

# The Road Forward

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

## EPDs: The Tool for Quantifying Emissions



Audrey Copeland  
President & CEO  
March 27, 2023

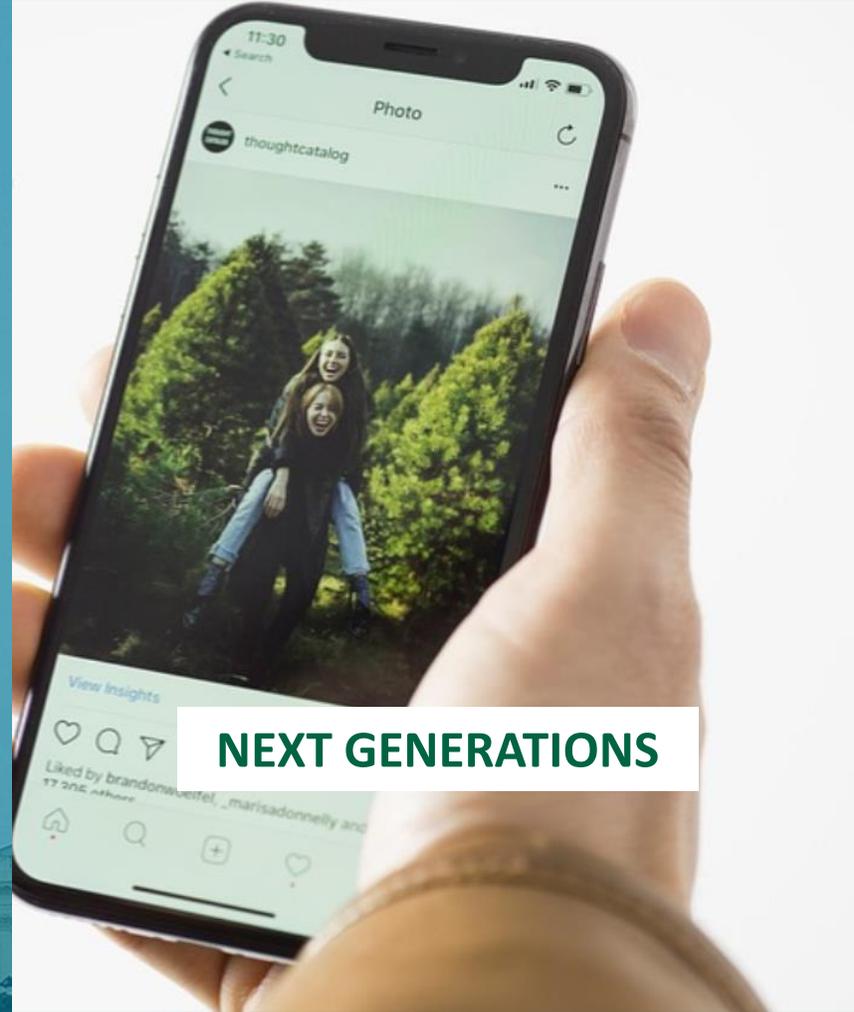
# Why?



**PROFIT**



**LEGISLATION**



**NEXT GENERATIONS**

# 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 Type III Environmental Label
- **Independently verified**



## EPD “Nutrition” Label

### Your Building Product

Amount per Unit

LCA IMACT MEASURES	TOTAL
Primary Energy (MJ)	12.4
Global Warming Potential (kg CO <sup>2</sup> eq)	0.96
Ozone Depletion (kg CFC- 11 eq)	1.80E-08
Acidification Potential (mol H <sup>+</sup> eq)	0.93
Eutrophication Potential (kg N <sup>-</sup> eq)	6.43E-04
Photo-Oxidant Creation Potential (kg O <sub>3</sub> eq)	0.121

