NEAUPG-2021
Turning Green to Gold

How Asphalt Industry Can Benefit from Upcoming Climate Regulations

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GHG at Project Level

- On-road vs Off-road
- 2012 MAP-21 mandates broad performance measures
- 2014 FHWA released Infrastructure Carbon Estimator (ICE)
  - Upstream (material production)
  - Construction (material transport, construction equipment, and maintenance)
  - Emission models developed in WA, UT, CO, VT, MA, and MD
- 2016 CEQ issued final guide for project-level GHG emissions
- 2016 FHWA proposed the inclusion of GHG measures in new construction and issued the rule in Jan 2017
- 2018 FHWA repealed the GHG rule after a formal public-notice-and-comment rulemaking process

Biden's Climate Policy

- The White House on April 23, 2021 "Enhancing climate ambition and enabling the transformations required to **reach net-zero emissions by 2050**
  - "**achieve net-zero emissions, economy-wide, by no later than 2050**." https://joebiden.com/clean-energy/
- The White House on April 23, 2021: **achieve 50-52% reduction goal in U.S. GHG emissions from 2005 levels by 2030!**
- HB 3684 Infrastructure Investment and Jobs Act
  - **"A State… shall develop a carbon reduction strategy … [that] shall … (D) at the discretion of the State, quantify the total carbon emissions from the production, transport, and use of materials used in the construction of transportation facilities within the State"**

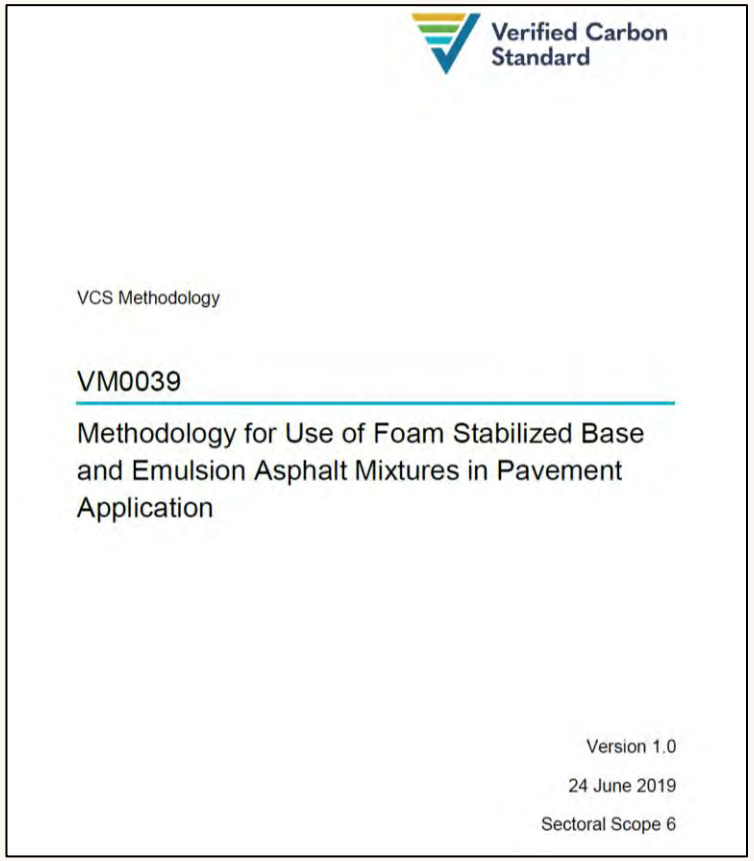
The Time is Now!

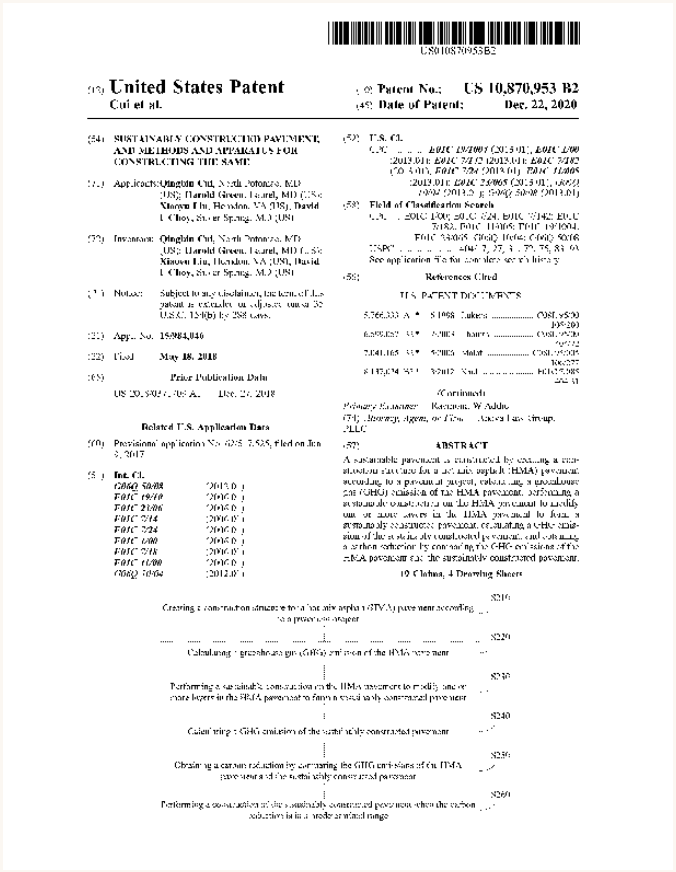
What Does It Mean for the Pavement Industry?

