



NATIONAL ASPHALT  
PAVEMENT ASSOCIATION



VIRGINIA ASPHALT ASSOCIATION

*71st Annual Meeting*  
APRIL 27TH - 29TH, 2022

# Asphalt Industry's Journey to Net Zero

**The Road Forward and  
Environmental Product  
Declarations**

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# The Road Forward

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

Learn more at  
[asphaltpavement.org/climate](https://asphaltpavement.org/climate)



**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

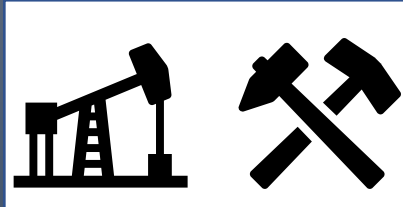


A photograph of two construction workers at night. They are wearing hard hats (one blue, one white) and high-visibility safety vests (one yellow, one green). They are looking down at a tablet computer held by the worker in the green vest. The background is dark with some blurred lights and construction equipment.

## Our Mission:

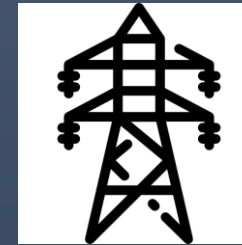
Engage, educate and empower the U.S. asphalt community to produce and construct net zero carbon emission asphalt pavements.

Production and  
Construction



Supply Chain

Electricity



Quality, Durability,  
Longevity, Efficiency

**Net Zero  
Strategy**

# GET INVOLVED WITH NAPA

- Specific discussions at NAPA Committee meetings
  - Committee for Asphalt Research and Technology (CART)
  - Committee for Engineering Application & Practice (CEAP)
  - Sustainability Committee
- NAPA is seeking Partners in this effort
  - [AsphaltPavement.org/Climate/Partners](https://AsphaltPavement.org/Climate/Partners)

# **Introduction to EPDs**

# Understanding Carbon



## Embodied Carbon

Manufacture, transport and installation of construction materials

## Operational Carbon

Building Energy Consumption

# 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**

- 11-page report

- **Independently verified**

- **Declared Unit**

- The “serving size”
  - 1 metric tonne (1 short ton) asphalt mixture



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 CO2	kg CO2 Equiv.	33.77 (30.63)	4.22 (3.82)	23.32 (21.15)	61.30 (55.61)
ODP	Ozone depletion potential	kg CFC-11 Equiv.	1.79e-08 (1.63e-08)	2.55e-08 (2.31e-08)	6.24e-08 (5.66e-08)	1.06e-07 (9.60e-08)
EP	Eutrophication potential	kg N Equiv.	8.95e-03 (8.12e-03)	1.26e-03 (1.14e-03)	2.38e-03 (2.16e-03)	1.26e-02 (1.14e-02)
AP	Acidification potential	kg SO2 Equiv.	9.62e-02 (8.73e-02)	2.15e-02 (1.95e-02)	4.23e-02 (3.84e-02)	1.60e-01 (1.45e-01)
POCP	Photochemical ozone creation potential	kg O3 Equiv.	1.98 (1.79)	0.69 (0.63)	1.25 (1.14)	3.92 (3.56)

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



# Life Cycle Assessment (LCA)

- Representative survey of 50 plants
  - Conducted by Dr. Amlan Mukherjee (Michigan Tech)
- Complies with **ISO 14040/14044**
- **Underlying LCA** for the PCR for Asphalt Mixtures
- Also serves as the **LCA model** for NAPA's **Emerald Eco-Label EPD software tool**
- **Revised LCA** has been published for the new PCR

## Update to the Life Cycle Assessment for Asphalt Mixtures in Support of the Emerald Eco Label Environmental Product Declaration Program

June 2021



*Amlan Mukherjee, PhD, PE*  
Professor

Department of Civil, Environmental & Geospatial  
Engineering

Michigan Technological University  
Houghton, MI 49931



**Michigan Tech**

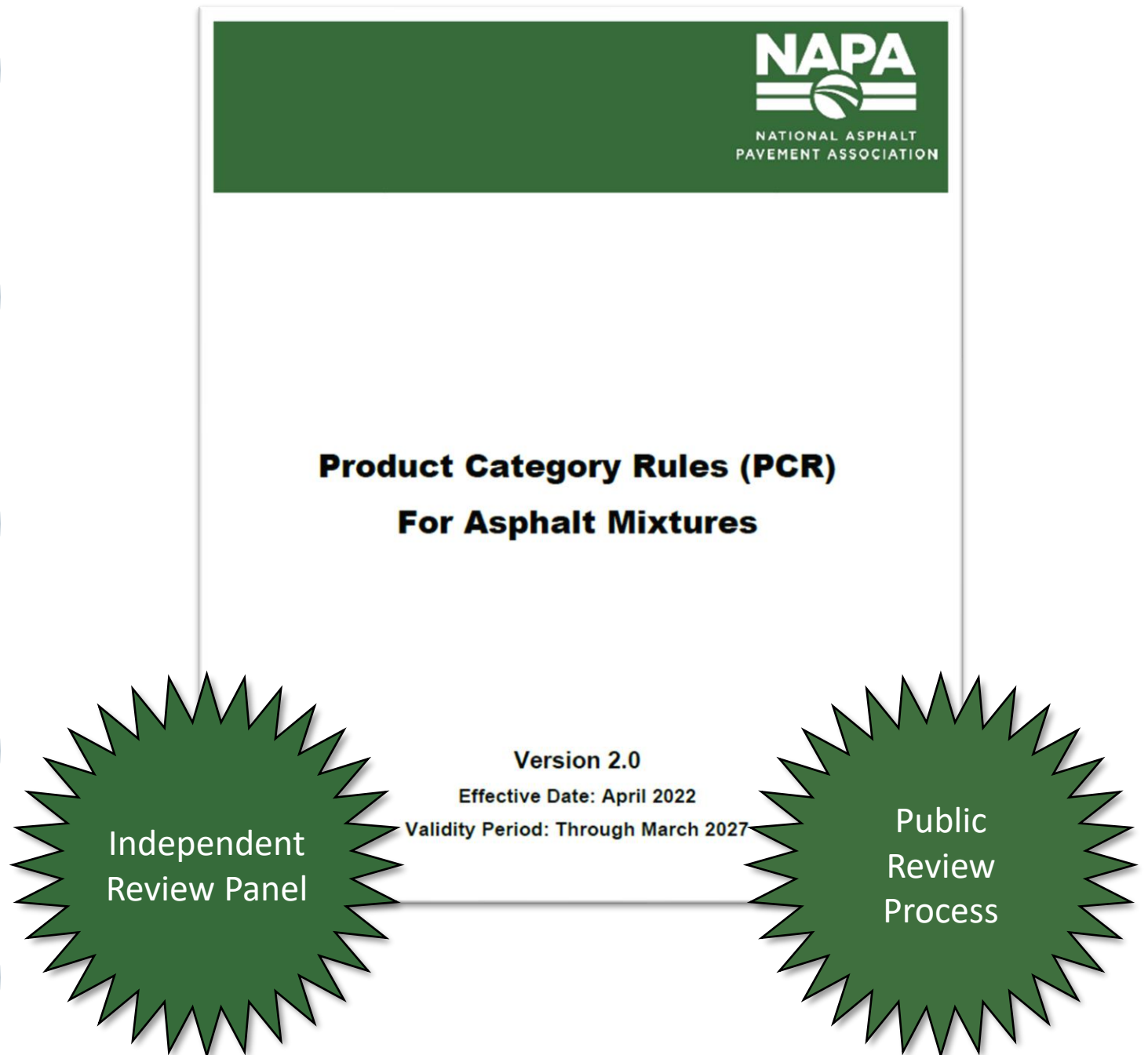
For:

