal government, while simultaneously investing in the platforms' accuracy and robustness would help to increase the comparability of EPDs.

2. Materials

BCCA identified four construction materials to be covered initially by the policy: structural steel, concrete reinforcing steel, flat glass, and mineral wool board insulation.

BCCA excluded some widely used construction materials, such as cement, concrete, and aluminum. These materials are major components of transportation and other infrastructure projects that have been funded by the 2021 Infrastructure Investment and Jobs Act. As such, a Federal Buy Clean program should ensure inclusion of these materials from the start.

One of the challenges encountered in BCCA is that they chose only to apply performance standards for a single type of insulation when there are several materials that can be used for similar purposes in their construction projects. By applying the Buy Clean standard only to mineral board insulation, industry expressed concern that they weren't competing on a level playing field with the other insulation materials. A Federal Buy Clean program should consider developing PCRs for other types of insulating materials, such as fiberglass, cellulose or polyurethane, should mineral board insulation be selected as a covered material.

3. Subcategories

DGS found that it needed to further divide some of the four proposed categories into subcategories, as the variation between products within a material category would not lend itself to an optimal single GWP limit. Instead, it introduced three subcategories under structural steel (hot-rolled sections, hollow structural sections, and plate) and two subcategories under mineral wool board insulation (light-density and heavy-density) and established separate GWP limits for these subcategories. A federal Buy Clean program should likewise consider establishing subcategories wherein GWP limits can accurately represent similar products within a material category.

Hot rolled steel undergoes a process that involves rolling steel slabs into long hot bands that can be formed into various shapes and sizes. It is important that the GWP of the steel slabs be measured in the PCR for this material as they are often imported from countries with lower production standards than North America.

4. Life Cycle Stages and Impact Assessment

There are typically five lifecycle stages for construction materials: production, construction, use, end of life, and recycle/reuse. The PCR is the vehicle for identifying the lifecycle stages for which an EPD will report environmental impacts. The focus for BCCA is on manufacturing, and therefore the EPD specifies environmental impacts only for the production lifecycle, which is defined as extraction and upstream production, transportation to the factory, and manufacturing.

Although an EPD can report on several different types of environmental impact, such as ozone depletion, water pollution, water use, energy use, human toxicity, etc., the BCCA's interest is production stage GWP. If PCRs were to specify measurement of these other environmental impacts, a Federal Buy Clean program could include them as evaluation criteria in the procurement process. This would provide a more holistic view of the total environmental impact of a specific material.

For example, in addition to GWP, PCRs could specify impact categories that include the following:

- ozone depletion
- acidification
- eutrophication
- smog formation
- human health impacts
- ecotoxicity

5. Exclusion of Emissions Due to Fabrication

The BCCA does not require DGS to include emissions that occur during the 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). There were several issues taken into consideration in making this recommendation:

- In the case of structural steel and concrete reinforcing steel, the GWP contribution due to fabrication is 10% or less of the overall reported GWP for these materials.
- Often, especially for concrete reinforcing steel, the fabrication stage is undertaken by small to medium-sized businesses, and inclusion of GWP scores associated with fabrication could require multiple EPDs to be developed over time (primarily due to supply chain changes). As such, the additional costs to these businesses for a small portion of the overall GWP was considered prohibitive.

A federal Buy Clean program, however, may want to consider including emissions due to fabrication for flat glass. Flat glass, as defined in the PCR being used by BCCA is not processed (i.e., tempered or coated) or in assemblies, such as window frames. There is a PCR for processed glass which includes emissions from fabrication, and most of the glass purchased for construction projects is processed. A federal Buy Clean Program should therefore specify an EPD requirement for processed glass, using this separate PCR.

6. Facility-specific EPD

The BCCA specifies the use of facility-specific EPDs in setting GWP limits for each eligible material and requires successful bidders to produce current facility-specific EPDs before their products can be installed on state construction job sites. They define a facility-specific EPD as a product EPD in which the environmental impacts can be attributed to a single manufacturer and manufacturing facility. Facility-specific EPDs, however, are not always available and instead the use of an industry-wide (or industry average) EPD or a company-wide (representing multiple facilities) EPD is commonplace.

The distinction is important because industry-wide and company-wide EPDs are based on secondary data, such as average industry data from LCI datasets, whereas facility-specific EPDs are based on primary data, or data that is actually measured at the facility. Facility-specific EPDs thus offer the most unambiguous representation of a facility's environmental impact and eliminate the need for "production-weighting" the GWP result, which becomes necessary in the use of industry-wide or company-wide EPDs. "Production-weighting" accounts for the amount produced by different manufacturers of specific materials and is not disclosed when used in calculating the average GWP. As such, GWP limits calculated using industry-wide or company-wide EPDs are subject to mathematically incorrect results.

A federal Buy Clean program, however, should consider how to incentivize and accelerate the creation of facility-specific EPDs as they offer the best opportunity for an accurate assessment of a material's GWP.