- GHG emissions included in NEPA
- State DOT includes GHG emissions as a performance measure
- Contractors must meet emission goals in projects determined by State DOTs
- Adoption of low-carbon materials, equipment, and construction methods
- Compliance requirements and increased cost

- AND… we are doing good to the environment

Our Approach: Transforming Environmental Liability to Economic Asset and Revenue



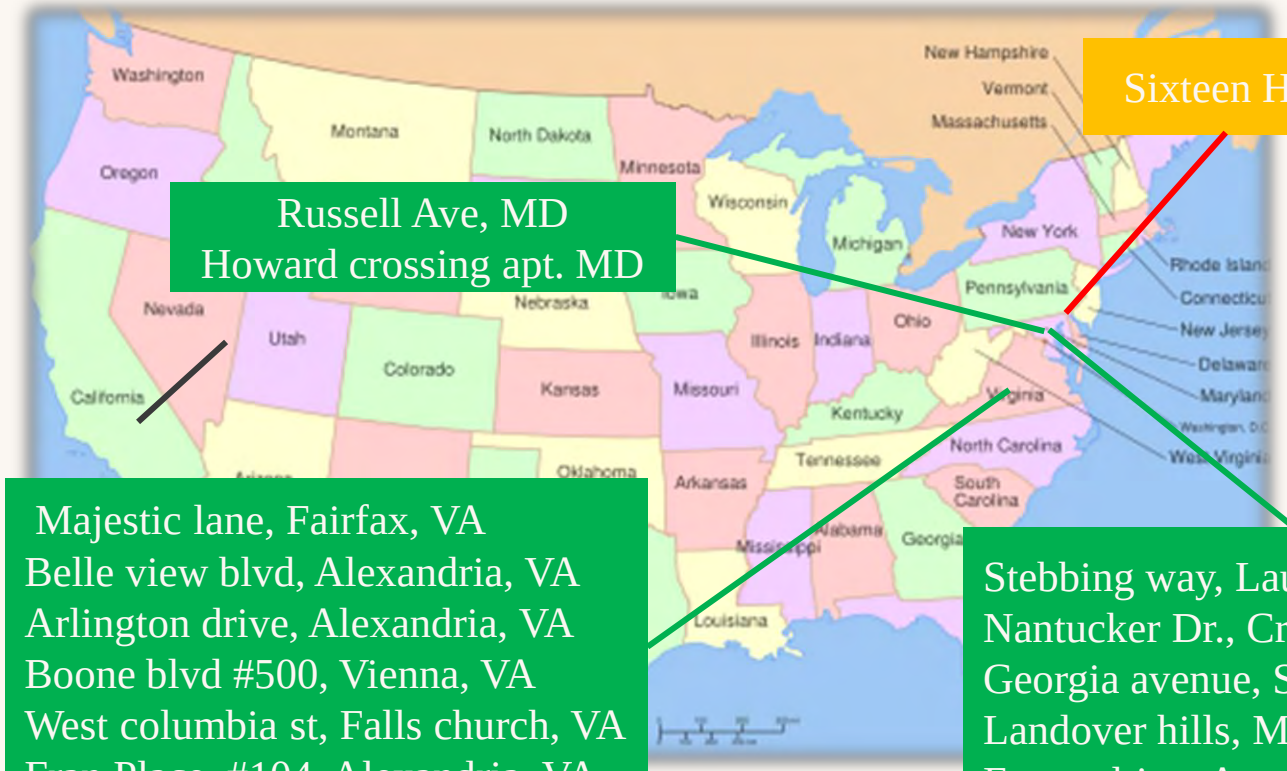


Our methodology was approved in 2019 and can be found on the Verra/VCS website:

https://verra.org/methodology/vm0039-methodology-for-us-of-fsb-in-pavement-application-v1-0/