Your Product's Ingredients: Listed Here

<https://westcoastclimateforum.com/cfpt/concrete/strategy1>

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

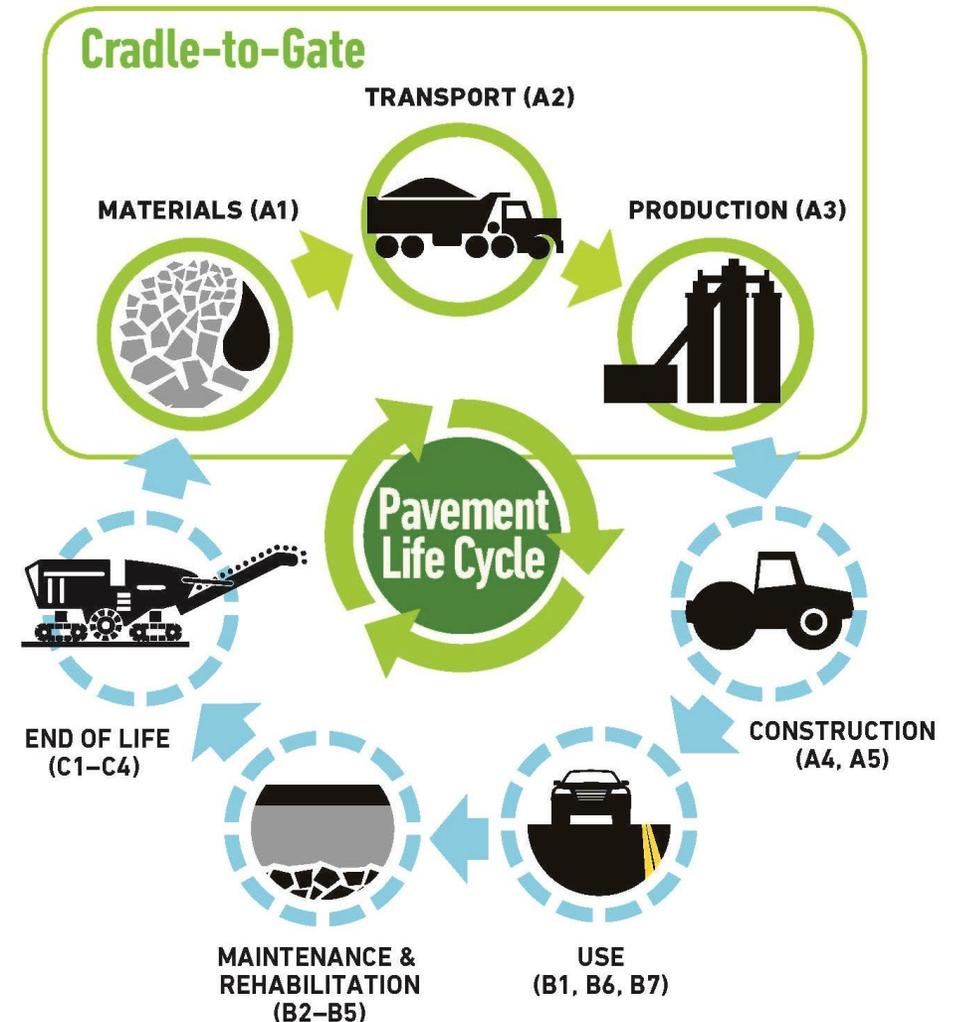
# EPDs for asphalt mixtures have a **Cradle-to-Gate** scope

- **Included:**

- Materials
- Transport
- Production

- **Other life cycle stages are not included**

- Mix producers have little control over them

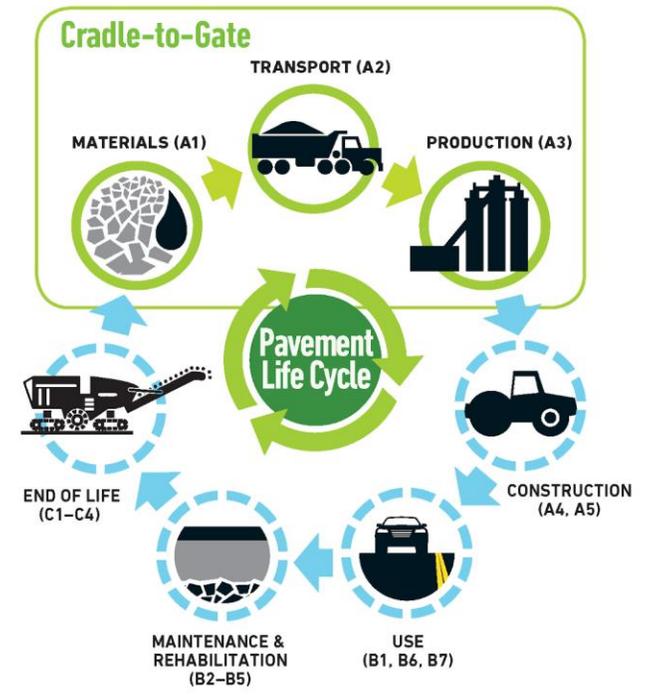




[NAPA'S EPD PRIMER VIDEO](#)

