

AAPA's 14th International Flexible Pavements Conference

Sydney
25–28 September 2011

Topic: SUSTAINABILITY BENEFITS
TO THE COMMUNITY BROUGHT BY
ASPHALT PAVEMENT TECHNOLOGIES

PRESENTER: David Newcomb

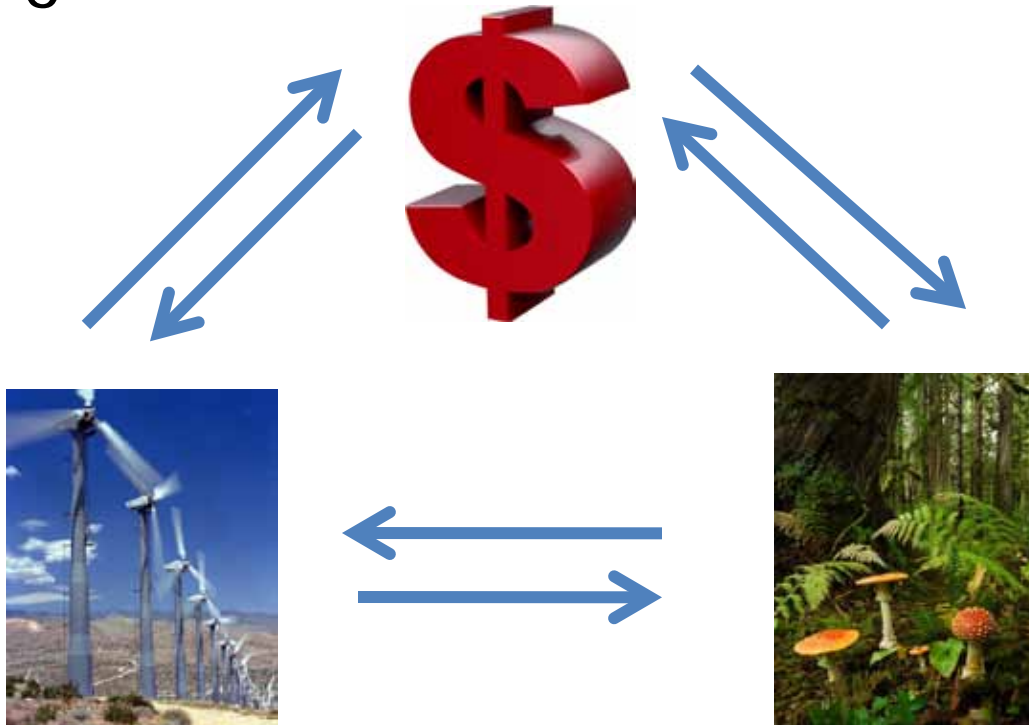
Position: Senior Research Scientist

Organisation: Texas Transportation Institute

(Formerly: VP, Research & Technology, NAPA)

It's All About . . .

- Saving Money!
- Saving Energy!
- Saving the Environment!



NAPA Strategic Plan

- Legislation
- Warm Mix
- RAP and RAS
- Thin Overlays
- Life Cycle Costs
- Perpetual Pavements
- Sustainability



Saving Money

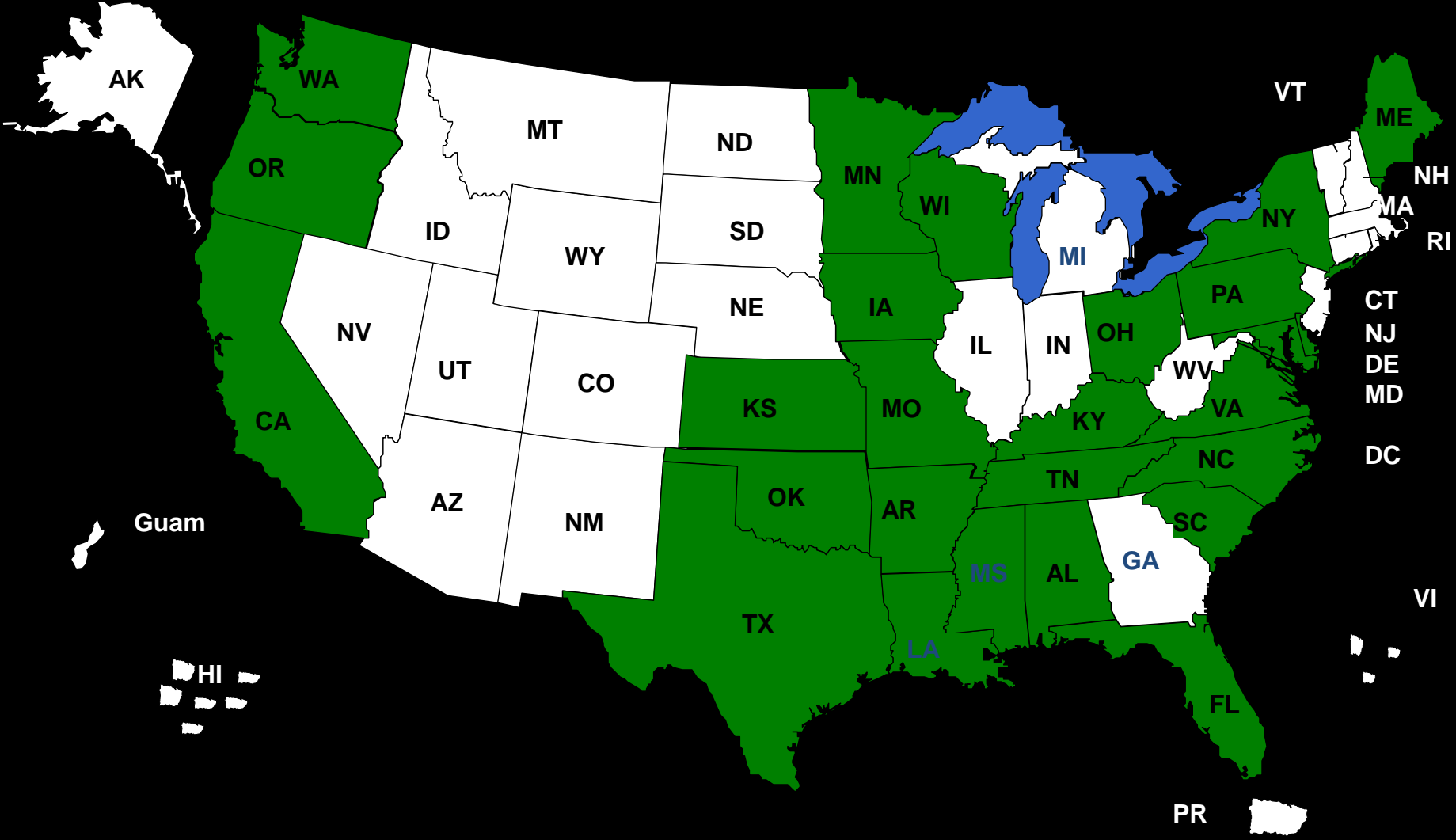
- Legislative Work
- Concrete vs. Asphalt
- RAP/RAS
- Perpetual Pavements
- 101 Ways to Save Money
- Plant Energy Audit
- Energy and Warm Mix Conferences
- Best Practices Conferences
- Thin Overlays



