Getting to Substantially Lower Embodied Greenhouse Gas Emission Construction Materials

Material Prioritization and Data Improvement

EPA Office of Chemical Safety & Pollution Prevention
Inflation Reduction Act Stakeholder Engagement

March 2, 2023




EPA

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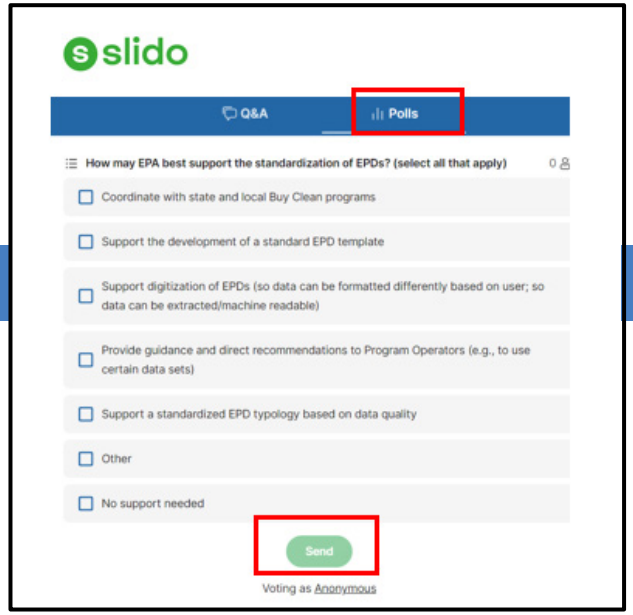
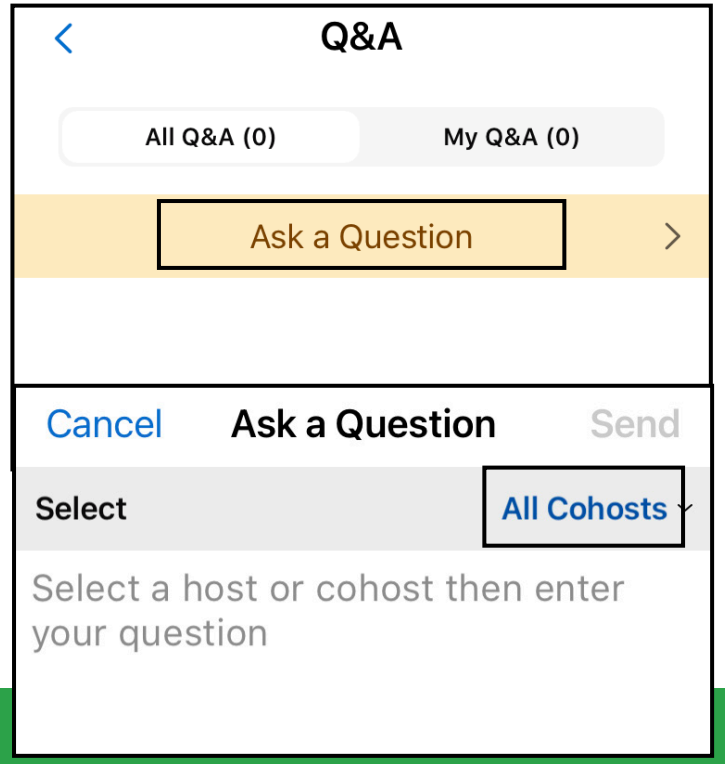
Engagement

Slido polling questions will appear on the right of your screen. Results will display real-time.

Submit questions at any time using the Q&A panel. Select *All Cohost* and type in your questions and someone will answer your questions verbally or written.

Submit your written responses to EPA's RFI via the open docket on Regs.gov. Link provided in this presentation.





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EPA Low Embodied GHG Emission Construction Materials
Stakeholder Engagement Webinar Series

- **Construction Materials Prioritization and Environmental Data Improvement**

  March 2, 2023, 2 – 3:30 p.m. EST

- **Grants and Technical Assistance for Environmental Product Declarations**

  March 22, 2023, 2 – 3:30 p.m. EST

- **Carbon Labeling**

  April 19, 2023, 2 – 3:30 p.m. EST

Today's Agenda

Time	Topic	Speakers
2:05- 2:15 PM	Overview of IRA Low Embodied Carbon Construction Materials Programs and EPA's Role	• Jennie Romer, Deputy Assistant Administrator, EPA Office of Chemical Safety and Pollution Prevention • Alison Kinn Bennett, EPA Environmentally Preferable Purchasing Program/Sustainable Marketplace
2:15 – 2:50 PM	Data Improvement RFI Questions & Context	• Danny Macri, EPA Climate Protection Partnerships Division • Peter Arbuckle, USDA, Federal LCA Commons
2:50 – 3:00 PM	Material Prioritization RFI Questions and Context	• Alison Kinn Bennett, EPA Environmentally Preferable Purchasing Program/Sustainable Marketplace
3:00 – 3:30 PM	Q&A	All

Inflation Reduction Act Overview

- **The Inflation Reduction Act (IRA), signed August 16, 2022, makes historic investments in climate action** that are expected to reduce U.S. emissions ~40% by 2030 while supporting disadvantaged communities and the clean energy industrial base.
- **EPA will play a major role in delivering these programs.** The Agency received $41.5 billion in appropriated funds and expects to receive an additional $11.7 billion in future revenue from reinstating the Superfund Tax on oil and gas production.
- **The Embodied Carbon programs at EPA will enable the agency to drive additional decarbonization** through federal purchasing not just for IRA but also BIL, AIM and regular appropriations while setting standards that can be utilized by state, local, and private partners.
- **EPA is implementing two programs directly** while also collaborating with GSA, FHWA and other agencies to support their IRA funding distribution as well.