# Emerald

## ECO LABEL



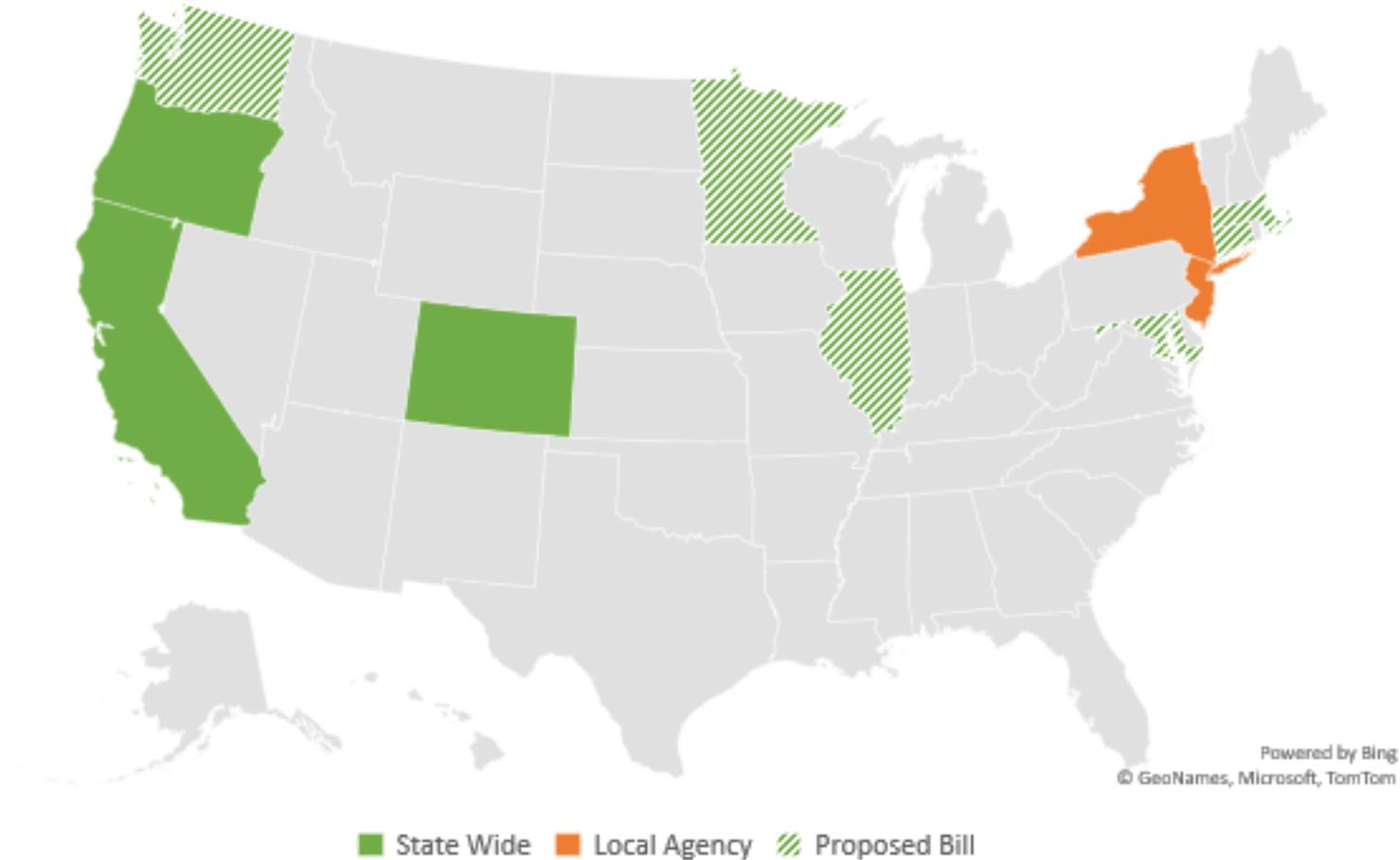
The three green icons represent the cradle-to-gate data used to create the Emerald Eco-Label Environmental Product Declaration (EPD) for asphalt pavement mixtures.

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

# “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 Standard

- Federal office buildings, courthouses, and land ports of entry
- Requirements
  - Submit an EPD for each mix
  - Use 2 environmentally preferable techniques
    - At least 20% RAP content
    - Warm mix technology (reduced onsite mix temperature)
    - Non-pavement recycled content (roof shingles, rubber, or plastic)
    - Improved energy/carbon efficiency of plants or equipment (e.g., natural gas)
    - Other environmentally preferable techniques (contractor can propose)

<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 17 Federal agencies
  - 90% of federally financed and purchased construction materials
- U.S. DOT Buy Clean Policy Statement
  - Explore the use of EPDs
  - Develop a Buy Clean Policy based on EPDs
- Partnering with State DOTs to align Buy Clean Policies

# 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*

- Focus is on vehicle fuel consumption/emissions
- FHWA Guidance made “paving activities” eligible
  - Projects must use LCA to quantify carbon emissions reductions
- Enhanced pavement smoothness may also be eligible



# Inflation Reduction Act

## EPA

- \$250 million to standardize EPDs and help industry develop EPDs
- \$100 million to develop “low-embodied carbon construction material labeling program”

\*\*\* How will low-embodied carbon materials be defined ???

## DOT/FHWA

- \$2 billion to procure low carbon construction products
  - Federal-aid Highways, Federal Lands, etc.
  - Differential Cost or Incentive



# Inflation Reduction Act

## EPA Interim Determination of Substantially Lower Embodied Carbon

- **Best performing 20%** of similar materials/products
  - If not available locally, then **best performing 40%**
  - If not available locally, then better than **estimated industry average**
  - **Agencies will define these thresholds** based on published EPDs
- Also, report **ENERGY STAR** Energy Performance Score (currently under development for asphalt plants)

<https://www.epa.gov/inflation-reduction-act/inflation-reduction-act-programs-fight-climate-change-reducing-embodied>



# DRAFT Low Carbon Material Standard

- Federal office buildings, courthouses, and land ports of entry

## GSA IRA Limits for

### Low Embodied Carbon Asphalt - Jan. 2023

(Uncertainty-Adjusted GWPs, in kilograms of carbon dioxide equivalent per metric ton - kgCO<sub>2</sub>e/ t)

**Top 20% Limit**

**Top 40% Limit**

**Average or Better Limit**

**62.8**

**74.0**

**85.0**

- “Uncertainty adjustment” is arbitrarily assigned
- Same limits apply to all mix types



## EDC-7 (2023-2024)

- Integrating GHG Assessment and Reduction Targets in Transportation Planning
- EPDs for Sustainable Project Delivery

# QUANTIFYING IMPACT



**Emerald**  
ECO LABEL

Developing EPDs  
helps us  
understand what  
levers to pull to  
reduce emissions  
and costs.