Our team worked from 2013 – 2019 to get this methodology approved

Emission Data Collection



Sixteen HMA Plants

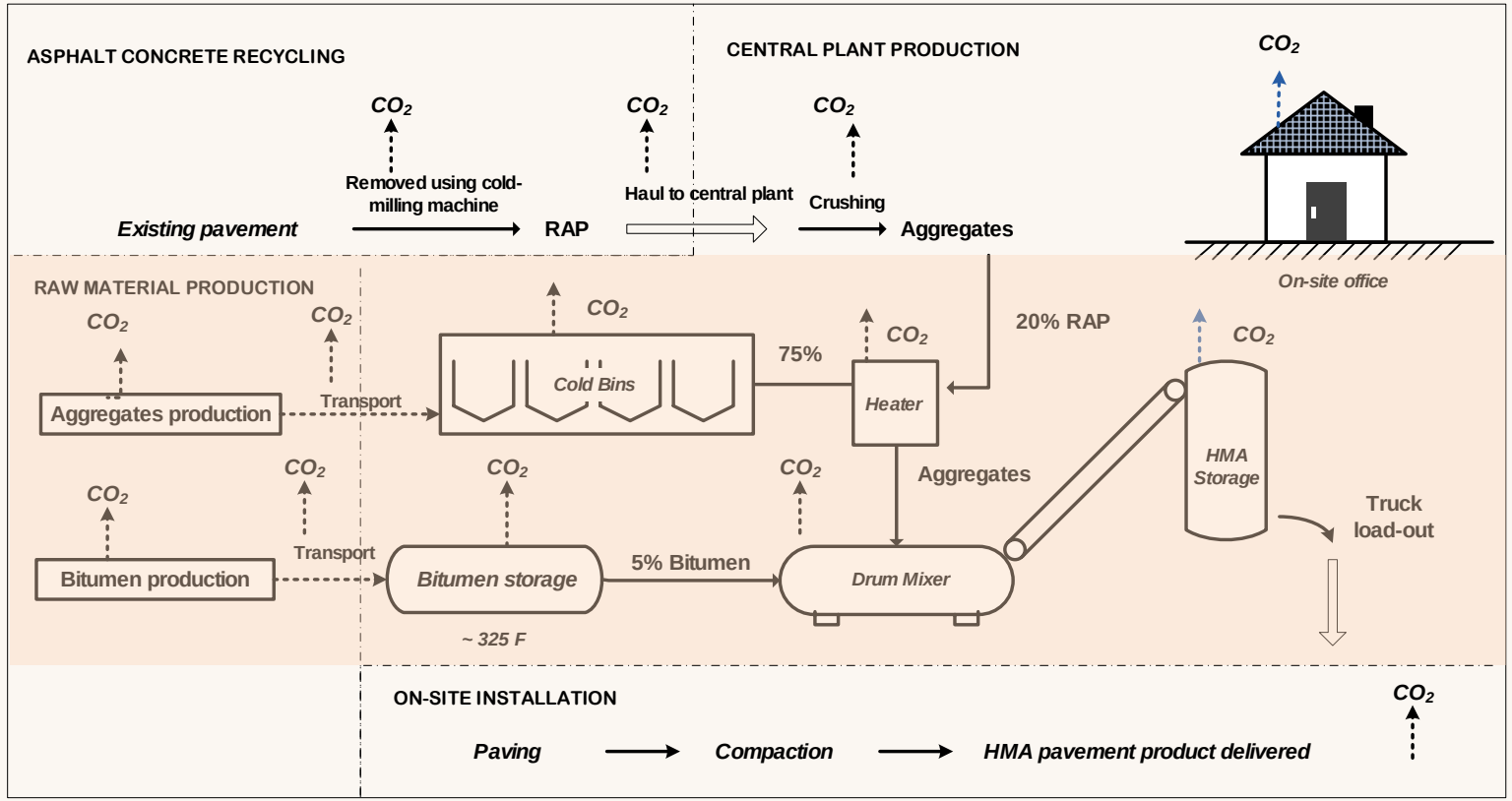
Russell Ave, MD
Howard crossing apt. MD

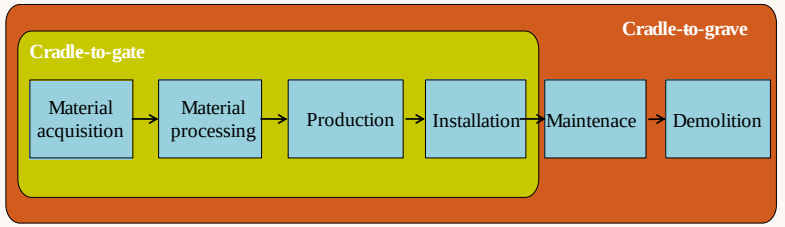
Majestic lane, Fairfax, VA
Belle view blvd, Alexandria, VA
Arlington drive, Alexandria, VA
Boone blvd #500, Vienna, VA
West columbia st, Falls church, VA
Fran Place, #104, Alexandria, VA

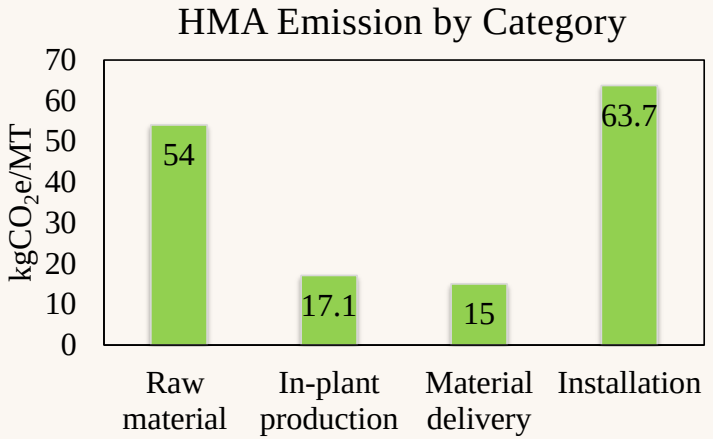
Stebbing way, Laurel MD
Nantucker Dr., Crofton, MD
Georgia avenue, Sliver spring, MD
Landover hills, MD
Forest drive, Annapolis, MD
Gaither road, Gaithersburg, MD
Prince Phillp Dr., Olney, MD

