



PRODUCER OUTREACH – ENVIRONMENTAL PRODUCT DECLARATIONS (EPDs) FOR ASPHALT MIXTURES WEBINAR

Agenda

- Welcome**
- Background:** *Overview of EPDs and why is PennDOT Collecting EPDs for Asphalt Mixtures?*
Kevin Gnegy, PennDOT Bureau of Construction and Materials
- Generating EPDs:** *How are EPDs created?*
Noah Shaltes and Martin Libertini, The Lindy Group
- Entering EPD data in eCAMMS:** *Demonstration of Data Entry into eCAMMS*
Sherry Hartman, PennDOT Bureau of Construction and Materials
- Question and Answer Session**
- Closing**

ENVIRONMENTAL PRODUCT DECLARATIONS (EPDs) FOR ASPHALT MIXTURES



Kevin Gnegy, P.E.

PennDOT Bureau of Construction and Materials

Pavement Materials Engineer

October 31, 2024

Introduction

- EPDs for Asphalt Mixtures
- Key Terms
- Brief Overview of EPDs
- EPD Program

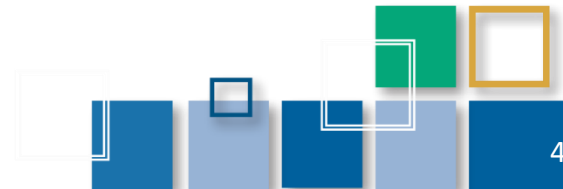


EPDs FOR ASPHALT MIXTURES

Construction materials including, asphalt mixtures, have environmental impacts during their life cycle.

Environmental product declarations, or EPDs, document those impacts. This tool helps States support procurement decisions and quantify embodied carbon reductions using life cycle assessments for sustainable pavements.

(FHWA Every Day Counts (EDC) Round 7)



KEY TERMS

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)

Tells you how to do a

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)

Which gets detailed in an

The Communication

Environmental Product Declaration (EPD)

“Providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information.”

(ISO 14025)

KEY TERMS



Greenhouse Gas (GHG)

EPDs communicate emissions of GHG from construction materials



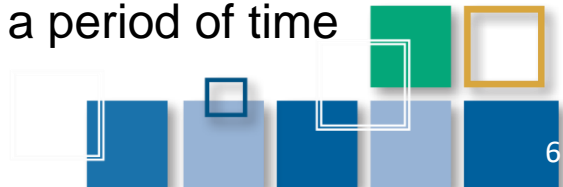
Embodied Carbon

The amount of GHG emissions associated with the manufacturer, transport and installation of construction materials



Global Warming Potential (GWP)

A measurement (included in the EPD) of the total energy that a gas absorbs over a period of time



BRIEF OVERVIEW OF EPDs

How Will They Be Used?

- ❑ Quantifies environmental impact of asphalt mixture production (cradle-to-gate)
- ❑ Reduce environmental impact of infrastructure construction materials
- ❑ Improve sustainability goals and to demonstrate a commitment to the environment
- ❑ Help meet sustainability target / future goals

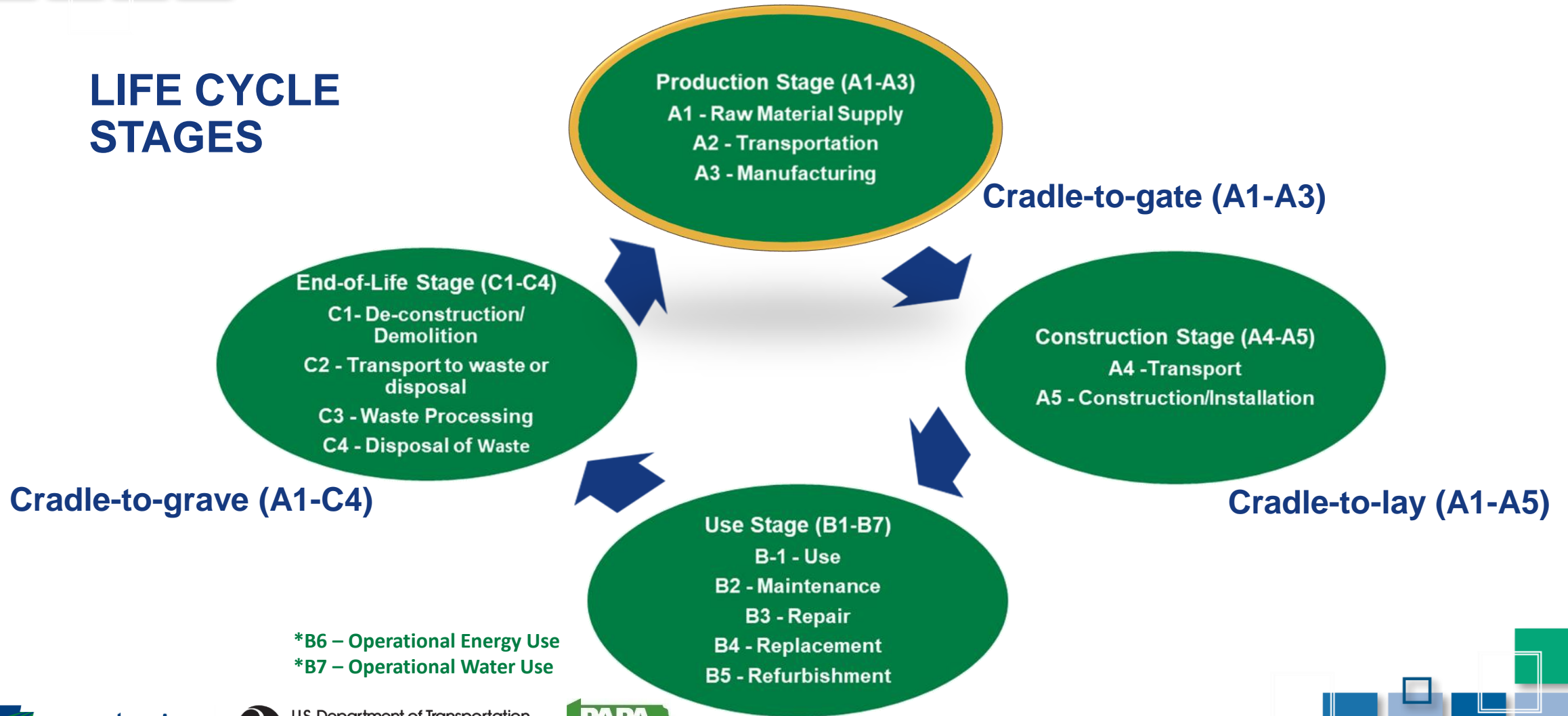
| Nutrition Facts | |
|---|-----------------------|
| Serving Size 1/2 cup (115g) Servings Per Container About 4 | |
| Amount Per Serving | |
| Calories 250 | Calories from Fat 130 |
| % Daily Value* | |
| Total Fat 14g | 22% |
| Saturated Fat 9g | 45% |
| Cholesterol 55mg | 18% |
| Sodium 75mg | 3% |
| Total Carbohydrate 26g | 9% |
| Dietary Fiber 0g | 0% |
| Sugars 26g | |
| Protein 4g | |
| Vitamin A 10% | Vitamin C 0% |
| Calcium 10% | Iron 0% |
| * Percent Daily Values are based on a 2,000 calorie diet. | |

Source: <http://www.elixirenvironmental.com/environmental-product-declaration.php>

| EPD "Nutrition" Label | |
|---|----------|
| Your Building Product | |
| Amount per Unit | |
| LCA MEASURES | TOTAL |
| Primary Energy (MJ) | 12.4 |
| Global Warming Potential (kg CO ² eq) | 0.96 |
| Ozone Depletion (kg CFC-11 eq) | 1.80E-08 |
| Acidification Potential (mol H ⁺ eq) | 0.93 |
| Eutrophication Potential (kg N-eq) | 6.43E-04 |
| Photo-Oxidant Creation Potential (kg O ₃ eq) | 0.121 |
| Your Product's Ingredients: Listed Here | |

BRIEF OVERVIEW OF EPDs

LIFE CYCLE STAGES



EXAMPLE EPD FOR ASPHALT MIXTURE - CRADLE-TO-GATE (A1-A3)

| Acronym | Indicator | Unit | Quantity per Metric Tonne Asphalt Mixture (Per Short Ton Asphalt Mixture) | | | |
|---------|--|----------------------|--|------------------------|------------------------|------------------------|
| | | | Materials (A1) | Transport (A2) | Production (A3) | Total (A1-A3) |
| GWP-100 | Global warming potential, incl. biogenic CO2 | kg CO2 Equivalent | 17.43 (15.82) | 5.35 (4.85) | 32.28 (29.28) | 55.06 (49.95) |
| ODP | Ozone depletion potential | kg CFC-11 Equivalent | 1.32e-08 (1.20e-08) | 3.23e-08 (2.93e-08) | 7.96e-08 (7.23e-08) | 1.25e-07 (1.14e-07) |
| EP | Eutrophication potential | kg N Equivalent | 4.73e-03 (4.29e-03) | 1.59e-03 (1.44e-03) | 7.96e-08 (7.23e-08) | 9.60e-03 (8.71e-03) |
| AP | Acidification potential | kg SO2 Equivalent | 5.26e-02 (4.78e-02) | 2.72e-02 (2.47e-02) | 5.78e-02 (5.24e-02) | 1.38e-01 (1.25e-01) |
| POCP | Photochemical ozone creation potential | kg O3 Equivalent | 1.13 (1.02) | 0.88 (0.79) | 1.73 (1.57) | 3.74 (3.39) |





EPD PROGRAM

Why is PennDOT Collecting the Data?

- Executive Order 14057 (Federal Sustainability Plan) net zero emissions for federal procurement by 2050
- Federal “buy clean” initiative(s) that promote the use of low-carbon construction materials in federally funded procurement
- The Commonwealth is supporting the “buy clean” initiative along with many other DOTs across the nation

EPD Development

- ❑ EPDs are plant and product specific, published in accordance with:
 - ISO 14025
 - ISO 21930
 - Product Category Rules (PCR) for asphalt mixtures
- ❑ ISO 14025 considers these Type III (third-party reviewed) EPDs
- ❑ EPDs are developed with specialized software by third-party entities following analysis of each phase of the production process

Who Pays to Develop the EPD?

- Material supplier is responsible for the development of EPDs for their products
- PennDOT is including a biddable lump sum item in ECMS contracts let through 2025 to assist in offsetting these costs



How Will the Data Be Collected?

- EPDs will be submitted as part of the 2025 annual JMF approval process
 - Bulletin 27, Appendix J is currently being updated, outlining EPD submission process for JMF approvals (available November 2024)
- JMFs submitted through eCAMMS will require:
 - PDF of the entire EPD document in the attachments feature
 - Entry of EPD data in eCAMMS reference fields (covered later in webinar)
- EPD data will be compared to the PDF for consistency – approval of JMF constitutes approval of EPD

EPD PROGRAM

Exemptions for EPDs

- New asphalt plants with less than 12 months of energy consumption data
- Plants with a new primary fuel source with less than 12 months of energy consumption data
- Portable plants with less than 12 months of energy consumption data at the same location
- Other unforeseen circumstances preventing EPD creation, as specified in Bulletin 27, Appendix J, if approved by the DME/DMM



How Will the Data Be Used?