# Asphalt Pavement Industry Survey on Recycled Materials and Warm-Mix Asphalt Usage 2019

Information Series 138

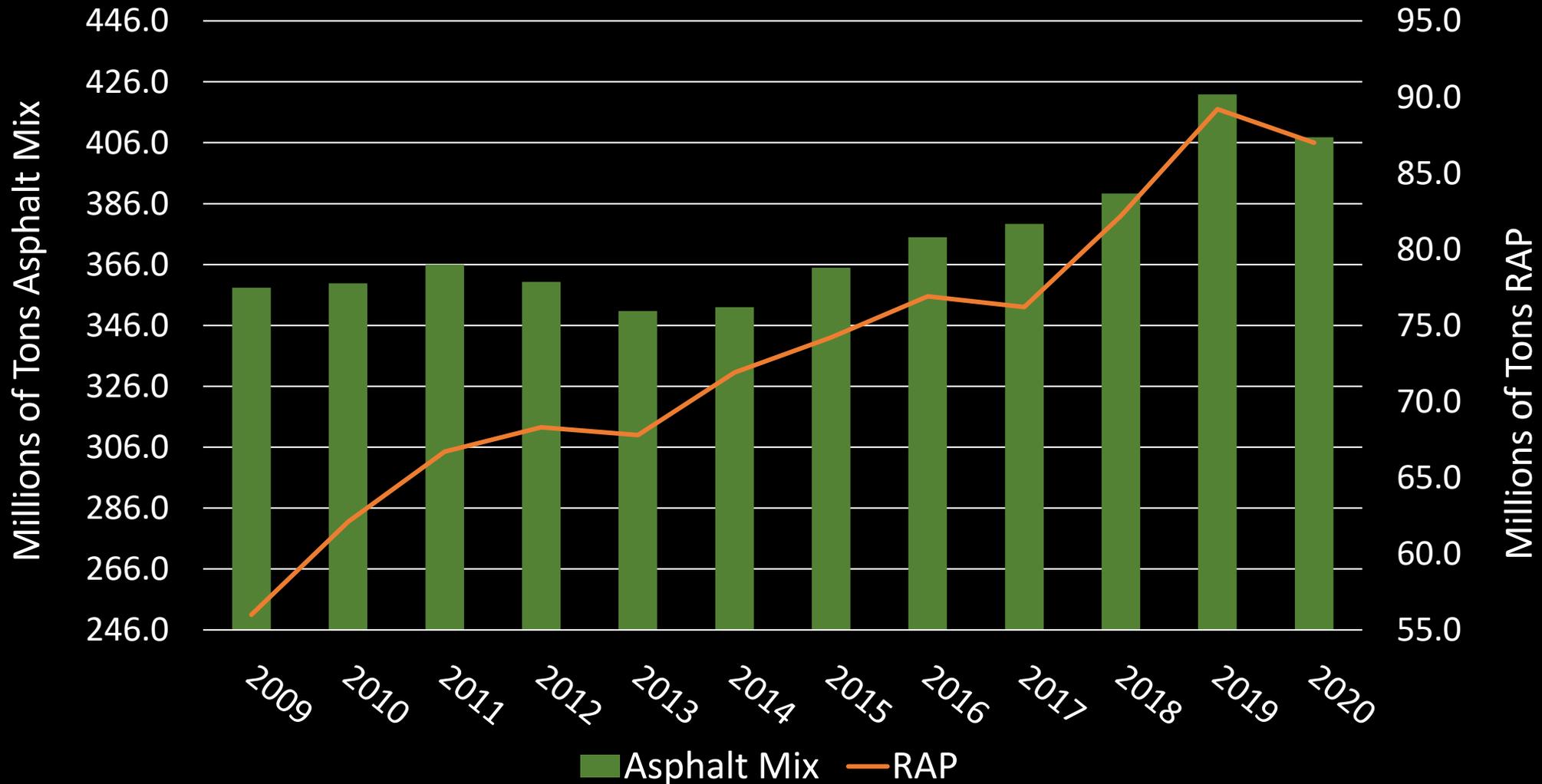
## The Jewel in our Crown: Reclaimed Asphalt Pavements (RAP)

[LEARN MORE ABOUT RECYCLING PAVEMENTS](#)