Warm Mix Asphalt

The Future of Flexible Pavements

States that have or will have Permissive WMA Specifications

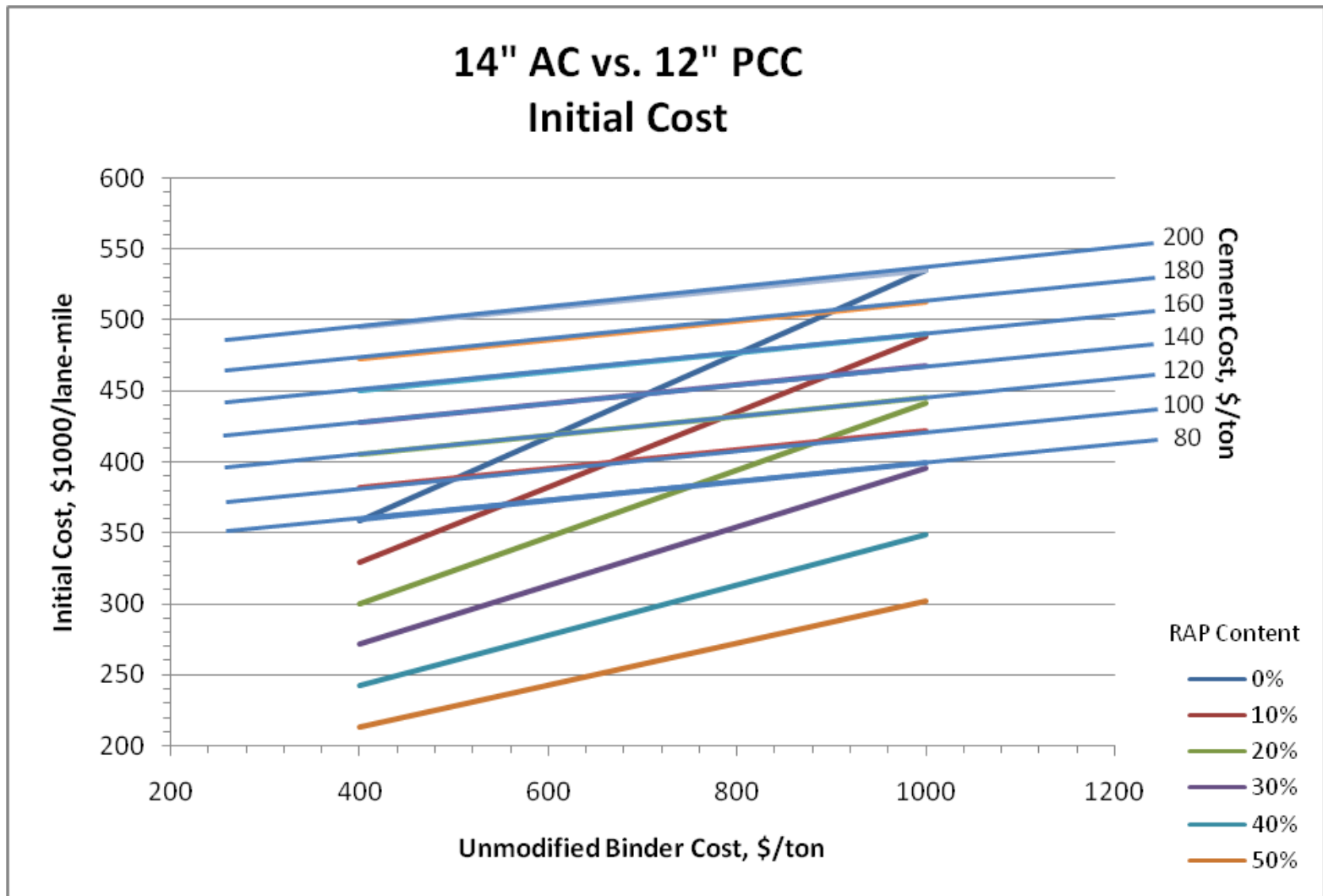


WMA Survey

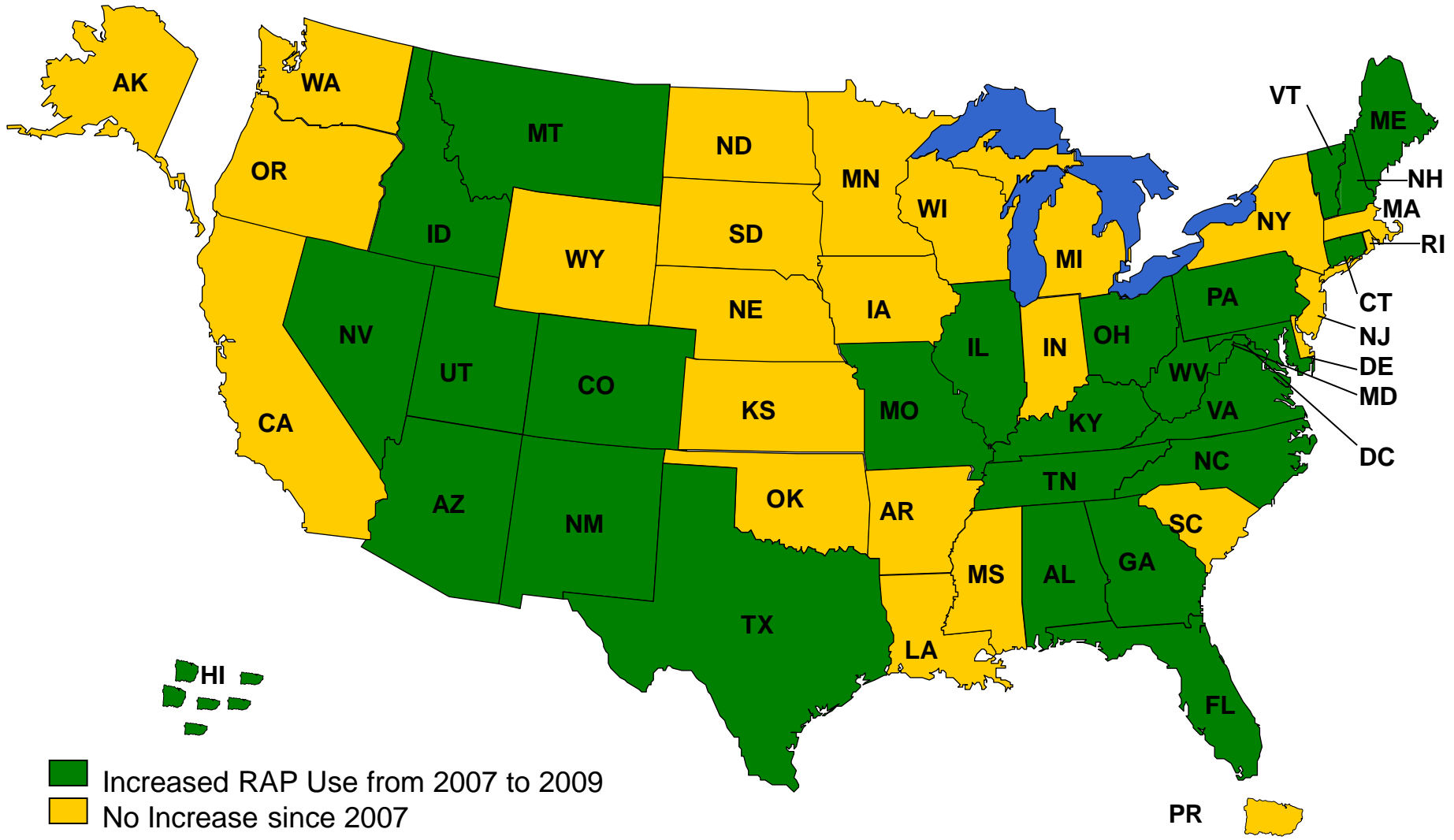
- 2009 – 13 million tons
- 2010 – 47 million tons

Initial Cost

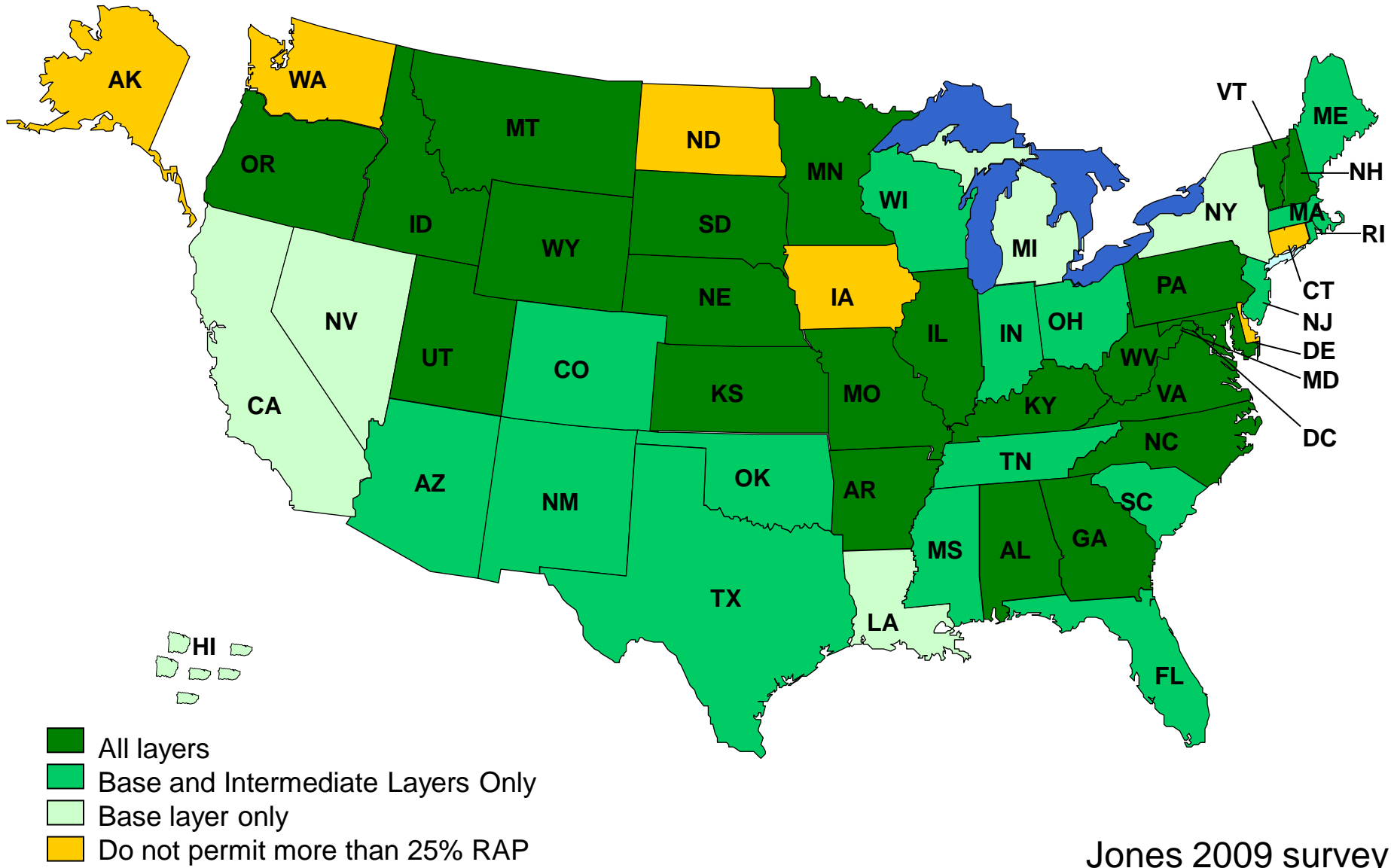
The Beauty of RAP!