Facility data | Project data

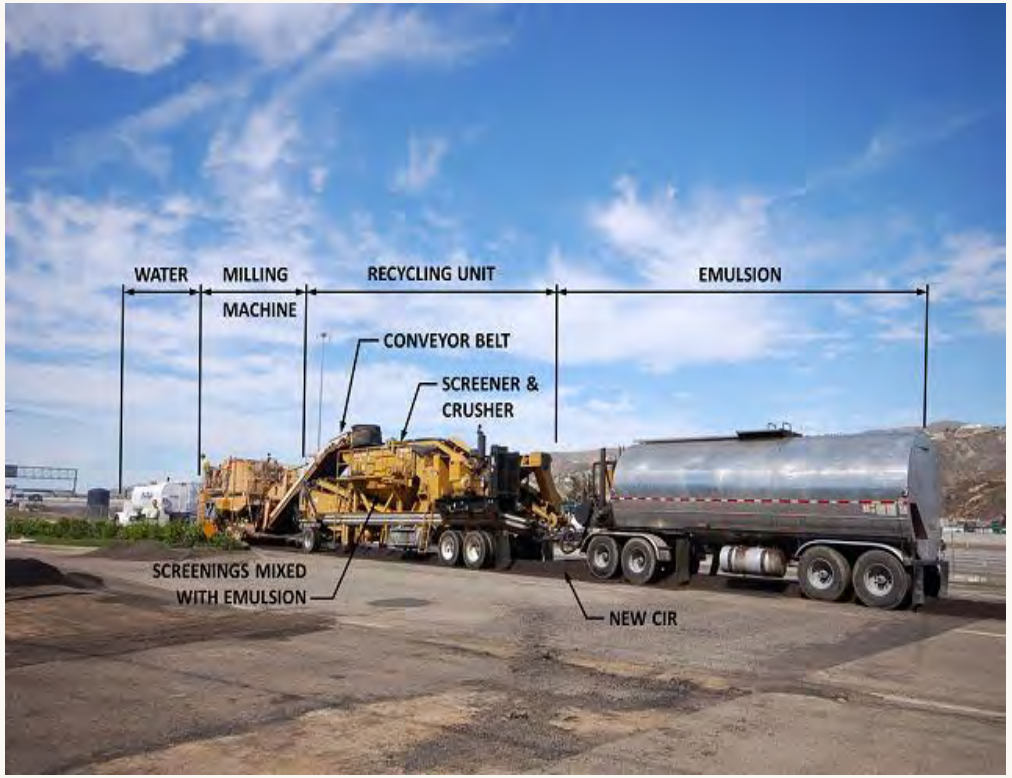
HMA Emission Sources







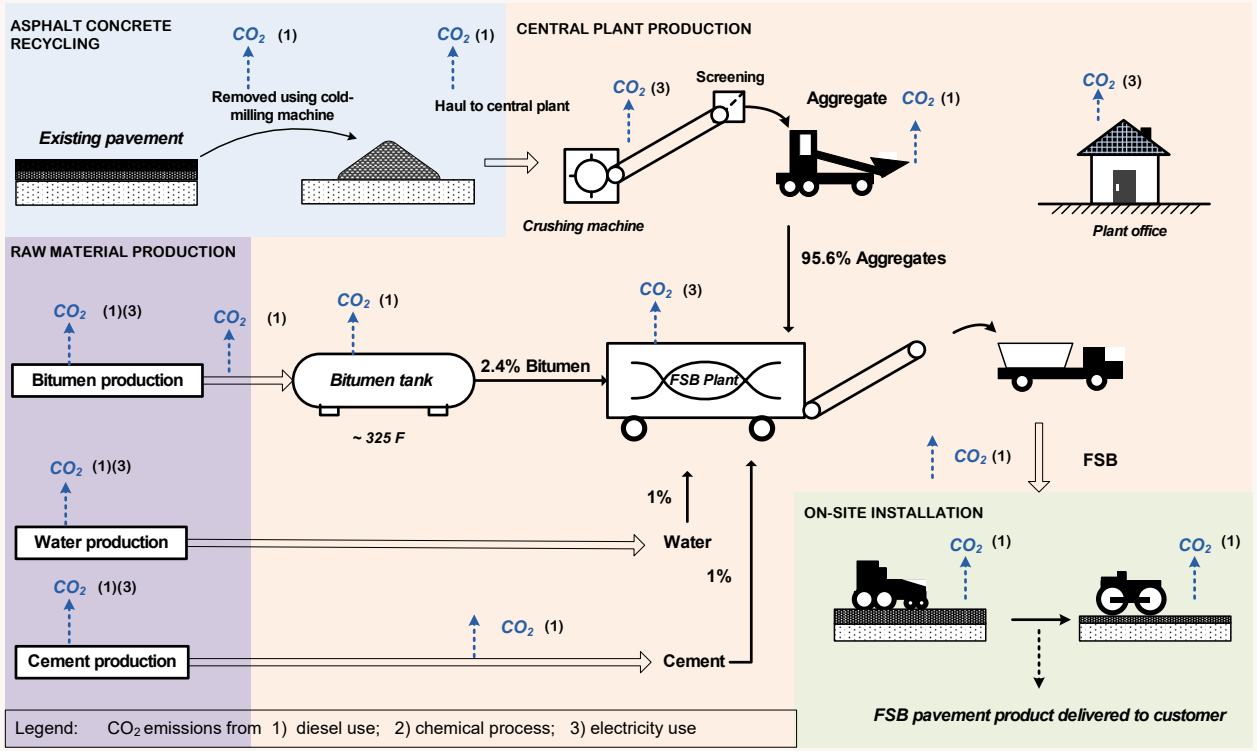
Cold Recycling Methods

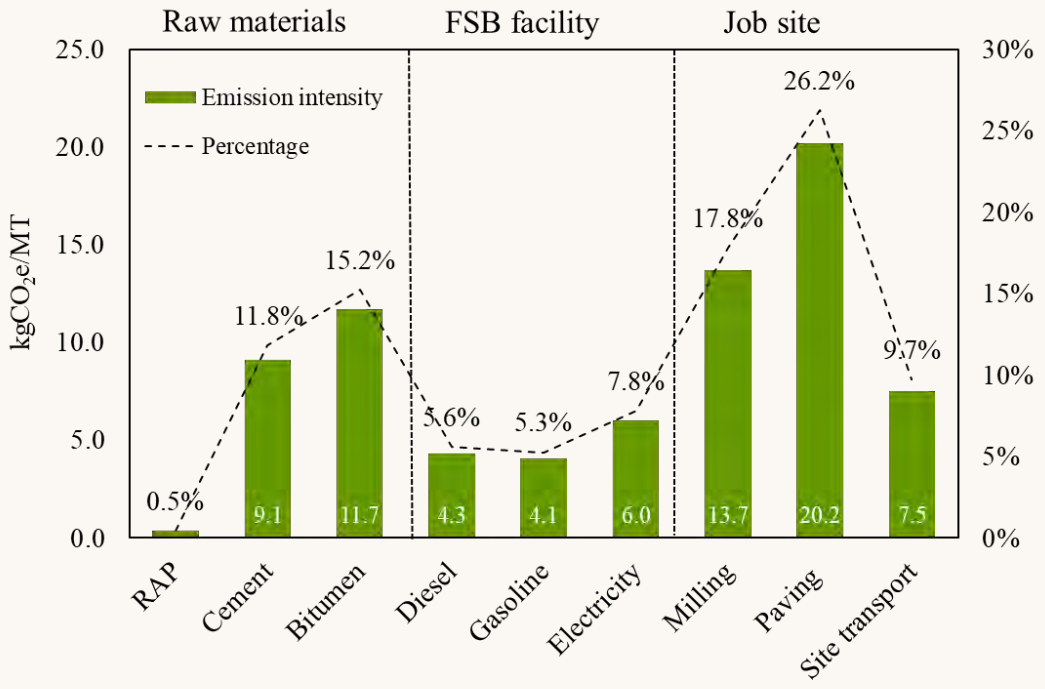


CIR – Pulverize existing HMA and some of the