

Sustainable Pavements Community of Practice:

Lessons Learned from Stakeholder Engagement and
Education on the Sustainable Pavements Program

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ACI Convention, San Francisco
April, 2023



Motivation

- Sustainability is gaining prominence in all industrial domains.
- There is emerging need to educate the workforce fast.
- Summarize efforts from Sustainable Pavements Program.
 - Stakeholder involvement
 - Educational efforts and best practices
 - Forming the community of knowledge
 - Success stories

About SPP

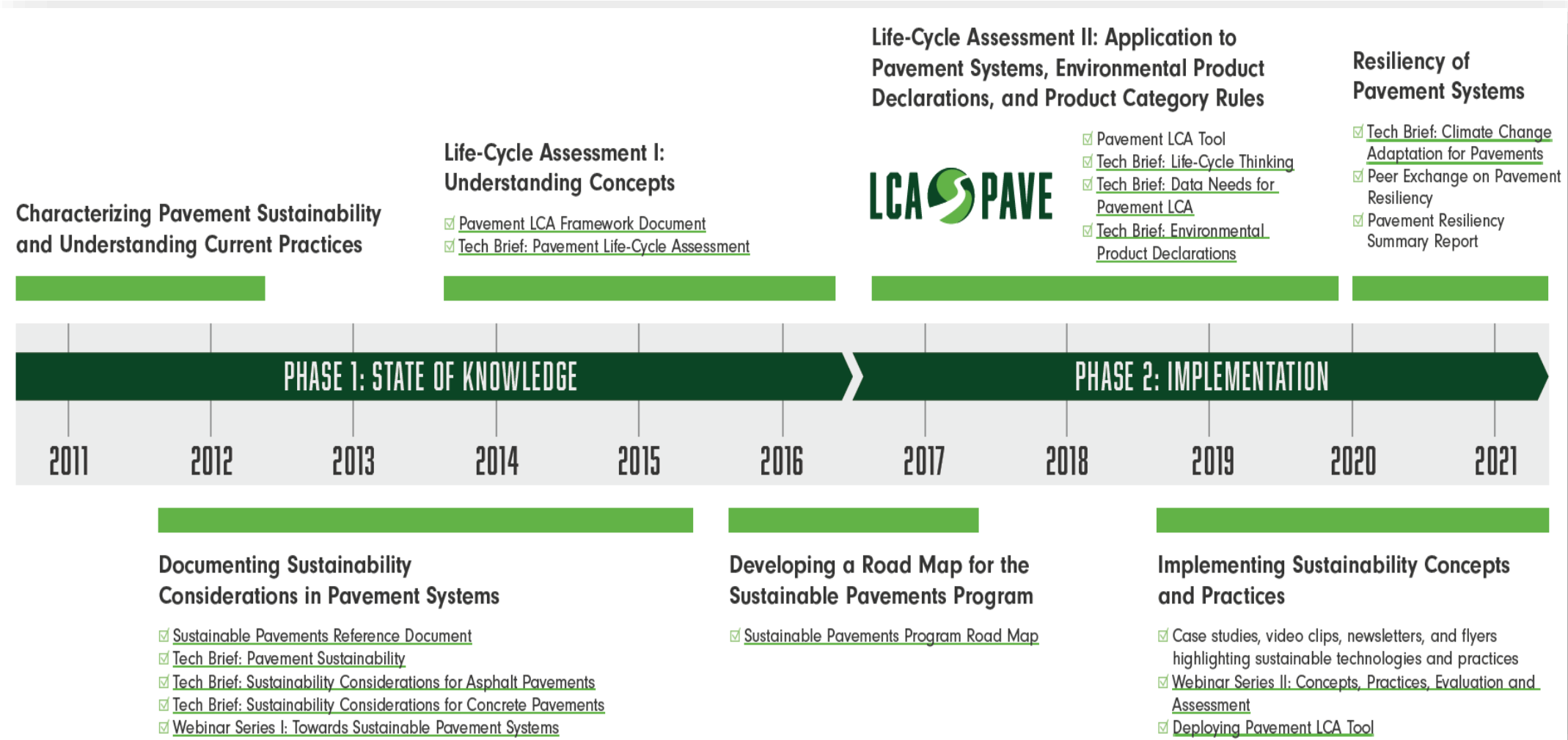
Over the past 10 years, Sustainable Pavements Program has:

- Created a national dialogue on pavement sustainability through 20+ Sustainable Pavements Technical Working Group meetings
- Evaluated the state of knowledge related to sustainability of pavements
- Educated stakeholders through 15+ webinars, 30+ technical documents, and 50+ technical presentations
- Developed a pavement LCA Tool based on stakeholder input that uses public data sources and EPDs

