



# What are EPDs? “Buy Clean Colorado Act”



**COLORADO**

Department of Transportation

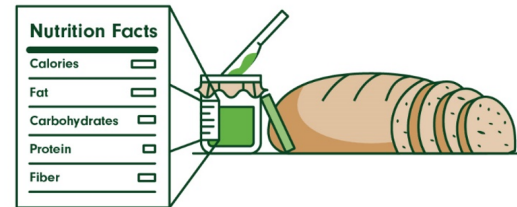
Joep Meijer (SME) & Hailey Goodale (CDOT)  
including slides from the FHWA as offered by Milena Rangelov



# What Are EPDs?

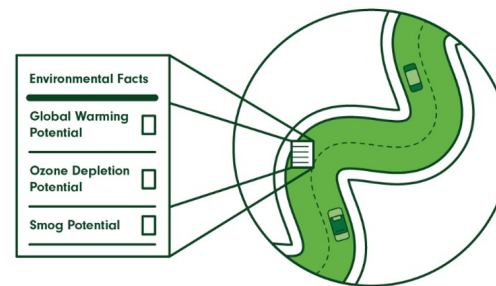


- Communicate environmental impacts of material or product.
- Express the results of an LCA.
- Developed with stakeholder input.
- Follow industry standards described in the PCR.
- EPDs are not required by Federal law or regulation.



Similar to nutrition labels for food products, EPDs communicate critical environmental information on pavement materials to the customer.

Using guidance from ISO and European Standards,



Source: FHWA.



## How Are EPDs Used?



- Communicate Good Stewardship
  - Producers can use them to improve their production, save money, expand their outreach
  - Earn points in Sustainability Rating Systems
- Informing purchasing decisions
  - Procurement aid
- Data Source for
  - Benchmarking Progress
  - LCAs for Informing Policy, Pavement Design, or Pavement Management Practices



# EPD Example

## Example for a recent EPD for

- an asphalt mixture in Colorado, that is
- compliant with “Standard Special Provision - Revision of Sections 101 and 106 - Materials Environmental Product Declarations”, and, “Appendix O - Environmental Product Declaration Protocol - 23”

<https://asphaltpd.org/epd/d/4RURv/>



### Company Information

Elam Construction is an asphalt mixture producer.  
Silverthorne Hot Plant asphalt plant  
28755 Highway 9  
Silverthorne, CO 80498  
USA

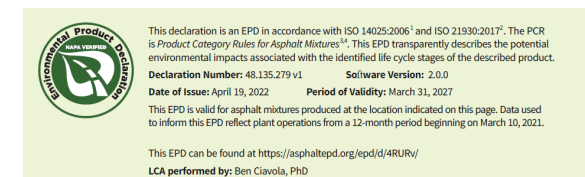


### Product Description

This EPD reports the potential environmental impacts and additional environmental information for an asphalt mixture, which falls under the United Nations Standard Products and Services Code 30111509. Asphalt mixtures are typically incorporated as part of the structure of a roadway, parking lot, driveway, airfield, bike lane, pedestrian path, railroad track bed, or recreational surface.

Mix Name: 12-901 SX(75) PG58-34 Lime  
Specification Entity: DEFAULT  
Specification: DEFAULT  
Gradation Type: Not Reported  
Mix Design Method: None  
Nominal Maximum Aggregate Size: Not Reported  
Performance Grade of Asphalt Binder: Not Reported  
Customer [Project/Contract] Number: Not Reported

This mix producer categorizes this product as a Hot Mix Asphalt (HMA) asphalt mixture. This asphalt mixture was produced within a temperature range of 157 to 157°C (315.0 to 315.0°F). Energy and environmental impacts are based on a plant's average performance over a 12-month period and are not adjusted for mix-specific production temperatures.