# Asphalt Mix and RAP Tonnage

*Total Production and Use in the U.S.*



# OUR CLIMATE STORY

## Positive impacts of RAP use, 2009-2021

GHG emissions from



**5,575,907**

Passenger vehicles  
driven for one year

CO<sub>2</sub> emissions from



**3,013,030**

homes' energy use  
for one year

CO<sub>2</sub> emissions from



**2,903,116,912**

gallons of gasoline  
consumed

CO<sub>2</sub> emissions from



**59,732,454**

barrels of oil  
consumed

Carbon sequestered by

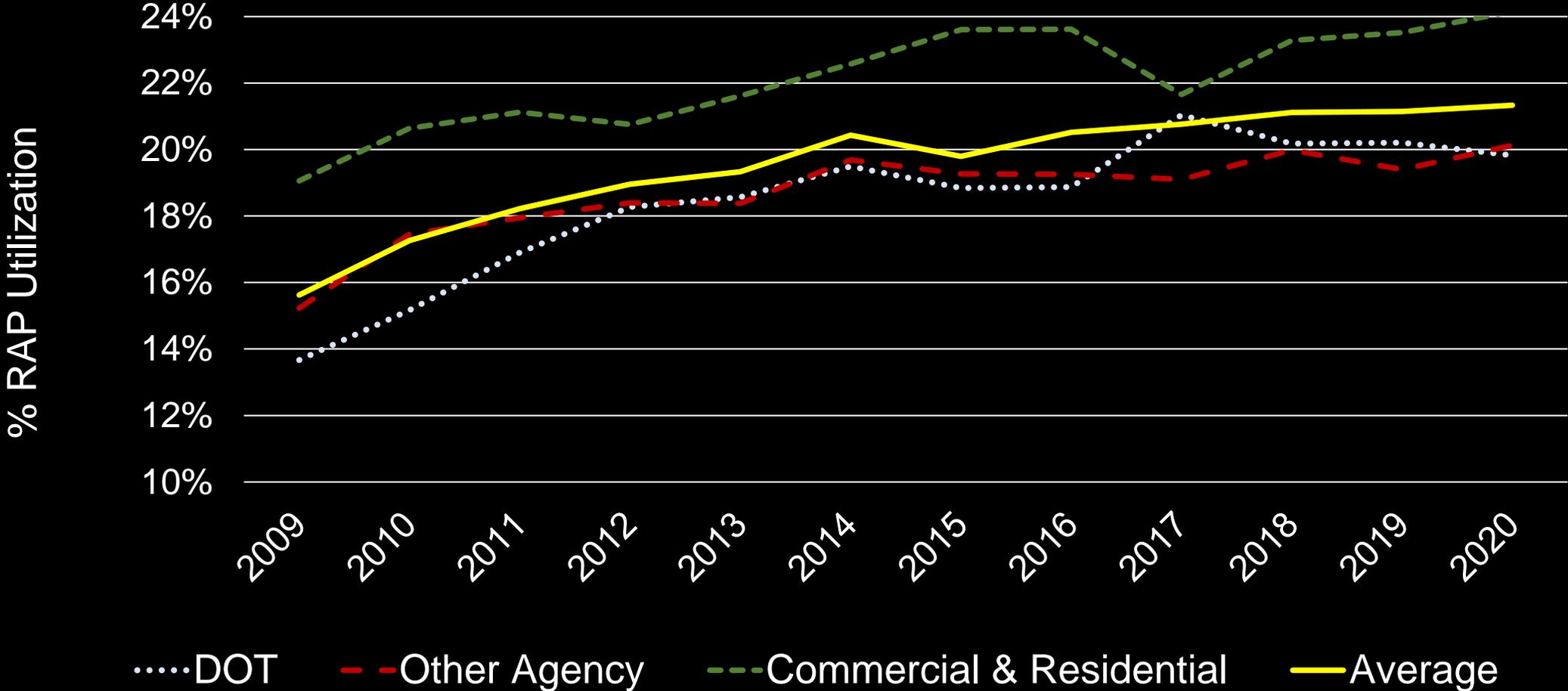


**33,226,025**

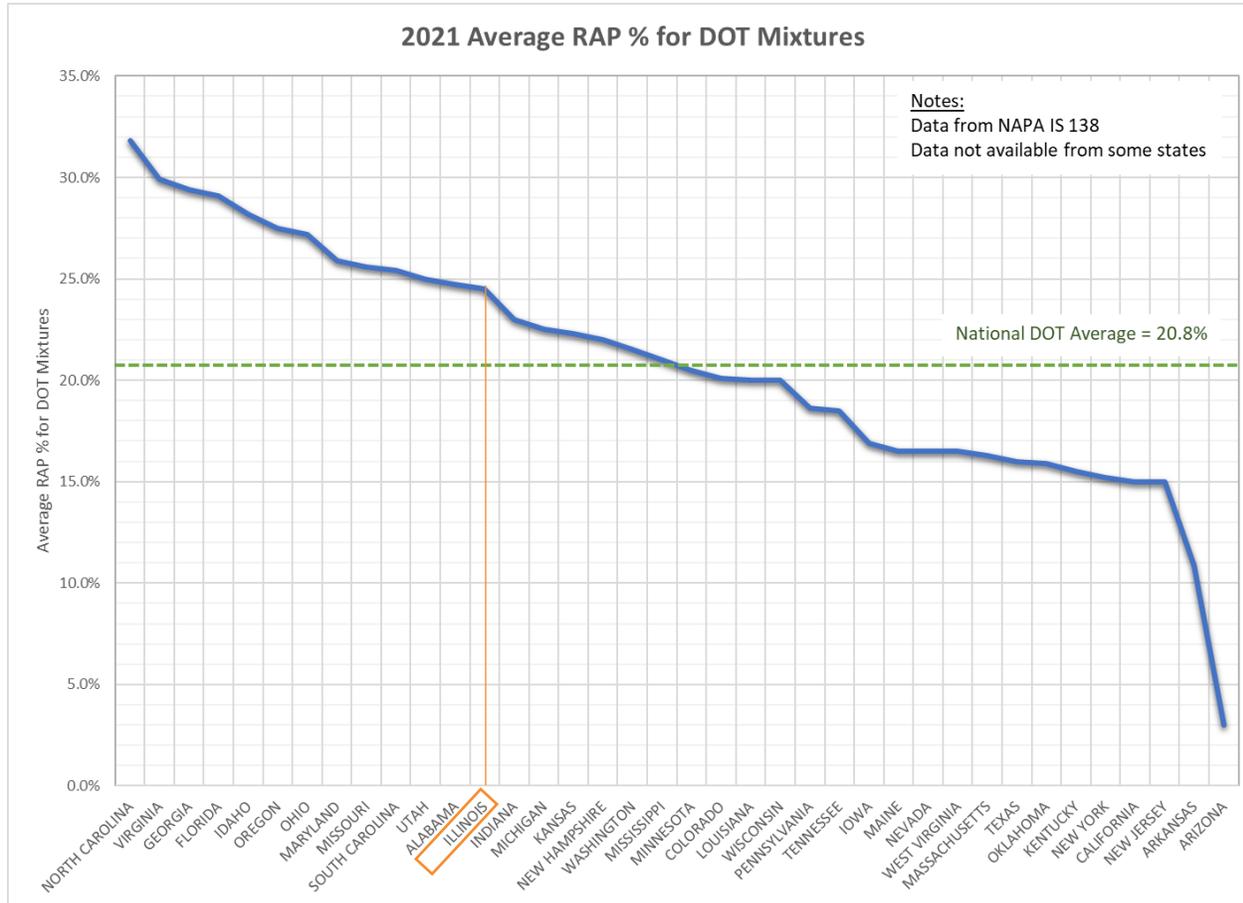
acres of U.S. forests  
in one year

# % RAP Utilization in Asphalt

## Utilization by Sector



# RAP: One Simple Step



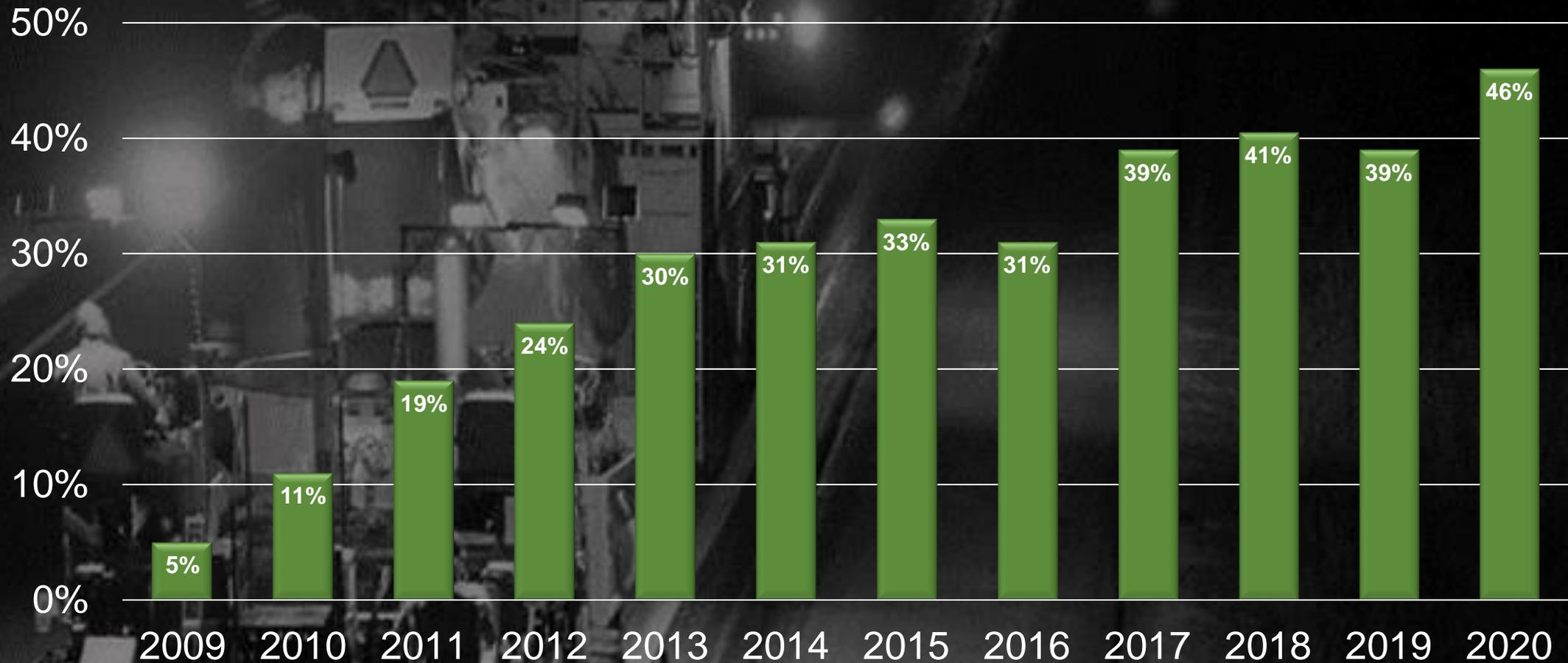
Increasing RAP by  
1% nationwide  
=  
GHG emissions from