**“Minimize environmental impacts
while maximizing economic
benefits and ensuring equitable
social outcomes”**

The Pursuit of Sustainable Thinking

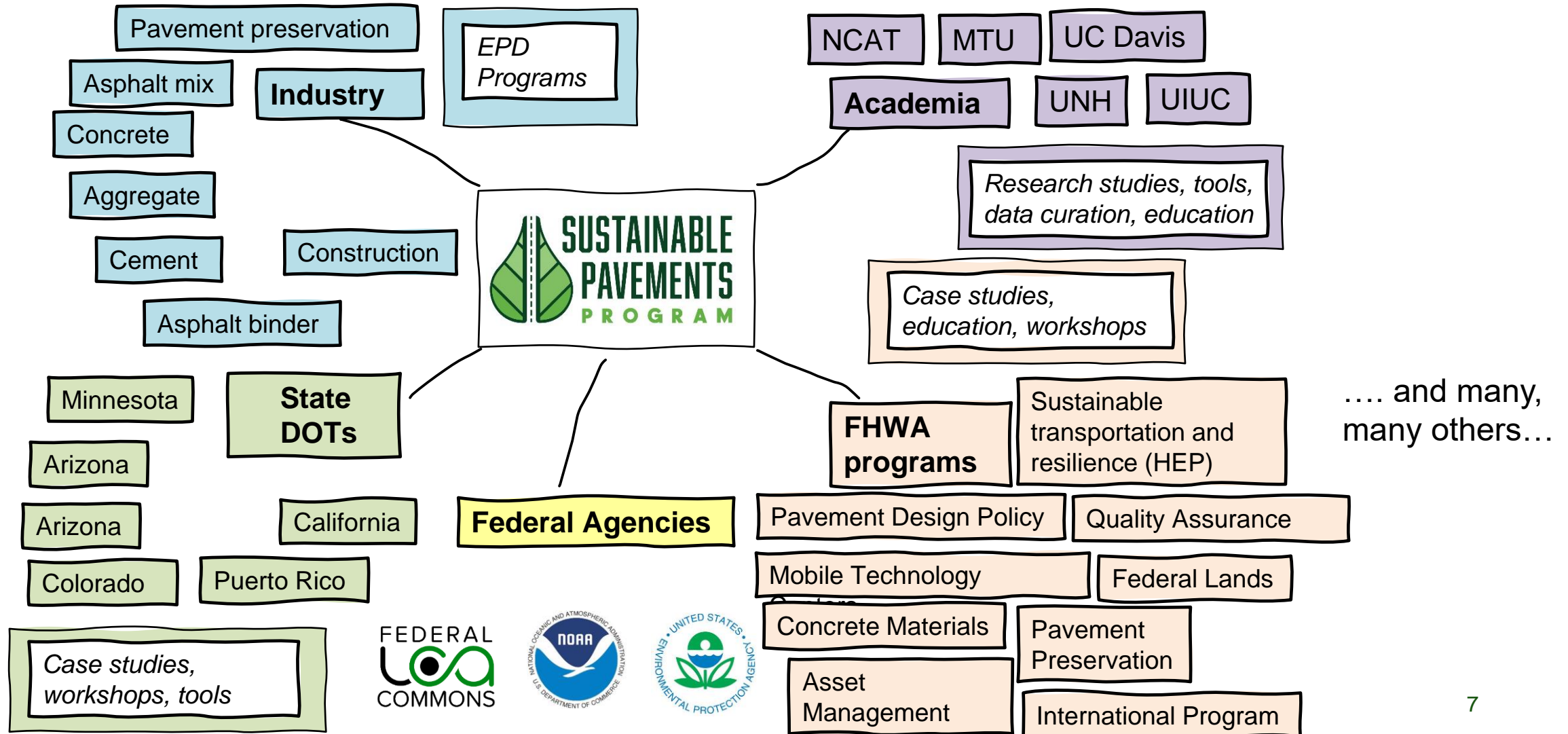
About SPP



Lessons Learned

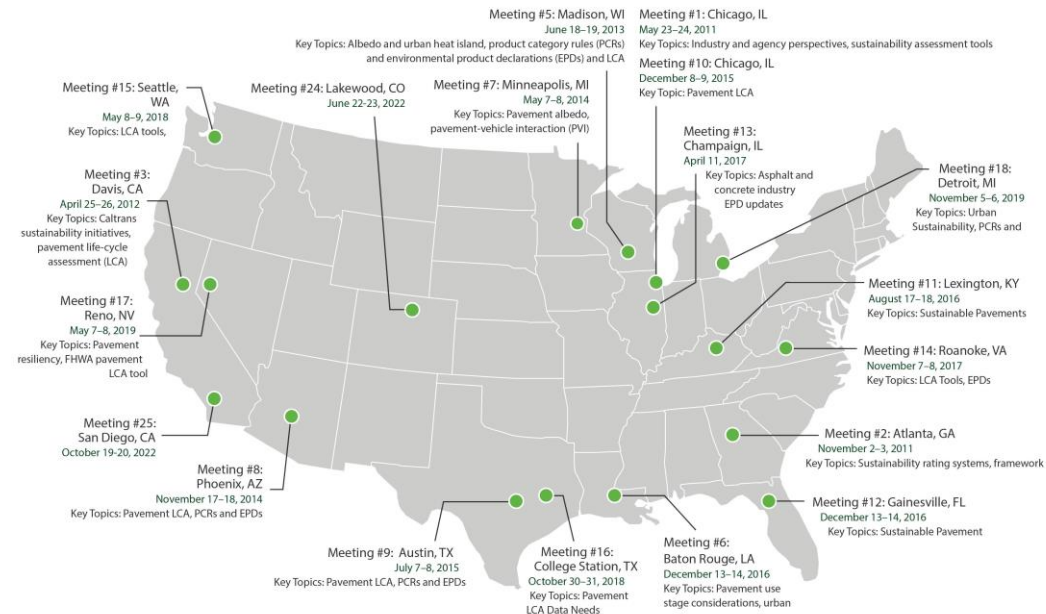


1. Stakeholder Involvement



1. Stakeholder Involvement

- Stakeholders from highway agencies, academia, and industry.
 - Share information on pavement sustainability
 - Provide input to FHWA
 - Review deliverables
 - Assist in implementation



Meeting #4:
Online
November 13, 2012
Key Topics: Sustainable pavements reference document, pavement albedo

Meeting #19:
Online
June 3, 2020
Key Topics: EPDs, FHWA Pavement LCA Tool


Meeting #20:
Online
November 9, 2020
Key Topics: Pavement Resiliency, FHWA Pavement LCA Tool

Meeting #21:
Online
March 9, 2021
Key Topic: Social Sustainability

Meeting #22:
Online
November 17-18, 2021
Phase kick-off, Sustainable Pavement Road Map

Meeting #23:
Online
April 22, 2022
Sustainable Pavement Program Road Map, CDOT Buy Clean experience

1. Stakeholder Involvement


**Buy Clean Policies and EPDs
Community of Knowledge Quarterly Webinar** 

Deriving Benchmarks for Construction Materials Based on EPDs


TUESDAY, JUNE 6, 2023

Public sector agency employees and consultants are encouraged to join us for this virtual webinar.

- Learn about methodologies and key considerations when developing benchmarks.
- Understand the necessity and importance of benchmarks in the context of Buy Clean policies.