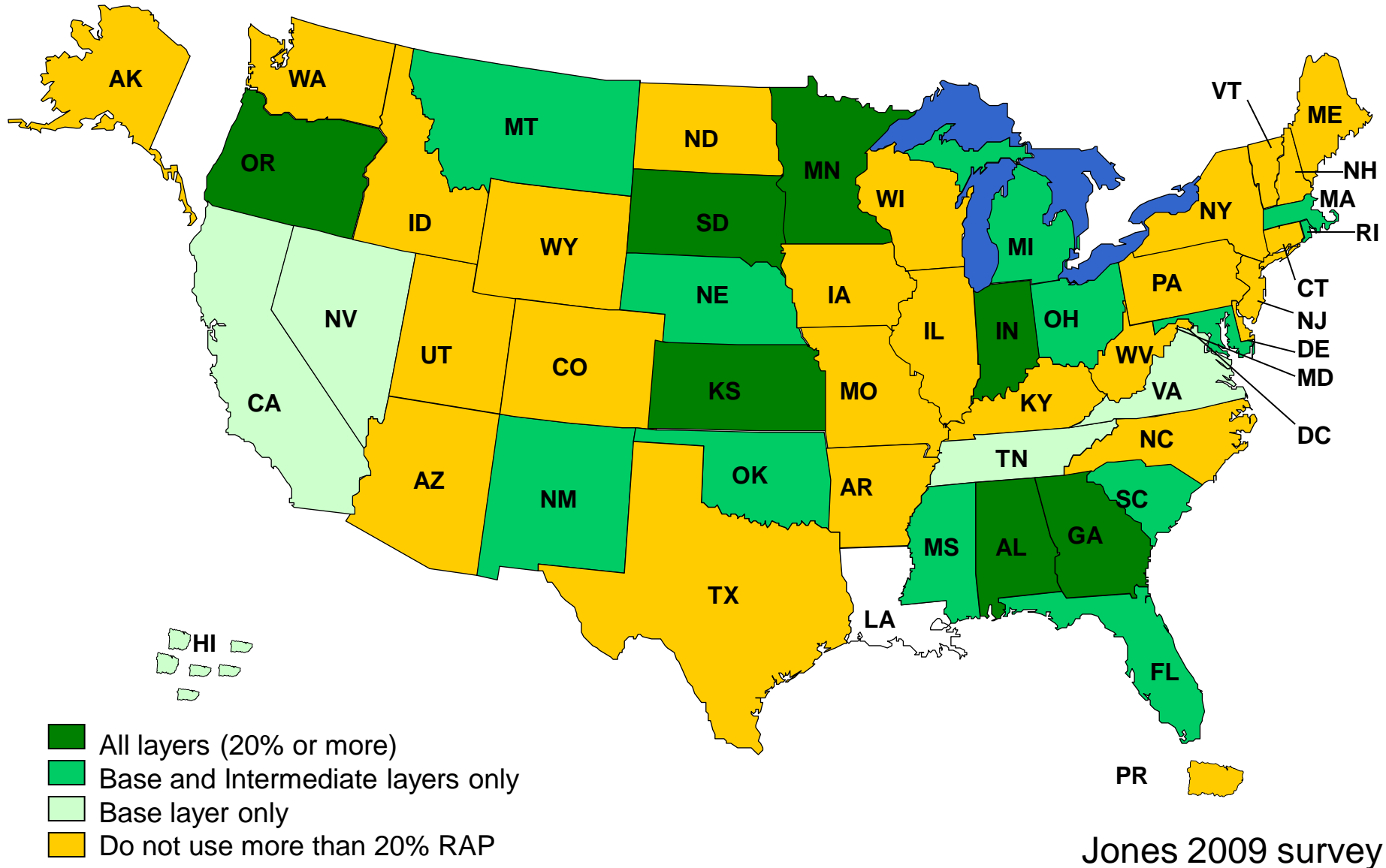
Increased RAP Use Since 2007



States that *Permit* More than 25% RAP in HMA Layers



States that **Use** More than 20% RAP in HMA Layers



Usage

- In 2008, national average RAP use was about 12.5%
- In 2010, the average was 17.6%



Information Series 123



Recycling Hot-Mix Asphalt Pavements



Quality Improvement Series 124

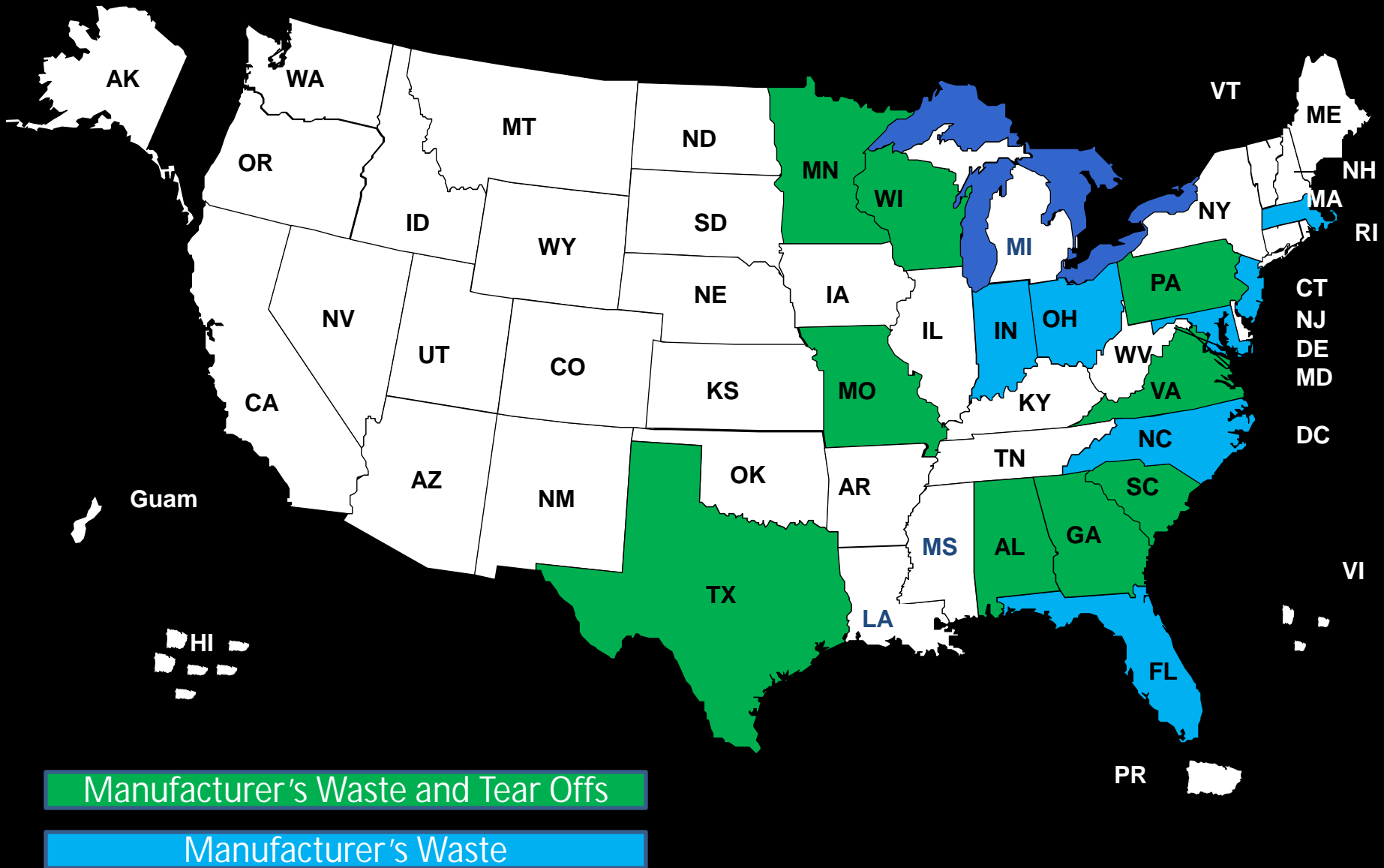


Designing HMA Mixtures with High RAP Content A Practical Guide



U.S. Department of Transportation
Federal Highway Administration

States Allowing Recycled Asphalt Shingles



RAS Economics Example

- Assume 5% Asphalt by Wt. of Mix
- New AC cost \$500/ton
- AC cost/ton of mix = \$25
- % AC in Waste Shingles = 30%
 - Effective AC = 80% × 30% = 24%
- % Waste Shingles in Mix = 5%
- Asphalt Replacement = 1.2% in Mix
- Savings AC = \$6.00 per ton

Shingle Economics Continued

| | Calculating the Costs of Using Waste Shingles | Per Ton |
|---|---|---------------|
| A | Savings from Asphalt Cement | \$6.00 |
| B | Savings from Fine Aggregate | \$0.15 |
| C | Savings from Tipping Fee | \$1.25 |
| D | Total Gross Savings per ton of Hot Mix (Add A+B+C) | \$7.40 |
| | | \$0.00 |
| F | Less Additional Processing/Crushing: | \$0.60 |
| G | Less and Additional Miscellaneous Cost (capital costs for equipment, etc.): | \$0.00 |
| H | Net Savings per ton of Hot-Mix Asphalt (D less E, F, G) | \$8.00 |

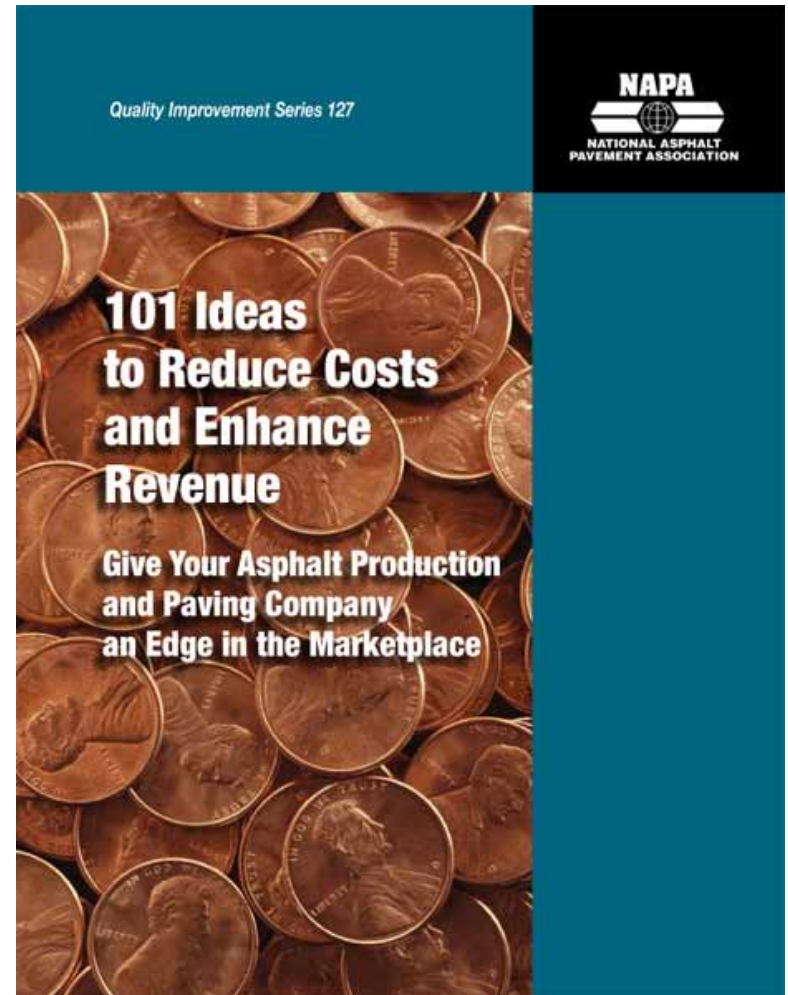
Not What We're Looking For!



