

FHWA Climate Challenge Program

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Asphalt Expo

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FHWA Climate Challenge

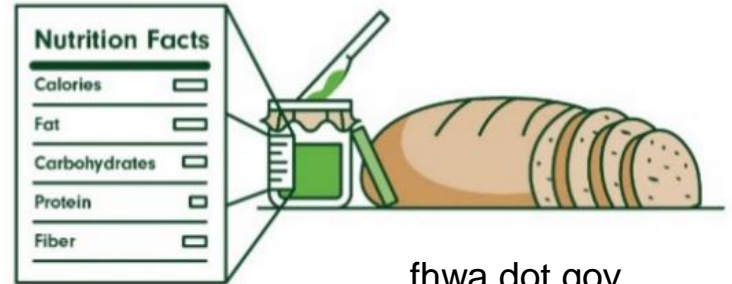
Quantifying Emissions of Sustainable Pavements

- \$7.1 million grant program to state agencies
 - Collaborate with industry and academia
- Eligible activities
 - Explore use of LCA and EPDs as a standard practice to inform pavement materials and design
 - Enhance sustainable pavement practices
 - Quantify emissions and impacts of those practices



Benefits

- Information
 - Allow consumer to make informed decisions
- Comparisons
 - Allow analysis of different processes
- Improvement
 - Identify areas for improvement and encourage efficiencies



VDOT Climate Challenge Project

Quantifying Greener Pavements in Virginia

Objectives:

- 1) Educate VDOT on EPDs and LCA practices
- 2) Collect production and construction data to quantify impacts
 - Asphalt, concrete, and aggregate industries



Climate Challenge Project Tasks

- 1) Roadmap
 - What do we know now
 - Short-term actions?
- 2) Develop and deliver initial training
 - By FHWA (March 2024)
- 3) Conduct LCA case studies and develop EPD-type data
- 4) Develop information to quantify impacts of paving practices
 - AASHTO standard?
- 5) Concluding symposium



EPD Examples

- **Aggregates**

- <https://transparencycatalog.com/company/martin-marietta>
- https://www.nrmca.org/wp-content/uploads/2019/10/Graniterock_EPD2018-07-03.pdf

- **Concrete**

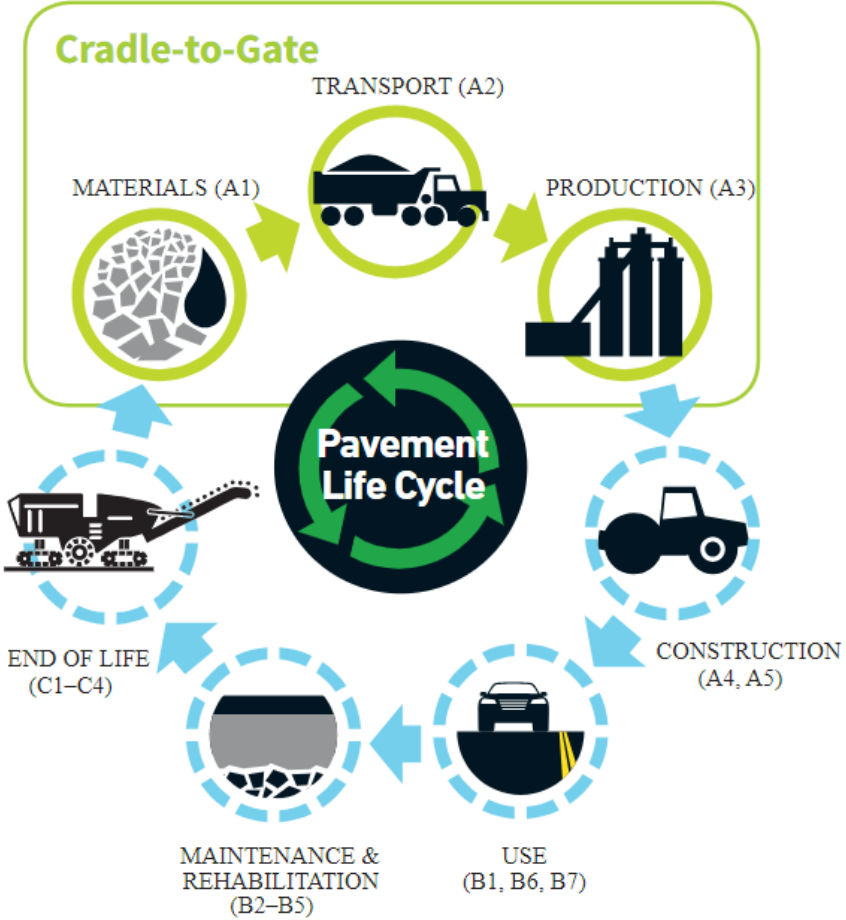
- <https://www.nrmca.org/association-resources/sustainability/environmental-product-declarations/>