- Participate in an engaging, open discussion on how to collaborate between public agencies and industry to develop benchmarks.



QUESTIONS	AGENDA
<ul style="list-style-type: none"> • What is background data and how does it affect benchmarking? • What is the current state of practice on developing benchmarks in the US? • What are some of the recommendations/gaps/needs that public agencies and industry associations have identified to develop benchmarks? 	<p>2:00 - 2:10 p.m. Welcome / Introduction - Migdalia Carrion</p> <p>2:10 - 2:30 p.m. Presentation - Dr. John Harvey</p> <p>2:30 - 2:55 p.m. Open Discussion</p> <p>2:55 - 3:00 p.m. Closing Remarks - Migdalia Carrion</p>

[Click to register](#) 

For more information, please visit the [Sustainable Pavements Program website](#).
Sign up to become a member of the Community of Knowledge Quarterly Webinar.

<https://usdot.zoomgov.com/meeting/register/vJlsc-yuqTwqEjxkLHzmqlswBXQwA8P0Ca0>

2. Educational Materials in Various Formats



[Pavement Sustainability: Start Here](#)



[Webinars](#)



[Library](#)



Reference documents



Tech Briefs



One-pagers



Technical articles





[Case Studies](#)



[Tools](#)



[Sustainable Pavements Technical Working Group \(SPTWG\)](#)

-  [LCA of Pavements Tech Brief](#)
-  [Pavement LCA Framework](#)
-  [A Primer on LCA for Pavements](#)
-  [LCAPave Tool](#)
-  [LCA Webinar Part I: Concepts](#)
-  [LCA Data Needs Tech Brief](#)

