

EPD / PCR

IRON AND STEEL SLAG STATUS

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PCR – Product Category Rule

- A PCR is a set of product category-specific requirements / rules / **guidelines for developing life cycle assessment** and reporting these findings in an Environmental Product Declaration for one or more product categories. Product category rules are reviewed and improved periodically over time (5-years).
- Product Category Rule (PCR) development can be sponsored by a **group of stakeholders, including associations, manufacturers,** or other interested parties.
- While PCRs must be prepared **in accordance with the requirements set forth in ISO 14025**, additional work may be needed to improve harmonization. PCRs for construction products must **additionally comply with ISO 21930.**
- Copies of the ISO standards can be downloaded from ANSI: <http://www.webstore.ansi.org>.

EPD – Environmental Product Declaration

- A **verified report used to communicate the environmental impacts of a specific material** (e.g., asphalt binder, portland cement) or product (e.g., asphalt mix, concrete mix).
- **EPDs are a life-cycle assessment developed by product manufacturers** following the Product Category Rules (PCR) that are developed with industry stakeholders and LCA experts and subjected to a critical review process.
- EPDs can be issued for a **specific product from a specific producer** but may also be issued for a **generic product from a group of manufacturers** (such as an association) that reflects the results of an industry-average LCA.
- EPDs using the same product category rules can be compared to identify materials with improved environmental performance in terms of various environmental and resource use impacts (e.g., energy use, air pollution, global warming, ozone layer depletion).

<https://www.fhwa.dot.gov/pavement/sustainability/pubs/hif19027.pdf>

Why Are We Interested?

July 25, 2024

DelDOT's EPD Journey: Paving the Way for Sustainable Infrastructure

When the Delaware legislature passed the Delaware Climate Change Solutions Act of 2023, it set goals of 50 percent GHG reduction by 2030 and net-zero by 2050. The State also required its agencies to develop construction preferences by July 2025. This was a key milestone on the Delaware Department of Transportation (DelDOT)'s environmental product declarations (EPDs) implementation journey.

PENNDOT'S EDC-7 EPD PROGRAM & IMPLEMENTATION PLAN

Dean Schmitt, PennDOT
Bureau of Maintenance
April 10, 2024



EPA Label Program for Low Embodied Carbon Construction Materials

The EPA Label Program for Low Embodied Carbon Construction Materials will define parameters and thresholds informing the White House Federal Buy Clean Initiative, which aims to grow the market and reward innovation for American-made, lower-carbon construction materials. Initial labeling is set for late 2026.

Current EPA Focus

- Material / ~ Slag Impact
 - Asphalt / ~90+%
 - Concrete / ~80% (40% Coarse Aggregate / 40% Fine Aggregate)
 - Cement
 - SCM or Alternative SCM / ~10 to 100%
 - Steel / ~10 to 25%
 - Glass / ?

U.S.E.P.A.