IRA 2022 provides a major boost to lowering embodied carbon

Sec #	Agency	Funding	Purpose	Funds expiration
60503	GSA Federal Buildings Fund	$2.15B	To acquire and install materials/products for use in the construction or alteration of buildings that have substantially lower levels of embodied GHG emissions (*as determined by EPA*)	9/30/26
60506	DOT FHWA	$2B	To reimburse or provide incentives (up to 2% of incremental costs) to eligible recipients for the use of construction materials/products that have substantially lower levels of embodied GHG emissions (*as determined by EPA*)	9/30/26
60116	EPA	$100M	For administrative costs to develop (*with GSA and DOT-FHWA*) a program to identify and label construction materials/products that have substantially lower levels of embodied GHG emissions, based on EPDs and determinations by State agencies, as verified by EPA.	9/30/26
60112	EPA	$250M	Grants and technical assistance to businesses, states, tribes and nonprofit organizations to support the development, enhanced standardization and transparency, and reporting criteria for EPDs for construction materials/products that include measurements of the embodied GHG emissions across all life cycle stages	9/30/31
50161	DOE	$5.812B	For financial assistance for advanced technology retrofits for US industrial or manufacturing facilities that produce iron, steel, steel mill products, aluminum, cement, concrete, glass, and other energy intensive industrial processes	
	DOE	$10B	For the 48C tax credit to expand clean technology manufacturing	
30002	HUD	$837.5M	For direct loans and grants to improve climate resilience of affordable housing, including low-emission building materials/processes	
70006	FEMA		May provide financial assistance for costs associated with low-carbon materials	

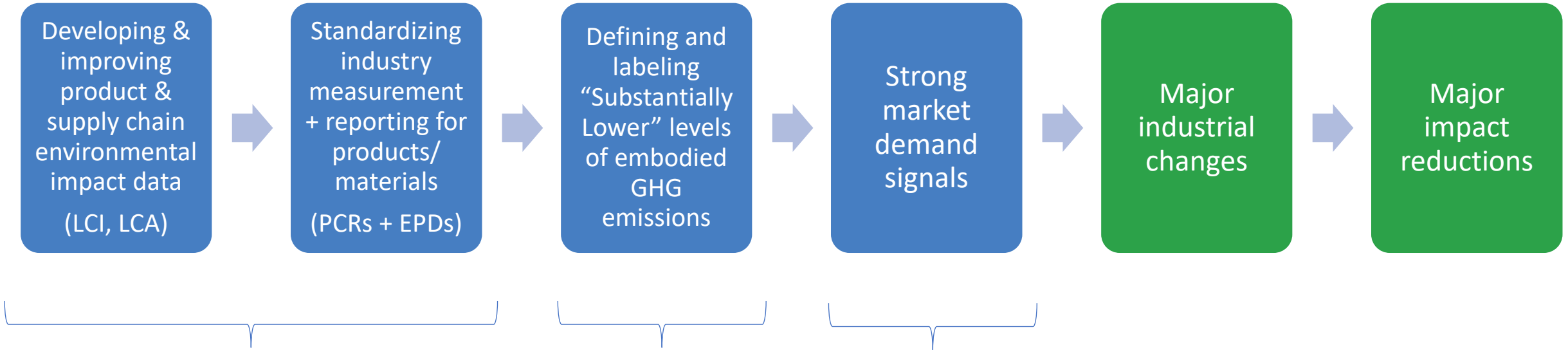
Federal Buy Clean Initiative

Leverages Federal procurement and funding to catalyze markets for low-carbon construction materials to upgrade our transportation, buildings and energy infrastructure

- As the **world's largest buyer of goods and services**, the Federal government's supply chain emissions twice as large as emissions from Federal buildings and vehicles
- The **U.S. manufacturing sector** produces the materials that are critical to rebuilding and strengthening the nation's infrastructure but is responsible for nearly **a third of U.S. greenhouse emissions** from industrial processes
- Buy Clean Federal efforts aim to build upon and accelerate **existing Buy Clean efforts** led by local governments – especially Cities and States – with support from industry, labor and environmental groups
- A White House-led **Buy Clean Task Force** is coordinating interagency efforts to send the **first Federal demand signal** for lower embodied-carbon construction materials – **steel, cement/concrete, asphalt and glass** – that are made in America with union jobs

www.sustainability.gov/buyclean

High-Level Theory of Change



What is “Embodied Carbon”?

