

Port Authority of NY & NJ's Experience with EPDs

NEAUPG Annual Meeting

Presented By:

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Outline

- Introduction
- EPDs
 - Why?
 - Background
 - Current Policy
 - Looking Ahead







Airports

Current and Completed Major Asphalt Projects

- Newark Liberty International
 - New Terminal A (2018-Current)
 - New Apron and Taxiway Areas as well as a New Redesigned Terminal Roadway System
- Teterboro
 - Rehabilitation of Runway 6-24 (2022)
- John F. Kennedy International
 - Interim Pavement Rehabilitation of Taxiway C (2022)



Clean Construction Program

PRESS
RELEASE



In September 2020, the PANYNJ Announced its Clean Construction Program

- **Incorporation of LEED and Envision-equivalent standards** during infrastructure design
- **Specification for low carbon concrete:** reduces the required cement content in certain concrete mixes by 25%, significantly reducing its carbon intensity and allowing for lower-carbon alternatives
- **Pilot projects** to develop low carbon concrete and materials
- **Requirement for Environmental Product Declaration:** enables systematic collection of environmental data directly from construction contractors to help inform more environmentally focused material selection
- **Waste matching for concrete, asphalt and soil:** creates a platform for waste matching across Port Authority construction sites to reduce waste sent to landfills and the truck trips required to bring materials to and from construction sites
- **Requirement for low emissions vehicles on-site:** specifies that large diesel construction equipment must be Tier 4 or newer to ensure the cleanest models available are used for agency projects



The Clean Construction Program builds on our already industry-leading practices to further reduce carbon emissions from construction (embodied carbon), promote the reduction and reuse of construction and demolition waste (circular economy), and reduce the air quality impacts of construction activity.

Accomplishments to Date:

- ➔ Socialized our Policy
 - Outreach – Met with regional Contracting associations and material suppliers before making changes to Contract documents
- ➔ Started Tracking
 - Developed a Carbon Management System to calculate the Carbon Emissions based upon EPDs, and Contractor Quantity Submittals
- ➔ Codified and Established Workflows
 - Updated our Contract Books to include the Embodied Carbon Clause which requires the submission of database importable files (*Electronic Data Deliverables - EDD*) for quantities of incoming materials (daily yardage/tonnage tallies reported monthly) along with corresponding EPDs (*Environmental Product Declarations*)

EPD-Environmental Product Declaration

- Focus on incoming Construction Materials
- All new Contracts include the Embodied Carbon Clause which requires the submission of EPDs for construction materials

B. Embodied Carbon

In order to comply with the Authority's greenhouse gas emissions reduction goals, and to quantify and reduce the impact of embodied carbon emissions, the Contractor and his subcontractors and suppliers shall comply with the EPD and EDD submittal requirements for data related to the embodied carbon of the following construction materials used in the Work of the Contract:

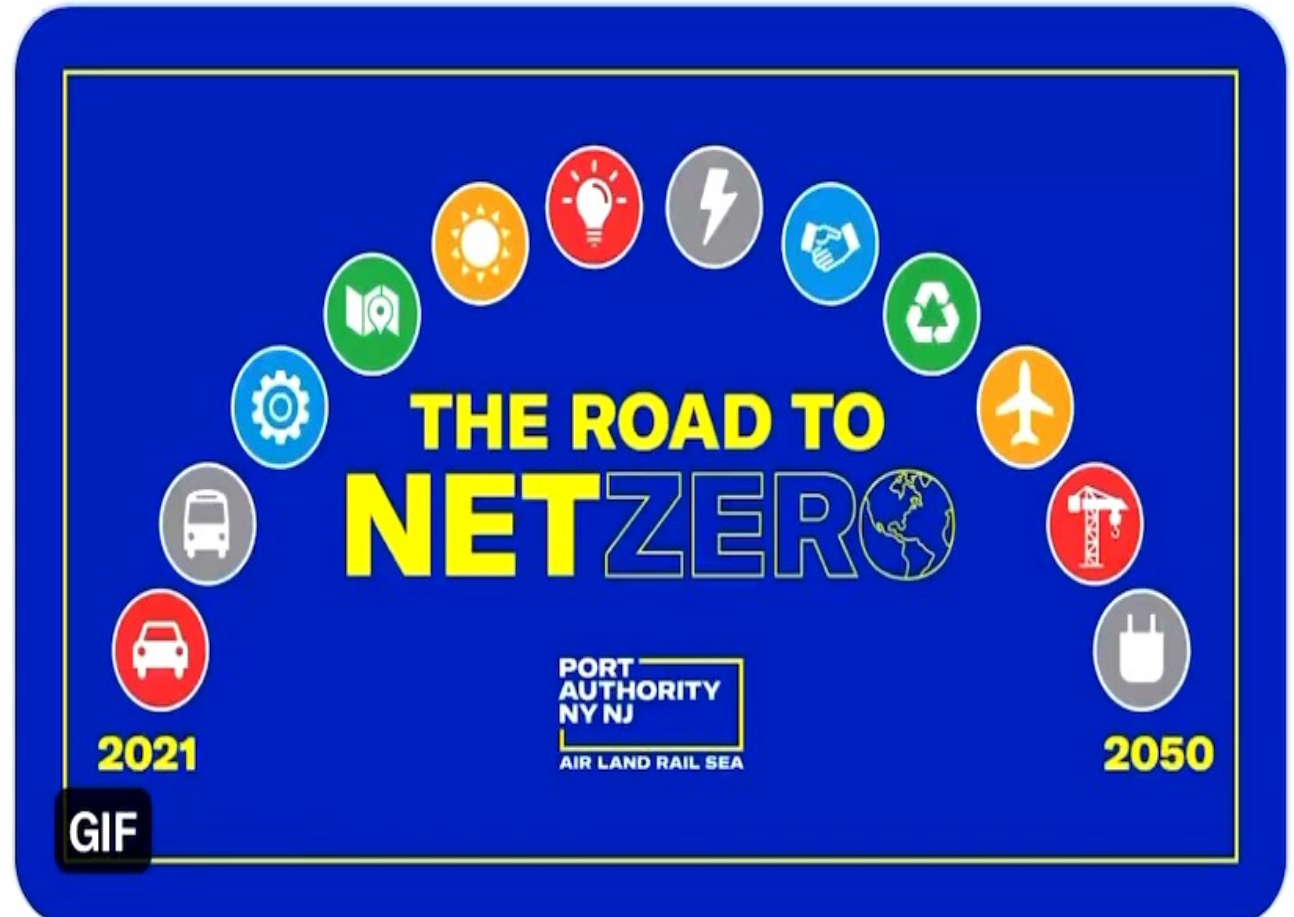
- 1.) Asphalt.
- 2.) Concrete.
- 3.) Steel.
- 4.) Aluminum.
- 5.) Wood.

C. The Contractor shall submit EPDs for each of the materials listed in B. above. Non-third-party verified EPDs will be rejected.

- 1.) EPDs shall be specific to the material, product, plant and mix used in the Work. In the absence of providing a specific EPD, the Contractor shall submit evidence that no material, product, plant or mix-specific EPD could be sourced. Evidence may be in the form of a computer screenshot showing a "No EPDs found" outcome from a query within *EC3* identifying the parameters used to search. Figure 1 below is a sample of the search results for a 6000 psi (28-day) ready mix concrete from a manufacturer searched with the name field containing the word "Jersey".

Why EPDs?