- Approved EPD data will be extracted from JMFs and analyzed to prepare industry averages and benchmarks across the Commonwealth
- Benchmarks will be used as future targets to drive reductions in total GWP for cradle-to-gate asphalt mixture production





QUESTION AND ANSWER SESSION

Please enter your question into chat and we will do our best to answer in order received.

A summary document of the questions and responses will be available after the webinar, along with a recording of the webinar.



Thank You

For any questions or requests for information, please contact the PennDOT EPD
Resource Account: EPDS@pa.gov

GENERATING EPDs

LINDY PAVING'S EXPERIENCE



NOAH SHALTES, DIRECTOR OF SUSTAINABILITY
MARTIN LIBERTINI, DAILY PLANT QUALITY CONTROL MANAGER

OCT 31, 2024





ASPHALT SUPPLY
CONCRETE SUPPLY
ASPHALT, BRIDGE,
AND UTILITY
CONSTRUCTION

Lindy Paving is the only **FIVE-TIME winner** of the prestigious Sheldon G. Hayes Award, the National Asphalt Paving Association's highest honor, for **QUALITY** pavement.





ASPHALT SUPPLY

11 Asphalt Plant Locations

Second Avenue

Koppel

Neville Island

Zelienople

Homer City

Conneaut Lake

Erie

Hillsville

Wheatland

New Kensington

Sterrettania



The Road Forward

A Vision for Net Zero Carbon Emissions
for the Asphalt Pavement Industry



Vision: Sustainable communities and commerce, connected by net zero carbon emission asphalt pavements

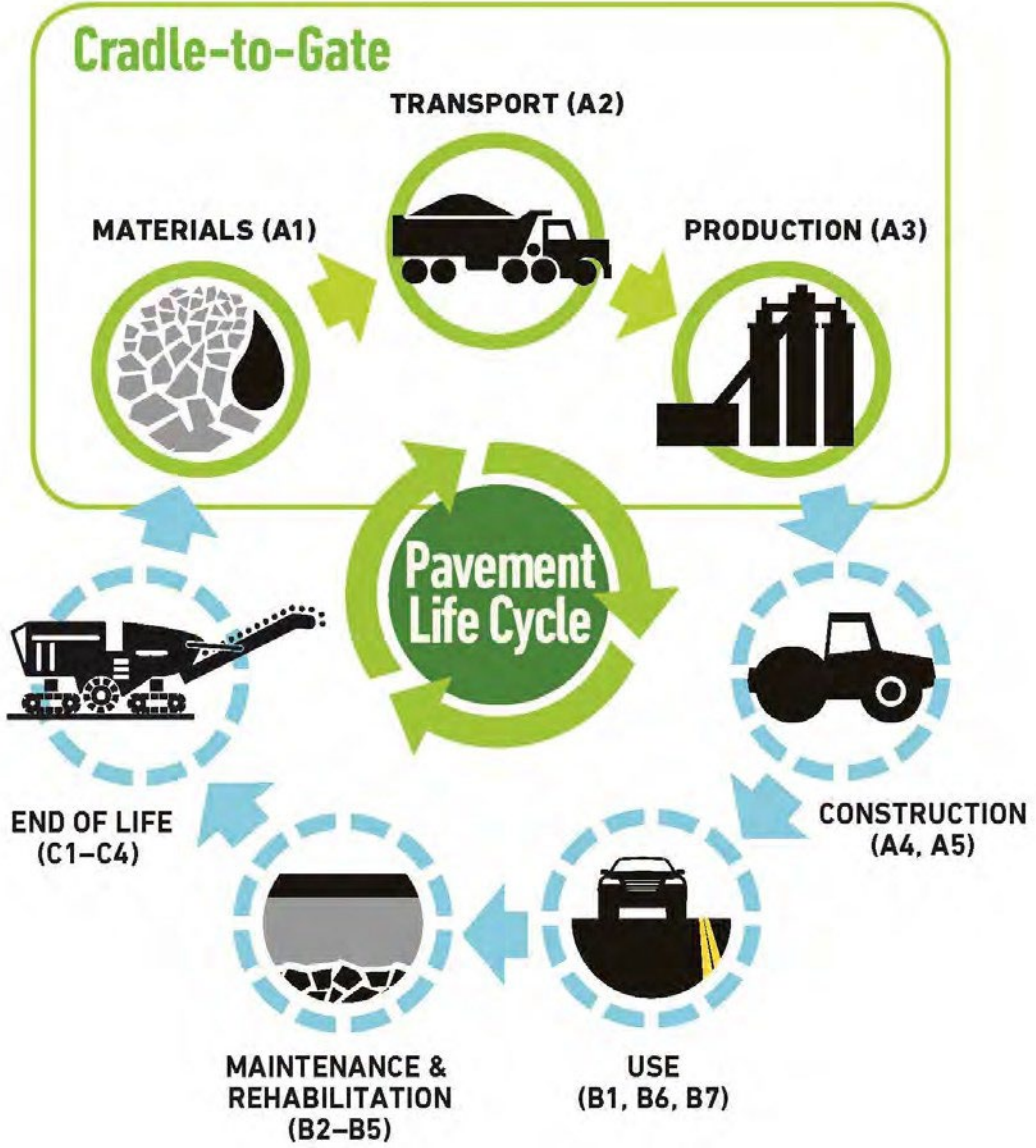
Mission: Engage, educate, and empower the U.S. asphalt community to produce and construct net zero carbon emission asphalt pavements

Life Cycle Framework – LCA & EPDs

Cradle-To-Grave LCA



EPDs
Emerald
ECO LABEL



What is an EPD?

- **Environmental Product Declaration**
 - **Quantified** environmental information on the **life cycle** of a product to enable **comparisons** between products fulfilling the **same function***
- **“Nutrition label” for environmental impacts**
 - ISO Standards
 - Product Category Rules (PCR)
- **Independently verified**



Product Impacts

Declared Unit: 1 m³ of 10,000 psi concrete at 28 days

Amount Per Declared Unit

| | |
|---------------------------------|---------------------------|
| Global Warming Potential | 445 kgCO ₂ eq |
| Emitted | 460 kgCO ₂ eq |
| Sequestered | -15 kgCO ₂ eq |
| Ozone Depletion | 0.000 kgCFC11eq |
| Acidification | 2.96 kgSO ₂ eq |
| Eutrophication | 0.09 kgNeq |
| Smog Formation | 0.61 kgO ₃ eq |
| Primary Energy Demand | 3017 MJ |
| Non-renewable | 3000 MJ |
| Renewable | 17 MJ |

<https://www.buildingtransparency.org/resources/how-get-epd/>

*Source: ISO 14025:2006. EPDs from different Product Categories should NOT be compared to each other.

COMPARE BY MANUFACTURER



LCIA Method: TRACI 2.1

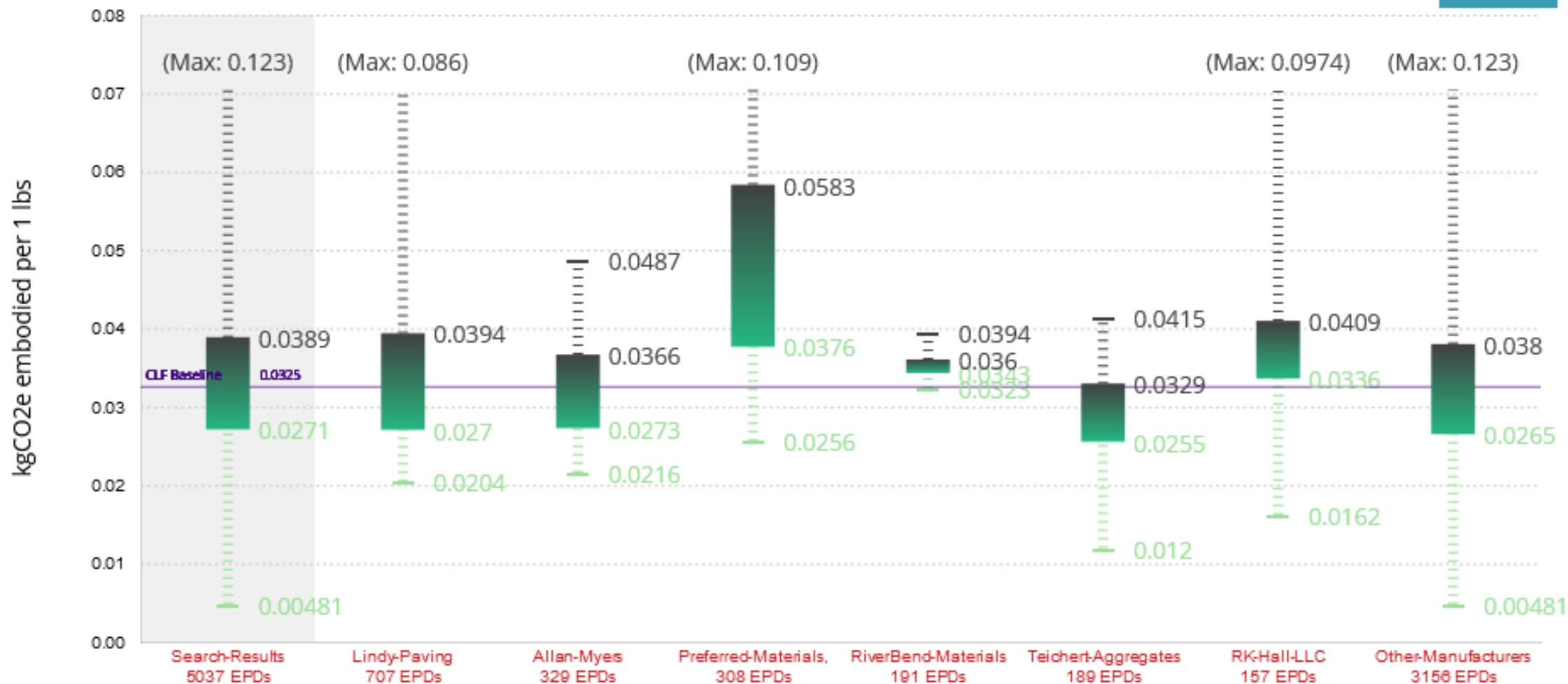
AND

Valid after: 2024-10-29

AND

EPD Type: Product EPDs OR Industry EPDs

zoom



Save...



Welcome to the Emerald Eco-Label EPD Tool

Portable Plants

The portable plants function is now live! Check out our [recent webinar](#) to learn more about this and other new features.