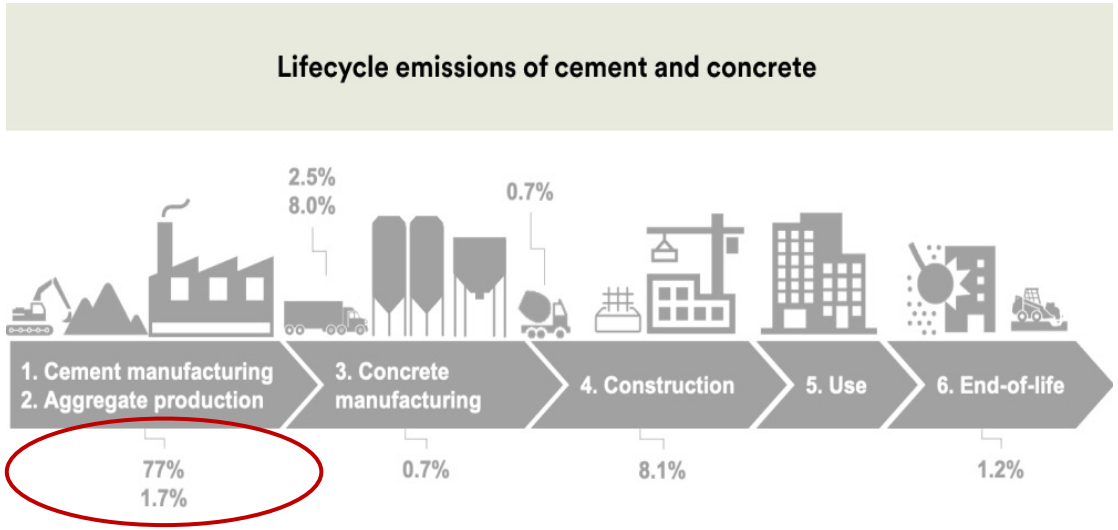


Figure 1. Lifecycle emissions of cement and concrete showing percent GHG emissions associated with the production of concrete. Cao & Masanet, 2021. Reprinted with permission of Eric Masanet.

- “Embodied carbon” refers to the amount of greenhouse gas (GHG) emissions associated with the extraction, production, transport, and manufacturing of material;
- Note that the Inflation Reduction Act also directs EPA to look at the use and disposal stages.
- Traditional manufacturing produces significant GHG emissions due to the energy-intensive processes used to extract raw materials like limestone, taconite ore, and silica and then converting those raw materials via industrial processes to produce an end product.
- Federal and local governments purchase almost 50% of the concrete poured in the U.S. each year – demand signals for “low embodied carbon” materials can drive changes through the entire supply chain.

Sustainable Marketplace

Defining Green. Buying Green. Measuring Green. www.epa.gov/greenerproducts

- Take a lifecycle, multi-attribute approach to defining “greener”
- Engage in the development and update of private sector product & service sustainability standards & ecolabels
- Assess and recommend standards & ecolabels for federal purchasers
- Assist feds (and others) in buying greener products and services
- Assist small businesses in selling their greener products and services to the federal government
- Measure compliance and benefits of buying green

EPA

Target FY23/24 Timeline for EPA's Low Embodied Carbon Construction Materials Program Implementation

Spring/ Summer 2023

- Receive stakeholder feedback on shaping EPD assistance and carbon labeling programs
- Engage federal expertise in Product Category Rules, ASHRAE 189.1, LEED, other standards
- Establish direct, near-term EPD assistance in priority sectors
- Enhance Federal LCA Commons - Developing new & improving existing LCA datasets

Summer /Fall 2023

- Solicit proposals for competitive grant programs potentially including:
  - Development & harmonization & typology of Product Category Rules; conformity assessment of PCRs and EPDs
  - Development of industry-wide EPDs & tools to generate product-specific, digital EPDs
  - Expansion of tools/resources for businesses to conduct LCAs and measure & report actual GHG emissions
  - Development of aspects of new carbon labeling program

Early 2024

- Award first round of competitive grants
- Evaluate year 1 effectiveness and course-correct, where necessary

Request for Information

Data Improvement

Please submit your comments on RFI questions to the open docket at https://www.regulations.gov/docket/EPA-HQ-OPPT-2022-0924/document

B. What data accessibility and improvement approaches should EPA consider?

C. What PCR and EPD standardization, measurement, verification, and reporting approaches for use in procurement decision-making should EPA consider?

Context: White House Buy Clean Task Force High Level Recommendations

Executive Order 14057 (December 2021) requires Task Force to provide recommendations for:

Collecting environmental performance information	Increasing transparency of emissions and verifying accuracy of and auditing EPDs

• Utilize Environmental Product Declarations (EPDs)
• Recommended additional facility-level benchmarking data to be requested of manufacturers:
  • EPA carbon intensity benchmarks
  • ENERGY STAR Energy Performance Scores
	• Require actual supply chain data in EPDs for the most carbon intensive processes
	• Engage in and consider assessing Product Category Rules (PCRs) to ensure EPDs are suitable, consistent and comparable
	• Develop and update background datasets to support life cycle analysis (LCA) and EPDs for construction materials
	• Develop mechanisms for digital tracking of EPDs

Context: Environmental Product Declarations (EPDs) are based on Product Lifecycle Assessments which are based on Product Category Rules

Product Category Rule

- "Set of specific rules, requirements, and guidelines for developing environmental product declarations for one or more product categories." (ISO 21930)

Life Cycle Assessment (LCA)

- "Compilation and evaluation of the inputs, outputs, and the potential environmental impacts of a product system throughout its life cycle." (ISO 14040)

Environmental Product Declaration (EPD)

- "Providing quantified environmental data using predetermined parameters… and, where relevant additional environmental information." (ISO 21930, Type III EPDs)