*National Asphalt Pavement Association*  
6406 Ivy Lane, Suite 350  
Greenbelt, MD 20770-1441

3<sup>rd</sup> Party  
Critical  
Review

# PCR for Asphalt Mixtures, v2

- Subcategory PCR under **ISO 21930**
- Complies with **ISO 14025** and **ISO 21930** standards
- **EPDs can be comparable** if asphalt mixtures meet similar performance criteria
- **Declared unit is 1 metric tonne (1 short ton)** of asphalt mixture
- Takes effect April 1, 2022
- More info at <https://asphaltpavement.org/epd>



# Emerald Eco-Label Software

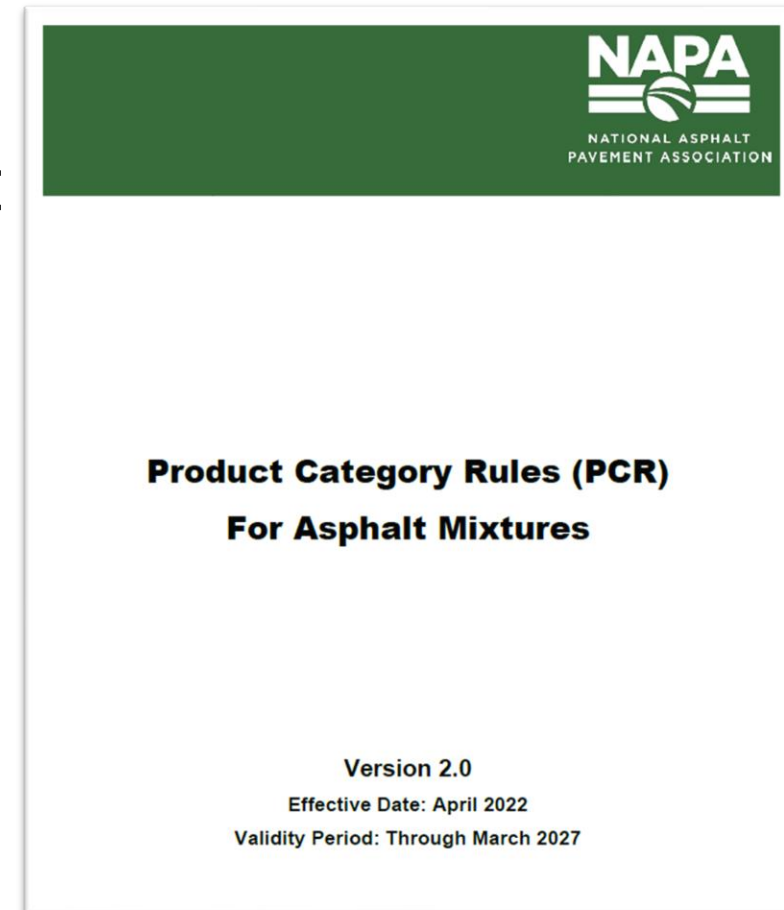
- NAPA's web-based **software tool**
- Asphalt mix producers use it to develop **verified EPDs**
- EPDs are **plant-specific & mix-specific**
- Can be used for **asphalt plants** located in the U.S.
- **Simplified process** that saves mix producers time and money