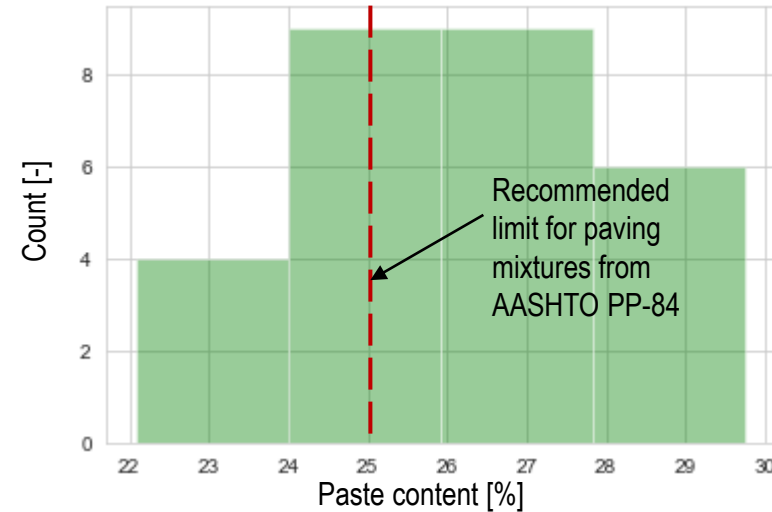
3. Educating Educators- Sustainability Ambassadors

- Webinars related to sustainability in a specific domain taught by SMEs
- Travel funding for SMEs to present on sustainability at conferences
 - Creating new content
 - Broadening our outreach
 - Increasing capacity



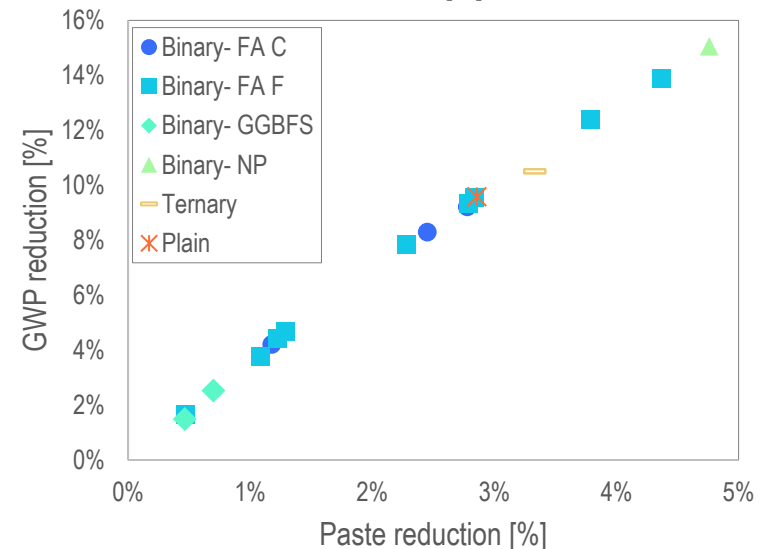
4. Internal Collaboration: MCTC Example

- Analysis of MCTC mixture dataset
- LCA for all mixtures
- Focus on savings with performance engineered mixtures
 - Environmental, economic, durability improvements