- **Asphalt**

- <https://asphaltepdp.org/published/>



EPD Info

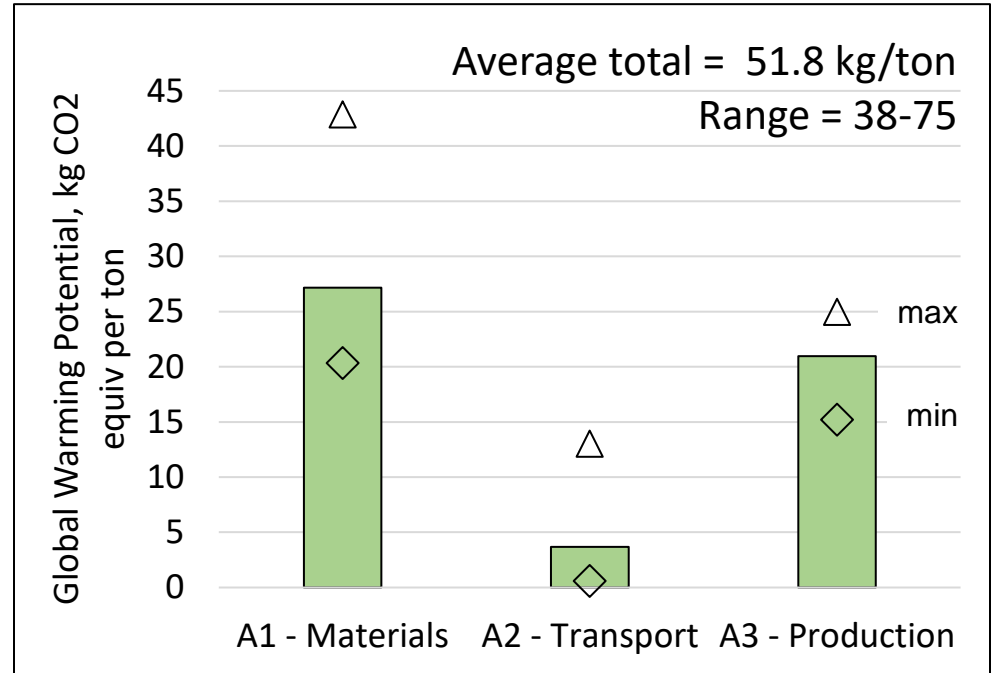


Product	Industry Averages	Virginia Product Specific Data
Aggregates	Yes	
Cement	Yes	Some
Asphalt Binder	Yes	
Concrete	Yes	3 plants, many mixtures
Asphalt Mixtures	Yes	7 plants, 45 mixtures