base materials to make a mix using stabilizing agent. Recycling train does it in-place

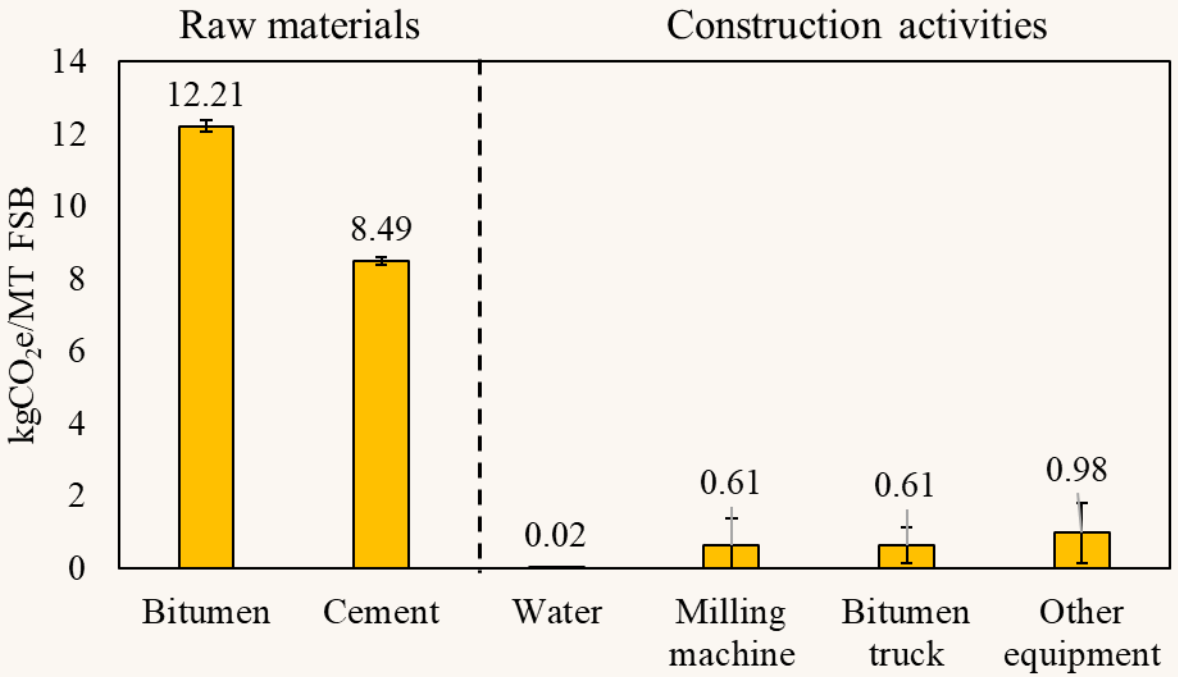
CCPRM – Use the stockpiled RAP and stabilizing agent to produce mix at ambient temperature and deliver to the site for laydown