Each company is required to designate a primary/technical lead. Prior to being granted access to use the tool, each primary/technical lead must watch two webinars and take and pass the corresponding quiz for each webinar. The webinars are: [Environmental Product Declarations: What they are and how to use them](#) and [How to Use Emerald Eco-Label, NAPA's EPD tool](#).




Resources

- [Download EPD Data Gathering Sheet v5](#)
- [Download Emerald Eco-Label EPD Tool Instructions](#)

Please note, you will need your NAPA username and password to receive a member discount for use of this tool. If you need credentials or for questions regarding use of the EPD tool, please [contact NAPA](#).

Each EPD generated using this tool may be subject to a random audit. Each company must maintain or upload during EPD generation proper documentation of water usage, energy usage, and mix designs and supply the documentation to be audited.

G25

| | A | B | C | D |
|----|---|--|---|---|
| 1 |  | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | Welcome to the EPD Tool data gathering sheet. It is meant to be used in conjunction with the EPD Tool Instructions (pdf). | | | |
| 9 | It is provided to help you gather the relevant data needed to create your first EPD using the Asphalt EPD tool. | | | |
| 10 | The data can be divided into four categories: | | | |
| 11 | <ol style="list-style-type: none">1. Organizational information2. Plant data3. Suppliers and ingredients4. Mix information (Mix Form A and Mix Form B) | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |
| 16 | There is a separate worksheet for each category to align with the data entry sections of the EPD Tool. Each worksheet has been formatted to make it easy to print. | | | |
| 17 | | | | |
| 18 | | | | |
| 19 | Several of the form fields (highlighted in blue) have drop-down menus. As the software is updated over time (for example, as more product-specific data becomes available for additives), it should be easy for users to update this file by revising the appropriate table in the Drop-Downs tab rather than transferring their data to a new file altogether. | | | |
| 20 | | | | |
| 21 | | | | |
| 22 | All data entered into the EPD tool is confidential. Only the downstream environmental impacts will appear in the final EPD. | | | |
| 23 | | | | |
| 24 | | | | |
| 25 |  |  | | |
| 26 | EPD Data Gathering Sheet. Created by Lianna Miller and Joseph Shacat Version 3, March 21, 2022 | | | |
| 27 | | | | |
| 28 | | | | |
| 29 | | | | |

< > **Intro** | 1. Organizations | 2. Plants | 3. Ingredients | 4. Mix Form A | 4. Mix Form B | Drop-Dow

1. Organizational Information

Use this sheet to collect organizational information.

* indicates required data fields.

| Your Data | Units | Organizational Data | Comments & Help |
|--|-------|---------------------|---|
| Lindy Paving | | Company Name* | In the EPD Tool, "Organization" refers to a whole company. For smaller operations, this may be the same as some of the "Plant" data |
| www.lindypaving.com | | URL* | Company website address |
| | | Primary Contact* | Name and contact information for the person who will be the lead for EPD creation at your company |
| 1807 Shenango Rd | | Address Line 1* | |
| | | Address Line 2 | |
| New Galilee | | City* | |
| PA | | State* | |
| 16141 | | Zip Code* | |



EPD Data Gathering Sheet.
Created by Lianna Miller and Joseph Shacat
Version 3, March 21, 2022

2. Plant Data

This section is where you enter information about your asphalt plant.

Production Types: At this time, the EPD Tool supports either conventional plants that produce a combination of hot-mix and warm-mix asphalt (HMA and WMA) **or** cold-central plant recycling (CCPR) plants. Plants that produce both of these are not supported.

Portable Plants: At this time, portable plants are not supported. Portable plants are defined as plants that changed location since the 12-month data collection period began or plants that are expected to change location during the EPD period of validity (through March 31, 2027).

* indicates required data fields.

| Your Data | Units | Production Facilities | Comments & Help |
|-----------|---------------|---|--|
| | | Plant name* | A user can create multiple plants |
| | | <u>Physical address</u> | Cannot be a PO Box; The ZIP code will be used for certain calculations |
| | | Address Line 1* | |
| | | Address Line 2 | |
| | | City* | |
| | | State* | |
| | | Zip Code* | |
| | | Production Facility Resource Use | |
| | | <u>Annual Production & Water</u> | |
| | | Data collection start date* | All quantities reported in the Production Facility section will be over a cumulative period of 12-months, within the last five years. Enter the start date of the twelve month period during which the data was recorded. The reported data for all the subsequent categories (in Production Facility) must have been measured for the same twelve month period starting from this date. |
| | US Short Tons | Total Asphalt Mix Sold (per year)* | For most plants, the total mix sold will be less than the total amount of mix produced, since some of the produced mix is wasted during startup/shutdown, when switching mixes, etc. This must be over the same 12 month period as all the other plant data |
| | | | Include water used for the following purposes: dust control, asphalt binder foaming processes for WMA or CCPR, irrigation (landscaping), slurry for wet scrubber operations, slurry for removing |

3. Suppliers and Ingredients

In this section of the EPD Tool, you will create a library of suppliers and materials that go into the mixes that your company produces. Ingredients are stored at the Organization level and are available to all plants associated with the Organization. Ingredients can be separated into four broad categories:

- 1.) Binders (including additives and modifiers that are blended at the terminal)
- 2.) Aggregates
- 3.) Binder additives (added or blended at your asphalt plant)
- 4.) Mix additives

* indicates required data fields.

Blue highlighted cells indicate a drop-down menu.

† indicates materials with a data gap.

1

2

3

4

5

6

7

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9

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11

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13

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17

18

19

20

21

22

Your Data

Units

Suppliers and Ingredients

Comments & Help

Suppliers (Sources)

Your library of companies/facilities that supply your aggregates, binders, and additives

Supplier 1

Copy and paste to add additional suppliers.

Hanson Aggregates

Supplier Company Name*

Company Website

Contact Name

Email*

Phone Number*

Address Line 1*

Address Line 2

City*

State*

ZIP Code*

Supplier 2

Insert rows (11) then copy and paste to add additional suppliers.

Supplier Company Name*

Company Website

Contact Name

Email*

Define a New Production Facility for

Facility Name*

Please ensure that the address entered on this page is for the physical address of the entity. Please do not use a P.O. box or other mail forwarding address.

Enter an address

Map Satellite

United States

North Pacific Ocean

North Atlantic Ocean

Google

Keyboard shortcuts | Map data ©2024 Google, INEGI | Terms

PennDOT & PAPA presentation plant Production Data

Total Yearly Production

Data collection start date*

10/29/2023



Data collection period must have started between 10/30/2019 and 10/29/2023.

Total Asphalt Mix Sold

0

U.S. Short Tons

Total Asphalt Mix Sold Documentation

Choose File

No file chosen

Total Water

0

Gallons

Check this box if your water usage data only captures water used directly in mix production process, and does not account for e.g. ground dust suppression.

Water Use Documentation

Choose File

No file chosen

Quantities reported on this page refer to a 12 month period that began within the last five years. Please state the start date of the twelve month period during which the data was recorded.

All subsequent entries must have been recorded over this 12 month period.

Please state the total tonnage of asphalt (including all mix types) produced at your plant and placed at a job over the chosen 12 month period.

Enter the total quantity of water consumed during the 12-month data collection period. Include water used for dust control, asphalt binder foaming processes for WMA or CCPR, irrigation (landscaping), slurry for wet scrubber operations, slurry for removing excess baghouse fines, and slurry for adding hydrated lime or other mineral fillers.

If your plant does not have its own water meter, you may estimate water consumption based on company records such as daily water truck deliveries, flow rates, operational usage of water pumps, etc. Be sure to document your assumptions and calculations. Be sure to upload any supporting documentation (e.g., utility bills showing water use, water usage calculations, etc.) using the "Choose File" button.

Waste

When baghouse fines, wet scrubber fines, or off-spec production materials are transported off-site for disposal or recycling they must be declared as hazardous waste, non-hazardous waste, or materials for recycling in a manner that reflects the actual disposition of these materials.

Hazardous Waste

Amount*

 Short Tons

Document

 No file chosen

Truck Distance

 miles

Train Distance

 miles

Barge Distance

 miles

Ocean Distance

 miles

Non-Hazardous Waste

Amount*

 Short Tons

Document

 No file chosen

Truck Distance

 miles

Train Distance

 miles

Barge Distance

 miles

Ocean Distance

 miles

Recycled Material

Amount*

 Short Tons

Document

 No file chosen

Truck Distance

 miles

Train Distance

 miles

Barge Distance

 miles

Ocean Distance

 miles

Electricity

Grid Power

 KWh

Power use documentation

 No file chosen

Location:

3544 N Progress Ave, Harrisburg, PA 17110, USA

Electricity Region:

PJM Interconnection, LLC

Please report total grid electricity usage over the chosen 12 month period. If you have supporting documentation (for instance, a utility bill showing annual electricity usage), upload it using the "Choose File" button. It is recommended that you upload supporting documents whenever they are available in case of a data audit.

If your plant is co-located with another facility that shares the same electricity meter, the recommended approach is to install a submeter for your plant's electricity consumption. In the meantime, it's acceptable to allocate electricity consumption using the same method your company uses for financial accounting purposes. Be sure to document your energy allocation approach and include this information in the supporting documentation.

The electricity mix for your plant is determined by the mix of energy provided to your regional electrical grid. This in the US this information is tracked by the US Department of Energy National Energy Technology Laboratory at the level of balancing authorities, from whom your energy company receives their supply of power. Your balancing authority and electricity mix has been automatically identified using this facility's zip code. In Canada, electricity is reported on a provincial basis.

Onsite Generator

In case your plant uses a generator, please report the energy source and quantity used to fuel the generator. Please ensure that energy use is reported for the chosen 12-month period.

If you do not track the fuel usage an onsite generator separately from other equipment used during asphalt production (for instance, loaders used to move aggregate), enter all the diesel (or biodiesel) here.

Diesel

Consumed in onsite generator. Includes Fuel Oil No. 2

Amount

 gal/yr

Documentation

 No file chosen

Biodiesel

Consumed in onsite generator. A liquid, bio-based fuel that meets the ASTM D6751 specification or comparable

Amount

 gal/yr

Documentation

 No file chosen

Generator biodiesel grade

Propane

Consumed in onsite generator. Liquid petroleum gas (LPG).

Amount

 gal/yr

Documentation

 No file chosen

Gasoline

Consumed in onsite generator.

Amount

 gal/yr

Documentation

 No file chosen

Burner Fuel

Enter the total quantity of burner fuel consumed during the 12-month data collection period. Include fuel consumed for the primary burner, secondary burner, and ancillary combustion equipment such as on-site asphalt-rubber blending plants, if applicable.

If your plant is co-located with another facility that shares the same natural gas meter, the recommended approach is to install a submeter for your plant's natural gas consumption. In the meantime, it's acceptable to allocate burner fuel consumption using the same method your company uses for financial accounting purposes. Be sure to document your burner fuel allocation approach and include this information in the supporting documentation.

Natural Gas

Consumed in burner. As gas, delivered via pipeline.