If facility-specific EPDs are generally unavailable, we recommended that an industry average be created from a collection of facility-specific EPDs that are available. A federal Buy Clean program, however, should consider how to incentivize and accelerate the creation of facility-specific EPDs as they offer the best opportunity for an accurate assessment of a material's GWP.

7. Factors That Can Affect Reported GWP in EPDs

The typical period for data collection in generating an EPD report is one year and there are several factors that can impact these results. They include:

- Data quality, primarily due to the age of the data used in a LCA, which can lag behind the published date of the EPD;
- Manufacturing operational efficiencies, whereby capacity utilization of a factory and GWP have an inverse relationship (i.e., the lower the capacity utilization the higher the GWP because of baseline energy requirements to run the factory);
- Variability in LCAs, due to the choice by LCA practitioners of lifecycle modeling, assumptions, LCA analysis software, and LCI datasets used; and
- PCR revisions, which can sometimes alter the reported GWP by several percentage points from one version of a PCR to another.

The BCCA does not require these factors to be considered when setting the maximum GWP limit for specified materials, even though these factors could impact the results of the reported GWP without any process or technology change by a manufacturer. A federal Buy Clean program should consider how variability in these factors can be mitigated in determining EPD-generated GWPs.

8. Options to Determine Industry Average GWP

Option 1: Mathematically calculate an average of reported GWP from only facility-specific EPDs

Option 2: Use the reported GWP from an industry-wide EPD

In the case of structural steel, there are very few facility-specific EPDs for the three subcategories of materials. There are industry-wide EPDs that were published in 2021 sponsored by the American Institute of Steel Construction and the Steel Tube Institute that represent between 60-90% of the domestic production, as generated by 3-7 major manufacturers. As such, DGS felt comfortable establishing the industry average GWP by leveraging the results calculated by these two trade organizations.

In the case of concrete reinforcing steel, DGS found that only one manufacturer supplied data in the generation of facility-specific EPDs. Use of these facility-specific EPDs in the calculation of an industry average GWP limit would therefore not be representative of the industry as a whole. Instead, DGS established an industry average GWP for concrete reinforcing steel by leveraging the industry-wide EPD sponsored by the Concrete Reinforcing Steel Institute, which represents data from 75% of the total US production.

DGS was unable to find any facility-specific EPDs for flat glass and found just three company-wide EPDs based on an expired North American PCR. As such, it is using an industry-wide EPD sponsored by the National Glass Association, which represents over 80% of flat glass manufacturing in the US, even though it also is not based on the most current version of the PCR. The program operator, NSF International, assured DGS that the current PCR would not change the GWP calculation that is reflected in the industry-wide EPD. The GWP encompassing the impacts from raw materials acquisition and production was summed to determine the average.

Only one company-wide EPD representing two facilities exists in the mineral wool board insulation industry and therefore could not be used to represent the industry as a whole. DGS chose instead to use the industry-wide EPD for light-density and heavy-density mineral wool board sponsored by the North American Insulation Manufacturers Association (NAIMA) to establish the industry average GWP. NAIMA represents a majority of mineral wool producers in North America. The industry average GWP summed the impacts from raw material acquisition, transport and manufacturing.

9. Setting the Maximum Acceptable GWP Limit

As stated above, due to the lack of sufficient facility-specific EPDs, DGS calculated GWP limits based on industry-wide EPDs, as generated by North American industry associations based on domestic production. They also excluded the emissions that occur during the fabrication stages. The resulting maximum acceptable GWP limits for the materials and subcategories of materials is as follows:

State District	Frontline district total cases
Hot rolled structural steel sections	1.01 MT CO ₂ eq./MT
Hollow structural sections	1.71 MT CO ₂ eq./MT
Steel plate	1.49 MT CO ₂ eq./MT
Concrete reinforcing steel	0.89 MT CO ₂ eq./MT
Flat glass	1.43 MT CO ₂ eq./MT
Light-density mineral wool board insulation	3.33 kg CO ₂ eq./1 m ²
Heavy-density mineral wool board insulation	8.16 kg CO ₂ eq./1 m ²

Source: California Department of General Services. https://www.dgs.ca.gov/-/media/Divisions/DGS/LegReports/Accessible-Reports/2022/BCCA-Legislative-Report_final.pdf?la=en&hash=C970382B9DC8530385F0F0FFCD1928D2B7533B99.



Operational Issues

A great deal of preparation was and continues to be required to educate and train the awarding agencies in the implementation of BCCA. Contracting officers in many ways become auditors of the EPDs submitted by prime and subcontractors and must ensure that the paper trail through the supply chain is accurate. Providing sufficient funding and administrative capacity at the federal agencies tasked with implementing these new procurement initiatives is essential to the program’s success.

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Additionally, mechanisms needed to be put in place to track and report on what is procured, what GWP impact these materials have, and where exemptions were used. DGS created a database to store EPDs and transactional data on actual purchases.

Education and training for suppliers was also necessary, ensuring that manufacturers understood the compliance criteria for EPDs.