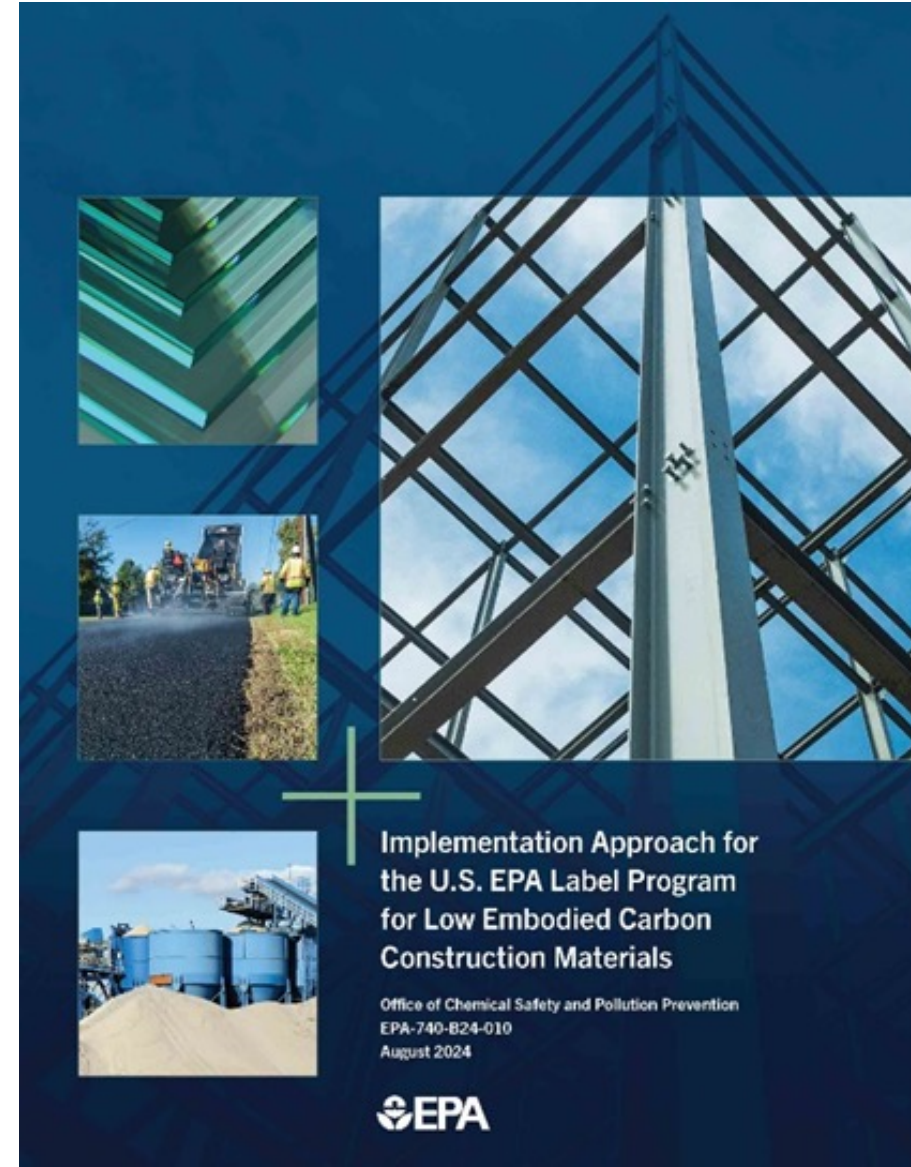
U.S. EPA Criteria for Product Category Rules (PCRs) to Support the Label Program for Low Embodied Carbon Construction Materials

(EPA's PCR Criteria) (Version 1—2024)

Office of Chemical Safety and Pollution Prevention

EPA-740-R-24-009

August 2024



Where Does Slag Fit?

Designation

Allocation

Identity

Designation

- Product
- Co-Product
- By-Product
- Discarded Material
 - Waste

Product / Co-Product

ISO 21930 Section 3.4.6

any of one or more *products* (ISO 14050:2009, 3.2) from the same *unit process* ([3.4.1](#)), but which is not the object of the assessment

Note 1 to entry: Co-product and product have the same status and are used for identification of several distinguishable flows of products from the same unit process. Where one of two or more co-products is the object of assessment of the *EPD* ([3.1.1](#)), this is normally considered the product and the other *output(s)* (ISO 14040:2006, 3.25) as the co-product(s). Where one of the co-products is an *input* (ISO 14040:2006, 3.21) to a *process* (ISO 14040:2006, 3.11), this is normally considered as a product input. From co-product and product, *waste* ([3.3.11](#)) is the only output to be distinguished as a non-product.

By-Product

ISO 21930 Section 3.4.71

Co-Product (3.4.6) from a process (ISO 14040:2006, 3.11) that is incidental or not intentionally produced and which can not be avoided.

Note 1 to entry: Wastes (3.3.11) are not By-Products

Discarded Material / Secondary Material

Material (ISO 5659 2:2012, 3.6) recovered from previous use or recovered from waste (3.3.11) derived from another product system (ISO 14040:2006, 3.28) and used as an input (ISO 14040:2006, 3.21) in another product system.