# Key Terms - PCR

## The Guidelines

Product Category Rule (PCR)



“Set of specific rules, requirements, and guidelines for developing Type III environmental product declarations for one or more categories” (ISO 14025)

## The Analysis

## The Communication



# What Are Product Category Rules (PCR)?



- PCRs are sets of industry-consensus standards and guidelines used to develop EPDs
- PCRs ensure EPD:
  - Consistency
  - Transparency
- PCRs and EPDs are not required by law or federal regulations



# Key Terms - LCA

## The Guidelines

Product Category Rule (PCR)

“Set of specific rules, requirements, and guidelines for developing Type III environmental product declarations for one or more categories” (ISO 14025)



## The Analysis

Life Cycle Assessment (LCA)

“A compilation and evaluation of the inputs, outputs, and potential environmental impacts of a product system throughout its life cycle.” (ISO 14040)

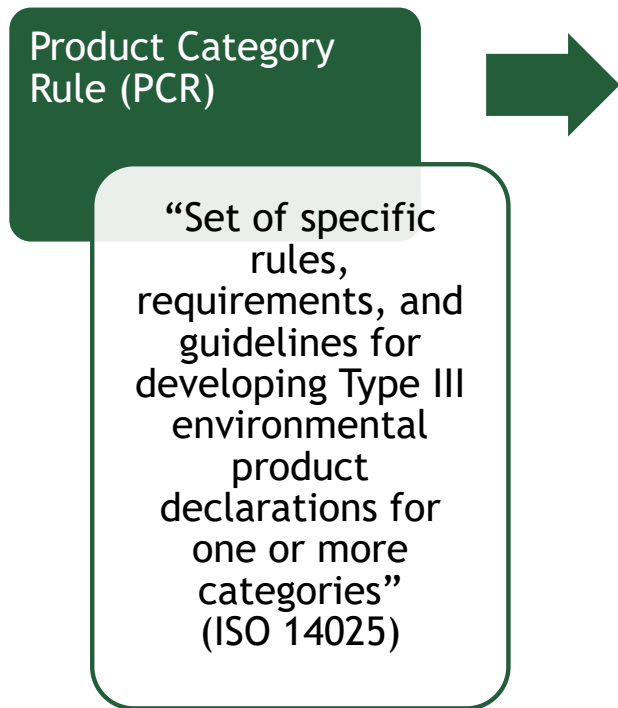


## The Communication

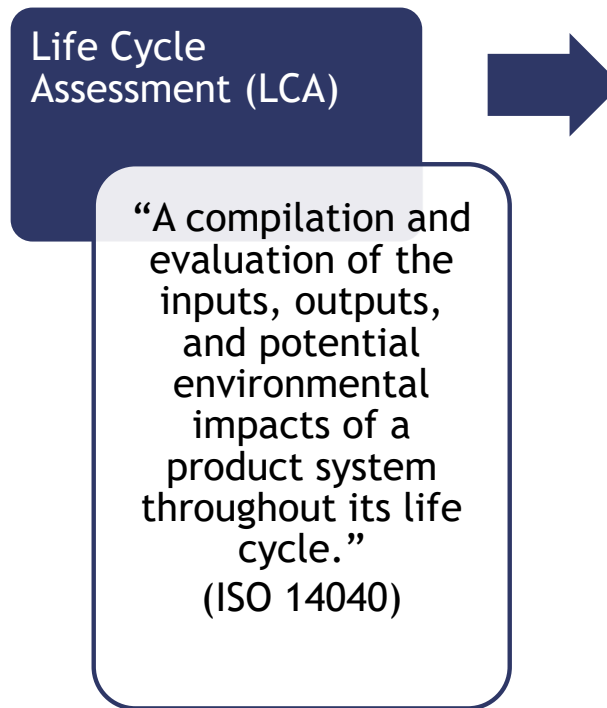


# Key Terms - EPD

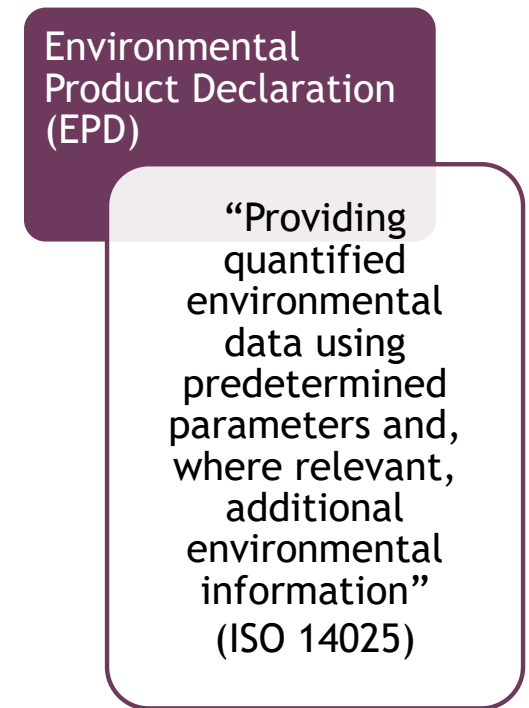
## The Guidelines



## The Analysis



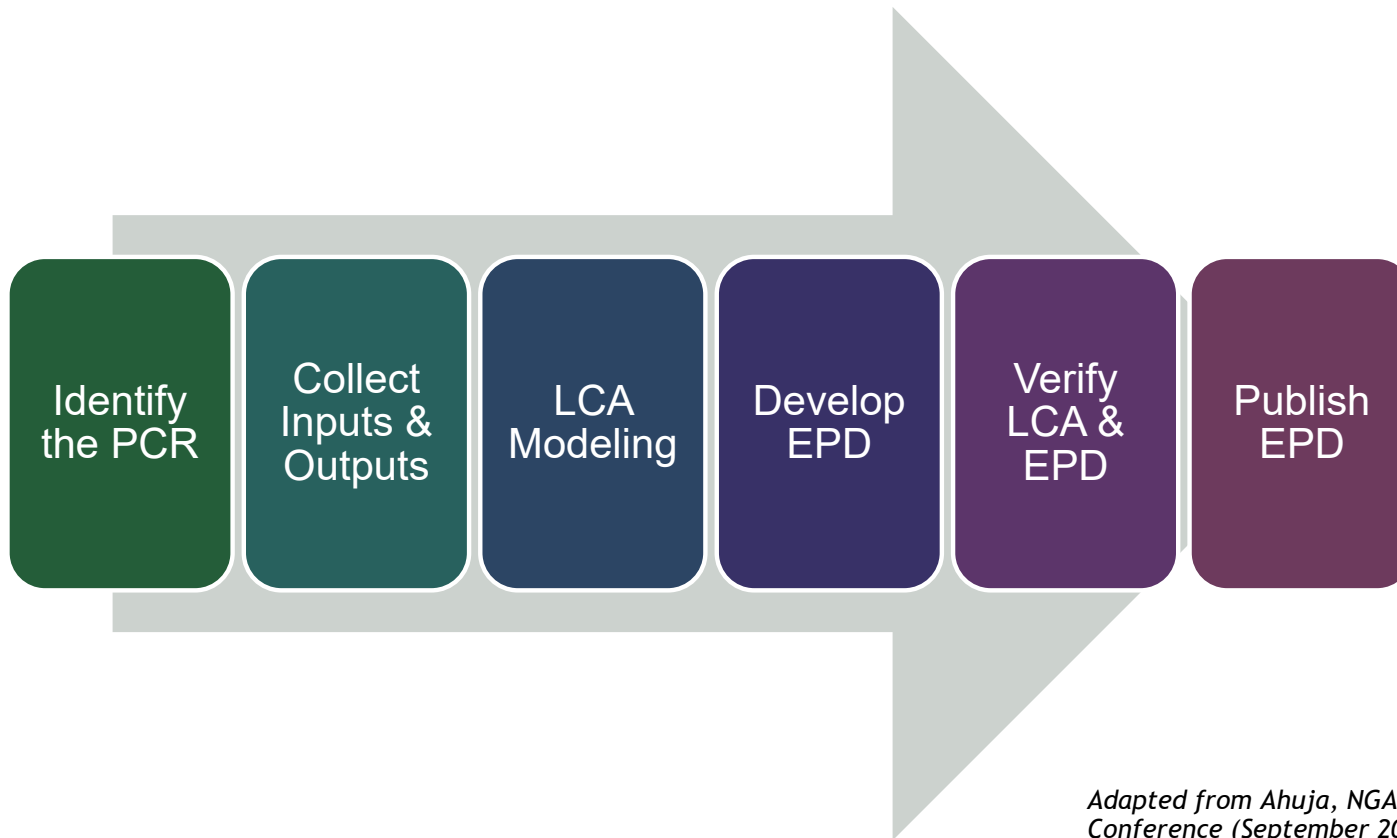