Independent  
Verification

# Scope of the PCR

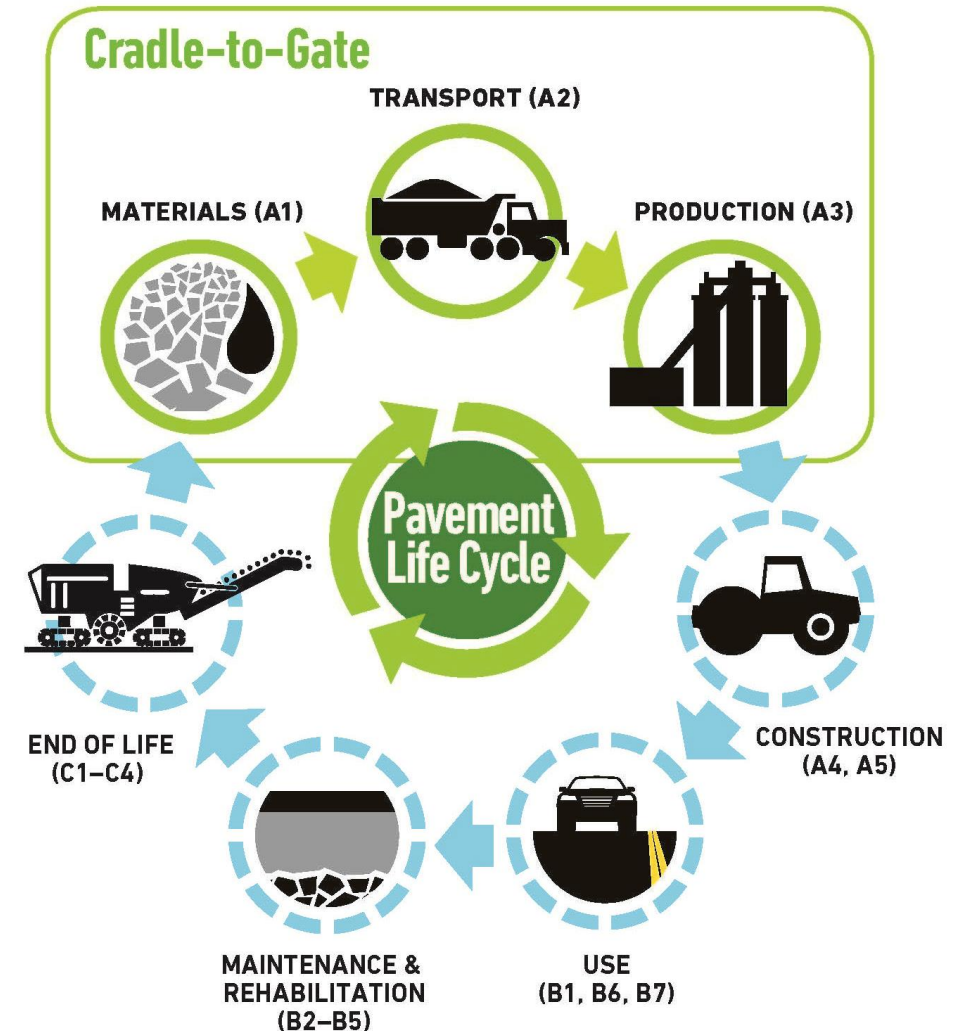
- **Technology** – plant-produced asphalt mixtures
  - Hot-mix, warm-mix, and cold central plant
  - Stationary and portable plants
- **Geography** – United States and Canada
- **Types of EPDs allowed**
  - Plant-specific mix-specific
  - Industry average





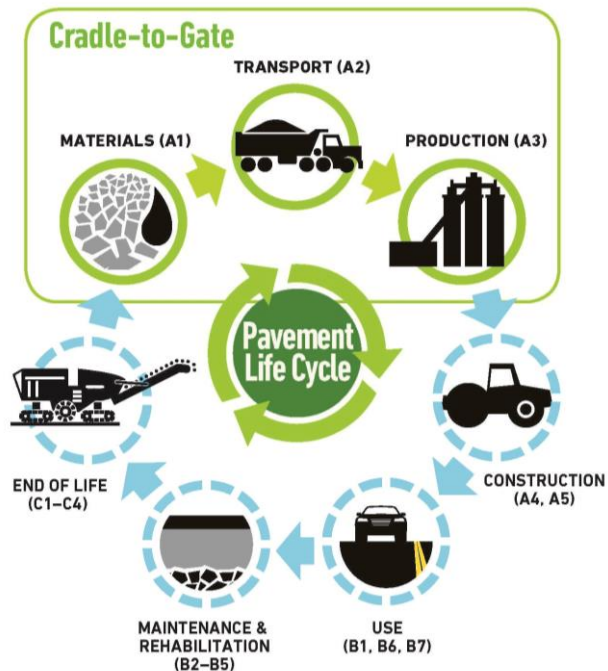
# EPDs for asphalt mixtures have a **Cradle-to-Gate** scope

- **Included:**
  - Materials
  - Transport
  - Production
- **Other life cycle stages are not included**
  - Mix producers have little control over them

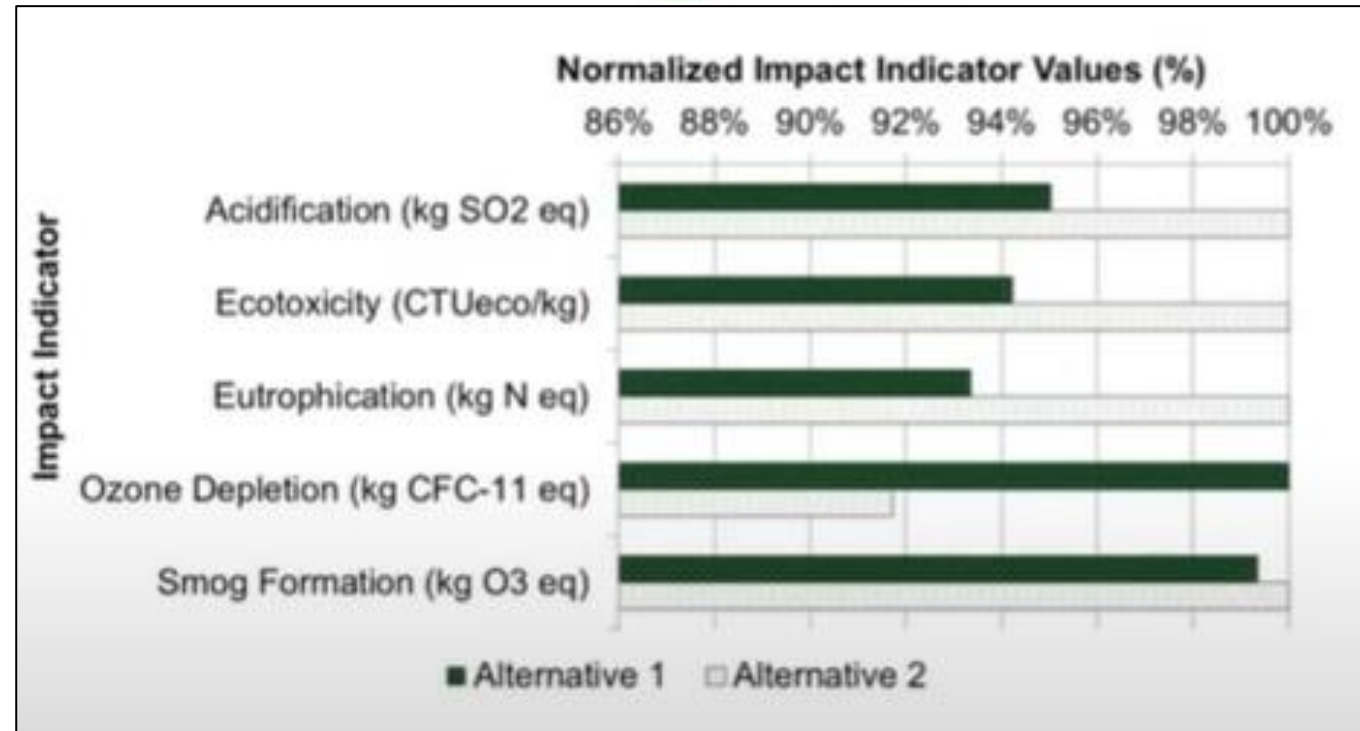


# FHWA Initiatives

- **LCA-Pave Software Tool**
  - Excel-based LCA software designed for agencies
  - Can use EPDs as a data input



