



Buy Clean Guidance for Structural Steel Products

Beginning in 2017 with the Buy Clean California Act, the American Institute of Steel Construction (AISC) has been at the forefront of helping policy-makers craft smart and informed Buy Clean policies for the American structural steel industry. This document summarizes our guidance for the benefit of future Buy Clean policy authors.

Following this guidance will ensure that a policy aligns with the realities of the structural steel supply chain, avoids unintended confusion, and functions effectively to reduce embodied carbon.

1. Recognize that many products are made from steel, but only some are structural steel

Structural steel is defined in the AISC Code of Standard Practice for Steel Buildings and Bridges ANSI/AISC 303-16 (COSP), which is available as a [free download](#). To provide clarity and effectiveness in a Buy Clean policy, separate structural products from non-structural products. Products such as ornamental steel, piling, cold-formed steel framing, and metal building components should be addressed separately if desired.

2. Distinguish between the three major product types of structural steel

Hot-rolled sections, hollow structural sections, and steel plate each have distinct embodied carbon profiles due to the unique steel-making processes required to produce them. A requirement for one is not applicable to another. In order for a Buy Clean policy to establish appropriate requirements, a calculation of total global warming potential (GWP) for a structure or a comparison at the procurement level should treat each product separately.

3. Focus requirements on high impact areas

Structural steel originates at a steel mill and then travels to a fabrication facility for value-added processing before arriving at a job site. However, before the product ever leaves the mill gate, upwards of 90% of the environmental impacts have already occurred. For structural steel, Buy Clean policies should create requirements that address a cradle-to-mill-gate scope only. If fabrication impacts are included, they should only reflect industry-wide fabrication impacts. Not only are the latter's impacts

relatively small, but the fabricator does not control the variables that would affect their impacts on a per tonnage basis. Project-specific factors such as project type (controlled by the owner) and design (controlled by the architect and structural engineer) have greater influence on a project's embodied carbon levels than do the fabricator's processes.

4. Include all relevant materials

All major structural products contain environmental impacts at the same order of magnitude. By mistakenly perceiving some products as "high-impact" and others as "low-impact", a Buy Clean policy would not only be discriminatory in the marketplace but also fail to fully achieve its embodied carbon reduction goals. Any product that provides a similar function in a building system should be included in a list of eligible materials, and a structural framing system can use any number of different products, including:

- Structural steel
- Reinforcing steel
- Sheet steel
- Precast concrete
- Cast-in-place concrete
- Mass timber
- Dimensional lumber
- Masonry block
- Brick

In particular, wood structural materials should include relevant information about forest management practices, including justification for claims of sustainably managed forests, as well as regional effects.

5. Enable consistent comparisons

Environmental Product Declarations (EPDs) are commonly used by Buy Clean policies because they are the best available mechanism for quantifying and reporting environmental impacts. However, Life Cycle Assessment (LCA) literature makes clear that their comparability is limited and urges caution when comparing EPDs outside the context of a robust whole-building LCA. At a minimum, enforce the following baseline standards:

- For steel EPD comparisons, only consider a cradle-to-mill-gate scope (LCA modules A1-A3; with A3 being a mill's operations, not a fabricator's) as the basis of comparison of steel to a prescribed threshold. This portion of the product's life cycle contains the majority of the GWP impacts and occurs prior to the installation of the product in the building. If fabrication impacts are included, they should only reflect industry-wide fabrication impacts. Also, some EPDs report values from module D, which fall outside the LCA system boundary.
- Limit applicable EPDs to those that comply with the current or prior version of the Product Category Rule (PCR), a consensus-based set of rules for developing EPDs for a particular type of product, used in the determination of the industry-wide values. For structural steel, the applicable PCR is [Part B: Designated Steel Construction Product EPD Requirements of the Product Category Rule \(PCR\) Guidance for Building-Related Products and Services](#)

6. Use verified industry-wide values as the basis of thresholds

Industry-wide values properly represent an industry's performance when developed in accordance with ISO procedures, such as being formed from a statistical survey of a minimum number of producers and weighted by production volume. To most accurately capture an industry's performance, base GWP thresholds on Type III-certified industry-wide LCA results and EPDs (with an appropriate uncertainty factor, see #7) . AISC's industry-wide EPDs for fabricated structural steel products are available at www.aisc.org/epd. By contrast, attempting to average the GWP impact of available producer EPDs for a product is an improper and unrepresentative approach; as it does not account for production volume, improperly skews the results, and can be fraught with misinterpretation.

7. Increase thresholds above industry-wide values

Thresholds should be set above industry-wide values for two critical reasons.

- LCA Uncertainties

EPD results represent snapshots in time, based upon the best available background data and methodologies. But they include uncertainties due to variations in data sources, calculation methodology, data collection processes, changes to background data sets over time, production levels, changing standard and PCR requirements, and electric grid energy mix changes over the 5-year life of an EPD - just to name a few!

This reality is commonly accepted. Building Transparency's EC3 tool estimates the uncertainty surrounding GWP values in EPDs to be between 25% and 40% for various products, the California Department of General Services originally recommended an uncertainty factor as high as 35%, and more jurisdictions are issuing steel sustainability specifications with uncertainty factors.

- Imports

Steel produced in the United States has the lowest carbon intensity per ton of all major steel-producing countries. However, many Buy Clean policies set thresholds based on domestic production only. Domestic-only thresholds disadvantage domestic steel producers who are significantly below global GWP averages but above domestic averages. That restricted approach, along with waiver processes and other loopholes, indirectly encourages the import of foreign steel, often with embodied carbon levels three times that of equivalent domestic products.

The domestic steel industry has taken great care in the LCA process and believes that the estimates of GWP published in our EPDs are more accurate than those published by foreign producers or other industries. Yet, we believe the reality of LCA uncertainties to affect the results in the range of 10% to 20%. Further, when consideration of the impact of imports is also taken into account, we recommend GWP threshold levels be set at 25% above the industry-wide value. Alternatively, in regions that experience high levels of imports, thresholds could also be set at global GWP averages.

8. Recognize renewable energy generation

As steelmaking is an energy intensive endeavor, mills are incentivized to produce, fund, and promote renewable energy generation for the purpose of reducing environmental impacts as reported in product EPDs. These actions include onsite generation, renewable energy certificate (REC) purchases, and long-term renewable power purchase agreements (PPAs). However, current EPD standards, identified in the PCR Part A, do not allow for the primary reporting of embodied carbon reduction based on these achievements if that renewable energy is delivered using the regional power grid. In order to accurately acknowledge the lower GWP of structural steel products, reinforce the incentives for renewable energy generation, and further the goal of greening the national electric grid, a smart Buy Clean policy should fully recognize any credible renewable energy benefits stated on a producer EPD that augment GWP values. Credibility shall be assessed in accordance with standard industry practices, such as those in guidance documents published by the American Center for Life Cycle Assessment (ACLCA).

Got Questions?

Max Puchtel, SE, PE, Director of Government Relations and Sustainability, puchtel@aisc.org.

The American Institute of Steel Construction (AISC), headquartered in Chicago, is a non-partisan, not-for-profit technical institute and trade association that has been the leading advocate and trusted resource for the American structural steel design community and construction industry since 1921.

Learn more at www.aisc.org/buyclean