Amount

mcf/yr

Documentation

Choose File

No file chosen

Liquified Natural Gas

Consumed in burner. Natural gas that has been cooled to a liquid state for shipping and storage.

Amount

gal/yr

Documentation

Choose File

No file chosen

Propane

Consumed in burner. Liquid petroleum gas (LPG).

Amount

gal/yr

Documentation

Choose File

No file chosen

Oil Heater

Enter the quantity of fuel used for the plant's hot oil heater and direct fire asphalt tank heaters, if applicable. If your plant does not separately meter the oil heater fuel consumption, it's acceptable to include this fuel in the Burner Fuel field.

Natural Gas

Consumed in oil heater. As gas, delivered via pipeline.

Amount mcf/yr

Documentation

Liquefied Natural Gas

Consumed in oil heater. Natural gas that has been cooled to a liquid state for shipping and storage.

Amount gal/yr

Documentation

Propane

Consumed in oil heater. Liquid petroleum gas (LPG).

Amount gal/yr

Documentation

Diesel

Consumed in oil heater. Includes Fuel Oil No. 2.

Amount gal/yr

Documentation

Used Oil

Consumed in oil heater. Includes recycled fuel, waste oil, and once used oil.

Equipment

Enter the total quantity of fuel consumed during the 12-month data collection period by equipment such as loaders, skid steers, on-site trucks, air compressors, etc.

Diesel

Consumed in mobile equipment. Includes Fuel Oil No. 2

Amount

gal/yr

Documentation

Choose File

No file chosen

Biodiesel

Consumed in mobile equipment. A liquid, bio-based fuel that meets the ASTM D6751 specification or comparable

Amount

gal/yr

Documentation

Choose File

No file chosen

Eqp biodiesel grade

Report biodiesel grade as percent biodiesel in a biodiesel/petroleum diesel mix. E.g. If you are using B20 Biodiesel, enter "20" as the biodiesel grade.

Propane

Consumed in mobile equipment. Liquid petroleum gas (LPG).

Amount

gal/yr

Documentation

Choose File

No file chosen

Gasoline

Consumed in mobile equipment.

Amount

gal/yr

Documentation

Choose File

No file chosen

Define a New Aggregate

Select Source

Select a supplier company. Please ensure a company has not already been defined before adding a new supplier.

Source*

New Supplier

Aggregate Details

Ingredient Name*

Aggregate Type*

† Ingredients with upstream data gaps. Data gaps that represent more than 1% of the mix by mass (individually) or 5% of the mix by mass (combined) are ineligible for EPD creation. Data gaps below these thresholds will be indicated on the EPD. Work is ongoing to develop datasets to fill these data gaps. Please contact NAPA at epd@asphaltpavement.org with inquiries about timelines for filling data gaps and to request upstream data from your supplier.

Nominal maximum aggregate size

inches

Please convert fractional inch measurements into a decimal value.

Description

Define a New Asphalt Mix

Remaining mass budget of 100% is outside 0.01% tolerance

Mix Definition

Identify the primary characteristics of this mix. Note that all mass percentages are in terms of **total mix mass**.

Mix ID*

Enter a meaningful unique identifier for this mix. We suggest you use your company's naming convention and/or identifier.

Primary Contact*

Identify a primary contact person for this mix. This person's contact information will be included on all EPDs generated for this mix design.

Safety Data Sheet

Please select the SDS for this mix. If your organization has no SDS sheets defined, please create one using the Organizations interface before continuing.

This mix is sold with packaging Check this box if this mix is sold in a bag, bucket, or other package (e.g., cold patch).

Specification

Mix Specification Entity*

Name of the entity that developed the specification for this mix.

Mix Specification*

Mix specification name

Specification

Mix Specification Entity*

Name of the entity that developed the specification for this mix.

Mix Specification*

Mix specification name

Mix Design Document

Document containing the mix design.

Mix design method

Project or Customer ID

OPTIONAL: ID for the project or customer for whom this mix was designed.

Upper PG Grade Upper PG Grade Suffix

Lower PG Grade Lower PG Grade Suffix

Gradation type

Nominal Maximum Aggregate Size

Enter the nominal maximum aggregate size used in this mix. Please enter a value either in decimal inches or in millimeters, but not both.

Nominal maximum aggregate size (inches)

inches

Nominal maximum aggregate size (millimeters)

mm

Heating

How would you categorize this mix's processing?*

▼

Warm mix technology*

▼

Min Temp*

Minimum temperature of mix production.

Max Temp*

Maximum temperature of mix production.

Units*

▼

Ensure correct units are selected.

Reclaimed Asphalt Pavement

Percent RAP by Mass

RAP is processed onsite

 %

Reclaimed Asphalt Pavement used, as percent of total mix mass. Value should be between 0 and 100.

No mileage needed if processed on site

RAP Truck Distance

RAP Train Distance

RAP Barge Distance

RAP Ocean Distance

 miles miles miles miles

Enter the approximate average distance that RAP is transported from the initial processing or storage location to the asphalt plant. If the initial processing or storage location is onsite, you may enter a distance of zero if you included fuel consumption for on-site transport activities in the Equipment Fuel Consumption field of the Plants interface.

Recycled Asphalt Shingles

Percent RAS by Mass

RAS is processed onsite

 %

Recycled Asphalt Shingles used, as percent of total mix mass. Value should be between 0 and 100.

RAS Truck Distance

RAS Train Distance

RAS Barge Distance

RAS Ocean Distance

 miles miles miles miles

Enter the approximate average distance that RAS is transported from the initial processing or storage location to the asphalt plant. If the initial processing or storage location is onsite, you may enter a distance of zero if you included fuel consumption for on-site transport activities in the Equipment Fuel Consumption field of the Plants interface.

Aggregate

Identify all aggregates used in this mix. Do not include RAP or RAS - these are accounted for in the Mix Overview section above.

Distances should include all travel from the aggregate quarry or gravel pit to the asphalt plant. For recycled aggregates such as glass cullet or recycled concrete aggregates, the distance should include all travel from the material processing facility to the asphalt plant

Ingredient* Percent of Mix by Mass* %

Truck Distance Miles Miles Miles Miles Miles Miles

One-way distance. Default is 50 miles. One-way distance. One-way distance. One-way distance.

Document

Please attach a file that documents the use of this ingredient in this mix, if available.

[Add another aggregate](#)

Virgin Binder

Identify types and amounts of virgin binder used in this mix.

Do not include binder content due to RAP, RAS, or any other recycled sources. Do not include mass due to binder additives or modifiers added at your plant. Report all such additives in the next section.

Distances should include all travel from the asphalt terminal to the final mix production facility. If you source the binder directly from the refinery, use the distance from the refinery to the final mix production facility.

Ingredient* Percent of Mix by Mass*

----- %

| | | | | |
|--|--|--|----------------------------|---------------------------------------|
| Truck Distance | Train Distance | Barge Distance | Ocean Distance | |
| <input type="text" value="50"/> Miles | <input type="text"/> Miles | <input type="text"/> Miles | <input type="text"/> Miles | <input type="button" value="remove"/> |
| One-way distance calculated from the terminal. Default is 50 miles. | One-way distance calculated from the terminal. | One-way distance calculated from the terminal. | One-way distance. | |

Document

No file chosen

Please attach a file that documents the use of this ingredient in this mix, if available.

Binder Additives and Modifiers

Identify all binder additives or modifiers used in this mix.

Please include any materials added to virgin binder by your organization at your mix production facility, after the binder has been received from the terminal but before the binder is added to the mix.

Enter the percent per ton of mix (not binder!) that this binder additive comprises. Typical values are 0.05-1.0%. To convert from % of binder to % of total mix mass, multiply the percentage of the additive in the binder by the decimal percentage of the binder in the mix. So, if your additive is 2% of the total binder mass, and your mix is 5% binder, your additive is $2.0\% \times 0.05 = 0.10\%$ of total mix mass. Be sure that this mass percent calculation is factored into your reported amounts of virgin binder.

Distances should include all travel from the additive manufacturing facility to the final mix production facility.

| | |
|--|------------------------------------|
| Ingredient* | Percent of Mix by Mass* |
| <input type="text" value="United Asphalt-Warren-Unmodified-64S-22"/> | <input type="text" value="5.4"/> % |

| | | | | |
|--|----------------------------|----------------------------|----------------------------|---------------------------------------|
| Truck Distance | Train Distance | Barge Distance | Ocean Distance | |
| <input type="text" value="50"/> Miles | <input type="text"/> Miles | <input type="text"/> Miles | <input type="text"/> Miles | <input type="button" value="remove"/> |
| One-way distance. Default is 50 miles. | One-way distance. | One-way distance. | One-way distance. | |

Document

 No file chosen

Please attach a file that documents the use of this ingredient in this mix, if available.

Add another binder additive

Mix Additives

Identify all other materials added directly to this mix. Please include any material that is not included in base aggregates, binders, RAP, or RAS. For a list of possible categories please see the Ingredient Category dropdown on the "New Mix Additive Source" page.

Ingredient* Percent of Mix by Mass*

Ingevity Corporation-Charleston-Ingevity Evotherm M1- Evotherm .25 %

| | | | |
|---|----------------------------------|----------------------------------|----------------------------------|
| Truck Distance | Train Distance | Barge Distance | Ocean Distance |
| <input type="text" value="741.77"/> Miles | <input type="text"/> Miles | <input type="text"/> Miles | <input type="text"/> Miles |
| <small>One-way distance. Default is 50 miles.</small> | <small>One-way distance.</small> | <small>One-way distance.</small> | <small>One-way distance.</small> |

remove

Document

Please attach a file that documents the use of this ingredient in this mix, if available.

Add another mix additive



An Environmental Product Declaration (EPD) for Asphalt Mixtures

Company Information

Lindy Paving Inc is an asphalt mixture producer.

Neville Island, a stationary asphalt plant at
4200 Neville Rd., Pittsburgh, PA 15225



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: W95721E1

Specification Entity: PennDOT

Specification: 20A15PE

Gradation Type: dense

Mix Design Method: superpave

Nominal Maximum Aggregate Size: 9.5 mm

Performance Grade of Asphalt Binder: PG 64-22

Customer [Project/Contract] Number: Not Reported

This mix producer categorizes this product as a Warm Mix Asphalt (WMA) asphalt mixture produced using chemical additive. This asphalt mixture was produced within a temperature range of 132 to 160°C (270.0 to 320.0°F) 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.



This declaration is an EPD in accordance with ISO 14025:2006¹ and ISO 21930:2017². The PCR is *Product Category Rules for Asphalt Mixtures*³. This EPD transparently describes the potential environmental impacts associated with the identified life cycle stages of the described product.

Declaration Number: 101.254.3232 v5 **Software Version:** 2.1.1

Date of Issue: March 11, 2024 **Period of Validity:** March 31, 2027

This EPD is valid for asphalt mixtures produced at the location indicated on this page. Data used to inform this EPD reflect plant operations from a 12-month period beginning on Jan. 1, 2023.