## LCA PAVE



<https://www.fhwa.dot.gov/pavement/lcatool/>

# **Overview of Using **Emerald Eco-Label** to Develop an EPD for Asphalt Mixtures**

# How to use Emerald Eco-Label

- **Registration info** at [www.asphaltpavement.org/epd](http://www.asphaltpavement.org/epd)
- **Watch two webinars** and pass the quizzes
- **Compile data** for plant and mixes
  - Use EPD Data Gathering spreadsheet
- **Purchase access** for your plant(s)
- **Enter data** for plant and mixes to produce EPDs
- **Upload supporting documentation**

AutoSave On EPD Data Gathering rev2 - Last Modified: 7/18/2018 Search

File Home Insert Page Layout Formulas Data Review View Help Acrobat

H5

Welcome to the EPD Tool data gathering sheet. It is meant to be used in conjunction with the EPD Tool Instructions (pdf).  
It is provided to help you gather the relevant data needed to create your first EPD using the Asphalt EPD tool.  
The data can be divided into three categories:  
1.) Organizational and Production (plant) level information  
2.) Supplier level information  
3.) Mix level information

Rows 3-40 cover the Organizational and Production level information.  
Rows 44-80 are for gathering data on the sources of substances in mixes.  
Rows 90-213 are for specifying mixes.

All data entered into the EPD tool is confidential. Only the downstream environmental impacts will appear in the final EPD. No sensitive data about mix design or energy usage will be revealed in the EPD.

trISIGHT

EPD Data Gathering Sheet.  
Created by Lianna Miller, Version 2

	Organizational Data	Units	Comments & Help
4	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
5	Contact information for headquarters or billing department		
6	Name and contact information for the person who will be the lead for EPD creation at your company		
7	<b>Production Facilities</b>		
8	Plant name		A user can create multiple plants
9	Physical address		Cannot be a PO Box; The ZIP code will be used for certain calculations
10	Name and contact for head of EPD creation for this plant		May be the same person for several plants. Does not need to be the Technical Lead
11	<b>Production Facility Resource</b>	<b>Units</b>	<b>Comments &amp; Help</b>
12	Annual Production & Electricity		
13	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.
14	Total Asphalt Mix Sold (per year)	US Short Tons	This must be over the same 12 month period as all the other plant data
15	Total Water	Gal	If you have exact (metered) water use data, enter it here. Only water used in asphalt production and dust control should be included.
16	Electricity: Grid Power	kWh	Use your total line electricity for your 12 month period.
17	Automatically computed from ZIP code eGRID subregion		This portion will self populate given the zip code of your plant. If you are interested, more about eGRID regions may be found by entering your zip code into the EPA's power profiler: <a href="https://www.epa.gov/energy/power-profiler">https://www.epa.gov/energy/power-profiler</a> . Your region will appear in bold below the US map.
18	Electricity: Solar	kWh	If your plant uses onsite solar sources, report the estimated energy contribution from these sources during your 12-month period here. Note that this is only onsite solar! The percentage of solar from your electricity provider is already calculated.
19	Electricity: Wind	kWh	Electricity generated by onsite wind energy sources. As with solar, only wind power sources that are at your production facility should be accounted for here. The percentage of wind from your electricity provider is already calculated during the

Sheet1



# Data requirements for the plant

- **12 consecutive months of data**
  - Within the past five years
- **Fuel consumption**
  - Burner
  - Hot oil heater
  - Generator
  - Equipment
- **Electricity consumption**
- **Water consumption**
- **Total mix sold (tons)**

**Your data is confidential!**



Photo courtesy of Duval Asphalt

# Data requirements for mix designs

- **Material content (by weight of total mix)**
  - Aggregates
  - Asphalt binder
  - RAP and RAS
  - Additives
- **Transportation mode and distance**
  - Truck, rail, or barge
- **Mix production temperature**

**Your data is confidential!**



Photo courtesy of Rock Road Companies, Inc.



# Upstream datasets

- The PCR requires the use of **public datasets** for upstream energy and materials
  - Fuels and electricity
  - Aggregates
  - Asphalt binder
- **Data gaps are noted in the EPD**
  - Binder additives (polymers, ground tire rubber, etc.)
  - Mix additives (WMA, rejuvenators, fibers, etc.)
- **Cannot develop EPD if data gap >1% (individual material) or 5% (total) of mix by weight**

FEDERAL  
COMMONS



# What is the time and cost of developing EPDs?

## Pricing Schedule as of Apr. 1, 2022

Year	Member Rate	Non-member Rate	Years of Tool Access
2022	\$3,000 per plant	\$6,000 per plant	5
2023	\$3,000 per plant	\$6,000 per plant	4
2024	\$2,750 per plant	\$5,500 per plant	3
2025	\$2,500 per plant	\$5,000 per plant	2
2026	\$2,250 per plant	\$4,500 per plant	1