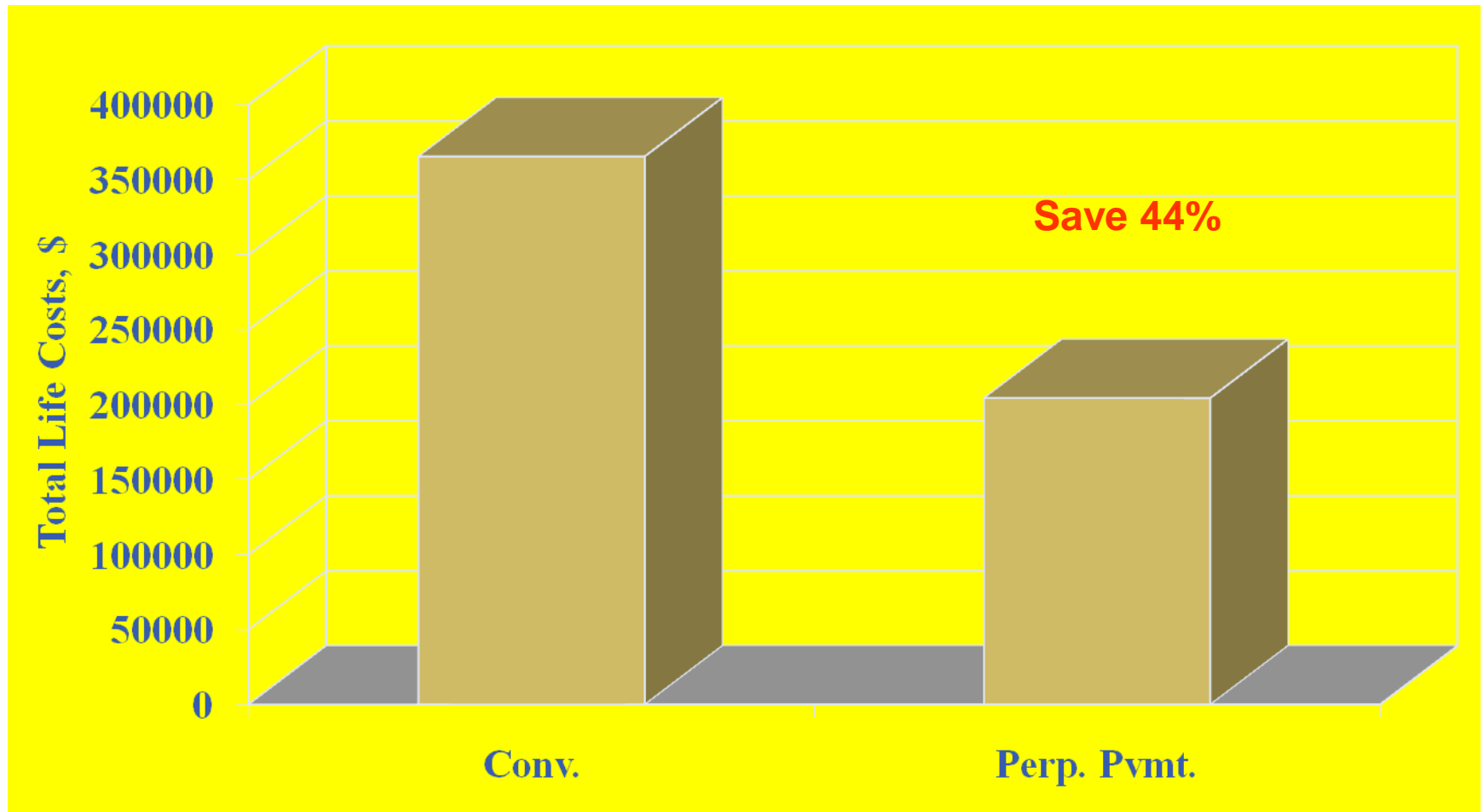
11 Million Tons of RAS Available in U.S.
Contractors in U.S. used 1 Million Tons in 2010

101 Ideas for Only \$10!

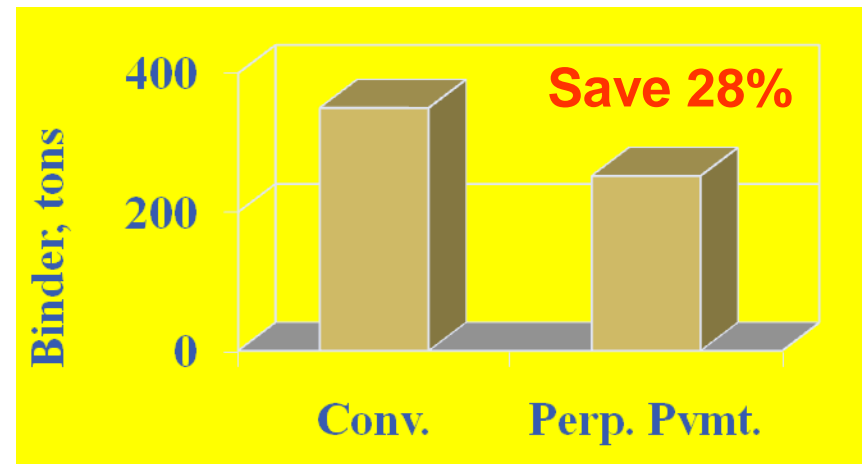
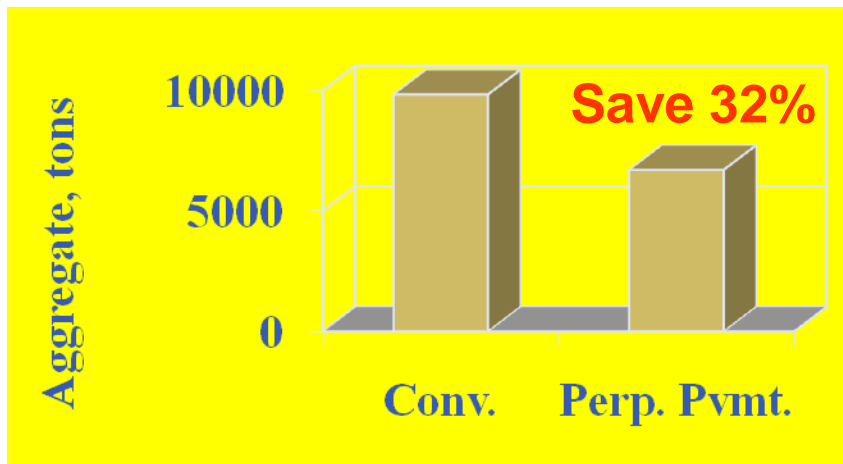
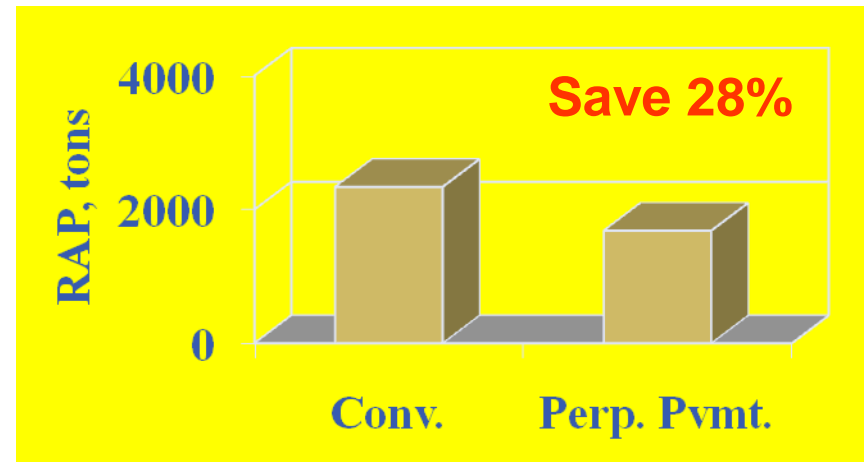
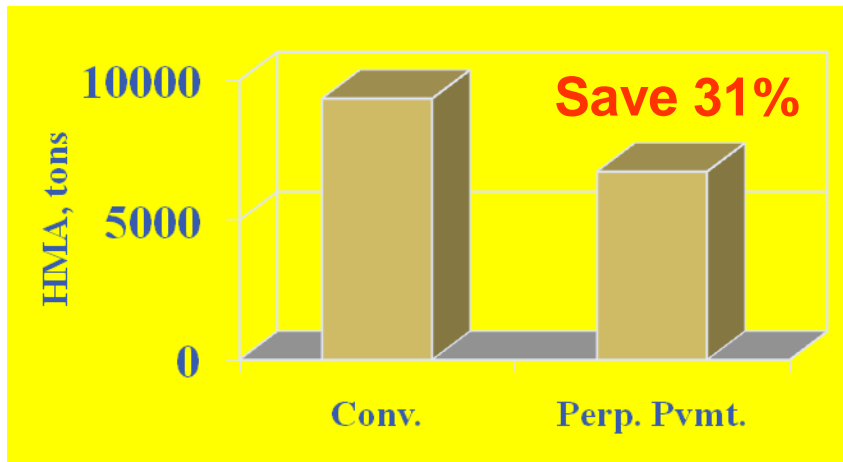
- Energy
- Transportation & Trucking
- Materials & Quality
- Maintenance
- Productivity
- Outside Sales
- Time Wasters
- Intangibles
- Safety, Safety, Safety