- The Port Authority of NY & NJ has a goal of a 50% GHG reduction by 2030 and achieving net-zero GHG emissions by 2050
- EPDs quantify the environmental impact



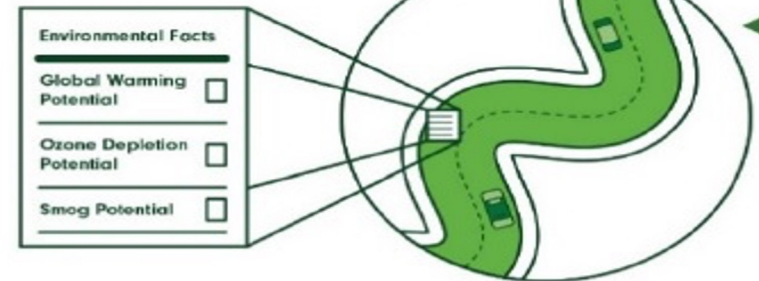
Understanding EPDs

- EPDs communicate the environmental impacts of a material or product
- Developed with stakeholder input
- EPDs provide transparent information on Life-Cycle impact data which can identify areas for environmental improvement as well as encouraging industry efficiency



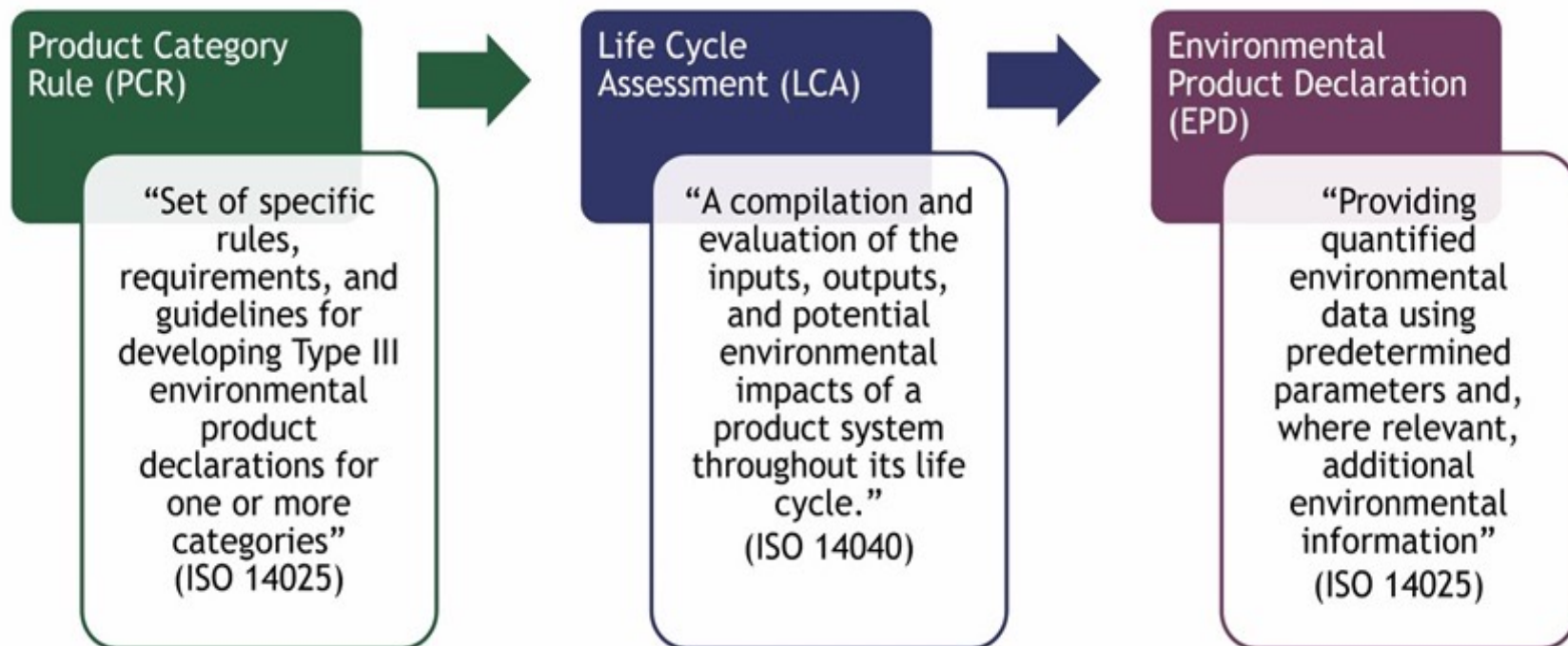
Similar to nutrition labels for food products, EPDs communicate critical environmental information on pavement materials to the customer.