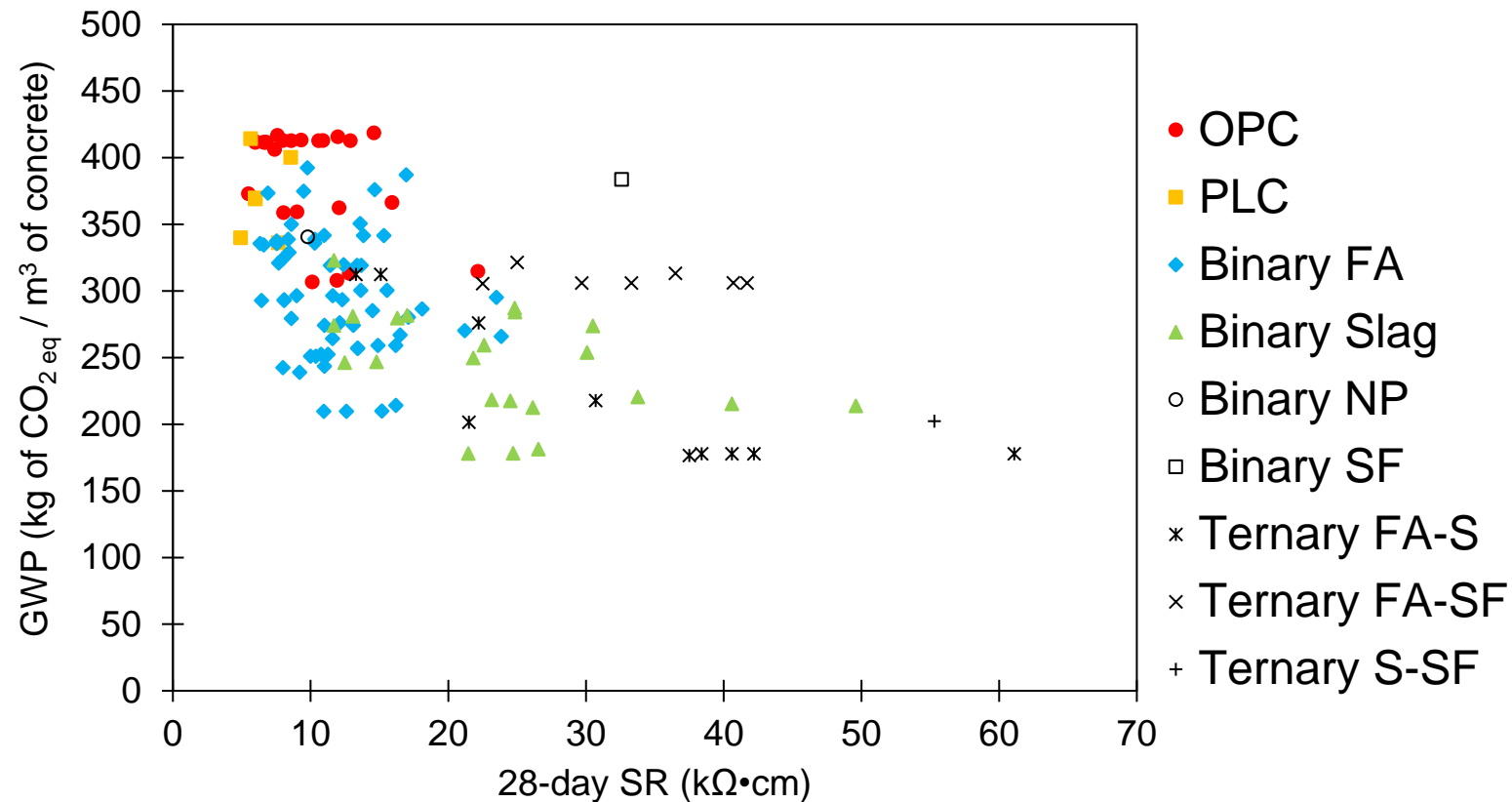


Source: FHWA

Source: Rangelov et al. (2022). Readily Implementable Strategies for Reducing Embodied Environmental Impacts of Concrete Pavements in the United States. *Transportation Research Record*, 2676(9), pp.436-450.



5. Using Research to Bust Myths



Source: Helsel et al. (2022) Contextualizing embodied carbon emissions of concrete using mixture design parameters and performance metrics. Structural Concrete.

6. Scenario-based learning

*The department is required to establish a **maximum acceptable global warming potential (GWP)** for each category of **eligible materials** used in public projects...*

*For invitations for bid for public projects, the contractor that is awarded the contract is required to submit to the contracting agency of government a current **environmental product declaration** for each eligible material proposed to be used in the public project...*

*The contractor will be **paid incentives/ disincentives** based on GWP savings relative to a **maximum acceptable GWP**.*

Task:

Put your State DOT hat on...
How would you develop this policy?
What questions do you have?

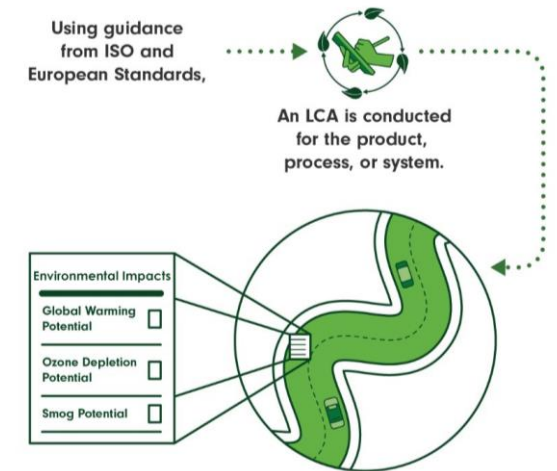
- Steel
- Glass
- Mineral wool
- Wood
- Concrete
- Cement
- Asphalt



6. Scenario-based Learning

Exercise: Identify the key information using provided EPDs

Question	EPD #1	EPD #2
What is the company for which the EPD is developed?		
What is their location (city and state)?		
What is the EPD publication date?		
When is EPD expiring?		
What is the type of mixture assessed in this EPD product?		
What is the application of this mixture?		
What is the PCR under which this EPD is produced?		
Who is the program operator for this EPD program?		