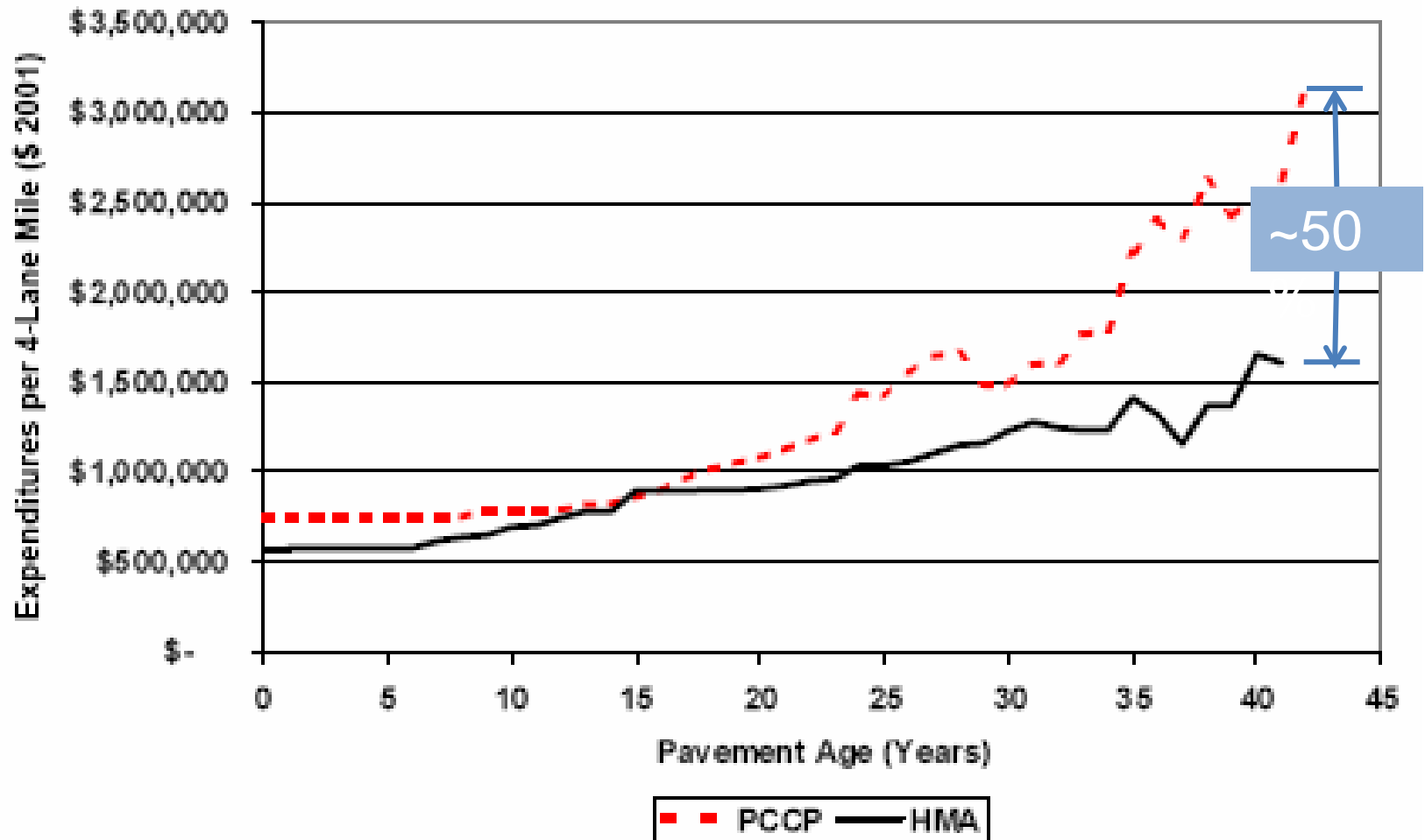
Perpetual Pavement Life Cycle Costs



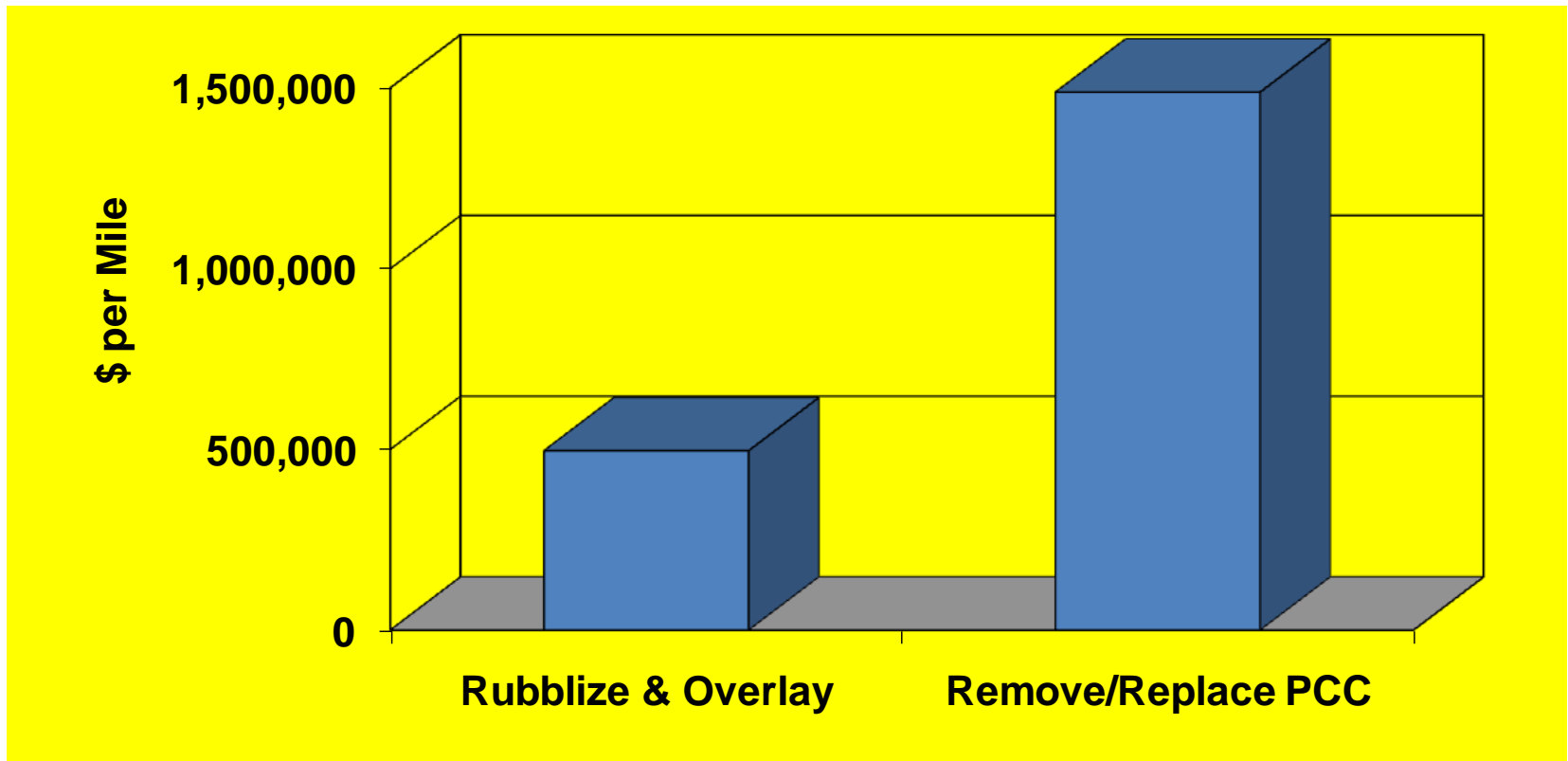
Perpetual Pavement Material Usage - Sustainable



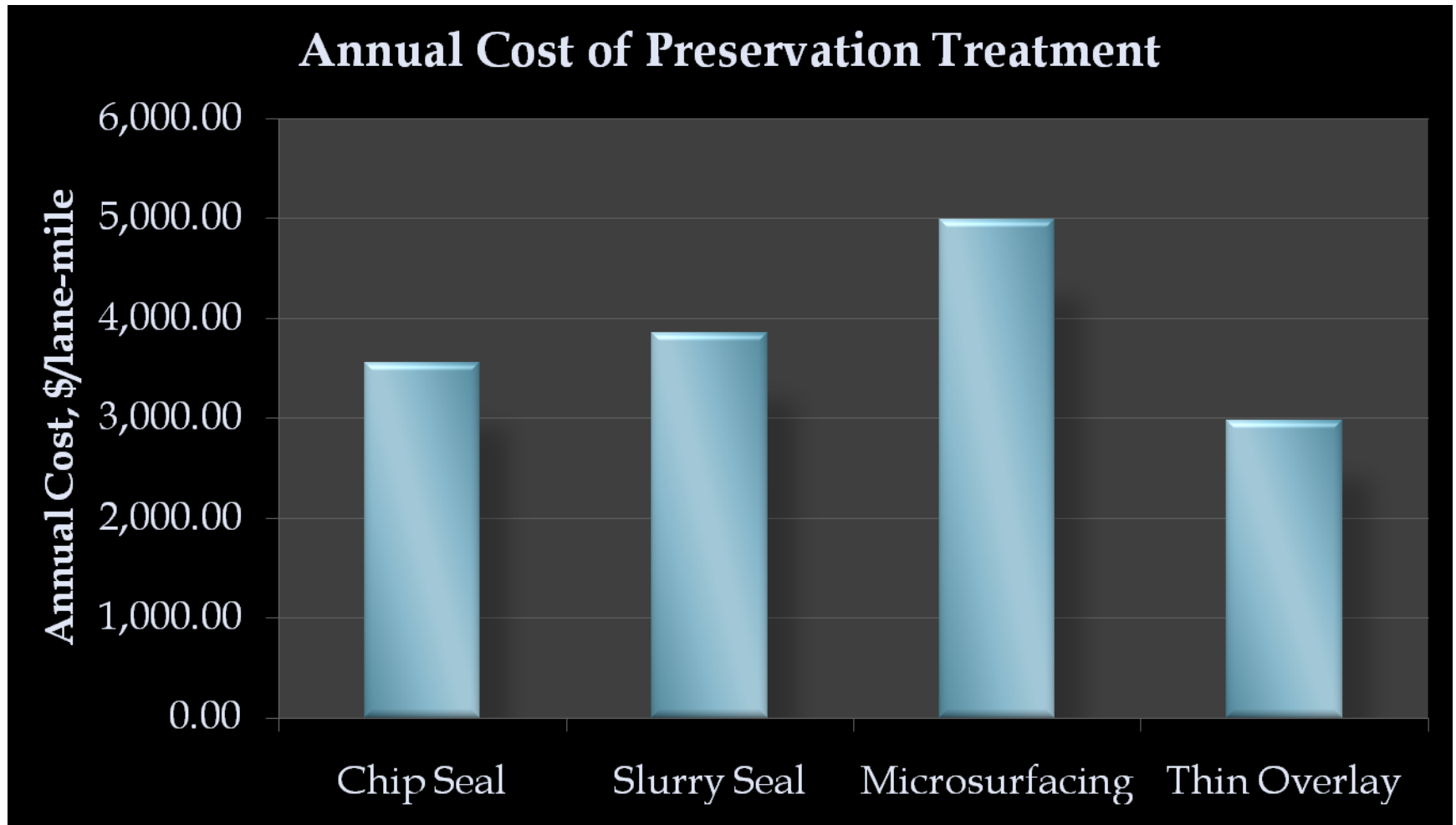
Study of Kansas Interstates Perpetual Pavements vs. Concrete