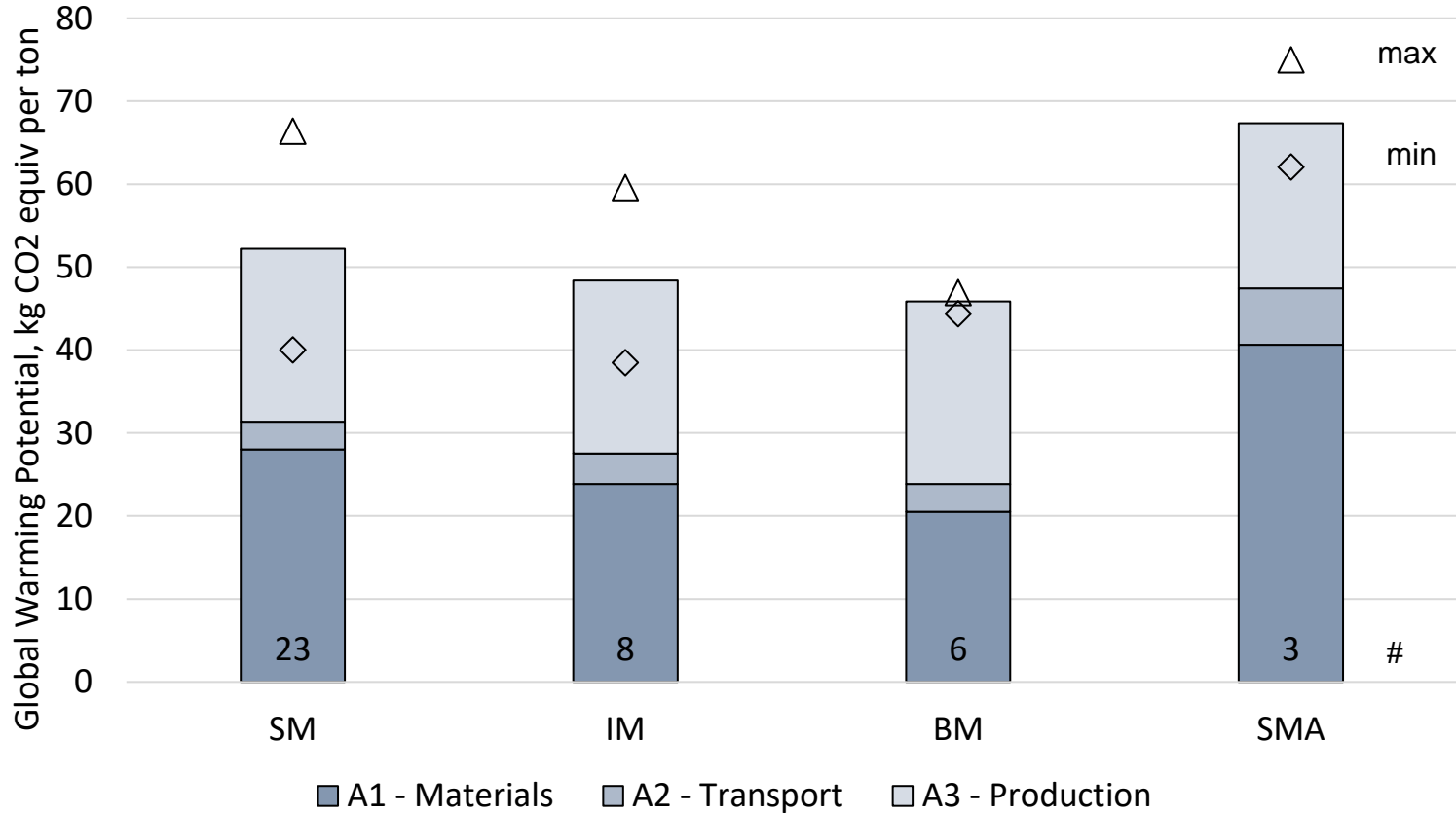


Current Activities – Asphalt Mixture EPD Data

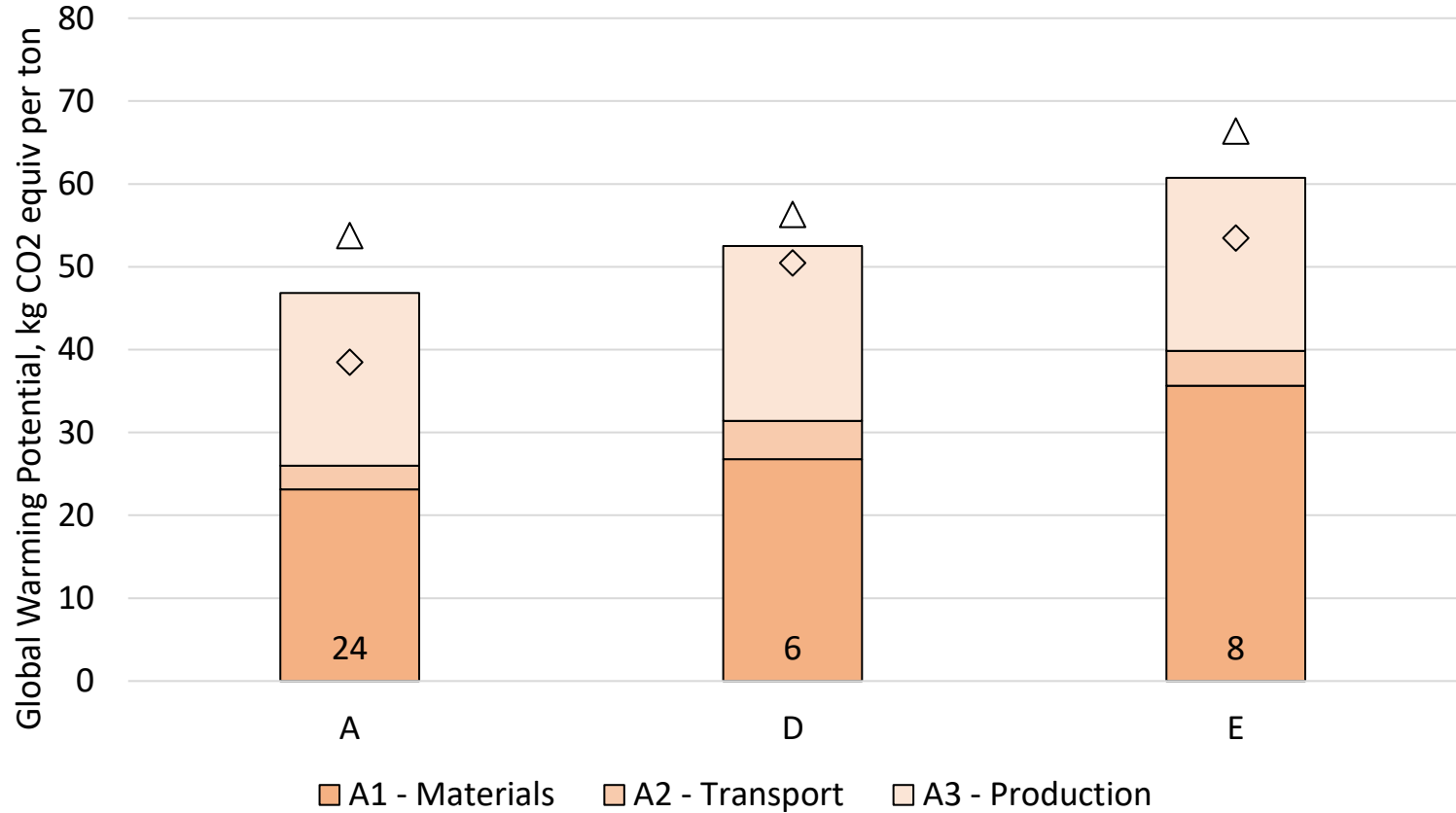
- Data source
 - 45 Virginia Mixtures
 - SM, IM, BM, SMA
 - 9.5, 12.5, 19, 25
 - RAP from 0-30%
- Outputs (GWP, kg/ton)
 - A1 = Materials
 - A2 = Transport
 - A3 = Production
 - Total