## The Communication







# Key Terms





- EPDs Report 7 Mandatory Impact Indicators, which include:
  1. **Global warming potential**  
*(GWP, measured in kg CO2 equivalent)*
  2. **Depletion potential of the stratospheric ozone layer**  
*(ODP, measured in kg CFC11 equivalent)*
  3. **Acidification potential of soil and water sources**  
*(AP, measured in kg SO2 equivalent)*
  4. **Eutrophication potential**  
*(EP, measured in kg Ne)*
  5. **Photochemical smog creation potential**  
*(POCP, measured in kg O3 equivalent)*
  6. **Abiotic depletion potential for fossil resources**  
*(ADP<sub>f</sub>, measured in MJ or NCV)*
  7. **Fossil fuel depletion**  
*(FFD, measured in MJ Surplus)*

## EPD “Nutrition” Label

### Your Building Product

Amount per Unit	
LCA IMACT MEASURES	TOTAL
Primary Energy (MJ)	12.4
Global Warming Potential (kg CO <sub>2</sub> eq)	0.96
Ozone Depletion (kg CFC- 11 eq)	1.80E-08
Acidification Potential (mol H <sup>+</sup> eq)	0.93
Eutrophication Potential (kg N <sup>+</sup> eq)	6.43E-04
Photo-Oxidant Creation Potential (kg O3 eq)	0.121

Your Product's Ingredients: Listed Here



## EPDs - Types of EPDs

- **Cradle-to-Gate**

- “Includes the impacts calculated from initial material production (e.g., oil exploration and extraction, mining of rock) up to the gate of the manufacturing site (and before transport to the paving site) (EN15804 modules A1-A3).”

- **Cradle-to-Site**

- “Includes the impacts of cradle-to-gate plus the transportation to the paving site, and the construction operation of paving (EN15804 modules A1-A5).”

- **Cradle-to-Grave**

- “Includes the impacts of cradle-to-site, plus the use stage processes (e.g., vehicle operation, stormwater, noise) and maintenance and rehabilitation ending just before the first reconstruction (EN15804 modules A1-A5, B1-B7, and C1-C4).”

*FHWA Tech Brief: Environmental Product Declarations, July 2020*

Fewer life cycle stages

More life cycle stages



- **Types of Data**

- There are multiple types of data that can be used to produce an EPD.
  - National Averages
  - Supply Chain Specific
  - Facility Specific
  - Material Specific
- HB 1303 requires facility- and material-specific data for EPD development.
- Industry-average data and general material EPDs can be used as a basis for Cradle-to-Gate EPD development, but facility- and material-specific adjustments must be made.