User Costs – Consider Additional Emissions from Vehicles



Thin Overlay Economics

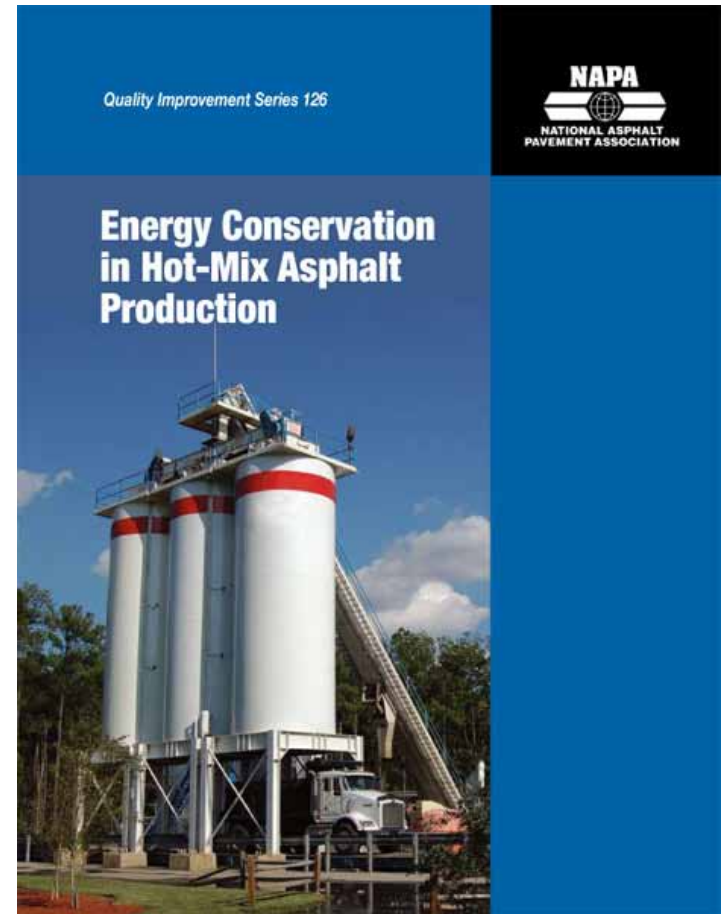


Saving Energy

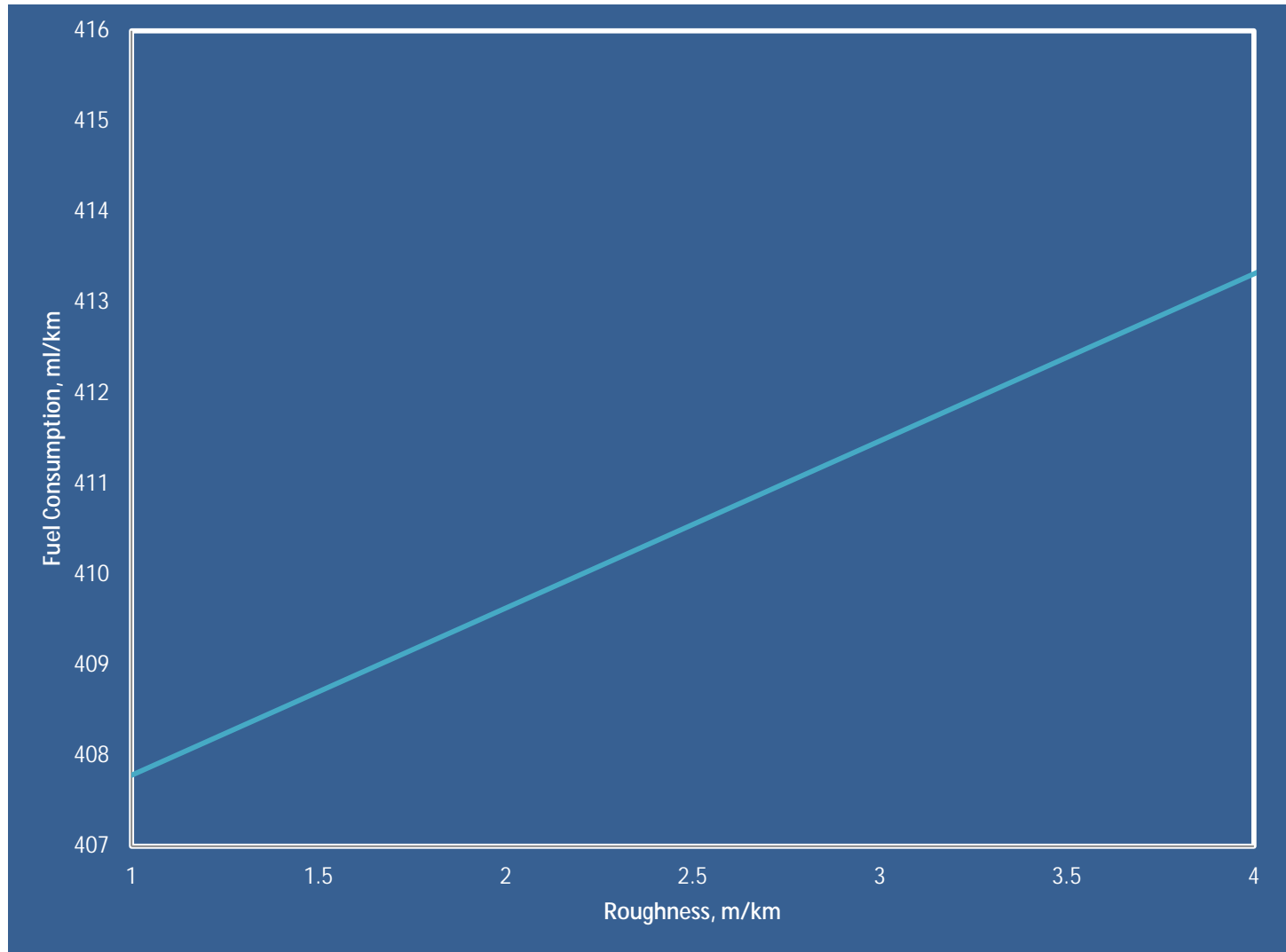
- Warm Mix
- Plant Energy Audit
- 2nd International Conference on Warm Mix Asphalt – October 11-13, 2011 – St. Louis
- Energy and Warm Mix Conferences
- Best Practices Conferences

Energy Audit

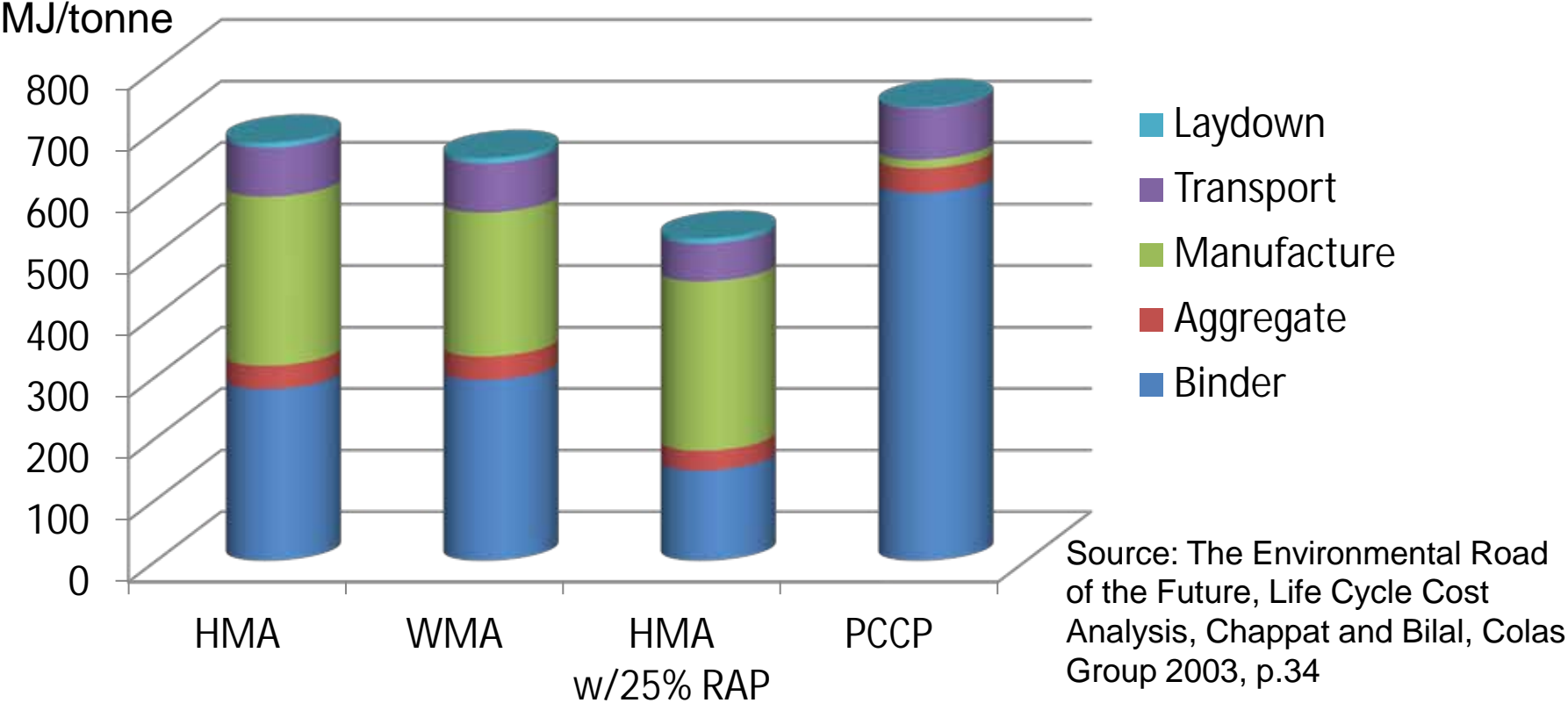
- Aggregate Stockpiles and Handling
- Insulation
- Exit Gas Temperatures
- Material Temperatures
- Alternate Fuels
- Hot-Oil Heaters
- Motor VFDs



