U.S. Department of Transportation
Federal Highway Administration

WMA Symposium - CIAPR

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Every Day Counts Initiative

- EDC is designed to identify and deploy innovation. Our goals is to:
  - Shorten project delivery
  - Enhance the safety of our roadways
  - Protect the environment

The Innovations

- Warm Mix Asphalt (WMA)

- Precast Bridge Elements

- Geosynthetic Reinforced Soil

- Safety Edge

- Adaptive Traffic Control Technology


What is EDC
Warm Mix Asphalt?

Q. Which project is which?

A: Hot-Mix Asphalt (HMA)?

B: Warm Mix Asphalt (WMA)?

Project No. 1

Project No. 2

Warm Mix Asphalt (WMA)

Hot Mix Asphalt at 320°F

Warm Mix Asphalt at 250°F

Warm Mix Asphalt

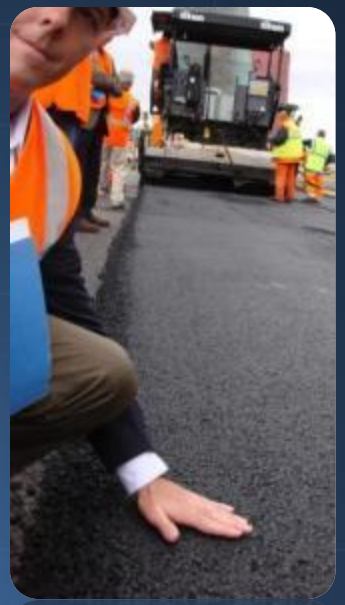
- **Definition:** Warm Mix Asphalt (WMA) is the general term used for technologies that allow producers of asphalt pavement material to lower the temperatures at which the material is mixed and placed on the road.
  - Reductions of 50 to 100 degrees Fahrenheit have been documented.

Warm Mix Asphalt (WMA)

Investigation and Implementation Premise

Although there are many factors driving the development and implementation of WMA technologies globally, in order for WMA to succeed in the US, *WMA pavements must have equal or better performance when compared to traditional HMA pavements.*

Brief WMA History…



- 1995 Preliminary Lab Experiments
- 1997 German Bitumen Forum
- 2000 Euroasphalt & Eurobitume Congress
- NAPA 2002 European Scan Tour
  - Germany and Norway
- NAPA 2003 Annual Convention - San Diego, CA
- 2004 First public demonstration in US
  - World of Asphalt – Nashville, TN
- 2005 WMA Technical Working Group Established
- 2007 AASHTO FHWA International Scan Tour
- 2008 First US International Conference on WMA
- 2011 First trail section in Puerto Rico at PR-2 Yauco

*Warm Mix Asphalt: European Practice**

Reported Reductions in Plant Emissions (%) with WMA

Emission	Norway	Italy	Netherlands	France
CO_2	31.5	30–40	15–30	23
SO_2	NA	35	NA	18
VOC	NA	50	NA	19
CO	28.5	10–30	NA	NA
NO_x	61.5	60–70	NA	18*
Dust	54.0	25–55	NA	NA