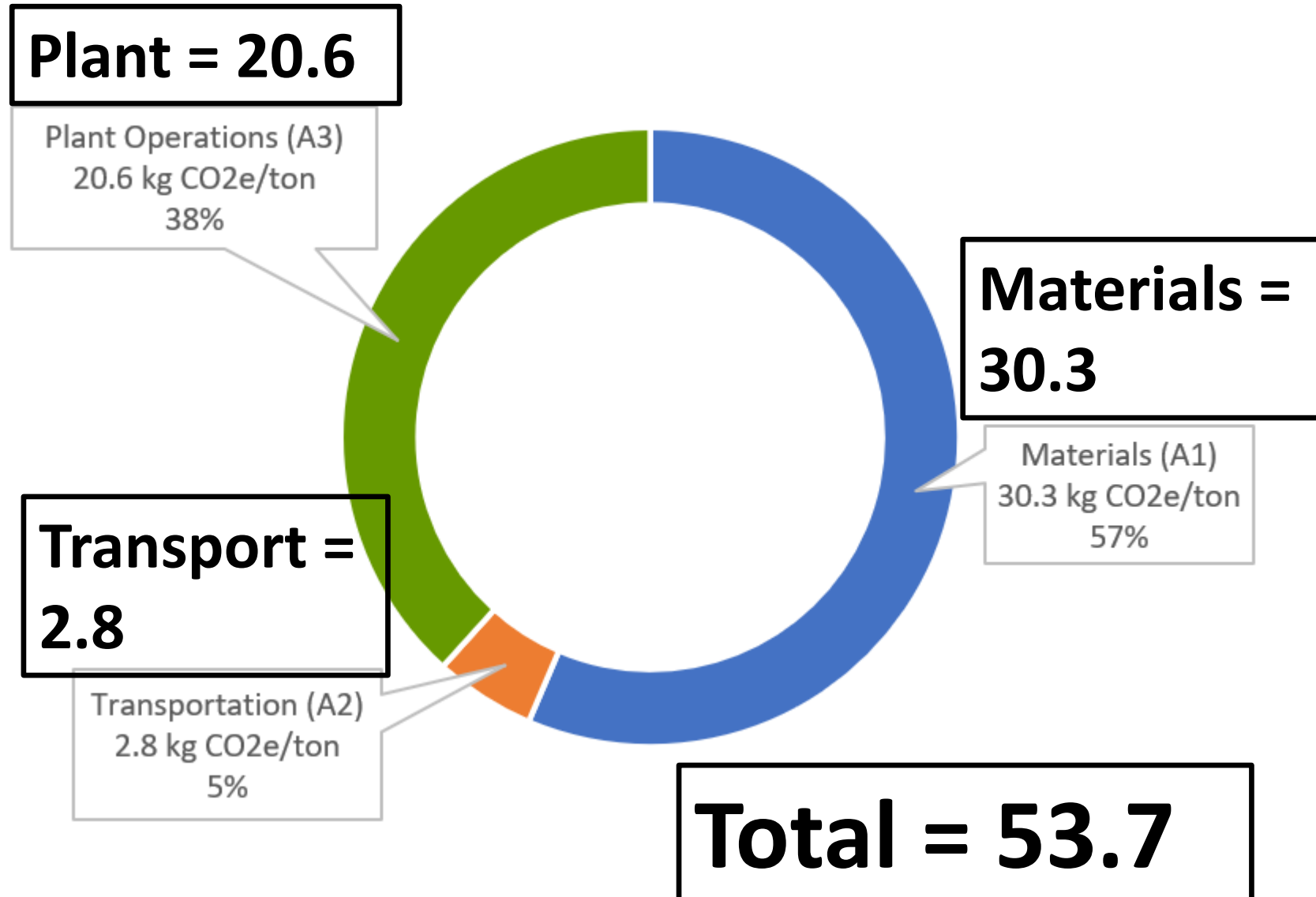
- **Initial data collection and plant setup takes most companies a couple of weeks**
- **New mixes typically take 10-15 minutes**