Context: The State of PCRs

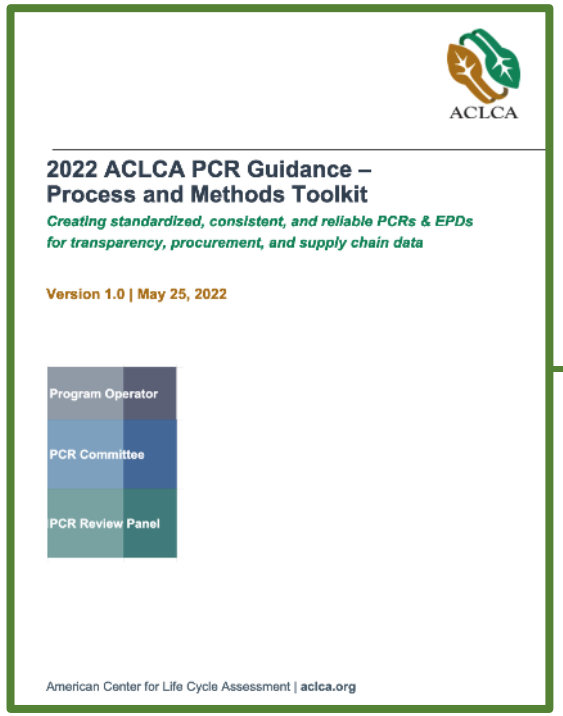
Existing PCRs vary in how they:

- Prescribe or show a preference for specific background datasets
- Identify methods for primary data collection
- Provide access to underlying LCA
- Include relevant stakeholders in the development
- Prescribe methods for addressing data quality
- Harmonize with upstream and downstream PCRs
- Specify the granularity of unit processes
- Among others…

Product Category Rule

- "Set of specific rules, requirements, and guidelines for developing Type III environmental product declarations for one or more categories." (ISO 21930)

Context: Example of Efforts Working toward Standardized, Consistent, and Reliable PCRs & EPDs for Transparency, Procurement, and Supply Chain Data



More conformance with ISO 21930

Standards Conformance
- Checklist by criteria
- Classified by role

Classification by Roles
- Program Operator
- PCR Committee
- PCR Reviewer

Levels of conformance

Use Case Threshold
- Transparency: 42 items
- Procurement: + 22 items
- Data Source: + 4 items

Methods & Methodology Addenda

Allocating Burdens and Benefits of Materials Shared Across Product Systems

Assessing Data Quality of Background Life Cycle Inventory Datasets

More forthcoming

Guidance for PCR Committees: Prescriptiveness
Harmonization of Methods

Your Feedback – EPD standardization, measurement, verification, and reporting

RFI Question 12. Standardizing and Verifying Product Category Rules:

- How might EPA grants/ cooperative agreements improve and harmonize Product Category Rules (PCRs) and support the development of a conformity assessment/verification program for PCRs?

Context: What is an EPD?

Discloses the "lifecycle" environmental impacts of a product similar to a nutrition label

ENVIRONMENTAL IMPACTS

Declared Product:

Plant name

Compressive strength: 3000 PSI at 28 days

Declared Unit: 1 m^3 of concrete

Global Warming Potential (kg CO_2-eq)	281
Ozone Depletion Potential (kg CFC-11-eq)	7.8E-6
Acidification Potential (kg SO_2-eq)	0.84
Eutrophication Potential (kg N-eq)	0.37
Photochemical Smog Creation Potential (kg O_3-eq)	16.9

….but without a lab test for GWPs and without the "recommended values"

Up to "buyer" to specify thresholds

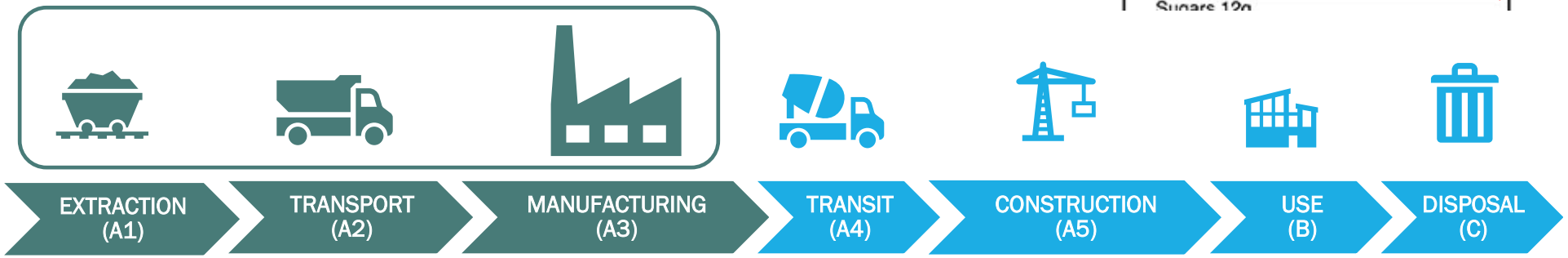
Nutrition Facts

Serving Size 2/3 cup (55g)
Servings Per Container 8

Amount Per Serving

Calories 230 Calories from Fat 70

	% Daily Value*
Total Fat 8g	12%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	12%
Dietary Fiber 4g	16%
Sugars 12g	



Context: The State of EPDs

IRA tasks EPA with supporting the enhanced transparency and standardization of EPDs.