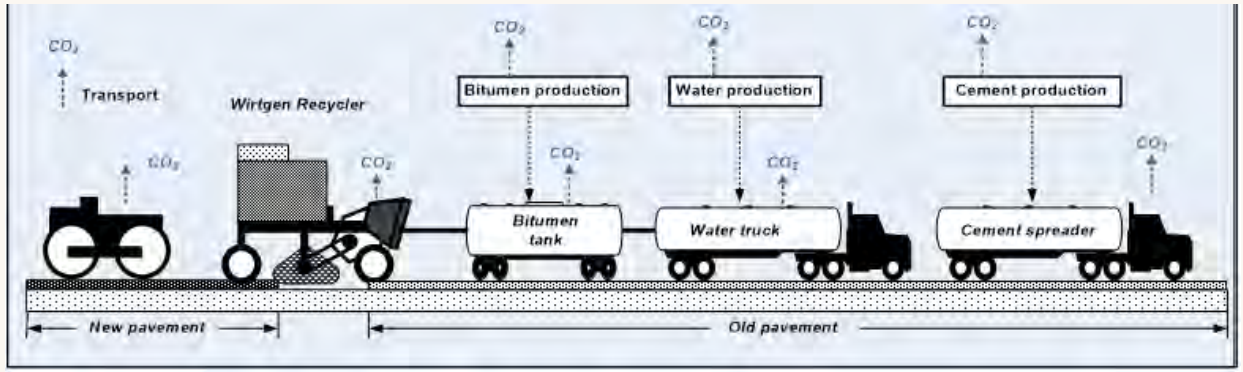
CCPR Emissions



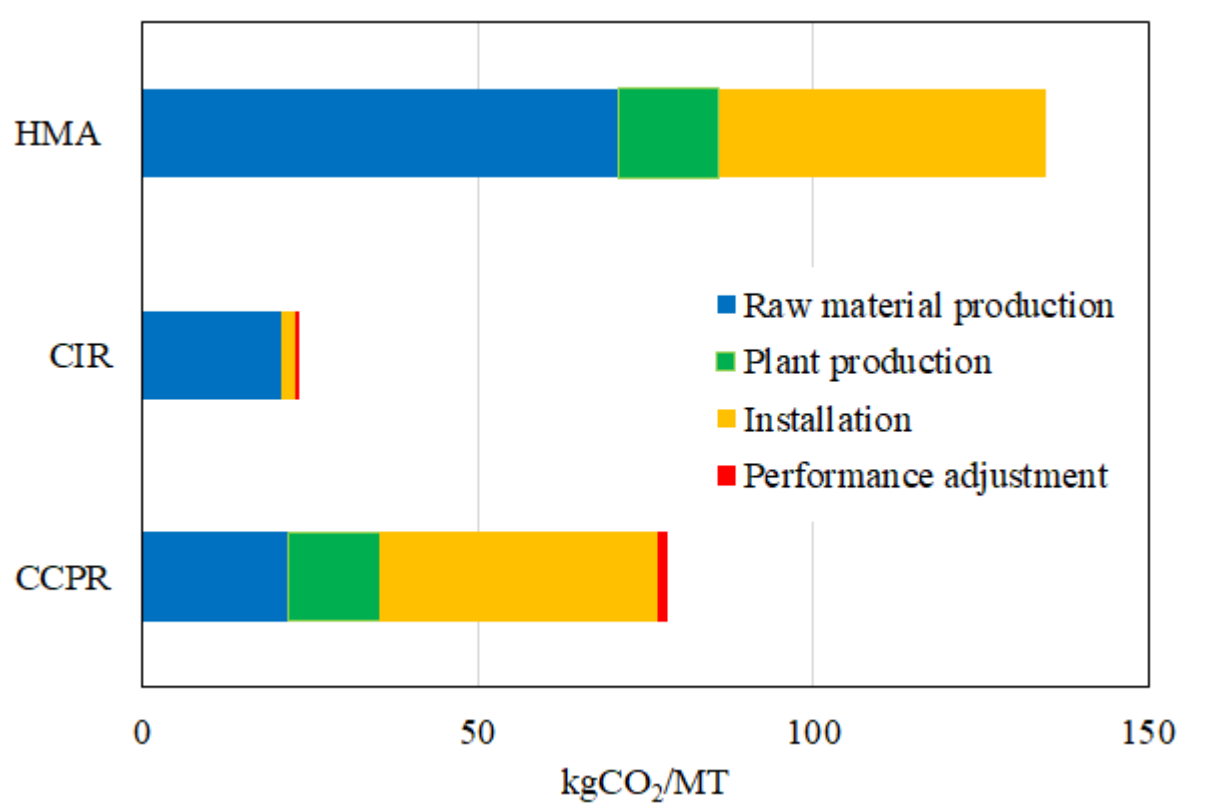


CIR Emissions

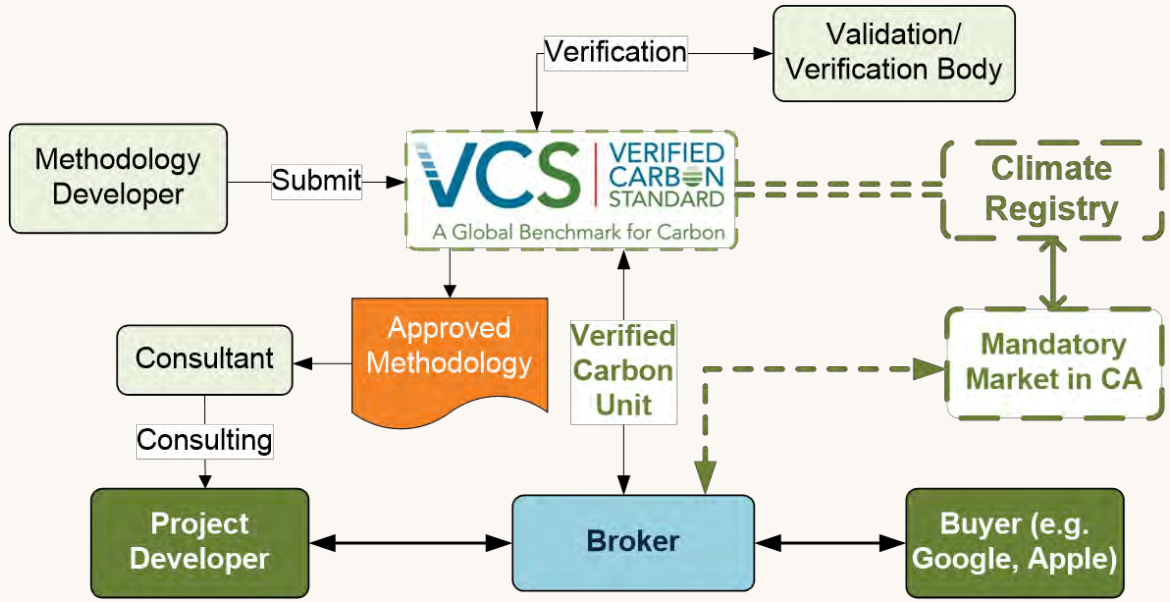




Turning Green to Gold



1 ton CO_2 Reduction = 1 VCU



Pave Next Example: HMA+CTB vs CCPRM+FDR

Conventional Design Area sans Removal of Existing Material

I-64

Design A: Conventional

Default Design Mix Plant Distance: 32.7 miles

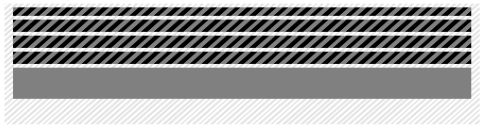
Total impact: 51,820 tons CO_2

Areas

Travel Lane and Shoulders

506,739.2 yd^2

Roadway



2 in HMA (3548), SN 0.88
2.5 in HMA (3550), SN 1.1
3 in HMA (3552), SN 1.2
3 in HMA (3552), SN 1.2
8 in CRB, SN 1.6

New Layer