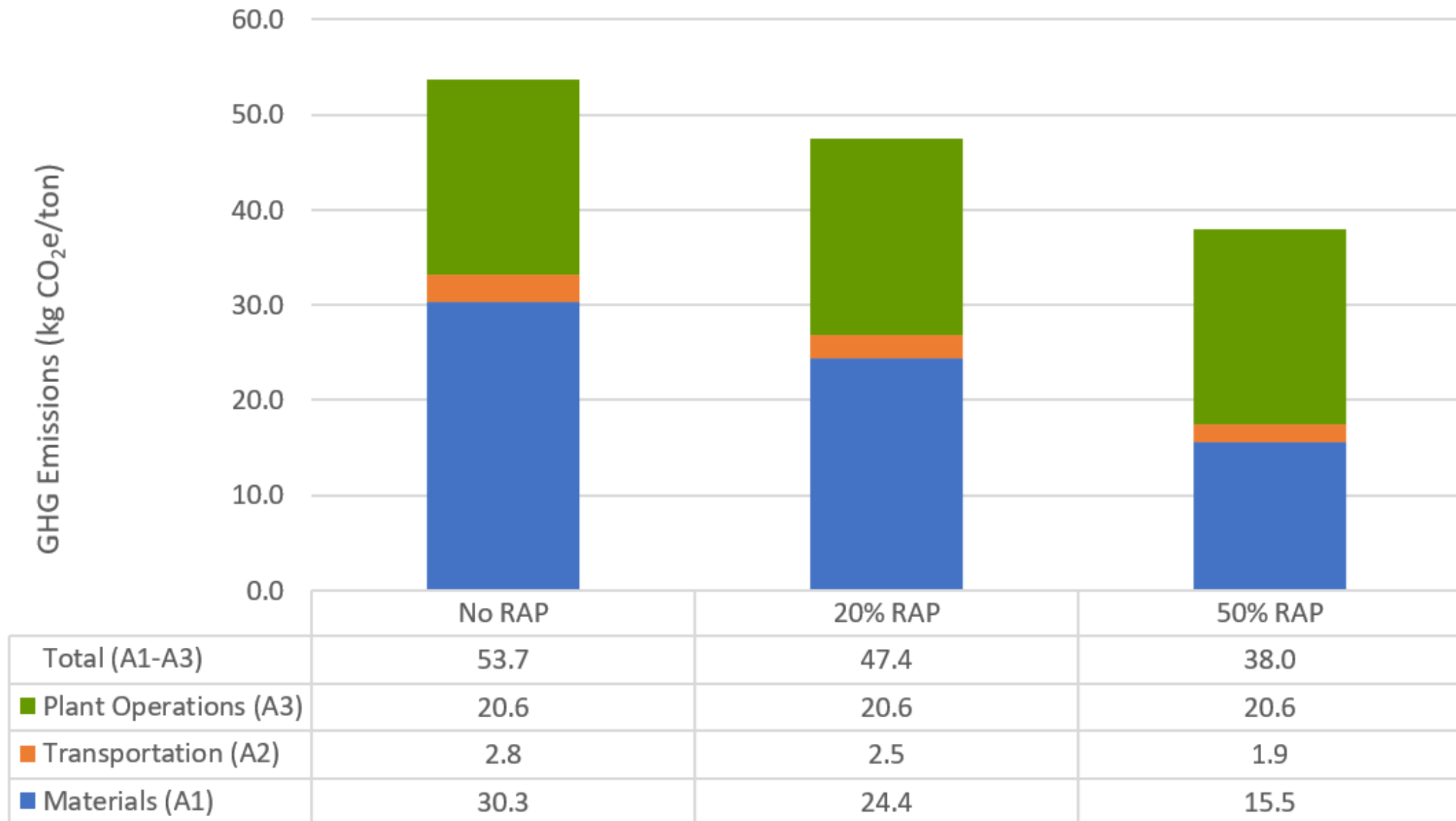
# Scenarios

# Baseline Reference Scenario

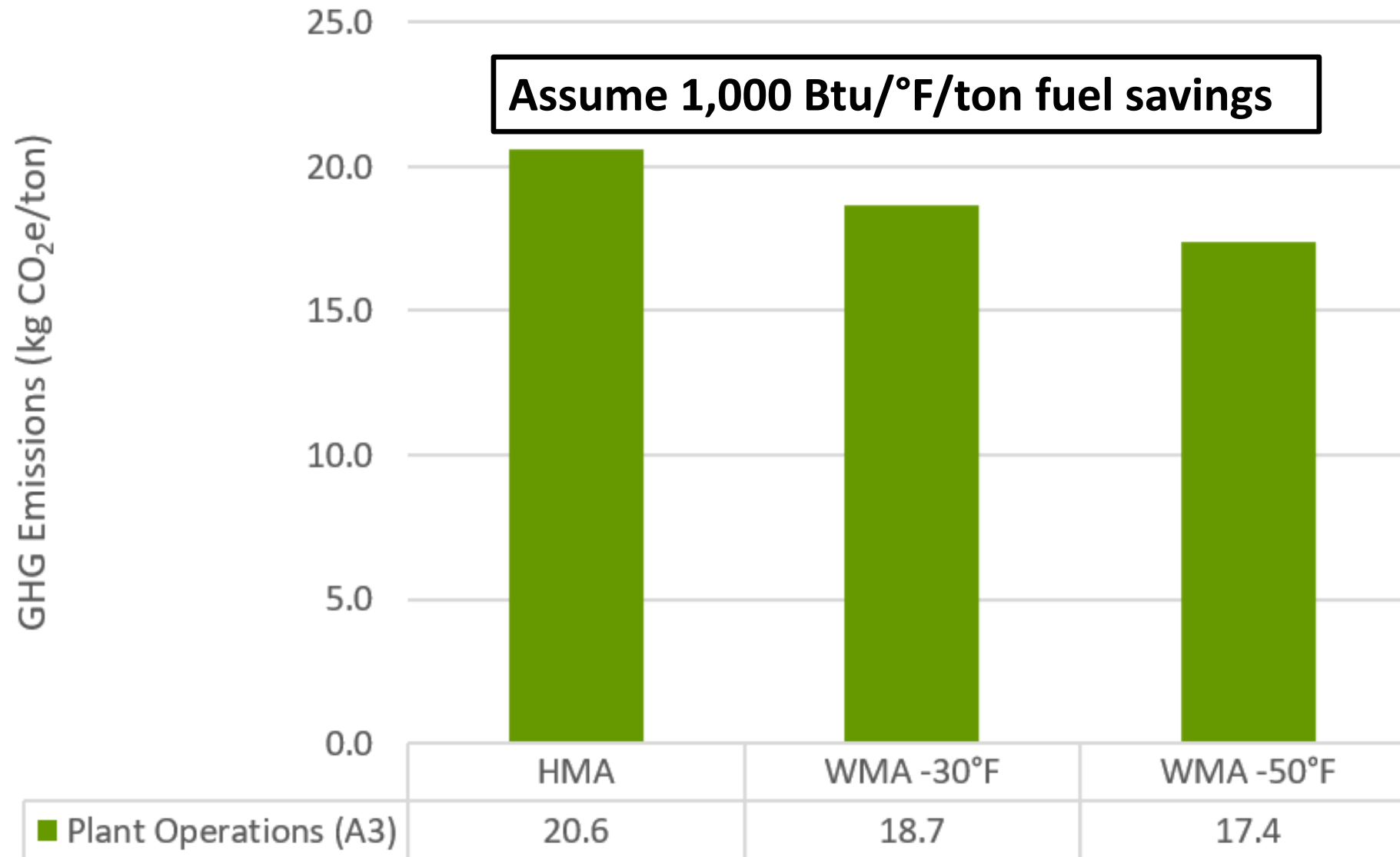
- **Burner = Natural Gas**
  - **289,000 Btu/ton**
  - **3.3 kWh/ton**
- **Average Haul Distance**
  - **~22 miles by truck**
- **5% Binder Content**
- **No RAP**