This EPD can be found at <https://asphaltpd.org/epd/d/74UA2e/>

LCA performed by: Ben Ciavola, PhD

Emerald

Environmental Product Declaration (EPD) for Asphalt Mixtures

Company Information

Lindy Paving Inc is an asphalt mixture producer.

Neville Island, a stationary asphalt plant at

4200 Neville Rd., Pittsburgh, PA 15225



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: W95721E1

Specification Entity: PennDOT

Specification: 20A15PE

Gradation Type: dense

Mix Design Method: superpave

Nominal Maximum Aggregate Size: 9.5 mm

Performance Grade of Asphalt Binder: PG 64-22

Customer [Project/Contract] Number: Not Reported

This mix producer categorizes this product as a Warm Mix Asphalt (WMA) asphalt mixture produced using chemical additive. This asphalt mixture was produced within a temperature range of 132 to 160°C (270.0 to 320.0°F) 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.



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LCA performed by: Ben Ciavola, PhD

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Mix Name: W95721E1

Specification Entity: PennDOT

Specification: 20A15PE

Gradation Type: dense

Mix Design Method: superpave

Nominal Maximum Aggregate Size: 9.5 mm

Performance Grade of Asphalt Binder: PG 64-22

Customer [Project/Contract] Number: Not Reported

This mix producer categorizes this product as a Warm Mix Asphalt (WMA) asphalt mixture produced using chemical additive. This asphalt mixture was produced within a temperature range of 132 to 160°C (270.0 to 320.0°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.

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An Environmental Product Declaration (EPD) for Asphalt Mixtures

Company Information



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LCA performed by: Ben Ciavola, PhD

An Environmental Product Declaration for Asphalt Mixtures

Product Ingredients

The product ingredients as identified in the mix design are provided in the table below.

TABLE 1. PRODUCT INGREDIENTS

| COMPONENT | MATERIAL | WEIGHT % |
|-----------------|-------------------------------|----------|
| Aggregate | Natural Stone | 25 |
| Aggregate | Natural Stone | 9 |
| Aggregate | Natural Stone | 47 |
| RAP | Reclaimed Asphalt Pavement | 15 |
| Binder | Unmodified | 5 |
| Binder Additive | Warm Mix Additive - Chemical* | < 1% |
| | | |
| | | |
| | | |
| | | |

*Indicates that this material is a data gap. Upstream data associated with extraction and processing is not accounted for in this EPD.

Regulated Hazardous Substances

Regulated hazardous substances, if applicable, are listed on the safety data sheet (SDS) associated with this asphalt mixture. The chemical names and composition of the mix from the SDS are provided here for transparency.

TABLE 2. REGULATED HAZARDOUS SUBSTANCES

| CHEMICAL NAME | CAS NO. | WEIGHT % |
|--|-----------|-------------|
| Aggregate | Various | 70.0 < 97.0 |
| Petroleum asphalt/bitumen | 8052-42-4 | 3.0 < 7.0 |
| Reclaimed Asphalt Pavement (RAP) | Mixture | < 40.0 |
| Reclaimed Asphalt Shingles | Mixture | < 10.0 |
| Polymers & Natural Rubbers | Various | < 0.5 |
| Process oils (inherent in refined petroleum asphalt) | Various | < 0.1 |
| Anti-strip or other amine-based additives | Various | < 0.1 |
| Warm-mix additives | Various | < 0.1 |
| | | |
| | | |

Product Ingredients

The product ingredients as identified in the mix design are provided in the table below.

TABLE 1. PRODUCT INGREDIENTS

| COMPONENT | MATERIAL | WEIGHT % |
|------------------------|--------------------------------------|----------|
| <i>Aggregate</i> | <i>Natural Stone</i> | 25 |
| <i>Aggregate</i> | <i>Natural Stone</i> | 9 |
| <i>Aggregate</i> | <i>Natural Stone</i> | 47 |
| <i>RAP</i> | <i>Reclaimed Asphalt Pavement</i> | 15 |
| <i>Binder</i> | <i>Unmodified</i> | 5 |
| <i>Binder Additive</i> | <i>Warm Mix Additive - Chemical*</i> | < 1% |
| | | |
| | | |
| | | |
| | | |
| | | |

*Indicates that this material is a data gap. Upstream data associated with extraction and processing is not accounted for in this EPD.

An Environmental Product Declaration for Asphalt Mixtures

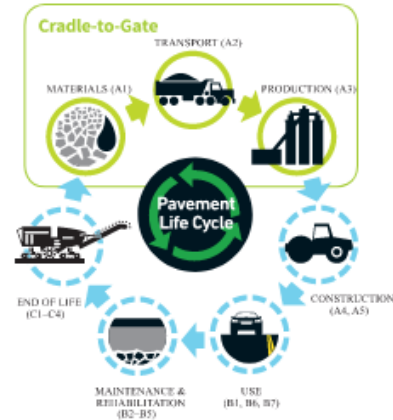
TABLE 3. ENVIRONMENTAL IMPACT SUMMARY TABLE

| IMPACT CATEGORY | POTENTIAL IMPACT PER METRIC TONNE ASPHALT MIXTURE (PER TON ASPHALT MIXTURE) |
|---|---|
| Global warming potential (GWP-100) | 59.00 (53.52) kg CO ₂ Equiv. |
| Ozone depletion potential (ODP) | 8.94e-08 (8.11e-08) kg CFC-11 Equiv. |
| Eutrophication potential (EP) | 1.42e-02 (1.29e-02) kg N Equiv. |
| Acidification potential (AP) | 2.02e-01 (1.83e-01) kg SO ₂ Equiv |
| Photochemical ozone creation potential (POCP) | 5.05 (4.58) kg O ₃ Equiv. |

Methodological Framework

DECLARED UNIT

The declared unit is 1 metric tonne (1 short ton) of an asphalt mixture (UNSPSC Code 30111509: Asphalt Based Concrete), which is defined as “a plant-produced composite material of aggregates, asphalt binder, and other materials.”³



LIFE CYCLE STAGES AND INFORMATION MODULES

This is a cradle to gate EPD. It covers the raw material supply, transport, and manufacturing life cycle stages (modules A1-A3). It does not include construction (placement and compaction), use, maintenance, rehabilitation, or the end-of-life life cycle stages (modules A4-5, B1-7, and C1-4).³

Materials (A1): This stage includes raw material extraction and manufacturing (e.g., quarry operations for aggregates, petroleum extraction and refinery operations for asphalt binder production, etc.) based on the relative proportion of ingredients in the mix design.

Transport (A2): This stage includes transport of raw materials to the asphalt plant based on actual transportation distances and modes for ingredients in the mix design.

Production (A3): This stage comprises plant operations involved in the production of asphalt mixtures, including generation of electricity and heat used during asphalt mix production (e.g., extraction, refining, and transport of fuels). Data for this stage is plant specific.

LIFE CYCLE INVENTORY

This EPD was created using plant-specific data for asphalt mix production of the production stage (A1-A3). Potential variations due to asphalt mixture design, supplier locations, manufacturing processes, efficiencies, and energy consumption are accounted for in this EPD. All upstream data sources are prescribed in the Product Category Rules (PCR) and are publicly available and freely accessible to enhance transparency and comparability. Use of the prescribed data sources improves comparability among the EPDs developed by limiting variability due to differences in the upstream data within the system boundaries.³

ALLOCATION PROCEDURES

Impacts from upstream production and transportation of raw materials are subdivided based on the relative material quantities (percentages) in the mix design. For conventional asphalt plants that produce both hot-mix asphalt (HMA) and warm-mix asphalt (WMA) mixtures, allocation of energy and other resources for asphalt mix production is on a mass basis. Mix-specific production temperatures are not used to separately allocate energy inputs to HMA and WMA mixtures. For conventional asphalt plants that also produce asphalt mixtures at ambient temperatures using cold central plant recycling (CCPR) technologies, HMA and WMA mixtures are subdivided from CCPR mixtures by segregating burner fuel consumption from CCPR mixtures.

An Environmental Product Declaration for Asphalt Mixtures

TABLE 3. ENVIRONMENTAL IMPACT SUMMARY TABLE

| IMPACT CATEGORY | POTENTIAL IMPACT PER METRIC TONNE ASPHALT MIXTURE (PER TON ASPHALT MIXTURE) |
|---|---|
| <i>Global warming potential (GWP-100)</i> | <i>59.00 (53.52) kg CO2 Equiv.</i> |
| <i>Ozone depletion potential (ODP)</i> | <i>8.94e-08 (8.11e-08) kg CFC-11 Equiv.</i> |
| <i>Eutrophication potential (EP)</i> | <i>1.42e-02 (1.29e-02) kg N Equiv.</i> |

TABLE 3. ENVIRONMENTAL IMPACT SUMMARY TABLE

| IMPACT CATEGORY | POTENTIAL IMPACT PER METRIC TONNE ASPHALT MIXTURE (PER TON ASPHALT MIXTURE) |
|--|---|
| <i>Global warming potential (GWP-100)</i> | <i>59.00 (53.52) kg CO2 Equiv.</i> |
| <i>Ozone depletion potential (ODP)</i> | <i>8.94e-08 (8.11e-08) kg CFC-11 Equiv.</i> |
| <i>Eutrophication potential (EP)</i> | <i>1.42e-02 (1.29e-02) kg N Equiv.</i> |
| <i>Acidification potential (AP)</i> | <i>2.02e-01 (1.83e-01) kg SO2 Equiv</i> |
| <i>Photochemical ozone creation potential (POCP)</i> | <i>5.05 (4.58) kg O3 Equiv.</i> |

LIFE CYCLE INVENTORY

This EPD was created using plant-specific data for asphalt mix production of the production stage (A1-A3). Potential variations due to asphalt mixture design, supplier locations, manufacturing processes, efficiencies, and energy consumption are accounted for in this EPD. All upstream data sources are prescribed in the Product Category Rules (PCR) and are publicly available and freely accessible to enhance transparency and comparability. Use of the prescribed data sources improves comparability among the EPDs developed by limiting variability due to differences in the upstream data within the system boundaries.¹

ALLOCATION PROCEDURES

Impacts from upstream production and transportation of raw materials are subdivided based on the relative material quantities (percentages) in the mix design. For conventional asphalt plants that produce both hot-mix asphalt (HMA) and warm-mix asphalt (WMA) mixtures, allocation of energy and other resources for asphalt mix production is on a mass basis. Mix-specific production temperatures are not used to separately allocate energy inputs to HMA and WMA mixtures. For conventional asphalt plants that also produce asphalt mixtures at ambient temperatures using cold central plant recycling (CCPR) technologies, HMA and WMA mixtures are subdivided from CCPR mixtures by segregating burner fuel consumption from CCPR mixtures.