**Reported as NO_2*
NA—not available

*Warm Mix Asphalt: European Practice, FHWA-PL-08-007, February 2008

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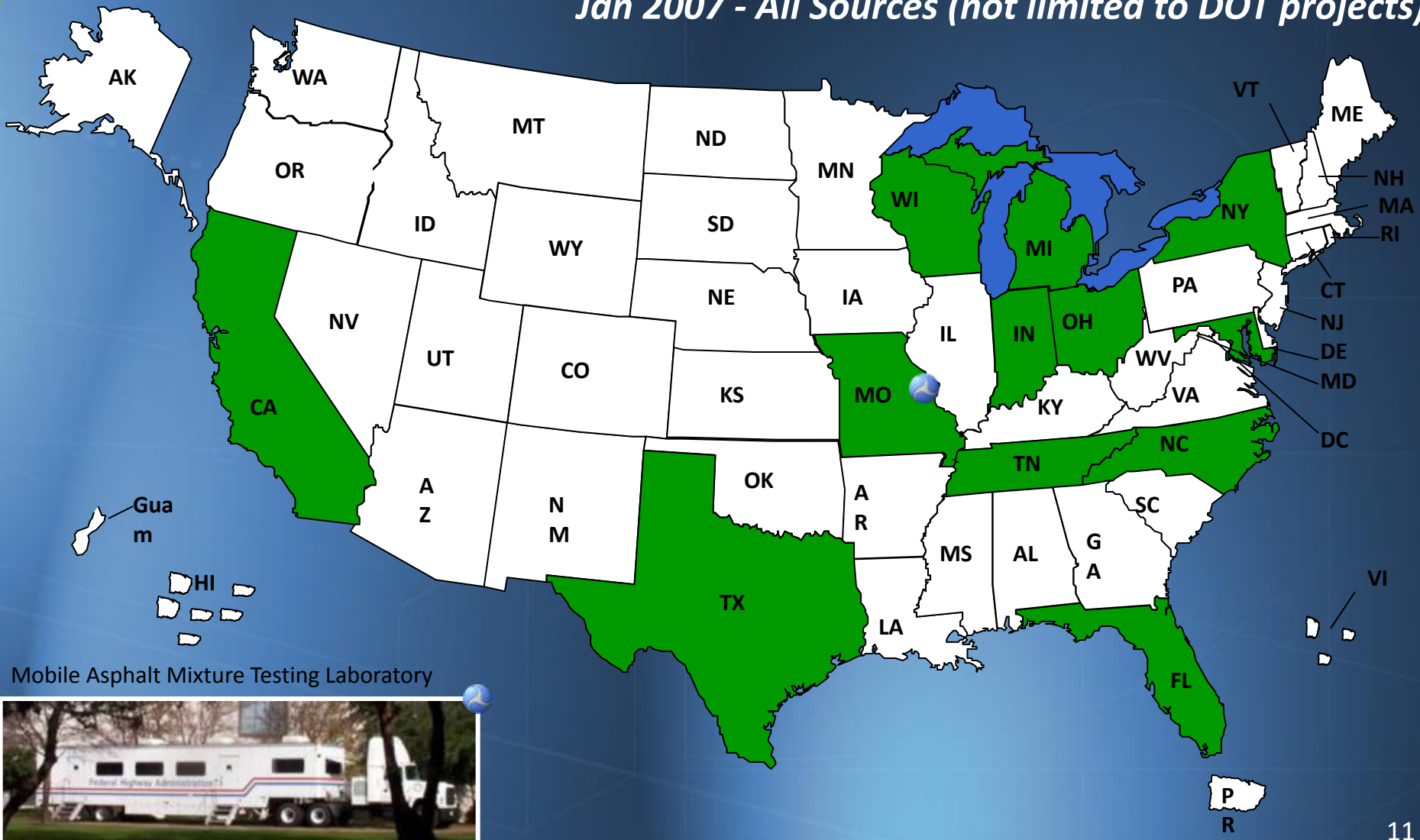
WMA Trials & Demonstration Projects

Jan 2007 - All Sources (not limited to DOT projects)



Mobile Asphalt Mixture Testing Laboratory

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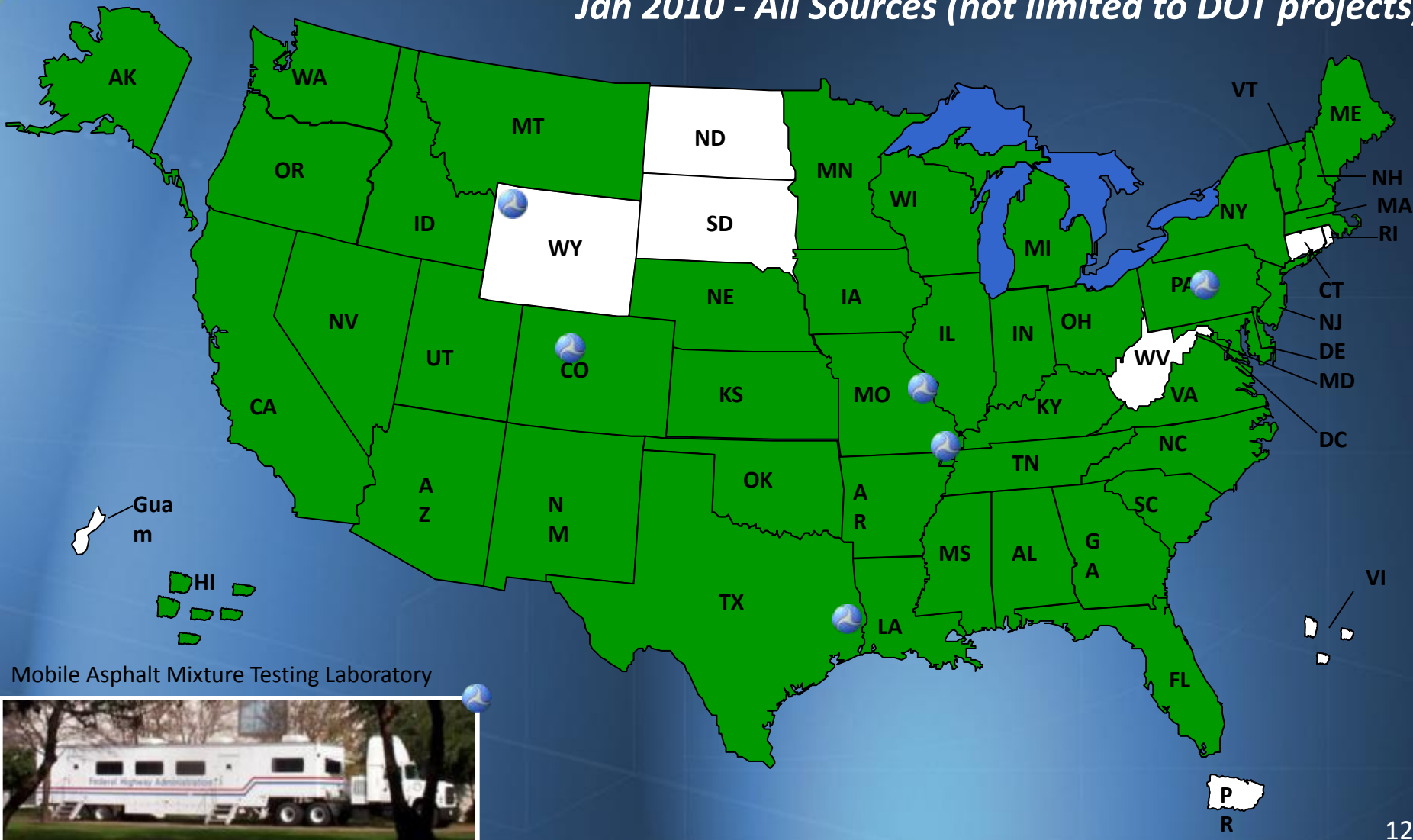
WMA Trials & Demonstration Projects