# Use of RAP

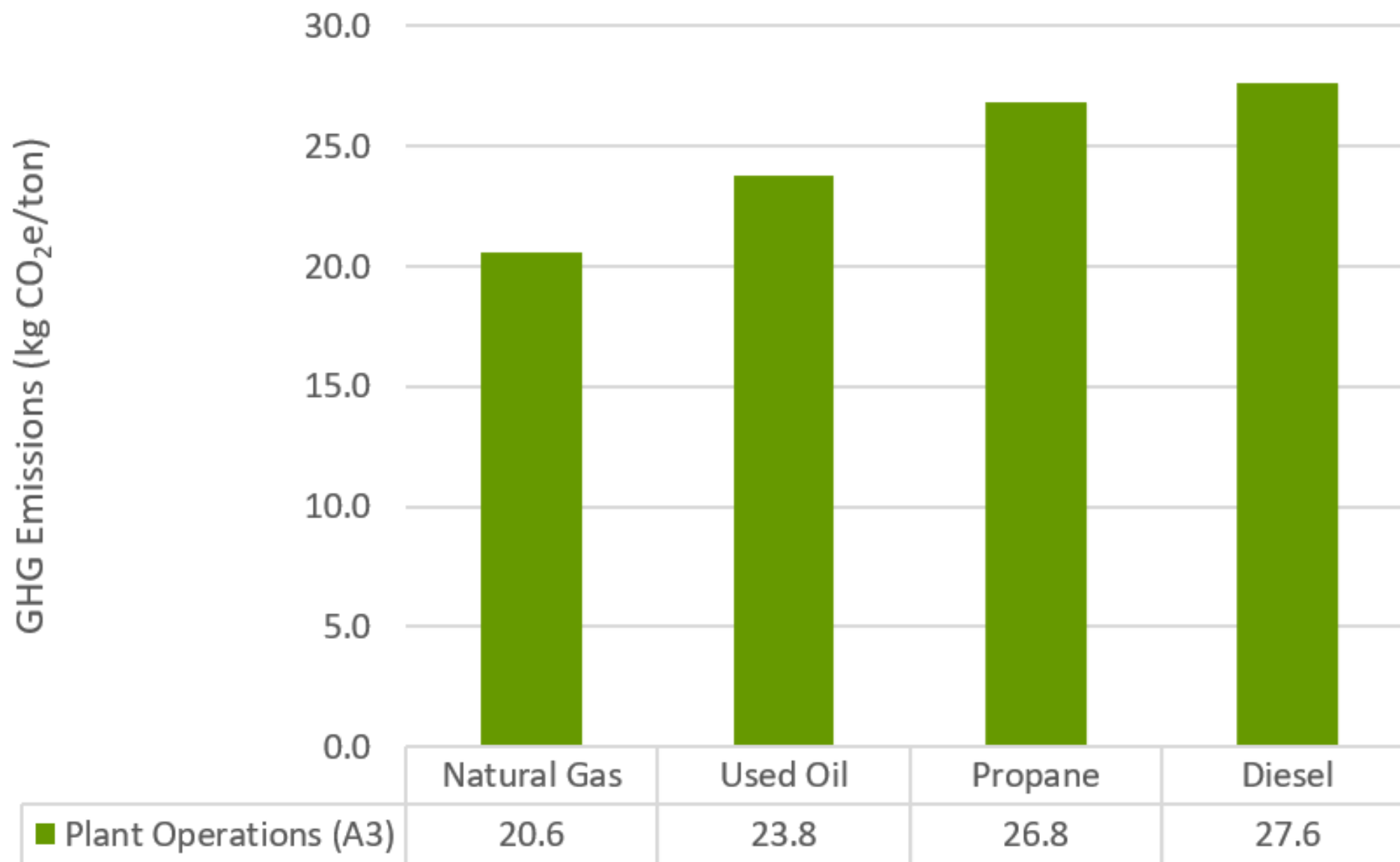


# Reduced Mix Production Temperature

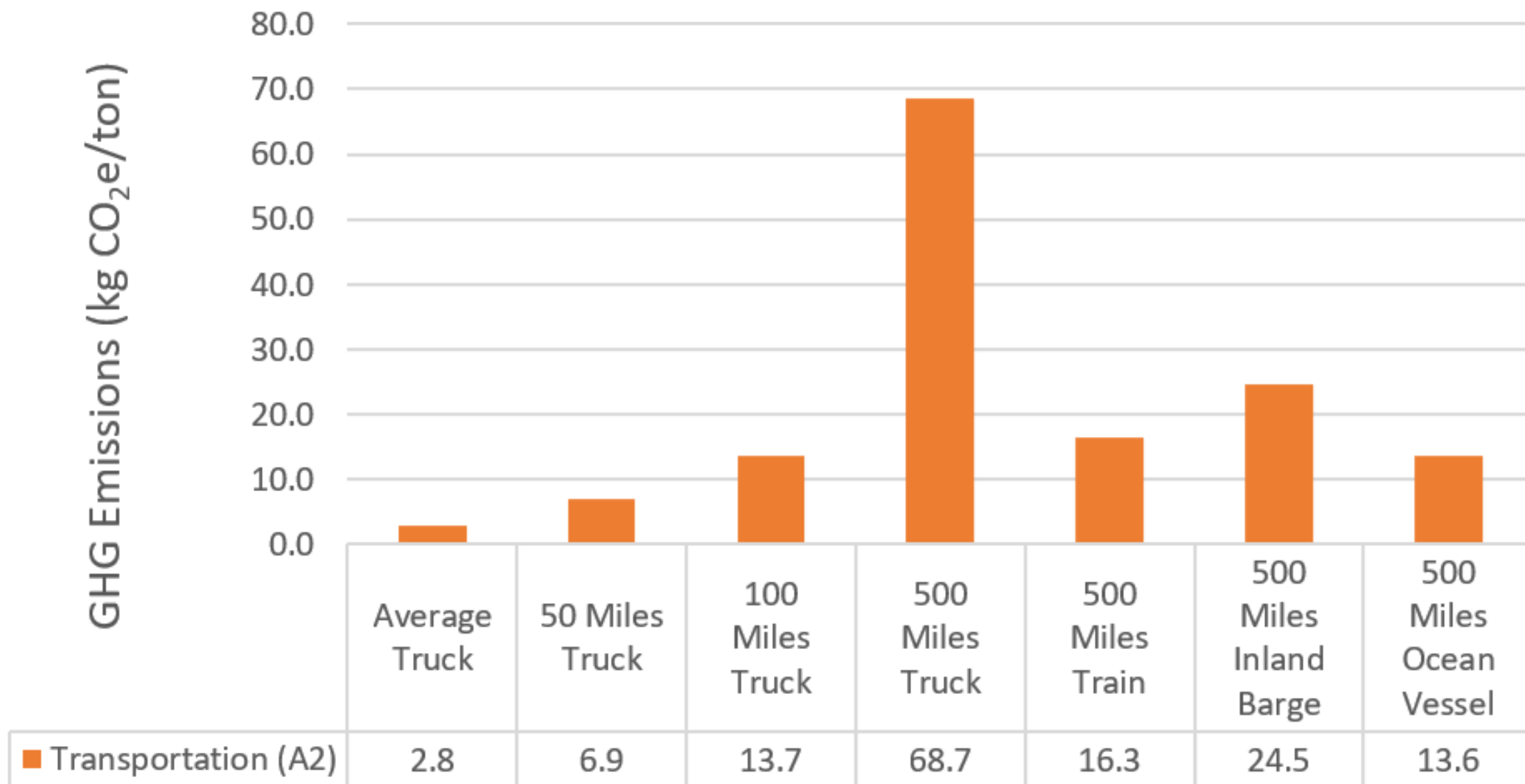




# Burner Fuels



# Aggregate Transport Scenarios



# **How and Why are Pavement Owners Using EPDs?**

# LEED projects and other green rating systems



- **EPD credits included in LEED v4 and v4.1**
- **Disclosure credit**
  - Projects collect EPDs from 20 different products
- **1,000+ LEED v4 projects certified in 2020**
  - Schools, banks, warehouses, medical, municipal, restaurants, etc.