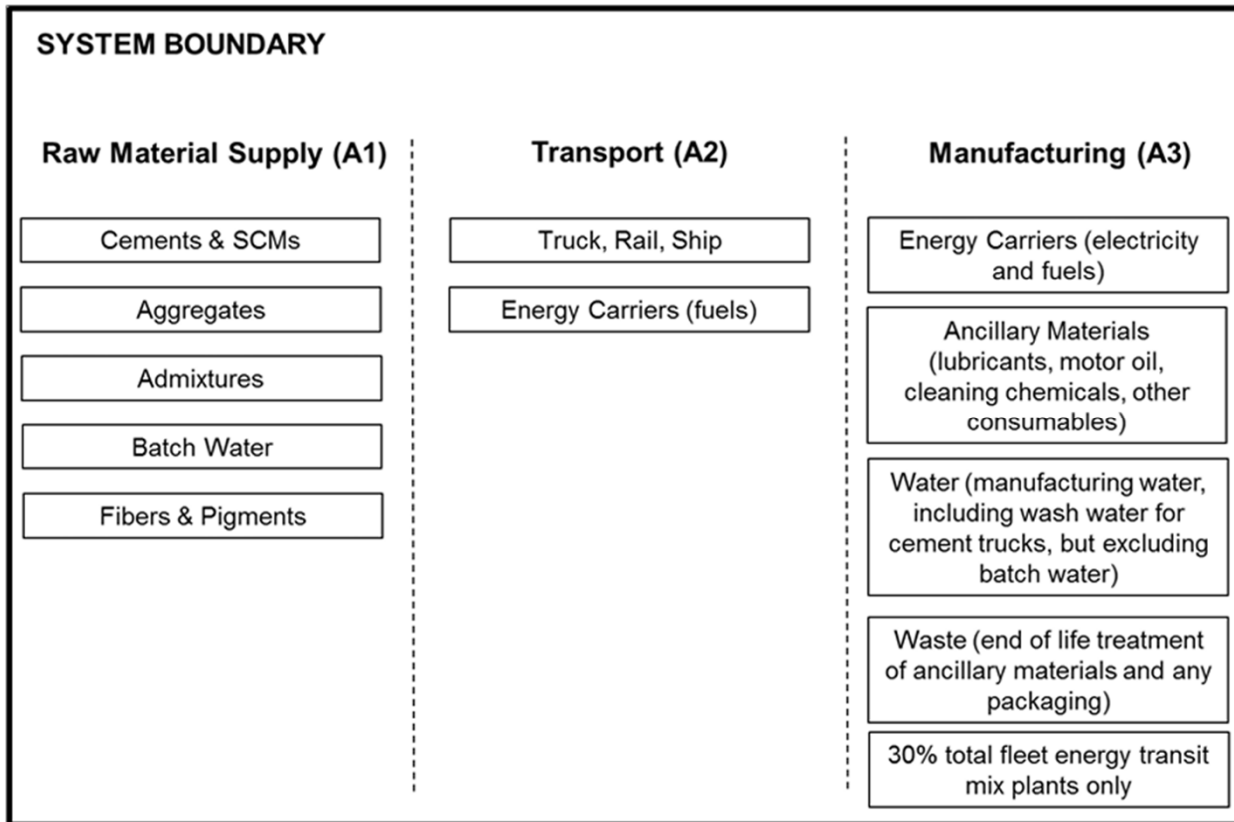
# EPDs - Cradle-to-Gate Inputs

Production Stage			Construction Stage		Use Stage							End of Life Stage			
Extraction & Upstream Production	Transport to Factory	Manufacturing	Transport to Site	Installation	Use	Maintenance (Includes Production, transport, and disposal)	Repair (Includes Production, transport, and disposal)	Replacement (Includes Production, transport, and disposal)	Refurbishment (Includes Production, transport, and disposal)	Operational Energy Use	Operational Water Use	Deconstruction/Demolition	Transport	Waste Processing	Disposal
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4

Adapted from NSF Concrete PCR



# EPDs - Cradle-to-Gate Inputs



NSF Concrete PCR



# Where Can I Find EPDs?



Material	Source
Portland Cement	<a href="#">PCA / ASTM International</a>
Slag Cement	<a href="#">ASTM International/ Slag Cement Association</a>
Steel	<a href="#">SCS Global Services</a>
Asphalt mixes	<a href="#">National Asphalt Pavement Association</a>
Concrete mixes	<a href="#">NRMCA/ NSF International</a>
Aggregates	<a href="#">ASTM International</a>



## Areas of Improvement and Future Developments

- Currently, no overarching agency governs development of EPDs and PCRs
  - A need for improved standardization and harmonization
- Closer ties to QA
- Need for consistent, reliable, public background data with high quality and regular updates
- New EPD programs: chemical admixtures, additives, SCMs etc.
- Digital PCRs and digital EPDs
  - Automation for cheaper and more efficient production of more consistent EPDs
  - Easier use of EPDs as data sources.





# How Agencies Can Use EPDs



- Establish an EPDs database
- Encourage development and use of EPDs
- Compile EPDs to track and communicate progress towards agency goals
- Use EPDs as input in LCA
- Conduct pilot program to introduce industry to EPDs and their applications
- Consider EPDs for material procurement
- Participate as a stakeholder for creating PCRs



Questions?



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