**25,132**  
Passenger vehicles  
driven for one year

# WMA Usage

*Percentage of Total Asphalt Production in US*



# CLIMATE LEADERSHIP

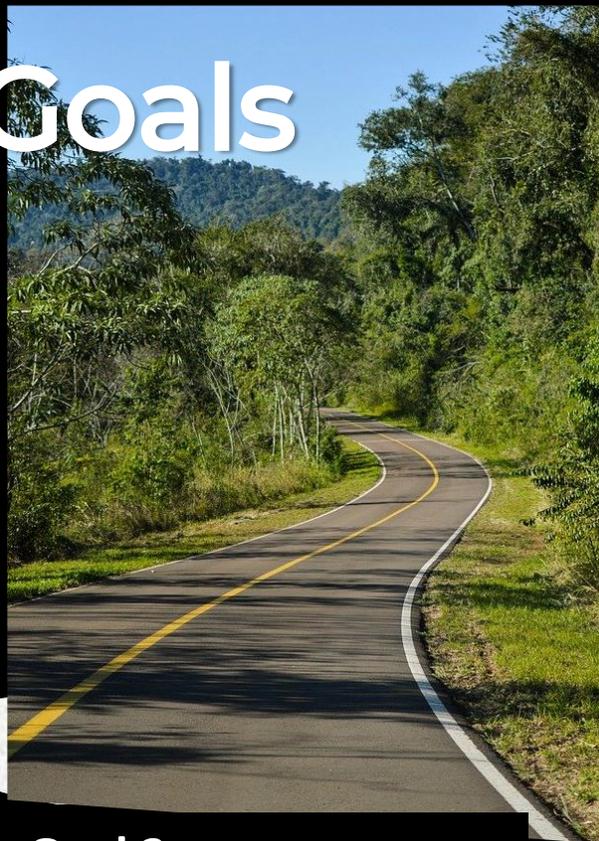
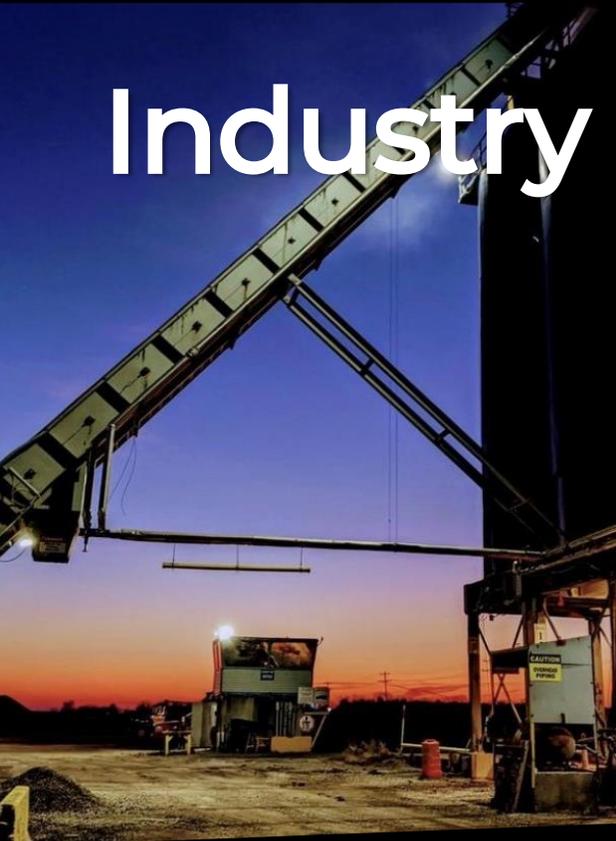
## The Road Forward



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# Industry Goals



## Goal 1

*Scope 1 Emissions*

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

## Goal 2

*Downstream Scope 3 Emissions*

Partner with customers to reduce emissions through pavement quality, durability, longevity, and efficiency standards by 2050

## Goal 3

*Upstream Scope 3 Emissions*

Develop a net zero materials supply chain by 2050

## Goal 4

*Scope 2 Emissions*

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

PAVING CREWS



PLANT CREWS/QC



EVERYONE HAS A ROLE TO PLAY



OWNERS & MANAGERS



Illinois Department of Transportation

DOTs

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## RESEARCH & BEST PRACTICES



[AsphaltPavement.org/climate](https://AsphaltPavement.org/climate)

# THE ROAD FORWARD 2022 PARTNERS

KRATON



HOLCIM



VINCI CONSTRUCTION USA

GALIGHIER ASPHALT



ASTEC



The Future is Riding on AJAX.



VOLVO



ingevity



LINDY PAVING

SUMMIT Materials



WIRTGEN GROUP

GRANITE



**NATIONAL ASPHALT  
PAVEMENT ASSOCIATION**

# Sustainability v Durability Not Mutually Exclusive Terms

SIP 106

## GHG EMISSIONS INVENTORY FOR ASPHALT MIX PRODUCTION IN THE UNITED STATES

Current Industry Practices and  
Opportunities to Reduce Future Emissions

Joseph Shacat  
J. Richard Willis, Ph.D.

## RAP Benefits for Pavement Owners

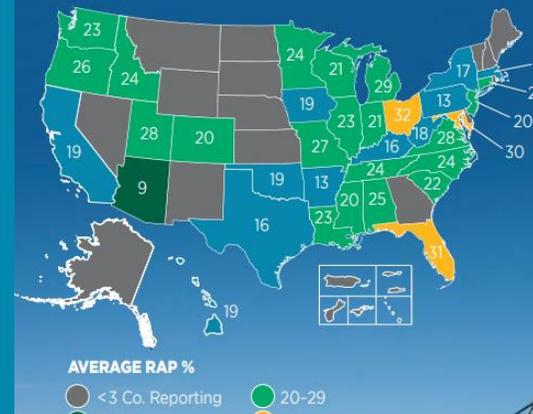
### WHAT IS RAP?