Waste

(ISO 21930: 2017, 3.3.11) Substance or objects which one intends to or is required to dispose of

Allocation (GHG) Methods

- No Allocation
- Economic Allocation
- Physical Partitioning
- System Expansion
- Mass-Based Allocation

EPA Guide – Allocation

If the PCR committee determines that a coproduct or byproduct exists, the PCR shall demonstrate steps taken to reach harmonization across PCR boundaries, such as reaching out to the impacted PCR committees to work towards cross-PCR harmonization. If the PCR committee is unable to reach harmonization with related PCR's but is aware of other PCR's differing approaches, it shall report differing approaches, it shall report the alternative allocation procedures used by upstream and down stream PCR's.

Active PCR's

Concrete

- Per Section 7.2, blast furnace slags (as a cement) are considered recovered materials and not co-products.
- Per Section 9.3. ““The product category rules for this EPD recognize fly ash, silica fume, and slag as recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a concrete material input.”

Slag Cement

- iron blast-furnace slag shall be considered a recovered material and not a co-product as is consistent with version 1 of the ASTM Slag Cement PCR and the version 2 of the NSF PCR for Concrete. Granulation is the first step in the process of making the recovered material as an input in slag cement manufacture;

Asphalt

Per Section 7.1.6.5, “Slag aggregate, including steel slag and blast furnace slag, is considered a co-product of steel and iron production according to the PCR for Construction Aggregates: Natural Aggregates, Crushed Concrete, and Iron/Steel Furnace Slag (ASTM 2017).

The upstream environmental impacts associated with iron and steel production shall be allocated to slag aggregates using appropriate economic allocation factors and included in A1, along with transportation to the slag aggregate processing facility and any subsequent processing of slag aggregates using the dataset(s) specified in Annex 1. Transportation of slag aggregates from the processing facility to the asphalt plant shall be included in A2.” (NAPA PCR for Asphalt Mixtures, 2022)

Construction Aggregates

7.2.5.2 Co-product allocation procedure

Slag aggregate is a co-product of steel. For each ton of feedstock ore or scrap entering the steelmaking process, about 0.15 tons of slag are created, the rest becoming steel. Significant economic differences exist between these coproducts. Those parts of slag aggregate production that are shared with steel shall be economically allocated (e.g. melting), using the factor given in Annex A. Other operations not shared with steel production (e.g. crushing, washing) shall be directly attributed to slag.

Steel Products

- In Process
- Public Comment Stage



Driving consistency in the **GREENHOUSE GAS ACCOUNTING SYSTEM** A pathway to harmonized standards for steel, cement, and concrete



IDDI

(Driving Consistency in the Greenhouse Gas Accounting System – 2023)

- Blast furnace slag has properties that allow it to be used as a substitute material for clinker in cement production. Because clinker production drives up to 85 per cent of emissions in cement, substituting treated blast furnace slag can dramatically reduce emissions from cement production.
- The question then becomes the level of emissions steel producers can allocate to blast furnace slag when it is sold as a material input to cement producers. This allocation question affects both the embodied emissions of steel and cement, since the input burden for cement producers should be equivalent to the emissions allocated to slag by the steel producer.

IDDI - Allocation

It is important to acknowledge at the outset the longstanding disagreement on allocation methodologies. Nevertheless, there is broad consensus that a single approach is critical to drive consistent reporting.

The analysis presented in this paper has found that “No Allocation” and “Economic Allocation” are both consistent with the identified principles, as well as with GHGP’s stated preference for more conservative allocation approaches.

Looking forward, the IDDI Secretariat recognizes that significant further engagement on this issue will be required across government and industry stakeholders to align on an allocation approach.

Identity

Slag Isn't Slag

ABFS ≠ GBFS ≠ BOF ≠ EAF ≠ SCM(Alternative)

Aggregate ≠ Cement

Concrete

- In the case of concrete, EPA notes, federal funds factor into projects accounting for more than half the industry's annual output. (Concrete Products – Aug 2024)

SFS as an “Alternative SCM”

- ASTM C1709-22
- Standard Guide for Evaluation of Alternative Supplementary Cementitious Materials (ASCM) for Use in Concrete
 - SFS is NOT EXCLUDED



Thank You!!
Questions?