7. Experiential Learning NHI Course-131134

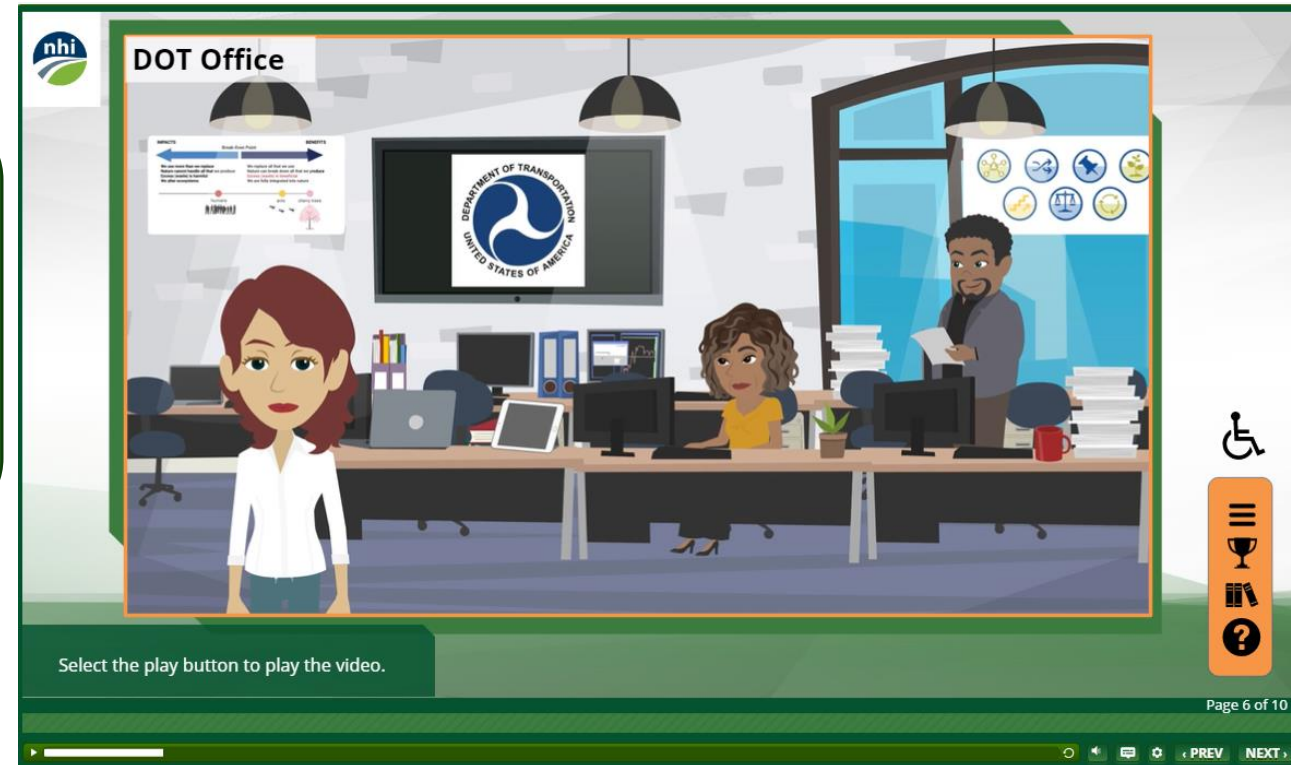
- Addresses the urgent need for sustainability education
- Leverages the existing SPP materials using:
 - Gamification
 - Micro-learning
 - Self-directed & experiential learning

I like that the course is interactive.

This lesson, as the course in general, went very well. I think the materials, course delivery, training environment, content and exercises were applicable to the intention of teaching how to identify why sustainability is important, why transportation matters and how to identify strategies to increase sustainability.

In general, I think the gamification is a welcome addition to NHI training materials. I found myself enjoying the training session more than traditional trainings, and motivated to complete the “game”. I think the leaf mechanism for rewards helps in the motivation to complete the training.

Excellent job.