Using guidance from ISO and European Standards,



<https://fhwa.dot.gov/pavement/sustainability/hif19087.pdf>

Understanding EPDs



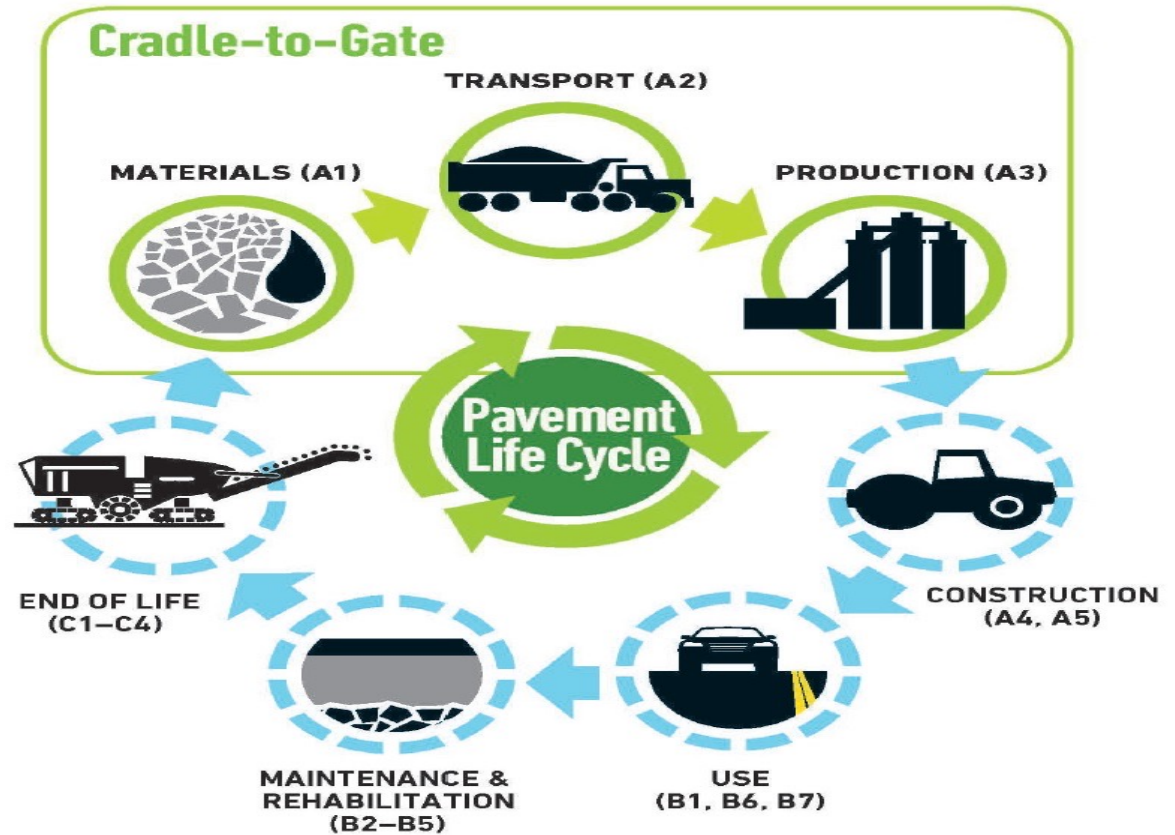
Carrion, Migdalia. Federal Government Perspective, Buy Clean Policies and EPDs NJAPA Conference. March 7, 2023.