Jan 2010 - All Sources (not limited to DOT projects)



Mobile Asphalt Mixture Testing Laboratory

Factors Driving Development of Warm Mix Asphalt

1. Improvement in field compaction… less variable … better performance!!!
2. Environmental and sustainable development concerns, “Green Highway Construction”
   a. Reduction in energy consumption (fossil fuels)
   b. Reduction in CO_2 and other emissions
3. Worker comfort … reduced fatigue
4. Potential for longer haul distances

Memorable Message

- **I.C. = I.P.**

  Improved Compaction = Improved Performance

- **F.E.W. key benefits…**
  - Fuel
  - Emissions
  - Worker Comfort

Q. How many WMA technologies are available in the US market today?

A. 9

B. 14

C. 20+

How Many WMA Technologies are Available in the US?

Currently Twenty Two (22) Technologies Marketed and Available in the US.

How Many WMA Technologies are Available in the US?

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Lake Asphalt of Trinidad and Tobago

Mathy Tech. & Eng. Services and Paragon Technical Services, Inc

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More to come …

Many other technologies are also used Internationally.

Warm Mix Asphalt (WMA)

General Technology Categories:

- Materials Processing
- Organic Additives
- Chemical Additives
- Foaming Processes
- Hybrid Systems (combination of technologies)

Economics of WMA

- Fuel Savings
  - Ex. Reducing production temperatures from 325ºF (HMA) to around 265ºF (typical WMA) will save ½ to 1 gallons of fuel per ton of mix
  - Cost savings of approximately 45¢ to 90¢ per ton of mix

Economics of WMA

- Start up costs:
  - Foaming Systems… range in price from ~ $35,000 to $80,000

  - Additive Systems… most require the addition of a pneumatic or volumetric pumping system. Range in price from ~ $7,500 to $60,000

Economics of WMA

- WMA Technology (Operating) Cost:
  - Foaming Systems… water is basically free. If a liquid antistrip is needed, this adds ~ $1 to $2 / ton
  - Additive Systems… $1.75 to 2.50 / ton of mix
  - This does NOT include fuel savings Net cost ~ Zero to $1.50 / ton

Performance Metrics

- June 2011, 40 out of 52 SHAs will have an established policy that encourages & sets targets for WMA usage on federal aid projects
- December 2011, 40 out of 52 SHAs will have a specification &/or contractual language that allows WMA on federal aid projects
- December 2012, 75% of SHAs with a WMA policy will have achieved set targets for WMA usage
- December 2013, all of SHAs with a WMA policy will have achieved set targets for WMA usage

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WARM MIX ASPHALT
"INNOVATION IN PRACTICE"
PR-2 YAUCO, PR

Innovation takes…

- Leadership
- Partnership
- Sharing Risk

WMA looks like Hot Mix Asphalt, but cooler!

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The Beginning…