Vary in disclosing:

- Name of LCA and EPD generation tools/consultants
- Names, years and sources of background datasets
- Declared and functional units
- Percentage of GWP based on actual supply chain data
- Whether supply chain data is manufacturer vs. facility specific
- Uncertainty resulting from the use of certain background datasets
- Among other attributes

Lack of uniformity in:

- Format
- Nomenclature of EPD type (manufacturer, facility-specific, etc.)
- Reporting A1, A2, A3 values independent of A1-A3
- Background data sets used
- Prescriptiveness
- Among other attributes

In Europe, organizations such as ECO Platform audit EPD Programs to ensure that required standards are met and that EPDs observe specific verification guidelines (Eco Platform, 2022)

Context: ISO LCA & EPD verification requirements

- ISO 14025 8.1.3 for **LCA r**equires "independent verification of data from LCA, LCI and information modules…" for
  - Conformance to ISO, PCR, General Program Instructions (GPI)
  - Evaluation of data
  - Plausibility, quality, and accuracy of data
- ISO 14025 8.1.4 for **EPDs** require verification by the review panel or an independent verifier for conformance to
    - ISO 14020
    - PO GPI
    - PCR
  - Verifiers must generate a report document the verification process in a report.

EPD programs such as BRE Global's EPD program in the United Kingdom and the Norwegian EPD program require verifiers to complete checklists, which ensures verifiers are applying the same level of scrutiny, and require additional requirements beyond ISO.

Under the International EPD System verifiers must submit an application and undergo training. Their General Program Instructions also has standards for pre-verifying tools that streamline LCA and EPD generation.

Your Feedback – EPD standardization, measurement, verification, and reporting

13 & 14 Harmonizing and Verifying EPDs:

- How might EPA grants/cooperative agreements improve and harmonize EPDs so as to provide comparable results and meet other needs?
- When an EPD is verified by a third-party, what requirements should that verifier/Conformity Assessment Body (CAB) meet or what accreditations should that CAB have to ensure credibility?
- Does the ISO 14025 verification scope and verifier competencies sufficiently satisfy expectations for third-party verification of an EPD used for public procurement?
- How should EPA support better verification practices?

Your Feedback – EPD standardization, measurement, verification, and reporting

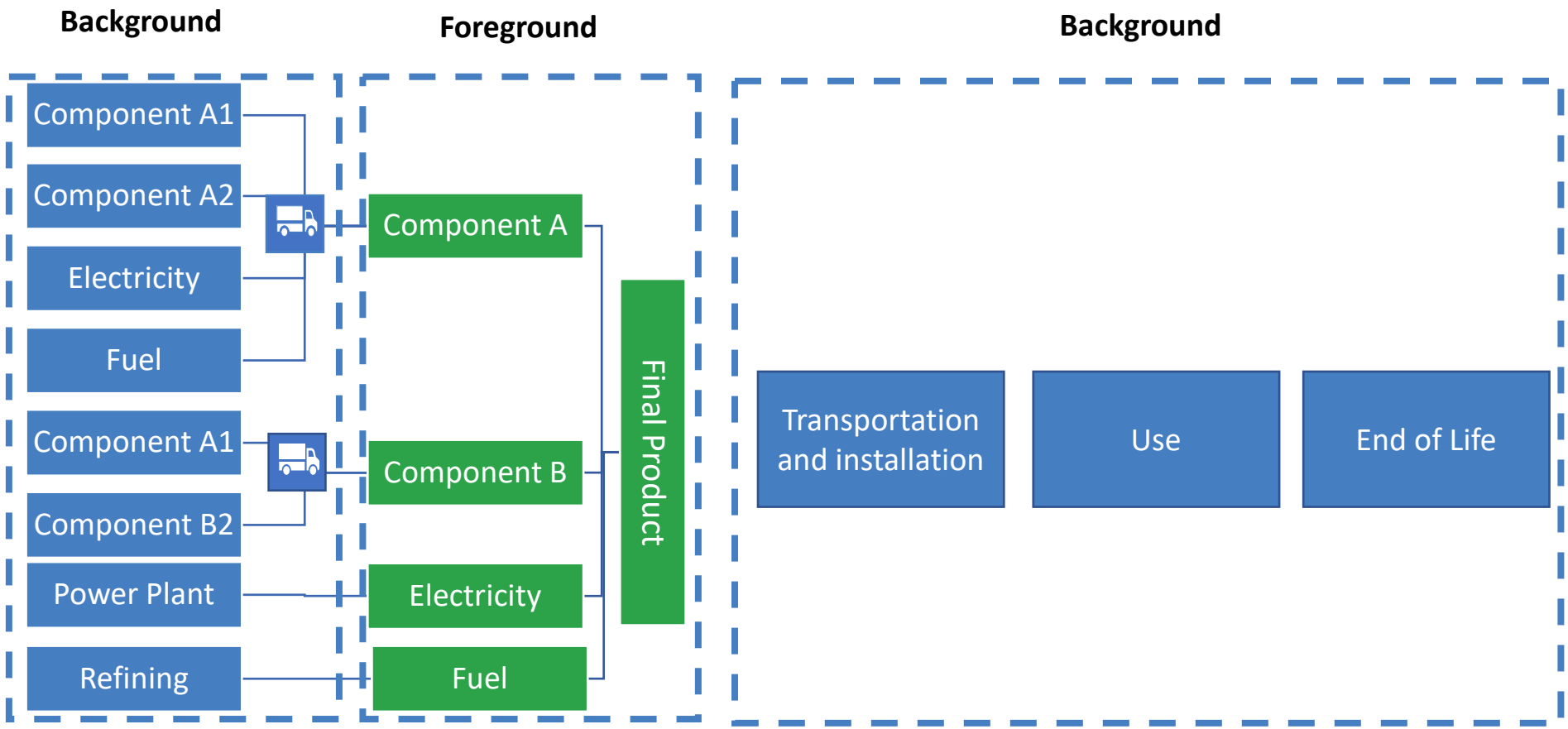
16. PCR and EPD Repositories/ Data Platforms:

- How might EPA grants/cooperative agreements help foster the development of national and/or international PCR and EPD repositories?
- What existing platforms have the greatest potential to support the goals of IRA Sections 60112 and 60116?
- What additional functionality and features are needed?