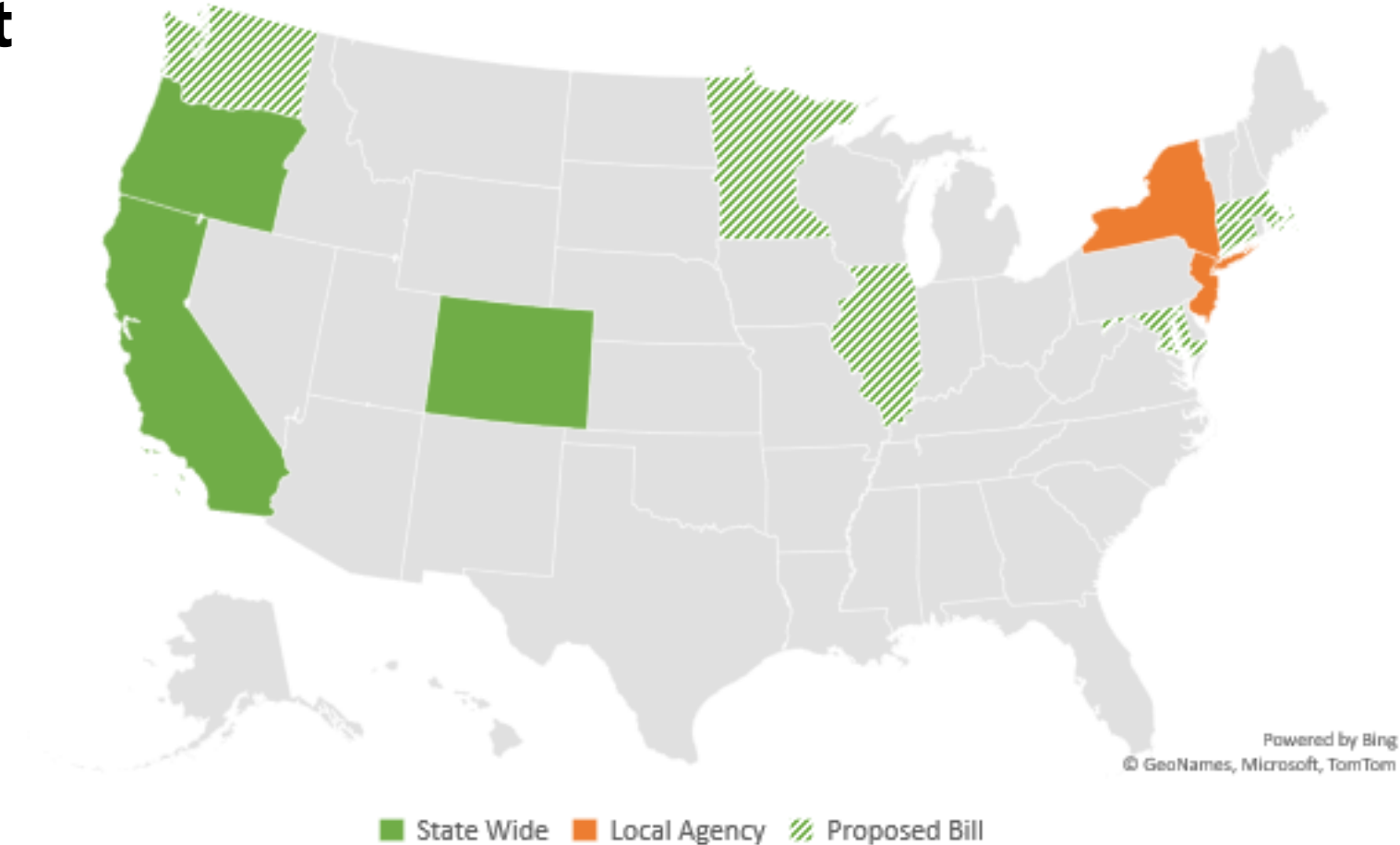




# "Buy Clean" Legislation

## Jurisdictions with Buy Clean policies that include asphalt mixtures

- Caltrans
- Colorado
- Oregon
- Port Authority of New York and New Jersey
- Illinois, Minnesota, other states are considering policies





# Environmentally Preferable Asphalt and Low Carbon Concrete Standards

- Federal office buildings, courthouses, and land ports of entry
- Projects with  $>10 \text{ yd}^3$  asphalt or concrete
- Requirements
  - Submit an EPD for each mix
  - **Asphalt** – Implement at least 2 environmentally preferable techniques
  - **Concrete** – National GWP limits based on compressive strength and mix type

<https://www.gsa.gov/real-estate/design-construction/engineering-and-architecture/facilities-standards-p100-overview>





# The White House Council on Environmental Quality

## Buy Clean Task Force

- Coordinating across Federal agencies
- Policy recommendations expected in June



# FHWA Climate Challenge

- Quantifying the emissions of sustainable pavements
  - Explore the use of EPDs and LCAs to inform pavement material and design selection
- Up to \$500,000 per agency
- Proposals accepted beginning July 1, 2022

# Carbon Reduction Program



## President Biden, USDOT Announce New Guidance and \$6.4 Billion to Help States Reduce Carbon Emissions Under the Bipartisan Infrastructure Law

Thursday, April 21, 2022

*Key program will fund projects that help fight climate change and save Americans money on gas*

- Embodied carbon reductions quantified using LCA
- Pavement smoothness – PEC Project



# Federal Acquisition Regulation: Minimizing the Risk of Climate Change in Federal Acquisitions

A Proposed Rule by the [Defense Department](#), the [General Services Administration](#), and the [National Aeronautics and Space Administration](#) on 10/15/2021

- Require corporate GHG emissions reporting for major federal suppliers?
- Consider Social Cost of Greenhouse Gasses in Federal contracts?
  - Current Federal value is \$51 per tonne CO<sub>2</sub>
  - Other estimates range from \$15 - \$426 per tonne CO<sub>2</sub>
  - Value depends on discount rate

2022  
**MIDYEAR  
MEETING**



THE RITZ-CARLTON BACARA  
SANTA BARBARA  
CALIFORNIA



[ASPHALTPAVEMENT.ORG/MIDYEAR](https://asphalt Pavement.org/midyear)

#NAPAMIDYEAR