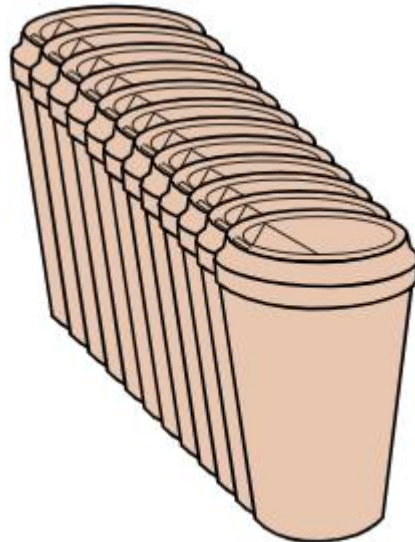


8. Practical Examples

Functional Unit in LCA

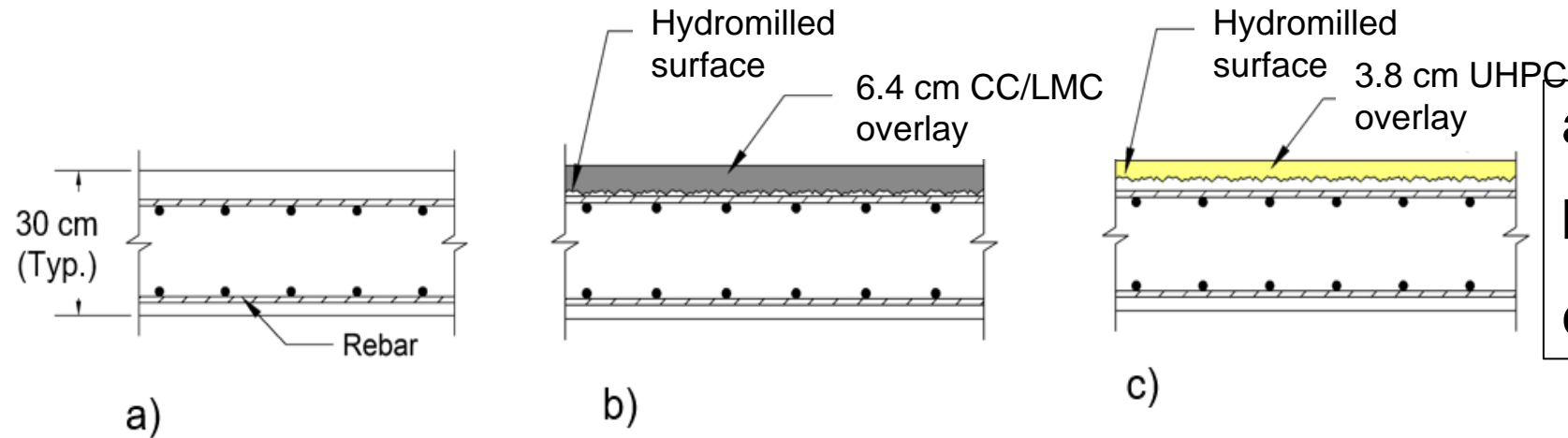


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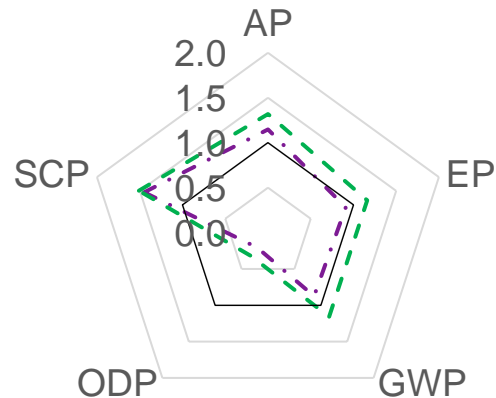
To make informed comparisons, products must have equal function.

8. Practical Examples

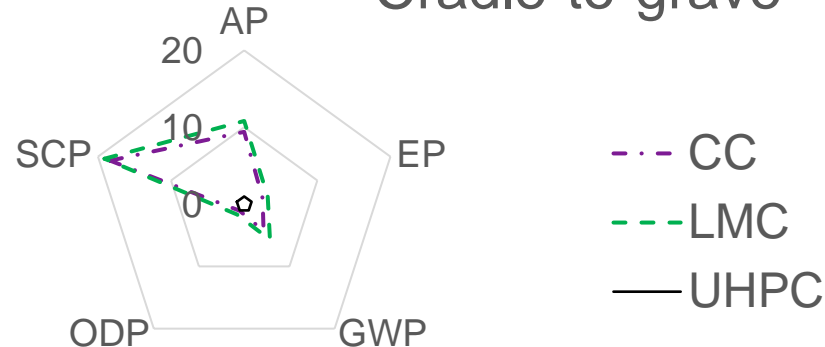


- a) pre-overlay
- b) CC or LMC overlay
- c) UHPC overlay

Cradle-to-built



Cradle-to-grave



Source: Rangelov et al. LCA of ultra-high performance concrete bridge deck overlays. In Pavement, Roadway, and Bridge Life Cycle Assessment 2020 2020 Jul 2 (pp. 61-71). CRC Press.

9. Interactive Tools

What do you know about EPDs?

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Not much.

Environmental Product Declarations

Bare bones awareness. General concept of how they are determined.

not enough about how they're developed

What questions do you have about EPDs?

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Who develops the EPDs and what data do they use?

how

How and where are the values calculated, small vs. big business ability to adapt, regional competition, QA/Verification of data by who?

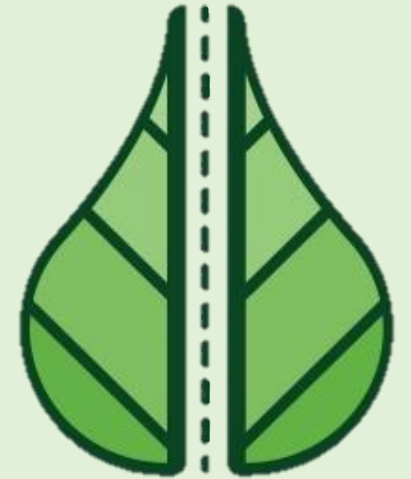
What concerns do you have about the use of EPDs?