Context: Foreground vs. Background Data

Foreground: Activities under the operational control of the manufacturer

Background: Everything else



Illustrative boundaries for foreground and background activities

Context: Example of how 3 PCRs can vary in use of background data

LCA Inputs	PCR for Product A	PCR for Product B	PCR for Product C
Electricity	Ecoinvent 3.4 electricity processes by NERC Region (2015)	NETL 2019 (consumption-based at balancing authority)	eGRID database (preference for consumption based but production based allowed)
Fuel	USLCI NREL (2007)	NREL (2021)	No indication
Transportation	USLCI (2010)	NREL (updated 2021) but based on older data	No indication
Materials	Prescribes or recommends datasets for different materials. Some inputs say manufacturing specific EPD ***preferred but not required. [Up to manufacturer/LCA Consultant]***	Prescribes datasets for different materials. Identifies data gaps.	Provides NREL US LCI / LCA Digital Commons, GaBi, EcoInvent, etc. ***as options. [Selected sources may vary by LCA tool.]***

Summary

- Combination of public and private lifecycle inventory databases used
- Inconsistency between PCRs
- Inconsistent application of background data within PCRs
- Data gaps
- Some datasets dated

Context: Current Federal LCA Data Improvement Vision

www.lcacommons.gov

Federal LCA Commons is a grassroots interagency collaboration to advance LCA methods, data, and information systems.

- Includes partners from 12 Federal agencies and National Labs

Products to date include:

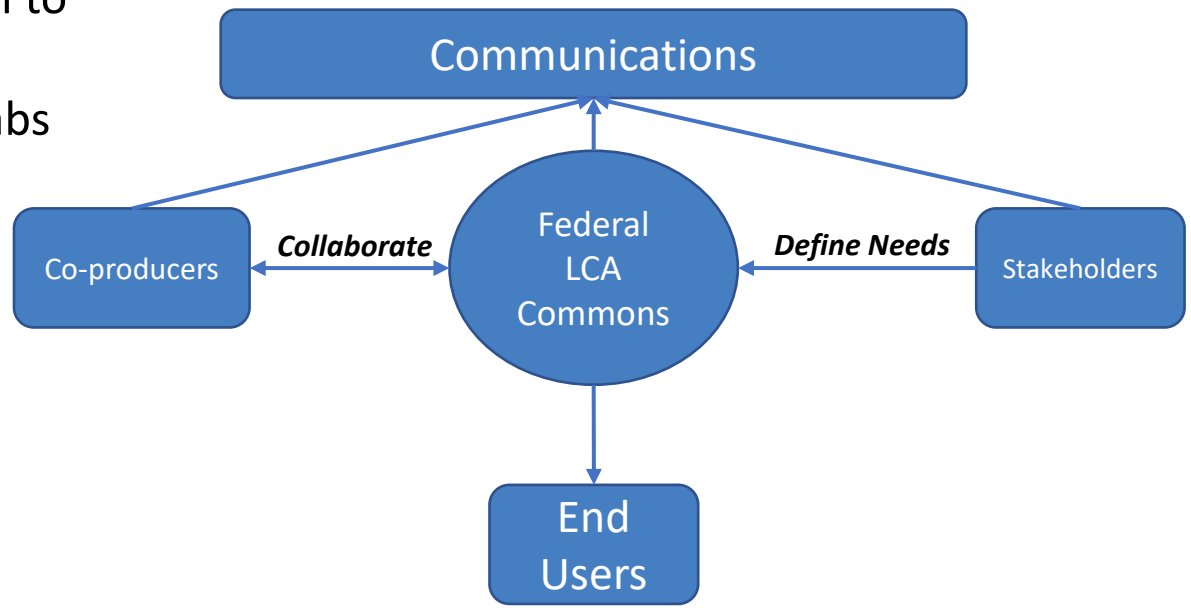
- US Electricity baseline,
- Federal Environmental Flow List (FedEFL),
- ReCiPe (w/ FedEFL)
- Data management and publishing platform

Hosted data products also include:

- EPA USEEIO, NREL USLCI, NETL, USFS/CORRIM

Vision:

- Enhanced governance (dedicated funding and management structure)
- Formal data management and maintenance BMPs
- Operationalizing LCA commons platform for accessing data
- Investing in curating new and updating existing datasets



Values Emphasized:

- Use of public "open" datasets that are "free" to use
- Transparency in LCI
- Internal quality review processes for system level data
- Protocols for documenting and publishing LCI

Your Feedback – Data Accessibility & Improvement

5. Public Accessibility of Data:

- What role can EPA play to support greater public access to product and facility specific environmental data?
- What background datasets need to be generated, made publicly accessible, and/or updated and enhanced to reflect embodied greenhouse gas emissions of the final product more accurately?
- What role should the Federal LCA Commons (https://www.lcacommons.gov/) have, if any?