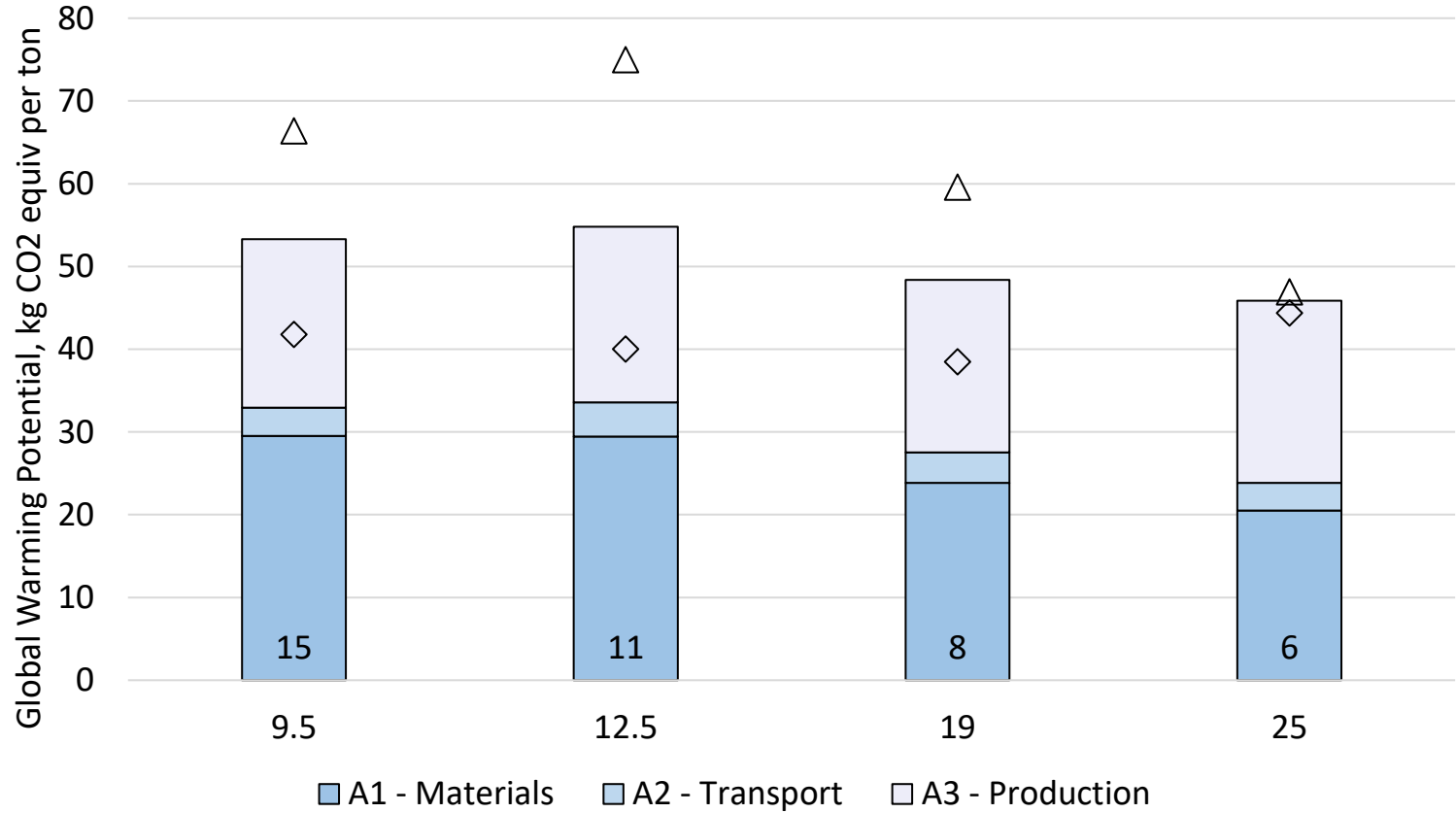
Mix Type



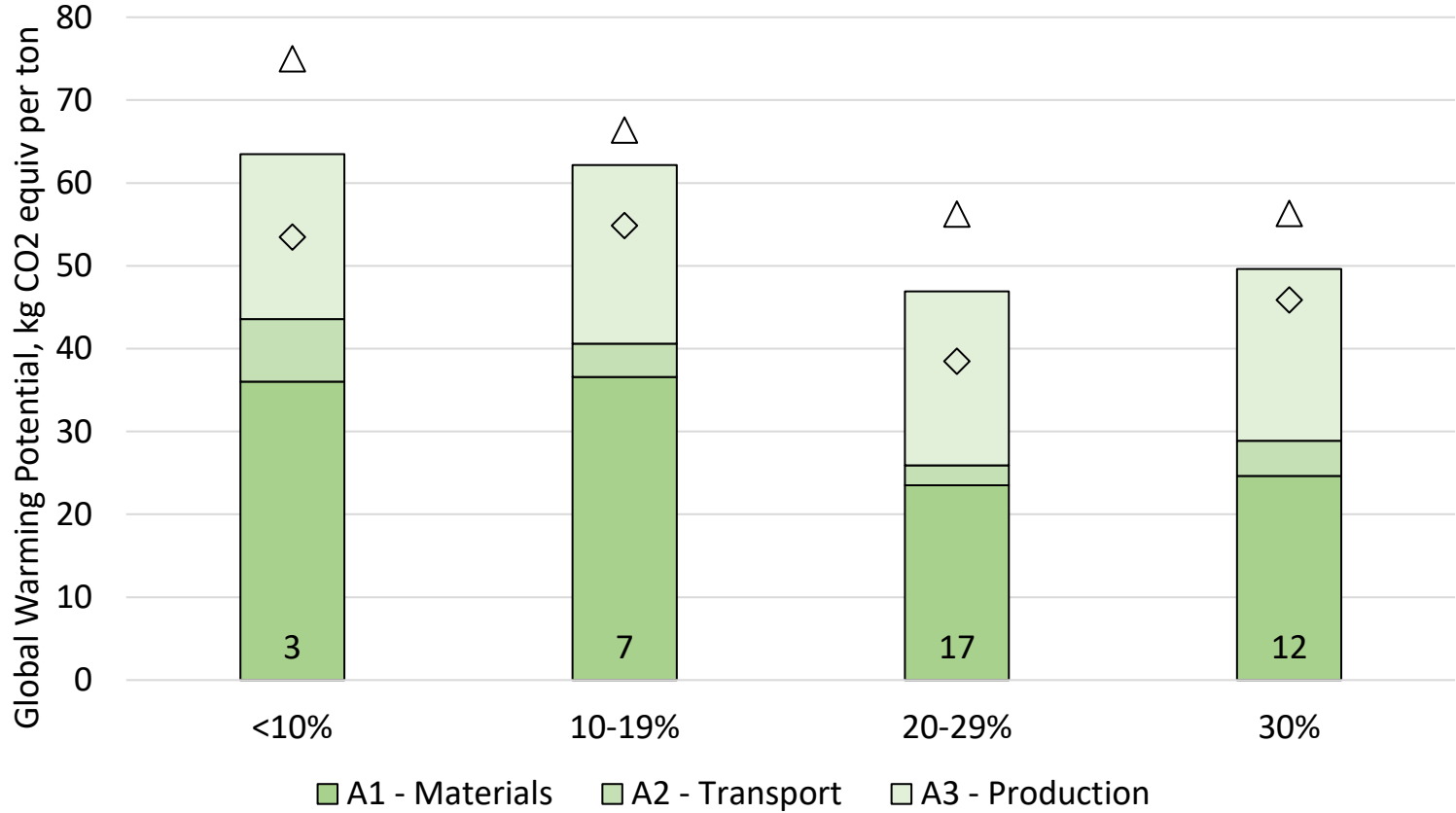
Binder Type



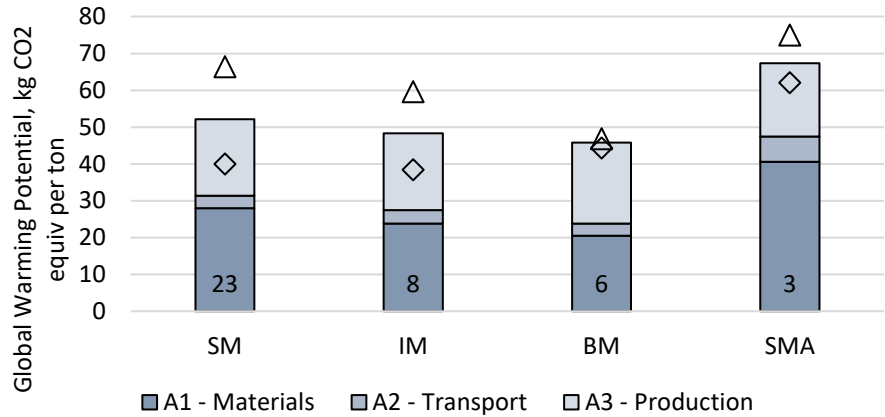
NMAS



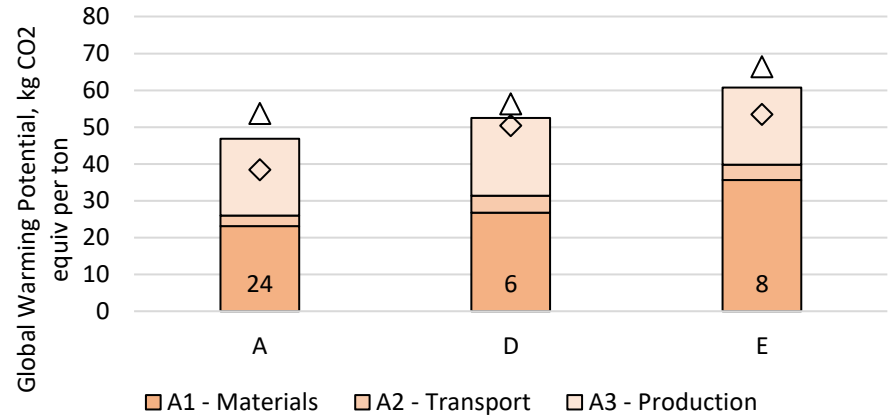
RAP Content



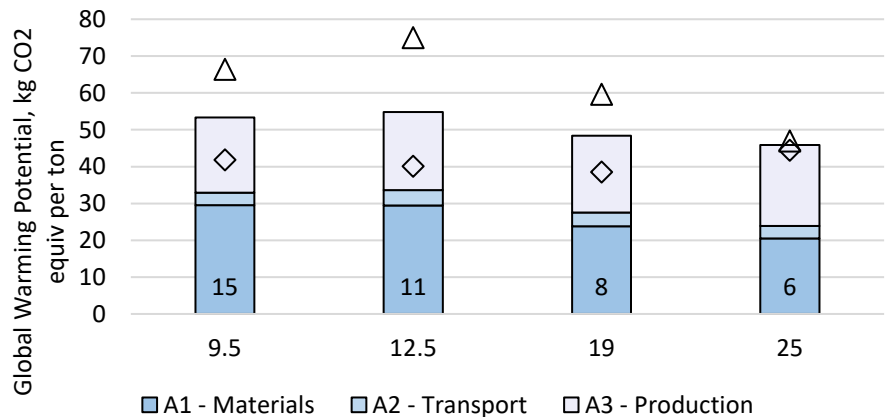
Mix Type



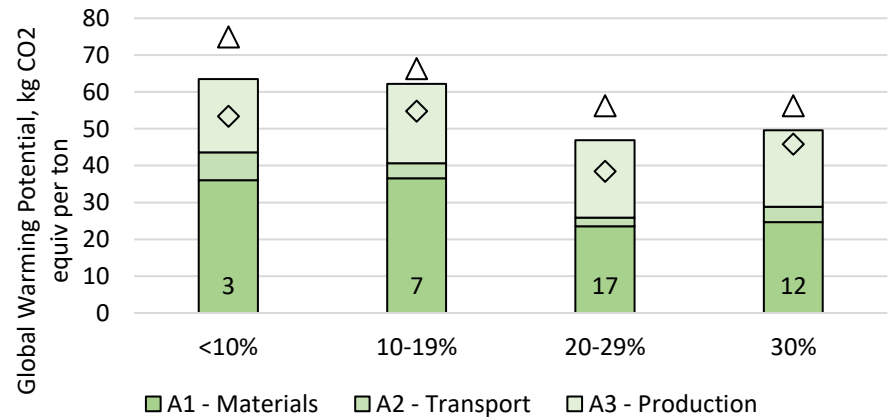
Binder Type



NMAS



RAP Content



Current Activities – Case Studies

- Full-depth reclamation
 - Conventional and paver-laid
- Concrete pavement
 - North Carolina, jointed concrete and roller compacted
- Asphalt
 - Conventional mixes
 - High RAP contents
 - Recycling agents
 - High polymer contents
 - Warm mix at reduced plant temperatures
- Inverted pavement*
 - *By FHWA



Asphalt Case Studies – Data Collection

- Mix
 - Type
 - RAP content
 - Binder type and content
- Plant
 - Tons produced
 - Production temperature
 - Total fuel used
 - Agg/RAP moisture content
- Transport
 - Haul distance
 - # of trucks
 - Total fuel used
- Production
 - Distance paved
 - Fuel used for each piece of equipment



Case Studies – Preliminary Data

- CCF per ton
 - 0.19-1.23
- Gallons diesel per ton
 - All equipment
 - 0.37-0.53
- Conversion
 - 5.5 kg CO₂eq per CCF
 - 10.2 kg CO₂eq per gal diesel
- GWP, kg CO₂eq per ton
 - Total = 5.6-12.2



Next Steps

- Help us identify construction projects for data collection
 - One day of production is great
 - Multiple days will allow us to quantify variability
- More info to come





We bring innovation to transportation.

Thank you!

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