Saving Road Users' Energy

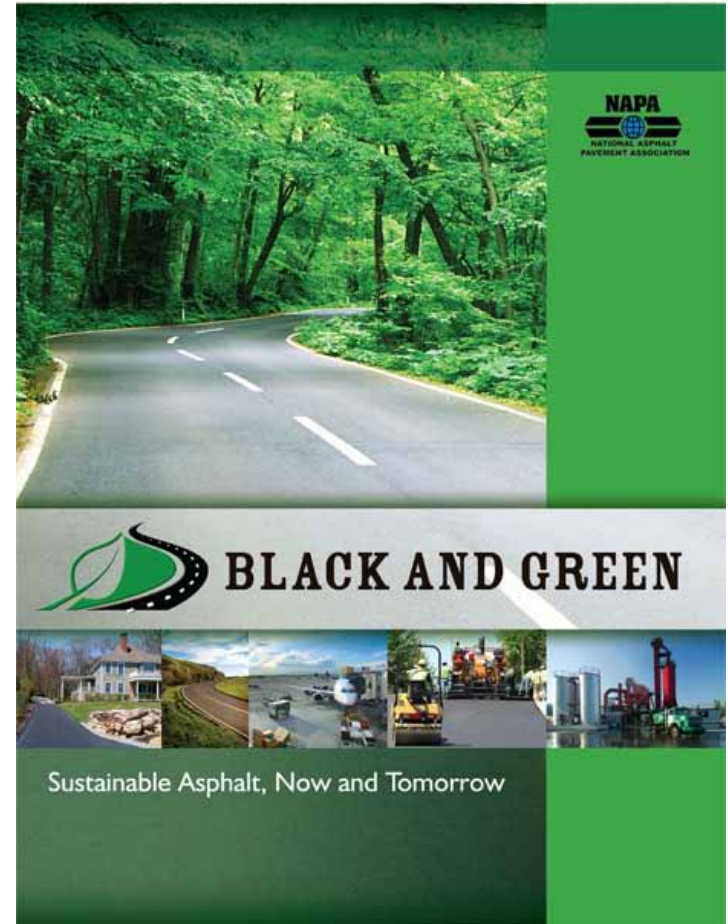


Energy Consumption Related to Road Construction and Maint.



Saving the Environment

- Warm Mix
- RAP/RAS
- Perpetual Pavements
- Work Zone Delays
- Green House Gas Calculator
- LEED Credits
- Noise Reduction

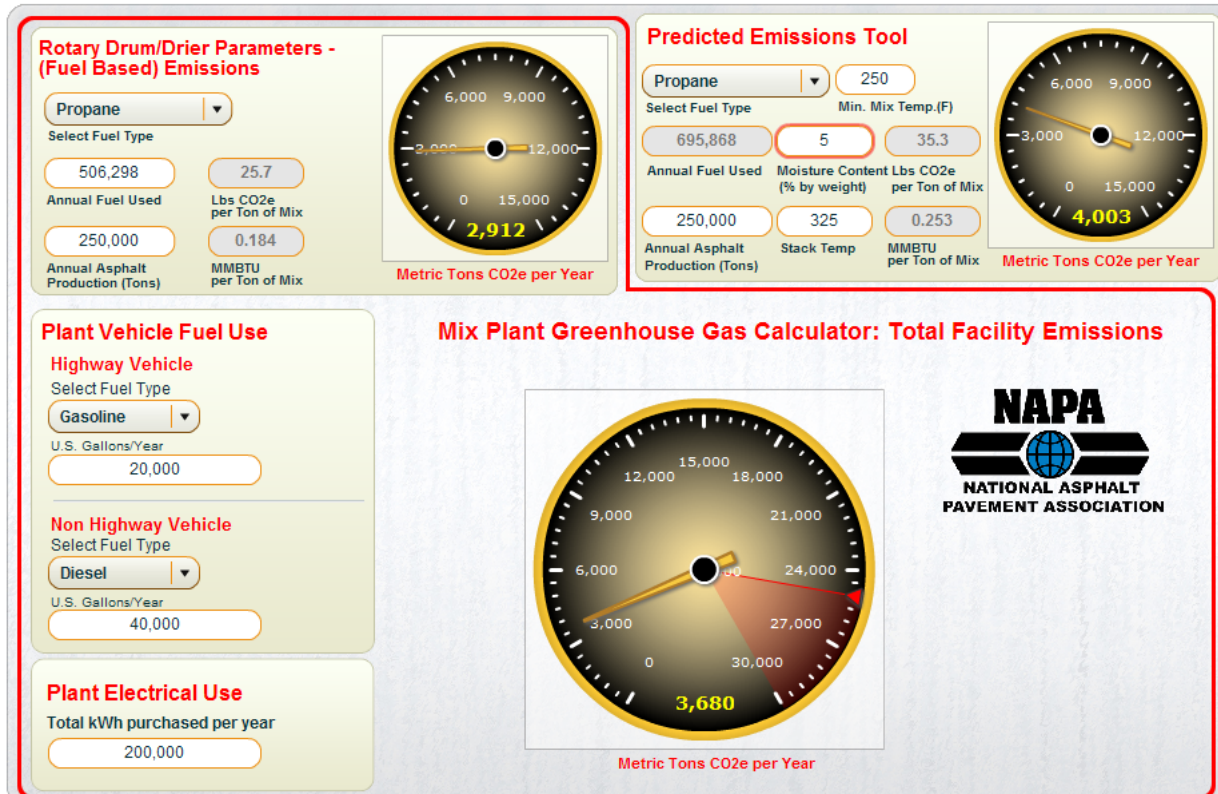


A History of Environmental Success

- 1970 – 1999
 - Increased Production by 250%
 - Decreased Emissions by 97%
- 2002
 - EPA De-Lists Asphalt Plants as Major Pollution Source