8. Improving Background Datasets:

- What is the best way to ensure the quality of these datasets (maintenance, assurance processes, etc.)?
- What types of uncertainty data should be reported in an EPD and how should this data be used in benchmarking?

Other Key Questions – Data Accessibility & Improvement

6. Moving More EPDs From Averages Towards Actuals:

- How can EPA support the development of product-specific EPDs that use more actual, facility-specific data for greenhouse gas emissions along a product's "upstream" supply chain?
- What type of/approach to verification is needed to ensure reported data is accurate?

Other Key Questions – Data Accessibility & Improvement

7. Life Cycle Stages:

- How should EPA consider the environmental impacts/ contributions of the use and disposal stages of materials/ products when those stages are not often addressed in EPDs and depend heavily on decisions by future owners of the materials/products?

Other Key Questions – Data Accessibility & Improvement

9. Whole Building Life Cycle Assessment (WBLCA) and similar whole project approaches:

- WBLCA may be able to inform low greenhouse gas emission design and the selection of substantially lower embodied emissions materials and products.
- Should EPA consider WBLCA and similar whole project approaches in EPD development and labeling of substantially lower embodied greenhouse gas emission materials/products, and if so, how?

Other Key Questions – Data Accessibility & Improvement

10. Other Environmental Impacts:

- Existing PCRs/EPDs cover additional environmental impacts categories related to air and water quality, resource depletion and human and ecological health.
- To what extent should EPA's efforts on EPDs consider/address these other impact categories?
- Are there concurrent data/model improvements needed to improve the characterization/quantification of other impacts for the purposes of improving the quality of EPDs?

15. Digitizing EPDs:

- What are issues to consider when transitioning to machine-readable reporting?
- How can EPA help advance digitization of EPDs for both producers and users of the data?
- What parameters should EPA be considering when establishing criteria for digitizing EPDs (e.g., interoperability, data security)?

Request for Information
Material Prioritization

Please submit your comments on RFI questions to the open docket at https://www.regulations.gov/docket/EPA-HQ-OPPT-2022-0924/document