Thickness: 18.5 in
Impact: 51,820 tons CO_2
Structural Number: 5.98
Green Mix: No

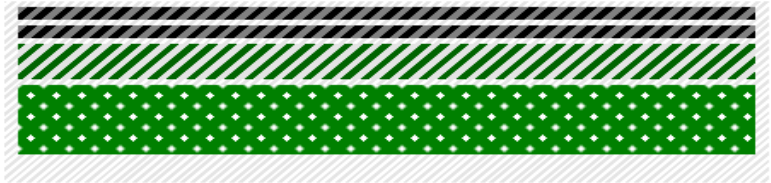
Green Design Example Area (1/4)

Reconstructed Travel Lanes (CCPRM and FDR)

199,372.8 yd^2

Roadway

Total Impact: 41,177 tons CO2



2 in HMA (3566), SN 0.88
2 in HMA (3564), SN 0.88
6 in FSB (3568), SN 1.92
12 in FDR, SN 2.4

New Layer

Thickness: 22 in
Impact: 12,629 tons CO_2
Structural Number: 6.08
Green Mix: Yes

Case Study:

Traditional Design

- 51,820 tons CO_2+ 3,200 tons CO_2 for removal of exiting material

Sustainable Design

- 41,177 tons CO_2

How much does University of Maryland pay for reducing their CO_2 footprint?