An Environmental Product Declaration for Asphalt Mixtures

TABLE 4. LIFE CYCLE IMPACT INDICATORS

| ACRONYM | INDICATOR | UNIT | QUANTITY PER METRIC TONNE ASPHALT MIXTURE (PER SHORT TON ASPHALT MIXTURE) | | | |
|---------|--|---------------------------|--|------------------------|------------------------|------------------------|
| | | | MATERIALS (A1) | TRANSPORT (A2) | PRODUCTION (A3) | TOTAL (A1-A3) |
| GWP-100 | Global warming potential, incl. biogenic CO ₂ | kg CO ₂ Equiv. | 31.37 (28.45) | 7.52 (6.82) | 20.11 (18.25) | 59.00 (53.52) |
| ODP | Ozone depletion potential | kg CFC-11 Equiv. | 1.59e-08 (1.44e-08) | 4.49e-08 (4.08e-08) | 2.85e-08 (2.59e-08) | 8.94e-08 (8.11e-08) |
| EP | Eutrophication potential | kg N Equiv. | 8.39e-03 (7.61e-03) | 3.72e-03 (3.38e-03) | 2.09e-03 (1.89e-03) | 1.42e-02 (1.29e-02) |
| AP | Acidification potential | kg SO ₂ Equiv. | 9.04e-02 (8.20e-02) | 7.50e-02 (6.80e-02) | 3.64e-02 (3.30e-02) | 2.02e-01 (1.83e-01) |
| POCP | Photochemical ozone creation potential | kg O ₃ Equiv. | 1.88 (1.70) | 2.07 (1.87) | 1.10 (1.00) | 5.05 (4.58) |

Notes:

GWP-100 – Global warming potential. The warming (relative to CO₂) that chemicals contribute to the atmospheric greenhouse effect by trapping the earth's heat. The impact scores for GWP-100 are based on a 100-year time horizon. As prescribed in Section 7.2.7 of the PCR for Asphalt Mixtures, this EPD does not assign a negative flow of CO₂ to GWP-100 when biogenic CO₂ enters the product system through biofuels and bio-based materials unless this information is provided in upstream datasets, in which case the amounts are indicated in Table 7. However, a positive flow of CO₂ is assigned to GWP-100 when biogenic CO₂ is emitted through the combustion of biofuels. This is a conservative approach that may over-estimate GWP-100. Bio-based materials tend to be used in small quantities in asphalt mixtures (<1% by weight of the mix) and biofuels are rarely used for asphalt mixture production, so the impacts are low in most cases. Biogenic carbon uptake for certain biofuels is provided as additional environmental information in Table 9. The location-based accounting method, is used for calculating upstream impacts of purchased electricity. Potential GHG emission reductions associated with the market-based accounting method, if applicable, are provided as Additional Environmental Information in Table 8.

ODP – Ozone depletion potential. The potential damage that chemicals such as chlorofluorocarbons (CFCs) cause to the earth's stratospheric ozone layer, which filters out harmful ultraviolet radiation from the sun. Impact scores for ODP are based on the quantity of ozone-depleting chemicals released to air, normalized to an equivalent mass of CFC-11.

EP – Eutrophication potential. The potential nutrient enrichment to water bodies caused by chemicals that are released to the water or air and subsequently deposited. Impact scores for EP are based on the quantity of nutrients released, normalized to an equivalent mass of N.

AP – Acidification potential. The potential formation of acid rain caused by releases of chemicals to the air. Impact scores for AP are based on the number of hydrogen ions that can be theoretically formed per mass unit of the chemical being releases as compared to SO₂.

POCP – Photochemical ozone creation potential. The release of hydrocarbons and nitrogen oxides that react with sunlight to produce photochemical oxidants, which can cause or aggravate health problems, plant toxicity, and deterioration of certain materials. Impact scores for POCP are based on the quantity of chemicals with POCP equivalency factors released to the air, normalized to an equivalent mass of O₃.

TABLE 4. LIFE CYCLE IMPACT INDICATORS

| ACRONYM | INDICATOR | UNIT | QUANTITY PER METRIC TONNE ASPHALT MIXTURE (PER SHORT TON ASPHALT MIXTURE) | | | |
|----------------|---|-------------------------|--|--------------------------------|--------------------------------|--------------------------------|
| | | | MATERIALS (A1) | TRANSPORT (A2) | PRODUCTION (A3) | TOTAL (A1-A3) |
| <i>GWP-100</i> | <i>Global warming potential, incl. biogenic CO2</i> | <i>kg CO2 Equiv.</i> | <i>31.37 (28.45)</i> | <i>7.52 (6.82)</i> | <i>20.11 (18.25)</i> | <i>59.00 (53.52)</i> |
| <i>ODP</i> | <i>Ozone depletion potential</i> | <i>kg CFC-11 Equiv.</i> | <i>1.59e-08 (1.44e-08)</i> | <i>4.49e-08 (4.08e-08)</i> | <i>2.85e-08 (2.59e-08)</i> | <i>8.94e-08 (8.11e-08)</i> |
| <i>EP</i> | <i>Eutrophication potential</i> | <i>kg N Equiv.</i> | <i>8.39e-03 (7.61e-03)</i> | <i>3.72e-03 (3.38e-03)</i> | <i>2.09e-03 (1.89e-03)</i> | <i>1.42e-02 (1.29e-02)</i> |
| <i>AP</i> | <i>Acidification potential</i> | <i>kg SO2 Equiv.</i> | <i>9.04e-02 (8.20e-02)</i> | <i>7.50e-02 (6.80e-02)</i> | <i>3.64e-02 (3.30e-02)</i> | <i>2.02e-01 (1.83e-01)</i> |
| <i>POCP</i> | <i>Photochemical ozone creation potential</i> | <i>kg O3 Equiv.</i> | <i>1.88 (1.70)</i> | <i>2.07 (1.87)</i> | <i>1.10 (1.00)</i> | <i>5.05 (4.58)</i> |

QUESTIONS?





The Road Forward

A Vision for Net Zero Carbon Emissions
for the Asphalt Pavement Industry

INDUSTRY GOAL 1

Achieve net zero carbon emissions during asphalt production and construction by 2050. Scope 1 Emissions

INDUSTRY GOAL 2

Partner with customers to reduce emissions through pavement quality, durability, longevity, and efficiency standards by 2050. Downstream Scope 3 Emissions

INDUSTRY GOAL 3

Develop a net zero materials supply chain by 2050. Upstream Scope 3 Emissions

INDUSTRY GOAL 4

Transition to electricity from renewable energy providers in support of net zero carbon electricity generation by 2050 and reduce electrical intensities. Scope 2 Emissions



Procedure for Entering JMF EPD Information into eCAMMS

This document addresses the input of Environmental Product Declaration (EPD) information related to Job Mix Formulas (JMFs) into the electronic Construction and Materials Management System (eCAMMS). Input requirements are as follows:

1. Enter the Reference Data in the “+ **Add Reference Data**” section of eCAMMS. The “+ **Add Reference Data**” button is located at the bottom of the JMF “**Design**” page, as illustrated on pages 3 through 5 of this document. A list of the Reference Data Type fields and their descriptions is provided below. An example of EPD data and an illustration of that information once saved in eCAMMS can be found on page 7.

| eCAMMS Reference Data Type fields | Description |
|---|---|
| EPD A1 – Materials (kg CO ₂ /T) | Materials extraction component of global warming potential, including biogenic CO ₂ (GWP-100) <u>per short ton</u> [*] of mixture |
| EPD A2 – Transport (kg CO ₂ /T) | Material transport component of global warming potential, including biogenic CO ₂ (GWP-100) <u>per short ton</u> [*] of mixture |
| EPD A3 – Production (kg CO ₂ /T) | Production component of global warming potential, including biogenic CO ₂ (GWP-100) <u>per short ton</u> [*] of mixture |
| EPD Total A1-A3 (kg CO ₂ /T) | Sum of A1, A2 and A3 <u>per short ton</u> [*] of mixture |
| EPD-Exemption: Date of Change ^{**} | Date the Exemption event occurred |
| EPD-Exemption: Reason ^{**} | Event/Reason for EPD Exemption |

* Short ton is equal to a U.S. ton (2,000 lbs.)

** If 12 months of energy consumption data is unavailable due to a qualifying event (e.g., new plant, change in primary fuel source or a portable plant with less than 12 months operation at the same location), then enter the two EPD-Exemption Reference Data Types instead of the first four EPD Reference Data Types listed in the table above.

NOTE: If multiple asphalt binders are listed on the JMF, only enter JMF EPD Reference Data generated using the anticipated primary asphalt binder supplier.

2. Attach a PDF copy of the published plant-specific, product-specific EPD to the appropriate JMF within eCAMMS using the attachment feature.

NOTE1: EPDs must be plant and product specific, published and developed in conformance with ISO 14025, ISO 21930 and the Product Category Rules (PCR) for asphalt mixtures. ISO 14025 refers to these as a Type III (Third Party Reviewed) EPDs.

NOTE2: If multiple asphalt binders are listed on the JMF, only attach the EPD PDF generated using the anticipated primary asphalt binder supplier.

NOTE3: The published EPD is prepared in such a way so as not to disclose proprietary information. Published EPDs are publicly available.

NOTE4: PennDOT will use this PDF to verify the EPD Reference Data matches the published values for the JMF during the JMF approval process.

NOTE5: In cases where an exemption-qualifying event has occurred, in lieu of attaching a PDF copy of the EPD, attach supporting documentation of the qualifying event.

The following is an illustration of the input of EPD information into the “+ Add Reference Data” section of eCAMMS:

1. To create a new JMF, click on the **JMF** menu option, then select “New Job Mix Formula”.

The screenshot shows the eCAMMS interface for creating a new Job Mix Formula (JMF). The top navigation bar includes 'Home', 'Sample', 'JMF', 'ESB', 'Product Evaluation', 'Maintenance', and 'Tools'. The 'JMF' menu is highlighted, and a dropdown menu is open, showing 'New Job Mix Formula' as the selected option. Below the navigation bar, there are buttons for 'Save As Draft' and 'Submit'. The main form area is titled 'JOB MIX FORMULA MAINTENANCE: GENERAL' and contains various input fields for design details, including Design Type (Asphalt), Supplier (LIN10A41), Plant Type (AD), Plant Size (04), JMF Year (2023), and JMF/Mix Design Number (W95112X1). There are also fields for user assignment (Designed By, Submitted By, Approved By) and a 'Delete' button at the bottom right.

2. On the “Job Mix Formula Maintenance: General” page, select the “Design” tab from the “Job Mix Formula Menu”

The screenshot shows the eCAMMS interface for the 'Job Mix Formula Maintenance: General' page. The 'Job Mix Formula Menu' is open, and the 'Design' tab is highlighted. A red arrow points to the 'Design' tab, and a red text overlay says 'Select "Design" from the Job Mix Formula Menu'. The page contains various input fields for design details, including Design Type (Asphalt), Supplier (LIN10A41), Plant Type (AD), Plant Size (04), JMF Year (2023), and JMF/Mix Design Number (W95112X1). There are also fields for user assignment (Designed By, Submitted By, Approved By) and a 'Delete' button at the bottom right.