Reclaimed asphalt pavement (RAP) is the terminology used for materials generated when asphalt pavements are removed for reconstruction, resurfacing, or other construction activities. RAP consists of high-quality, graded aggregates that are coated with durable asphalt binder.

### HOW AND WHERE IS RAP RECYCLED?

**89.2 million tons** of RAP are used annually in new asphalt pavement construction in the United States. As a fully recyclable product, RAP has many applications, and can be used over and over again, reducing the need for costly virgin materials. More than **94%** of RAP is used in new asphalt mixtures, while a small percentage is incorporated into other civil engineering applications like unbound aggregate bases. Nationally, RAP is utilized at an average rate of **21.1%** in new asphalt mixtures.

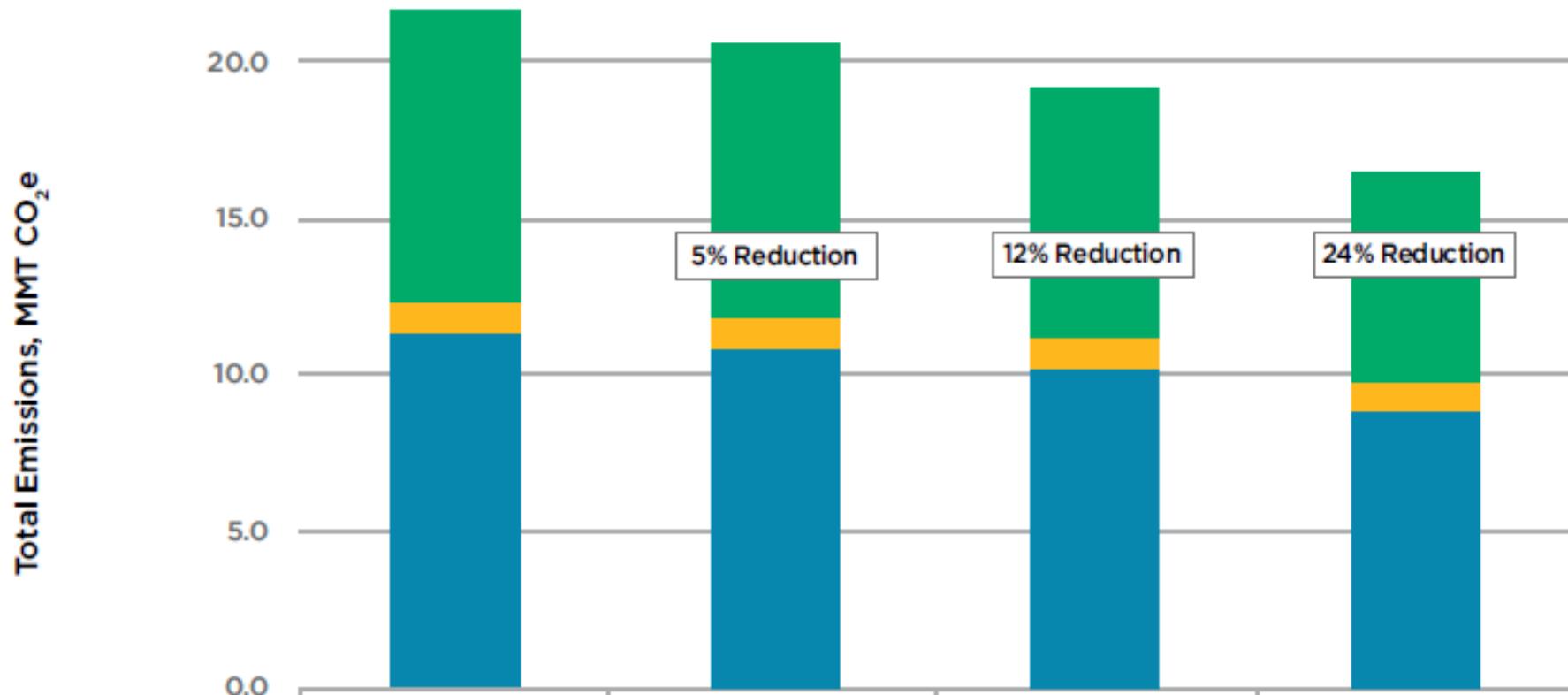
### AVERAGE PERCENTAGE OF RAP USED IN EACH STATE, 2019 (NAPA IS-138, 2020)



# Emissions Reduction Scenarios

Parameter	2019 Baseline	Short-Term	Intermediate	Long-Term
RAP Content	21%	25%	30%	40%
Natural Gas Consumption as Percentage of Fuel Combusted	69%	72%	75%	90%
Aggregate Moisture Content Reduction	N/A	0.25%	0.50%	1.0%
Asphalt Mix Production Temperature Reduction	N/A	10 °F	25 °F	40 °F
Reduction in Electricity Consumption Intensity	3.32 kWh/ton	5%	10%	20%

# Results - Emissions Reduction Scenarios



	2019 Baseline	Short	Intermediate	Long-Term
Total (A1-A3)	21.7	20.6	19.1	16.5
Mix Production (A3)	9.4	8.8	8.0	6.8
Transportation (A2)	1.0	1.0	1.0	0.9
Raw Materials (A1)	11.3	10.8	10.1	8.8

# Understanding Carbon



## Embodied Carbon

Manufacture, transport and installation of construction materials

## Operational Carbon

Building Energy Consumption

# ESTIMATED TONNAGE, 2009-2021