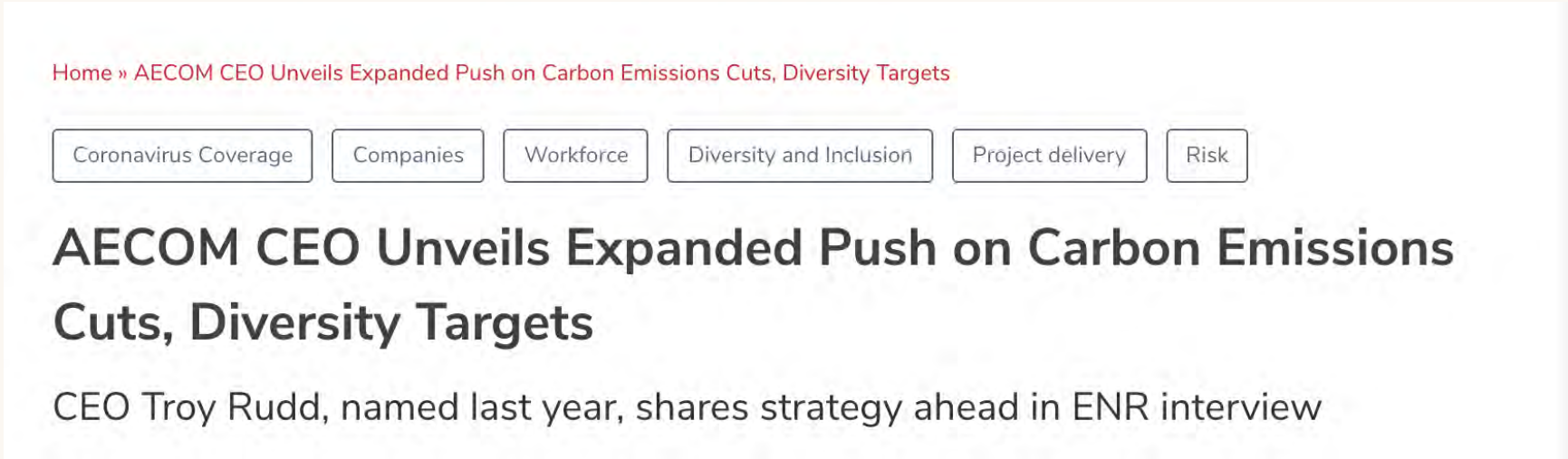
- *Pays \$10/t CO_2 for reduction from international projects*
- *Pay up to \$15/t CO_2 for reductions from in-state projects*
- *60,000 t CO_2 / this year goal*
- *150,000 t CO_2 by 2025 to achieve net-zero*

Savings and Payback for Sustainable Design

- 13,843 t CO_2
- \$138,430 at \$10/t CO_2
- \$207,645 at \$15/t CO_2
- *\$692,150 at \$50/t CO_2*

UMD Climate Action Plan – and beyond

- 50% reduction by 2020 (from 2005 levels), carbon neutral by 2025
- 100,000 MTCO2e purchased to offset air travel (50%), commuting (30%), and others
  - UMD air travel inventory: 1.5 MMTCO2e
- All carbon offsets are from international sources and cost at $3 – 10.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AECOM CEO Unveils Expanded Push on Carbon Emissions Cuts, Diversity Targets

CEO Troy Rudd, named last year, shares strategy ahead in ENR interview

Thank You

Backup Slides

Credit Ownership Determination

- Criteria:
  - Project ownership vs emission controllability
  - Emissions from operation vs from construction
- Environmental Social Governance (ESG) reporting liabilities
  - Scope 1, 2, and 3
- Contract and facility acceptance
- VCU application burden

Graphic by Stacy Smedley, 2021

Understanding Scope 1, 2 and 3 Emissions

Scope 1

Direct (Owned) Emissions

ONSITE facility emissions

direct combustion

OWNED equipment emissions

company owned vehicles/equipment

Scope 2

Indirect (Purchased) Emissions

PURCHASED facility energy

for electricity, heating/cooling, steam

Scope 3

Other Indirect (Purchased) Emissions

EMPLOYEE emissions

travel, commuting

LEASED ASSETS emissions

operations of leased assets

SUPPLY CHAIN emissions

material extraction/production, purchased goods/services, sold goods/services, material waste

For Any Project These are the Types of Data and Parameters Needed

- Weight of each raw material used to produce HMA or FSB or asphalt emulsions (kg)
- Total miles that trucks travelled to supply raw materials to HMA plant or FSB plant
- Total miles that trucks travelled to supply raw materials to the job site
- Total miles that trucks travelled to supply products to the job site
- Electricity consumption of the whole plant (kWh)

- Output quantity of FSB and asphalt emulsions (t)
- Total operating hours of on-site use of equipment
- Total labor hours of on-site use of equipment
- Density of FSB or asphalt emulsions (lbs/cubic ft)
- Layer coefficient of FSB or asphalt emulsions
- Length of damaged pavement (miles)
- Running speed of cold recycler (mph)