Understanding Asphalt EPDs

- Currently, asphalt EPDs only account for the A1-A3 portion of an LCA

A1- Materials
A2- Transport
A3- Production

- Work towards developing a complete LCA pavement EPD (Cradle-to-Grave)



Source: Emerald Eco Label-An Environmental Product Declaration for Asphalt Mixtures

Understanding Asphalt EPDs

Asphalt Data Requirements:

- From Asphalt Plant
 - Fuel Consumption
 - Burner
 - Hot-Oil Heater
 - Generator
 - Equipment
 - Electricity Consumption
 - Water Consumption
 - Total Tons Produced



Flushing Asphalt, Flushing, NY

Understanding Asphalt EPDs

Asphalt Data Requirements:

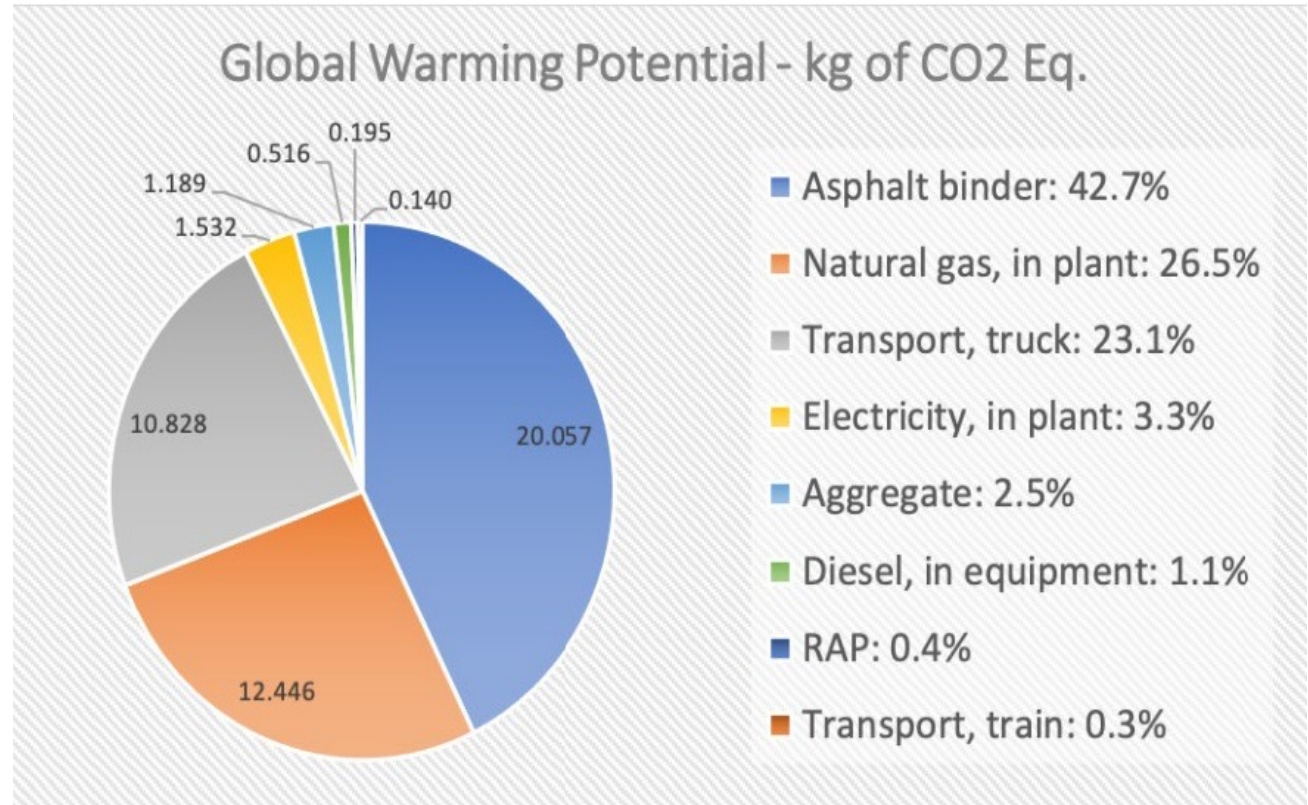
- From Mix Design
 - Material Content
 - Aggregates
 - Binder
 - RAP
 - Additives
 - Transportation Mode and Distance of Materials
 - Truck
 - Rail
 - Barge
 - Mix Production Temperature



Tilcon, Mt. Hope, NJ

Greatest Contributors to GWP

- Material Hauling (Truck)
- Asphalt Binder Content
- Burner Fuel Consumption



Mukherjee "Update to the LCA of Asphalt Mixtures in Support of Emerald Eco Label EPD Program" April 2022

How Can We Reduce GWP?