3. Scroll down and click the “+ Add Reference Data” button.

Job Mix Formula Maintenance: DESIGN

DESIGN TYPE: ASPHALT
 SUPPLIER CODE: LIN10A41
 JMF YEAR: 2023

JMFMix DESIGN NUMBER: W55112X1
 JMF MATERIAL CLASS: SR12.5
 JMF STATUS: INITIAL

Asphalt

General

Asphalt Mix Type:

Design ESAL Range:

Agg. Skid Resistance Level (SRL):

Mixture Final Asphalt Binder Grade:

Gradation Classification: N/A

Gyrotory Information and Mixture Characteristics

Gyrotory Mold Diameter, mm:

Mixture Mass to Compact, g:

Gyrotions at Ninitial:

% Air Voids at Ninitial:

Gyrotions at NDesign:

% Air Voids at NDesign:

Gyrotions at Nmaximum:

% Air Voids at Nmaximum:

Bulk Sp. Gr. of Combined Agg. (Gsb):

Voids in Mineral Agg. (VMA), %:

Voids Filled with Asphalt (VFA), %:

Theoretical Max Sp. Gravity (Gmm):

Theoretical Maximum Density (lbs/ft³):

Bulk Sp. Gravity of Mixture (Gmb):

Bulk Density of Mixture (lbs/ft³):

Avg. Mixture Draindown (%):

Batch Plant Mix Times

Mix Time - Dry (s):

Mix Time - Wet (s):

Marshal Mix Design Method

Number of Blows:

Stability:

Flow:

Ignition Furnace Information

Asphalt Content Test Method:

External Party Oven:

Ignition Furnace Set Temperature, °C:

Sample Size Used for Correction Factor, g:

Asphalt Binder Information

Total % Asphalt (Pb):

% Effective Asphalt Binder (Pbe):

Total % Virgin Asphalt:

Total % Reclaimed Asphalt from RAP:

Total % Reclaimed Asphalt from RAS:

Reclaimed Binder Ratio from RAP:

Reclaimed Binder Ratio from RAS:

Total Reclaimed Asphalt Binder Ratio:

Fines/Asphalt (F/A) Ratio:

Calculated Asphalt Film Thickness, microns:

Aggregate Information

| | Result from Trial Blend | Calc. Wt. Avg. of Ind. Agg. |
|-------------------------------|-------------------------|-----------------------------|
| Sand Equivalency, %: | <input type="text"/> | <input type="text"/> |
| Fine Agg. Angularity, %: | <input type="text"/> | <input type="text"/> |
| Coarse Agg. % 1 Face Crush: | <input type="text"/> | <input type="text"/> |
| Coarse Agg. % 2 Face Crush: | <input type="text"/> | <input type="text"/> |
| Flat/Elongated Particles 5:1: | <input type="text"/> | <input type="text"/> |
| Flat/Elongated Particles 3:1: | <input type="text"/> | <input type="text"/> |

RAP/RAS

Total % RAP in Mixture (by wt. of mixture):

Total % RAS in Mixture (by wt. of mixture):

Total % Reclaimed Aggregate from RAP/RAS:

Virgin PG Binder Grade in Mixture:

+ Add Reference Data

| Reference Data Type | Reference Data | Edit | Delete |
|------------------------|----------------|------|--------|
| No records to display. | | | |

4. Next, select the data type for input. (See example of entered values on Page 7.)

Batch Plant Mix Times

Mix Time - Dry (s):

Flat/Elongated Particles 3:1:

Mix CT-Indx: Testing Lab

Marshal Mix

EPD A1 - Materials (kg CO2/T)

EPD A2 - Transport (kg CO2/T)

EPD A3 - Production (kg CO2/T)

EPD Total A1-A3 (kg CO2/T)

EPD-Exemption: Date of Change

EPD-Exemption: Reason

HWT: 10K Impression

Reference Data Type:

Reference Data

Edit Delete

Save Cancel

No records to display.

1 - Click here to display the "Reference Data Type" Menu

2 - Use the slider to locate the EPD items in the list, then select the data type for input

5. Then, enter the value for the selected Reference Data Type and click the **Save** button. (See example of entered values on Page 7.) Repeat Steps #3 to #5 for each of the first four EPD Reference Data Type. After entering the first four EPD Reference Data Types and values, click the Save button at the top of the eCAMMS **JMF Maintenance: Design** page to save the data to the eCAMMS JMF.

NOTE1: EPD Reference Data should only be entered from the EPD generated using the anticipated primary asphalt binder supplier.

NOTE2: If 12 months of energy consumption data is not available for the plant due to an exemption-qualifying event, in lieu of entering data for the first four EPD Reference Data Types, enter information only for the two EPD-Exemption Reference Data Types.

+ Add Reference Data

Reference Data Type Reference Data

Reference Data Type: EPD A1 - Materials (kg CO2/T)

Reference Data: 15.82

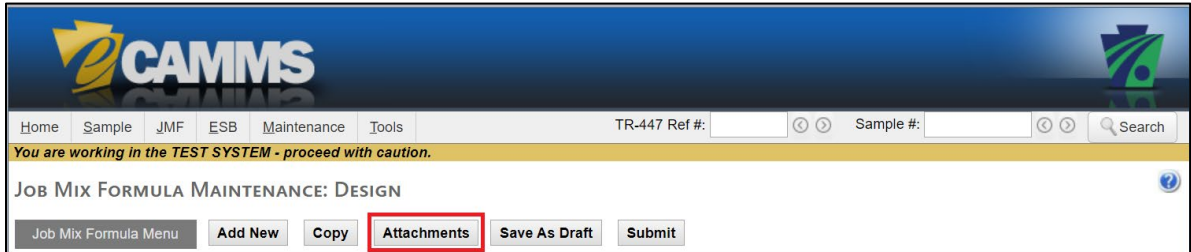
Save Cancel

Enter the value, then click Save

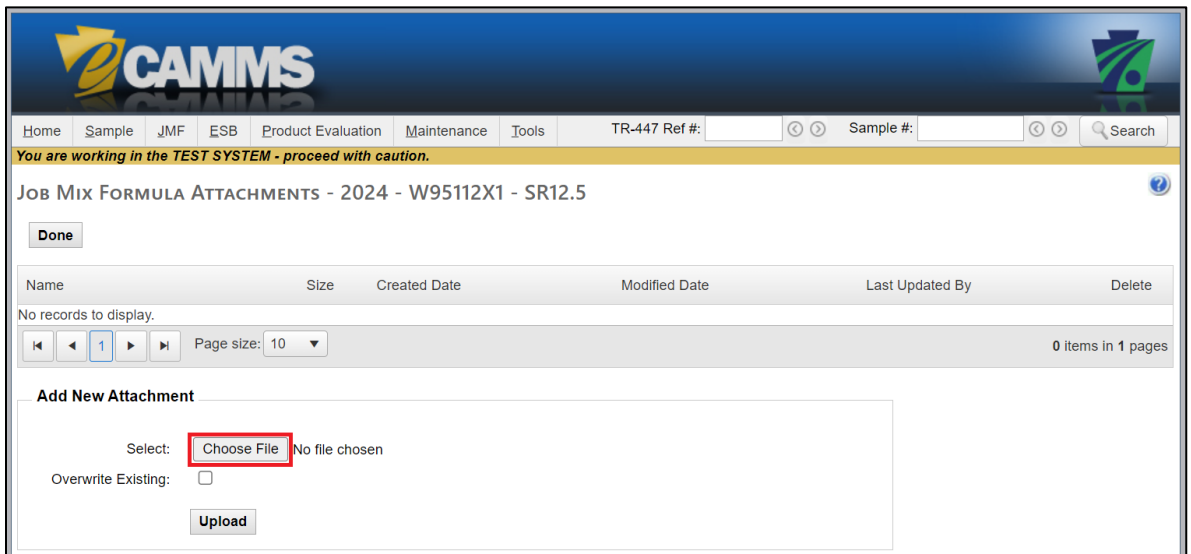
The following is an illustration of how to attach a PDF of the EPD (or supporting documentation in the case of an EPD Exemption) to the newly created JMF in eCAMMS:

1. To add an attachment, click **Attachments** at the top page:

NOTE: You may be prompted to save your JMF before you can add an attachment. If this happens, click **Save as Draft** and then click **Attachments**.



2. Click **Choose File**, navigate to your saved PDF copy of the EPD (or supporting documentation of your exemption-qualifying event), select the file, click **Open** and then click **Upload**. Finally, click **Done** to return to the **Job Mix Formula Maintenance** module. Once the rest of the JMF entry is complete, click **Submit** to send it to the Department for review/approval.



NOTE: If multiple asphalt binders are listed on the JMF, only attach the EPD PDF generated using the anticipated primary asphalt binder supplier.

Example

Sample data table from an EPD:

2 - Identify the per-short-ton information. In this example, the needed data is within parentheses.

| Acronym | Indicator | Unit | Quantity per Metric Tonne Asphalt Mixture (Per Short Ton Asphalt Mixture) | | | |
|---------|--|----------------------|--|---------------------|---------------------|---------------------|
| | | | Materials (A1) | Transport (A2) | Production (A3) | Total (A1-A3) |
| GWP-100 | Global warming potential, incl. biogenic CO2 | kg CO2 Equivalent | 17.43 (15.82) | 5.35 (4.85) | 32.28 (29.28) | 55.06 (49.95) |
| ODP | Ozone depletion potential | kg CFC-11 Equivalent | 1.32e-08 (1.20e-08) | 3.23e-08 (2.93e-08) | 7.96e-08 (7.23e-08) | 1.25e-07 (1.14e-07) |
| EP | Eutrophication potential | kg N Equivalent | 4.73e-03 (4.29e-03) | 1.59e-03 (1.44e-03) | 7.96e-08 (7.23e-08) | 9.60e-03 (8.71e-03) |
| AP | Acidification potential | kg SO2 Equivalent | 5.26e-02 (4.78e-02) | 2.72e-02 (2.47e-02) | 5.78e-02 (5.24e-02) | 1.38e-01 (1.25e-01) |
| POCP | Photochemical ozone creation potential | kg O3 Equivalent | 1.13 (1.02) | 0.88 (0.79) | 1.73 (1.57) | 3.74 (3.39) |

1 - Locate the Global warming potential (GWP-100) information

When all the EPD Reference Data is entered and saved in eCAMMS, it should look like this:

| + Add Reference Data | | | | |
|--------------------------------|----------------|--|------|--------|
| Reference Data Type | Reference Data | | Edit | Delete |
| EPD A1 - Materials (kg CO2/T) | 15.82 | | ✎ | ✕ |
| EPD A2 - Transport (kg CO2/T) | 4.85 | | ✎ | ✕ |
| EPD A3 - Production (kg CO2/T) | 29.28 | | ✎ | ✕ |
| EPD Total A1-A3 (kg CO2/T) | 49.95 | | ✎ | ✕ |

Environmental Product Declarations (EPDs) for Asphalt Mixtures

October 31, 2024, Producers Webinar

Question & Answer Session

- 1. What are your plans to assist with reimbursement to small, one-plant producers that provide ONLY maintenance material to PennDOT and do not work on any other contracts for PennDOT?**

The Department recognizes that this is a concern for producers that do not supply ECMS projects, however at this time, ECMS is the only option available to the Department to provide any cost offsets or reimbursements. This concern continues to be considered as the program advances.