A. What construction materials/products should EPA prioritize in implementation of IRA Sections 60112 and 60116?

Context: Breakdown of Manufacturing Emissions

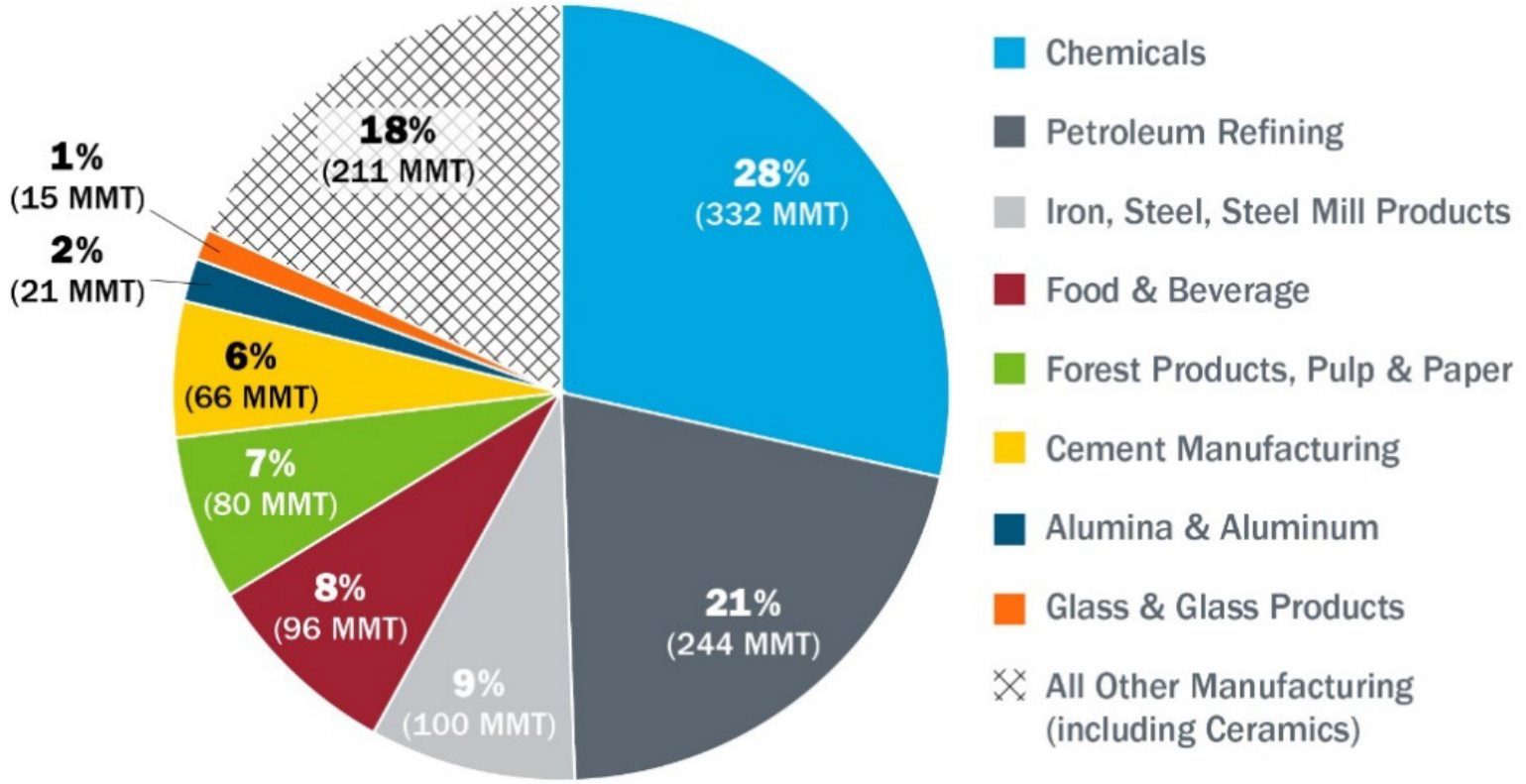


Figure. U.S. primary energy- and process- related CO_2e emissions (MMT CO_2e) for manufacturing industries (NAICS 31-33). *Figure derived from DOE's Manufacturing Energy and Carbon Footprints; source of data for footprints from DOE Energy Information Administration's 2018 Manufacturing Energy Consumption Survey.*

Context: Initial Priority Construction Materials & Products
Aligned with White House Buy Clean Task Force Efforts

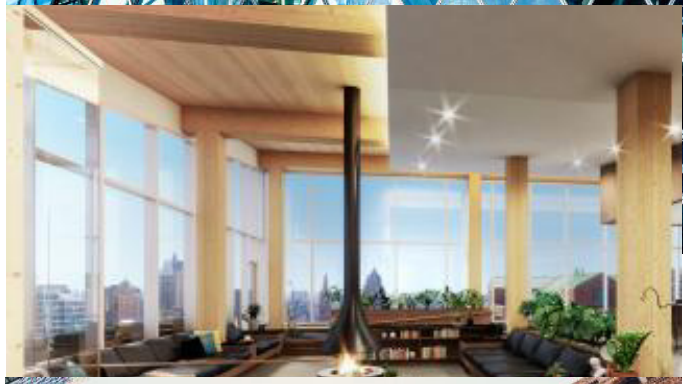
- **Materials/Products:**
  - Newly manufactured
    - concrete (and cement)
    - steel (including, but not limited to, hot rolled sections, plate, hollow structural sections, steel reinforcing bars/rebar, cold formed steel framing and steel joists)
    - glass (including, but not limited to, flat/float glass, processed glass, and insulated glazing units)
    - asphalt mix (paving)
  - Minimally-processed salvaged & reused

Note: This effort does not address what type of material should be used in a project (e.g., mass timber replacing steel, or copper compared to aluminum) but rather is limited to "like to like" comparisons, at this time.

Context: GSA's Proposed Next Tiers of Priority for Buy Clean Efforts

Based on near-term project pipeline needs for Federal construction projects

- Tier 2
  - aluminum (including curtain walls and storefronts)
  - insulation (including enclosure, equipment, piping, and acoustical)
  - commercial roofing materials
  - gypsum board
- Tier 3
  - structural engineered wood (including mass timber and cross-laminated timber)



Context: Other product/material categories to consider due to "production, use, and disposal" contributions to GHG emissions

See EPA's COVER MEMO to the Interim Determination

- Biobased materials
- FEMP designated / ENERGY STAR certified products
- Products and equipment containing no or low global warming potential HFCs consistent with EPA's American Innovation and Manufacturing (AIM) Act and the Significant New Alternatives Policy (SNAP) program
- Recycled content construction materials that meet or exceed the recycled content requirements under RCRA Section 6002
- Renewable energy technology products
- Products meeting relevant private sector standards/ecolabels recommended by EPA

Your Feedback

1. Newly Manufactured Materials:

- How should EPA prioritize construction materials and products to focus on for its **EPD assistance program**?
- How should EPA prioritize construction materials and products for its **carbon labeling program**?

EPA suspects there may be different factors to consider for each program, leading to different focus categories for EPD assistance than for labeling in the short term, and potentially longer term.

2. Minimally Processed, Salvaged and Reused Materials:

- How might EPA's programs incentivize, measure, and standardize the salvage and reuse of building/infrastructure materials as a key part of the Federal embodied greenhouse gas reduction strategy given the current lack of labels or EPDs and other challenges for some of these materials?
- What salvaged and reused materials should be prioritized and why?

Other Key Questions – Material Prioritization

3. Biobased Materials:

- How might EPA's programs incentivize biobased construction materials (e.g., mass timber, straw, hemp, cellulose cement), given the captured greenhouse gas emission advantages of some of these materials, while also ensuring sustainable forestry and agricultural practices (which may not be fully included in life cycle assessments (LCAs)) are considered as part of EPD assistance and carbon labeling, where relevant?
- Similarly, how might EPA measure impacts associated with the feedstock for biobased materials potentially displacing crops that might otherwise be used for food or biofuel?
- What are the opportunities to use agricultural waste in construction materials to substantially lower the embodied greenhouse gas emissions?

Q&A time!
For more information & to stay in touch…

- Please submit your comments on the RFI questions to the open docket at https://www.regulations.gov/docket/EPA-HQ-OPPT-2022-0924/document
- EPA's IRA Low Carbon Materials Program: https://www.epa.gov/inflation-reduction-act/inflation-reduction-act-programs-fight-climate-change-reducing-embodied
- White House Council on Environmental Quality: Federal Buy Clean Initiative https://www.sustainability.gov/buyclean/
- Listserv sign-up: https://www.epa.gov/greenerproducts/forms/contact-us-about-greener-products-and-services
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