- Use Locally Sourced Aggregates
- Reduce Aggregate Moisture
 - Moisture Management
- Lower Production Temperature
 - WMA
- Reduce Virgin Binder
 - Increase RAP
 - Balanced Mix Design



EPDs as a Procurement Aid

Where The Port Authority of NY & NJ stands:

- EPDs are required as part of the procurement of asphalt, however, no decisions made on their content
- Increase the education and communication of stakeholders
- Increase the completeness of data
 - Asphalt additive data gaps
 - Binder Additives (Polymers, etc.)
 - Mix Additives (Anti-Strip, WMA, fibers, recycling agents, rejuvenators, etc.)

Looking Ahead →

- Goal is to set GWP limits or benchmarks for PANYNJ Asphalt mixes based off local and agency-specific data
 - Go/No-Go Specification?
 - Incentive/Disincentive Specification?
- Benchmarks must be consistent and comparable, and set such that a significant percentage of local asphalt suppliers can attain them
- Performance of the material and its intended uses must be accounted for



Looking Ahead → Performance

- A material with low GWP on their cradle-to-gate EPD may produce more GWP over the life cycle of the infrastructure

Example:

A material may have 15% less GWP in its EPD than benchmark. But if it's 25% less durable, it will emit more GWP over the life cycle.

Analysis period = 60 yrs	
Material A	Material B
0.85 GWP	1.0 GWP
15 year life	20 year life
15	20
30	40
45	
Total GWP	Total GWP
3.4	3.0

Dr. John Harvey. *Deriving Benchmarks for Construction Materials Based on EPDs*. Buy Clean Policies and EPDs Community of Knowledge. June 6, 2023

EPDs & Performance



Research Study – Mix Design and Performance Testing

- As most states are moving towards performance-based specifications, EPDs & performance should be looked at
- Interrelationship between the EPDs of typical PANYNJ mixes and their resulting performance
 - RAP
 - 0% (Virgin), 20%, 30%
 - Short-term/Long-term Aging
 - Performance Testing
 - Stiffness (Dynamic Modulus-AASHTO T378)
 - Rutting (APA-AASHTO T340 & Repeated Loading-AASHTO T378)
 - Cracking (Overlay Tester-NJDOT B-10 & IDEAL-CT-ASTM D8225)

EPDs & Performance

Research Study – EPD Sensitivity Analysis

RUTGERS

- For a given expectation of performance, examine sensitivity of GWP to changes in mix design (A2 and A3 stay constant, but A1 changes)
 - Can the same performance be achieved by varying the Asphalt Binder Replacement percentages?
 - Analysis will provide a starting point to incentivize suppliers to adopt mix design practices that deliver marginally lower GWP for the same performance expectations

EPDs & Performance



Research Study – EPD Sensitivity Analysis

- Could a supplier be disqualified for reasons outside of their control?!
Two suppliers using the same raw aggregate source, but are in different geographical locations
 - Assess the sensitivity of the GWP, for mixes from each supplier, to factors the supplier can improve on, versus factors that are beyond their control
 - Develop a “handicap factor” to GWP expressed through EPDs in our procurement decisions so that suppliers are incentivized to compete in a fair playing field

FHWA Climate Challenge

PANYNJ Low Carbon Asphalt Support

- **GOAL 1 – Comprehensive Review of Low Carbon Asphalt**
 - Literature review of low carbon asphalt solutions
 - In-Place Recycling Review and LCA Quantification
 - Ranking of Carbon Reduction Solutions based on CO₂e Reduction
- **GOAL 2 – Testing Plan**
 - Enables a standard method of evaluating new technologies



Conclusions

- EPDs are a valuable tool for improving environmental outcomes of asphalt
 - Work towards developing EPDs that include the full pavement LCA (Cradle-to-Grave)
- Further and constant collaboration needed between asphalt industry and public agencies to improve on EPDs
- Asphalt performance and its intended uses must be accounted for

Points of Contact

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Thank You!

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