A Federal Buy Clean program should give attention to the specific language in the legislation to ensure it isn't contradictory to existing protocols and operational capabilities. For example, the BCCA specifies evaluating GWP limits every three years; however, the cycle for updating PCRs is every five years. Consider the situation in California where one program operator provided inaccurate data that was then used in the calculation of an industry-wide average establishing the baseline for setting a GWP for that specific material. The BCCA language states that limits can only be modified every three years, so had this error not been identified and corrected, the GWP limit based on erroneous data would have stood for that period of time.

Also, a federal Buy Clean program must be designed with enough flexibility to adapt to changes in the market, whether it is new technology that enables more stringent GWP limits or tracking and using additional environmental characteristics in EDPs that could impact GWP. An approach that allows for the assessment of breakthrough technologies in terms of availability and market penetration could potentially accelerate the downward trajectory of GWP. In general, the task of keeping PCRs and EPDs in sync is challenging and the program should be structured to provide evaluation flexibility.

DGS took the approach, at the recommendation of the California Air Resources Board, of “no tolerance” GWP limits. Either a manufacturer met the limit and qualified for consideration in the procurement process or they were eliminated from consideration (unless an exception was called). Another approach would be to use meeting or exceeding the GWP limit as one of several factors in the evaluation process. This approach would ensure that a manufacturer's material that was minimally under the GWP limit, but met or exceeded other important criteria in the evaluation process, would not be eliminated from consideration. This might be a way to mitigate the opportunity for challenges to procurement transactions, which can be time-consuming and create ill will with manufacturers.

Conclusions

The U.S. currently has an opportunity to grow our clean manufacturing and construction industries to both repair infrastructure and address the climate crisis by implementing a Federal Buy Clean policy. We believe a successful Buy Clean program will require incentives for clean industrial building materials and products, such as concrete, cement and steel, including through federal tax incentives, grant programs, and procurement. Scaling up industrial sector incentives and procurement policy also requires an accurate and standardized system to quantify and track the lifecycle greenhouse gas (GHG) emissions associated with industrial products.

The federal government can play two unique and critical roles in accomplishing these objectives: 1) effectively set a national standard for climate performance data transparency in the sector,

enabling a common framework across states and private industry, building trust in the integrity of Buy Clean policies and ensuring that manufacturers of low carbon industrial materials don't face a patchwork of different markets and rules; and 2) implement federal procurement programs for low-carbon industrial buildings materials that not only create early markets for cleaner products but help incentivize continuous innovation in decarbonizing the most widely used industrial products and processes.

The federal government has the opportunity to learn from the experience gained in the implementation of the Buy Clean California Act to aid in their efforts. Some of those lessons include:

1. Administrators of a federal Buy Clean program must engage industry, labor, and environmental organizations throughout the development of Buy Clean policies to identify potential roadblocks in advance and mitigate implementation delays, like those experienced in California.
2. Stimulating the market to participate in a federal Buy Clean program will likely require financial incentives to generate EPDs and offset initial premiums for low embodied carbon construction materials through demand incentive program funding (as included in the latest versions of both the Senate and House Build Back Better proposals).
3. Buy Clean legislation needs to be flexible and adaptive to ensure synchronicity between industry preparedness, technical capabilities, performance specifications, and reported compliance.
4. What gets measured in EPDs is defined in the PCR. Adequate staffing, both in numbers and in domain expertise, will be required to ensure the development of PCRs enable a fair comparison of GWP among covered materials. A common set of PCRs should be mandated for generation of EPDs used to meet federal Buy Clean program requirements.
5. Every effort should be made to invest in federally-managed underlying background and foreground data sets, such as the LCA and LCI data used to generate EPDs, so that they can be made freely available. Ideally, they should be specified for use in EPDs supplied on bids for federal government contracts. Use of common LCA and LCI data sets increases the accuracy and comparability of EDPs. The Federal LCA Commons platform housed at the US Department of Agriculture's National Agricultural Library and managed by US Department of Energy National Labs is the current framework for LCA and LCI data sets, which can be expanded and curated with additional funding.

6. Aligning materials specified in a federal Buy Clean program with planned federal spending for materials that have high levels of embodied carbon is essential. The exclusion of cement, concrete, and aluminum by the state of California limits program effectiveness, particularly as infrastructure spending is set to increase over the next decade, as authorized by the 2021 Infrastructure Investment and Jobs Act.
7. Adequate reporting and analysis of EPDs, procurements, and exceptions will enable a federal Buy Clean Program to evolve and increase effectiveness over time. For example, knowledge of the number of exceptions requested for a specific material can inform efforts to ensure PCRs are available and to incentivize adoption of EPDs for said materials.
8. Adequate and systemic education and training across awarding agencies, various levels of procurement professionals and project managers, and private sector industry associations and manufacturers is critical to ensuring uniform implementation of a federal Buy Clean program.

These insights into the challenges and operational issues in the deployment of the BCCA offers the federal government the opportunity to build a program which can address deficiencies or mitigate concerns that were encountered in California. A federal program could become the template for Buy Clean efforts across all levels of government and would facilitate consistency in procurement requirements, reducing regulatory uncertainty and engendering buy-in among manufacturers to reduce embodied carbon across entire sectors.

TOPICS

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