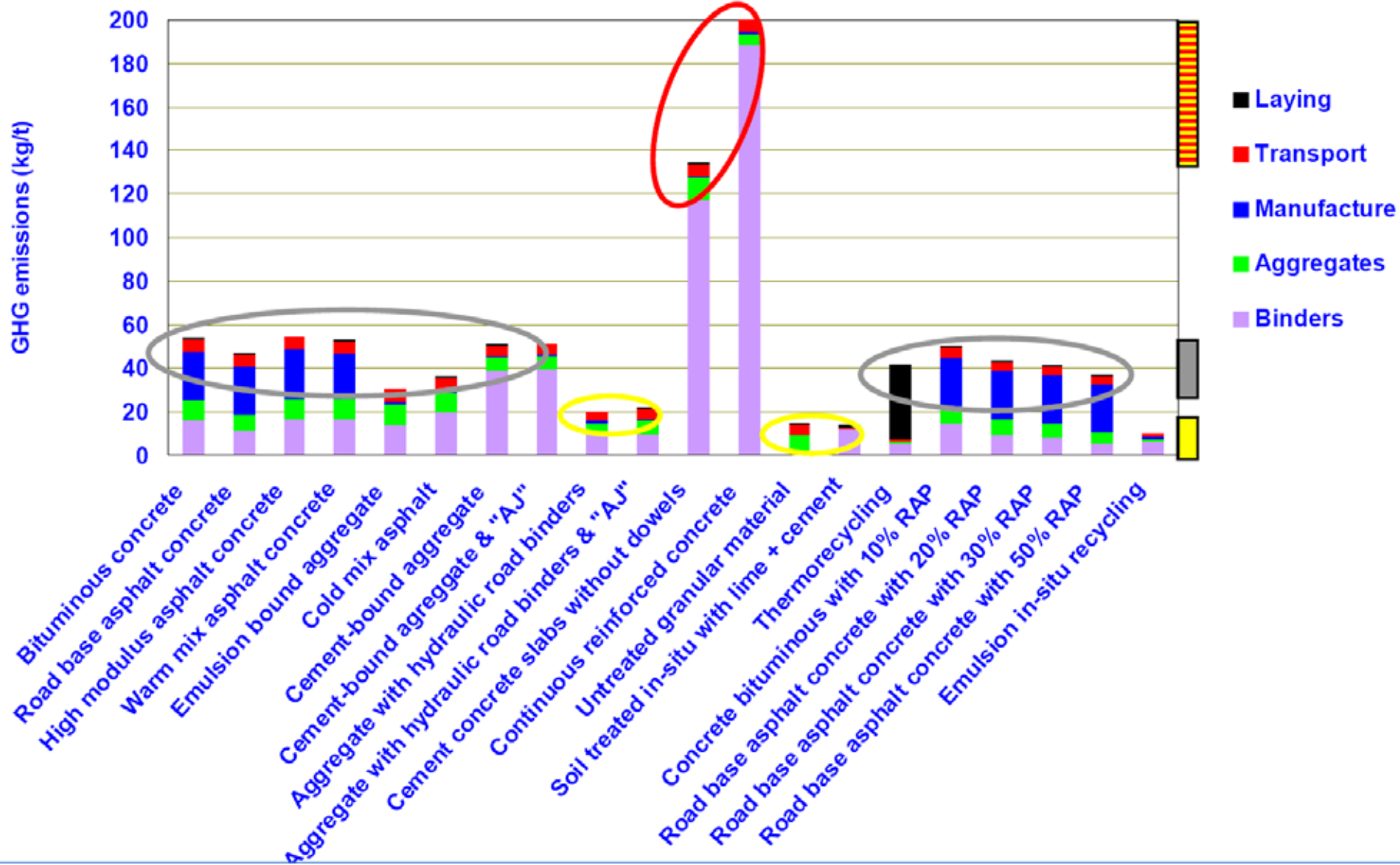


Saving the Environment Greenhouse Gas Calculator



25% RAP = 10% Reduction in GHG
2 million tons annually for U.S.

GHG emissions per tonne of laid material

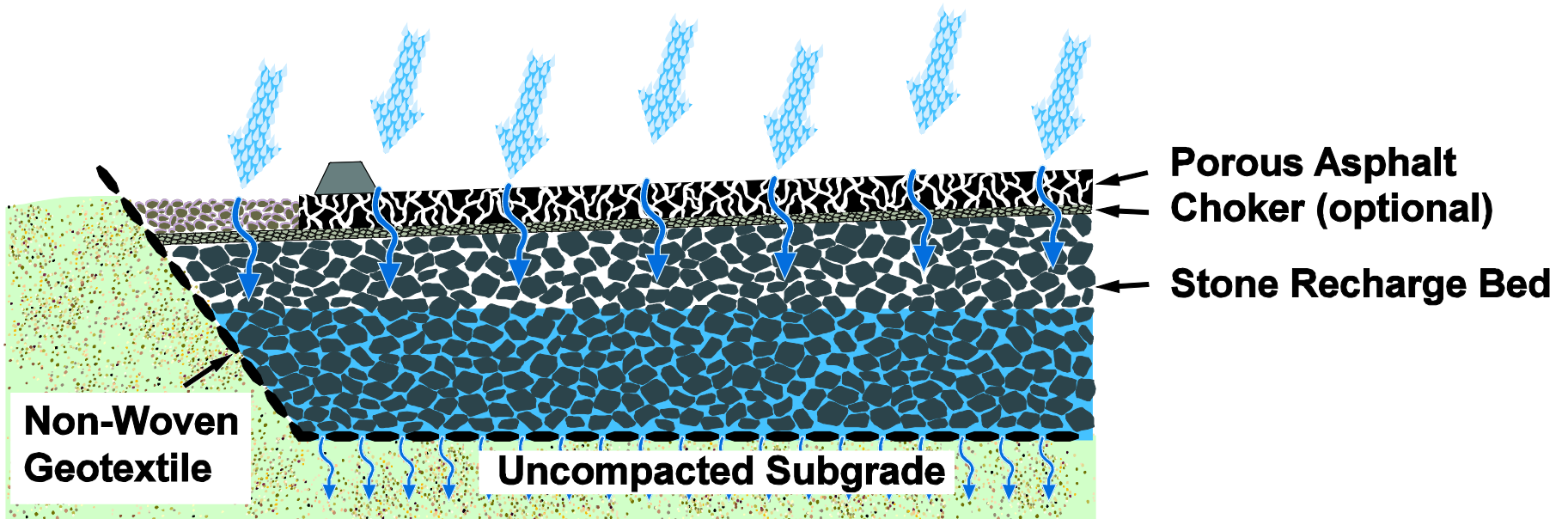


Porous Asphalt Pavements



- Photo courtesy Cahill Associates

What are Porous Pavements?

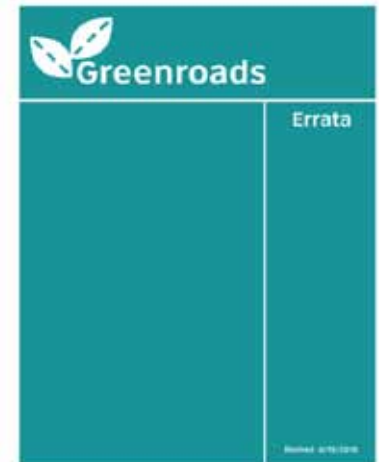
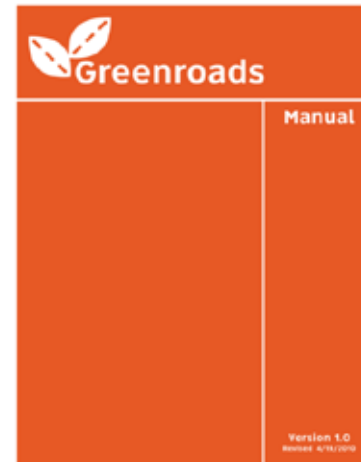


Green Rating Systems

- LEED



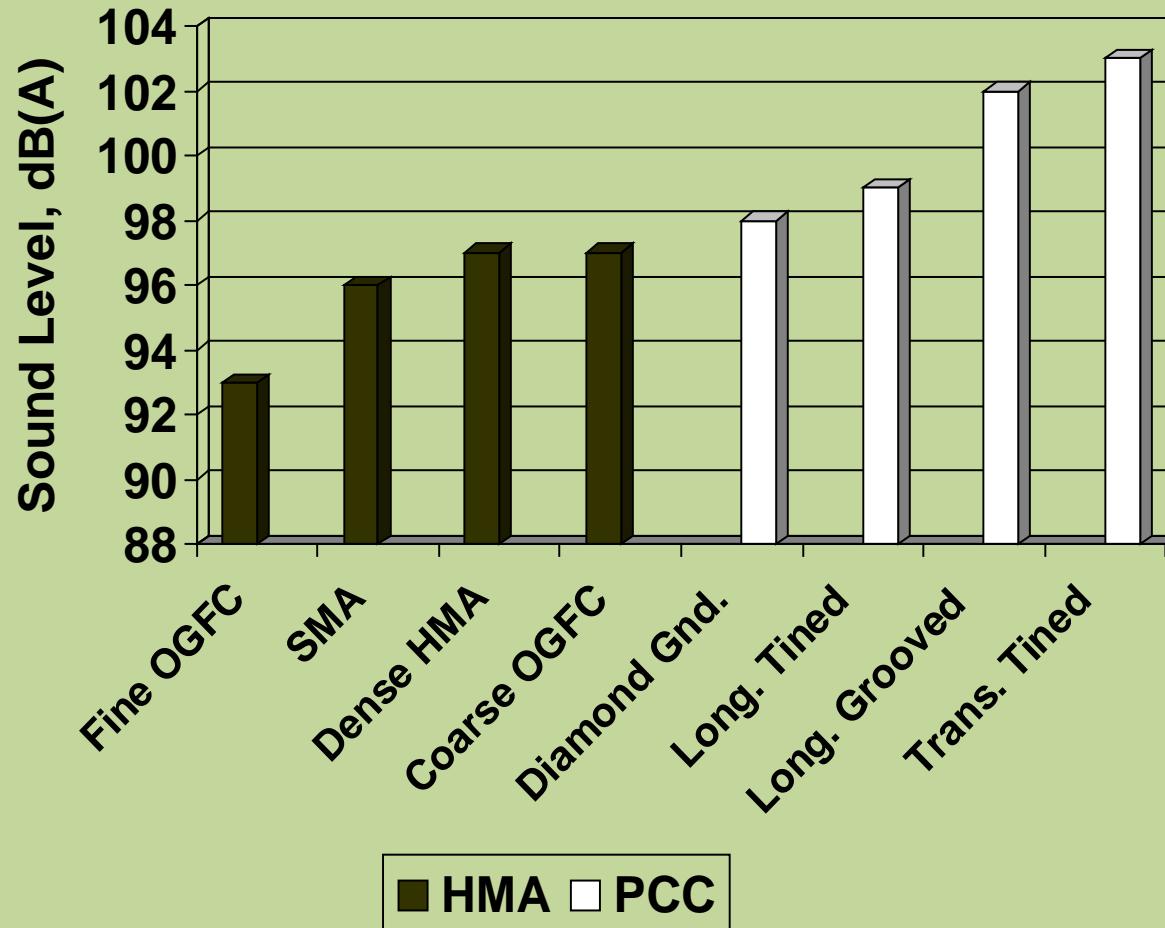
- IN-VEST – Infrastructure Voluntary Evaluation Sustainability Tool
- Green Roads



LEED Credits

| Rating Category | Credit Description | Pavement Type | Credits |
|-----------------|--|--|---------|
| SS Credit 6.1 | SW Design: Quantity Control | Porous Asphalt | 1 |
| SS Credit 6.2 | SW Design: Quality Control | Porous Asphalt | 1 |
| SS Credit 7.X | Heat Island Effect: Non-Roof | Reflective Surf. OG Asphalt Porous Asphalt | 1 – 3 |
| MR Credit 2.X | Const. Waste Mgt. Divert from disposal | RAP | 1 – 2 |
| ID Credit 1.X | Exceptional Performance or areas not addressed | WMA High RAP | 1 – 4 |

NCAT Study of 244 Pavements



Summary

- This Industry has a great story to tell.
- Innovation = Flexibility
- Flexibility = Wider Applications
- Economics for contractors and owners
- Energy conservation for contractors and road users
- Environmental benefits for everyone.