- 2. We are required to pay for a setup and work to have state-approved designs for local construction and maintenance, and already spent several thousands last year in data collections for BMD results. We do not belong to NAPA, so this is going to be a \$6,000 cost for this plant that provides PennDOT maintenance roughly 4,000 tons of material a year. I feel this is damning to the small businesses trying to maintain all the requirements for nothing in return, and this needs to be relayed to the powers that be that are making these expensive decisions and have them realize this is something every year that is hurting the smaller producers. I'm just asking someone to think about a way to assist us with the costs that we have no way to recoup but are required to do for state approval.**

The Department recognizes that this is a concern for producers that do not supply ECMS projects, however at this time, ECMS is the only option available to the Department to provide any cost offsets or reimbursements. This concern continues to be considered as the program advances. It should be noted that the \$6,000 cost covers the generation of EPD data for a period of five (5) years per plant. It is not an annual, recurring cost. As noted earlier, there is the potential that the EPD generation process may identify efficiency improvements that could result in a long-term cost savings for the producer.

- 3. What exactly does NAPA verify? The input quantities, such as how much natural gas was used, or just that everything is input correctly?**

NAPA verifies the Eco-Label tool. As an example, if they see your plant at an emission factor outside of a certain boundary, they will conduct a spot check to ensure calculations in your attachments are correct.

- 4. Can you use a generic MSDS for mixes? I have basic Bituminous concrete MSDS.**

Yes. Some producers have MSDSs published and use the generic MSDS to cover all of the mixes.

- 5. Regarding product ingredients for binder, is the total binder in the JMF required, or rather only the virgin asphalt percentage?**

You would enter the virgin binder contribution.

- 6. Since the percentage of aggregate in the blend is a baseline, if you change the percentage blend due to maintaining the JMF gradation, do you need to complete another EPD? What is the range before you need to complete a new EPD?**

If you change anything in the mix, you can modify your current EPD for that mix design. Keep in mind that everything is rounded, so a small enough change may not even change the rounding. Every time you republish, it will make a new version of that mix the most current version. However, if you make a new mix design, you will need a new EPD.

- 7. What mileage should be used if the sand and stone is processed on site?**

Since everything is processed on site, that would be zero (0) miles.

- 8. When entering the EPD data for individual designs, do you find that a lot of the data is redundant with similar mixes (e.g., for all 9.5mm mixes from the same plant)?**

NAPA has now integrated a copy tool to allow you to copy your data and make the small changes that you need to the percentages in similar mixes.

- 9. Changes can occur daily due to gradation; are you suggesting performing this every time this happens?**

No. You should establish that based on the mix design for a whole production season.

- 10. Is there a particular amount of distance that constitutes that your RAP stockpile or other materials are "on-site" with reference to the distance from the actual plant?**

Anything within your plant's boundaries would be considered on site.

- 11. Am I correct that mileage is based on a one-way trip?**

Correct.

- 12. Does this apply to plants located outside of Pennsylvania? If so, is the program set up with suppliers outside of Pennsylvania as well?**

Yes. There is representation in all 50 states.

- 13. Do you need multiple EPDs for multiple binder suppliers?**

Currently, we list multiple binder suppliers on the JMF. This is something we may reevaluate in the future, but for now you identify your primary binder source supplier. If there is a switch during the season, at this time you will not need to develop another EPD. If the primary binder supplier would differ for the following JMF year, then an updated EPD would be needed.

- 14. I understand the liquid binder is the big EPD number, but is PennDOT in agreement with this?**

Asphalt binder cement type can vary on GWP contribution, especially polymer modified binders and the amount in the mix design. A1, A2, and A3 all contribute to the overall GWP.

15. Is there a way to look at everything on your EPD before you publish?

UPDATED RESPONSE POST WEBINAR: Yes. Once all data has been entered into the NAPA Emerald Eco-Label tool and the user selects "save", the system will generate an "unpublished" EPD in PDF format. The EPD will have an "UNPUBLISHED" watermark on it but will allow for review of the results. The EPD is not designated as final until the user selects the "Publish" button.

16. If EPDs with a given threshold become a requirement in PennDOT's procurement process, will they be verifying all of the EPD inputs (i.e., natural gas, electricity, water, etc.)?

The District materials unit will be looking at the EPD attachment, making sure it is valid, third-party reviewed, and that it matches the mix design being submitted for review and approval. They will also review the GWP, A1, A2, A3, and total GWP entered in the data fields in eCAMMS to verify it matches the GWPs of the attached EPD.

17. Does PennDOT think it will take any longer to review mix designs this spring?

Initially there will be a learning curve for approving new JMFs, and there may also be an effect based on the number of JMF submissions that come in at once. However, following the initial round of submissions, the Department does not expect there to be an impact on the timeliness of reviews and approvals as long as the information is provided correctly.

18. Regarding small producers that don't supply ECMS projects: does PennDOT have a way to reimburse smaller suppliers? Not doing so seems very unfair as typically we sell far less to PennDOT and, at this point, will receive no funding while larger suppliers that benefit from sales directly to PennDOT are reimbursed fully.

The Department recognizes that this is a concern for producers that do not supply ECMS projects, however at this time, ECMS is the only option available to the Department to provide any cost offsets or reimbursements. This concern continues to be considered as the program advances.

19. Is there a reason that the list of product ingredients is not more detailed with accuracy in percentages?

The data entry for creation of the EPD is very precise, down to two decimal points, however the "published" EPD rounds those numbers up or down so as to maintain the confidentiality of a producer's specific mix.

20. It seems that this forces suppliers to purchase professional services; do you know the cost? Is there reimbursement available?

The cost to use NAPA's Emerald Eco-Label tool is \$6,000 for non-members and \$3,000 for members. That fee is per plant and allows access to the tool for five (5) years to create an unlimited number of new EPDs or to update/revise existing EPDs.

21. In eCAMMS, why can't the selections be simplified to select EPD and then be provided with the blocks to fill in instead of having to click multiple times?

Similar to the balanced mix design initiative, this is a new mechanism being implemented, and thus subject to being updated and adjusted as it is put into practice. This tool is relatively simple for us to modify in eCAMMS, which allows us flexibility over time without needing to task developers with creating a page for the information until the EPD requirements have matured over time.

22. Does it matter when the 12-month period takes place when totaling usage of material? For example, we begin this process in NAPA's system starting in December. Can we use the months of November of last year to November of this year?

Any consecutive 12-month period within the last five (5) years can be used for capturing and submitting the data to calculate EPDs. However, the time period selected must be used consistently across all EPDs developed for that plant.

23. Once PennDOT chooses a threshold, will it be an accept/not accept or will there be a bonus given to lower GWPs?

That topic is under discussion nationally. There is a "go/no-go" option but that does not seem to be one of the better options at this time. It may be more like an A+Bx bid option where Bx would be a B"e"; an environmental incentive for a lower GWP product. In the future, the Department may opt for a process and program that incentivizes production processes that result in lower GWP numbers for asphalt products. We do not expect there to be an accept/not-accept approach in terms of GWP data at this time.

24. Will the questions posed during this webinar be included in the recording?

Yes, the recording of the webinar (including questions and answers) will be made available as well as a written summary of all questions and the answers provided.

25. Is there an approximate estimate (man hours, cost, etc.) for the level of effort required to gather data and prepare the EPD?

An actual number is not available. There is more effort required up front to get the plant set up in the tool and get the aggregate data entered. Once that information has been collected and entered, the effort to update data to generate mix specific EPDs is less.

26. How far into the future does PennDOT expect to go before other materials (concrete, aggregate, emulsions, etc.) will be required to complete EPDs?

The Department has made an administrative decision to accelerate EPD data collection for the upcoming paving season. Concrete is on the near horizon. The steel industry is working very hard on their end to begin the process for steel products. The PCR for emulsions as well as the LCA are in development. Having said that, there is no specific timeline as of now.

27. Will PA publish values and formulas to allow producers to generate EPDs in-house?

No. Currently, there is only one software program available to calculate asphalt mixture EPDs (NAPA's Emerald Eco-Label). The requirements for developing EPDs are complex and require following the ISO standards as well as the PCR for asphalt mixtures. The availability of expertise to

develop the analytics to create EPDs outside of that tool seem to be very limited at this time. [NAPA Product Category Rules \(PCR\) for Asphalt Mixtures](#)

28. Is it correct that we will have to pay NAPA \$3,000 every five (5) years?

The cost to use NAPA's Emerald Eco-Label tool is \$6,000 for non-members and \$3,000 for members. That fee is per plant and allows access to the tool for 5 years to create an unlimited number of new EPDs or to update/revise existing EPDs.

29. What is the cost of becoming a member to be eligible for the NAPA member rate (\$3,000)?

NAPA's membership costs are described on their website and are partly based on total annual production. [Frequently Asked Questions About NAPA Membership](#)

30. If you have a central lab that you make your designs in, but have more than one location, do you still need the NAPA Emerald Eco-Label tool license for both plants?

Yes. If you are producing at more than one plant, then it will be necessary to buy separate licenses - one for each plant.

31. I was under the impression that Pennsylvania was careful not to require its businesses to join sources outside of the state; is this still the case?

The Department works diligently to ensure it does not make any form of recommendation on how producers accomplish their business needs. As written in the Frequently Asked Questions (FAQ) document, EPDs must be plant and product specific and published and developed in conformance with ISO 14025, ISO 21930, and the Product Category Rules (PCR) for asphalt mixtures. [Product Category Rules \(PCR\) for Asphalt Mixtures](#) At this time, the only known tool (within Pennsylvania and nationally) available to complete this analysis is the NAPA Emerald Eco-Label tool on the NAPA website. Access to the tool does NOT require becoming a member of NAPA or any other organization.

32. Would it be expected that each material will be able to use the NAPA EPD Eco-Label tool, or will they have a specific tool?

No. The NAPA Emerald Eco-Label tool is specific to asphalt mixtures only. The concrete and steel industries are in the process of exploring and developing PCRs and the associated tools and analytics necessary to generate EPDs for their materials.

33. Is it correct that mixes will not be approved without using NAPA?

2025 asphalt JMF submissions will not be approved unless they include mix-specific EPD data. As noted above, the only tool currently available to generate asphalt mixture EPDs is the NAPA Emerald Eco-Label tool available through the NAPA website.

34. Is there a discount for PAPA members?

No. NAPA is a national organization, and one needs to be a member of that organization to receive the discount for using the NAPA Emerald Eco-Label tool.