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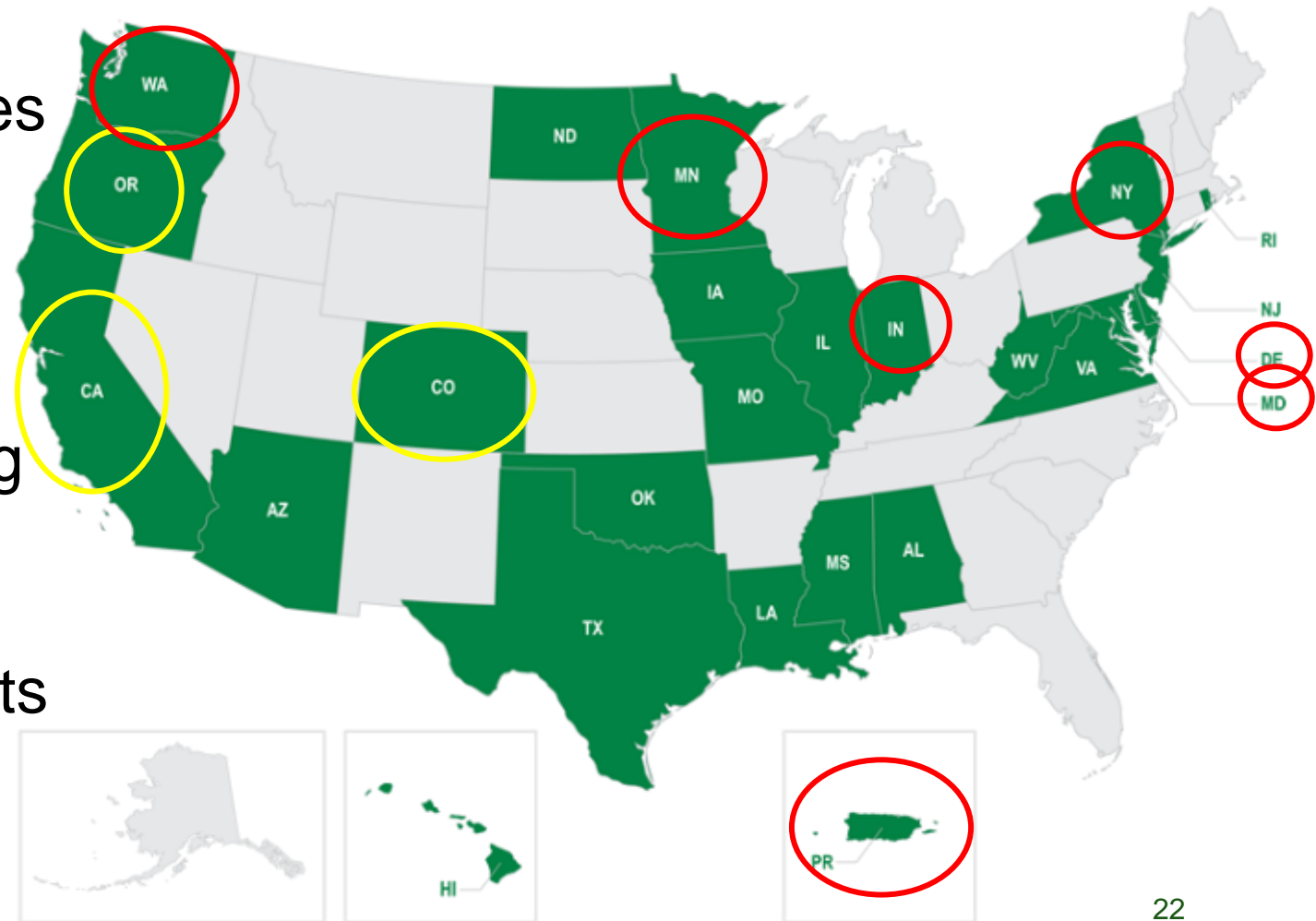
How do we know that the entities developing the EPDs are truly

Success Stories



Climate Challenge Participants

- 30+ proposals from 27 agencies (including 2 local agencies)
 - Education, implementation, benchmarking, fundamental research projects
- Providing technical and funding (\$7.1 million) assistance
- +7 DOTs are exploring Buy Clean Policy through its projects



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<http://www.fhwa.dot.gov/pavement/sustainability>

<https://www.fhwa.dot.gov/pavement/sustainability/epds/>