

Rapid Implementation of Warm Mix Asphalt in Minnesota

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Acknowledgements

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- Kent Hansen - NAPA
- Matt Corrigan - FHWA



Motivation to Use WMA

- Environmental
 - Lower greenhouse gas emissions
 - Lower fuel consumption
- Operational
 - Better compaction
 - More comfortable working conditions
 - More uniformity
- Performance
 - Can use RAP and/or shingles with WMA
 - Eliminates bumps in overlays
 - Reduced binder aging – reduced cracking



WMA Experience in Minnesota



Olmsted & Goodhue Counties

- First known WMA jobs in MN (2007)
 - Revix (Evotherm 3G) technology
 - Olmsted CR 104
 - 5 mile stretch: 1.5” top lift
 - Goodhue CSAH11
 - 537 tons placed in 4,200 feet of the EB lane



Crow Wing County

- County Road 108 (2008)
 - 2913 tons WMA, 272 tons HMA
 - 58-34 HMA vs. 58-28 WMA
 - Estimated 5 years of extended service life
 - Life cycle cost analyses are favorable for WMA
 - *ASCE Cold Regions paper 2009*
- County now allows alternate bids on several projects
 - 20,000 tons WMA in 2009 (CR 2)



2008 MnROAD Construction

- 6 Cells on Mainline
- PG 58-34, 20% RAP
- Contractor chose Evotherm 3G
- 2100 tons WMA



MnDOT Trunk Highway 95

- Late season paving (2009)
 - Contractor was delayed, needed to finish paving before winter
 - Supplemental Agreement – MnDOT paid extra \$0.60 per ton for WMA
 - Business as usual (mostly)
 - Good density 2nd day after going back to HMA rolling pattern



District 3 and 7 Projects in 2010

- First “regular” MnDOT projects requiring WMA

S-1 (2360) PLANT MIXED ASPHALT PAVEMENT – USE OF WARM MIX ASPHALT TECHNOLOGIES

The provisions of the attached 2360 Plant Mixed Asphalt Pavement (Gyratory Design) Specification is hereby modified as follows in order to use Warm Mix Asphalt (WMA)

All provisions for the production and placement of WMA will be the same as the conventional HMA mixtures as stipulated in 2360 Plant Mixed Asphalt Pavement (Gyratory Design) Specification except as noted below.

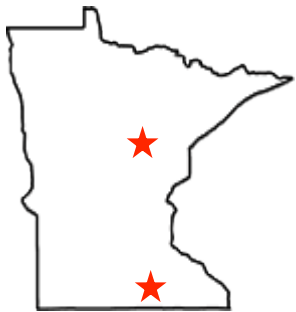
S-2.1 MIXTURE DESIGN

The contractor is responsible to use the same design used to produce the Hot Mix Asphalt, then modifying it to accommodate products or processes to meet the Warm mix criteria. This modification process will be limited to the same as described by the WMA Technical Working Group and found at <http://www.warmmixasphalt.com/WmaTechnologies.aspx>

Recycled Asphalt Shingles will not be allowed in any mixes on this project.

S-3.1 MIXTURE QUALITY MANAGEMENT

The Warm Mix Asphalt produced will not be allowed to exceed temperatures greater than 275 °F. Any WMA over that temperature will not be allowed to be used.



2011 MnDOT WMA Use

- Over 200,000 tons WMA!
- Large majority by plant foamers
- FHWA Every Day Counts initiative

INGENUITY IMAGINATION



INVENTION INNOVATION



WMA Technologies Used in MN



- Maxam AquaBlack
 - Installed on several plants
 - 15~100% of production was WMA
- Revix / Evotherm 3G
 - Easy for contractors
- Advera
 - 1 project

MnDOT does not endorse any particular proprietary product or technology



WMA Implementation Support



MnDOT Policy & Specification

- 2009 & 2011 Position Memos
- Permissive Spec
 - RAP & RAS are allowed
 - No changes in mix design
 - Labs must be aware of compaction temps for QA
 - No pre-approved products list
- www.dot.state.mn.us/materials/bituminous.html



WMA Frequently Asked Questions

Question
What is Warm Mix Asphalt?
The contractor has approached us (local agencies) about substituting WMA for HMA. Should we use WMA on our project?
Should we pay an additional cost for warm mix?
Are there any pavement performance issues with WMA?
With the increased use of RAP and/or shingles, are we getting complete blending between the recycled and virgin binders?
Are there any different procedures required for QC/QA testing?
How do I perform a WMA mix design?
Can modified binders be used with WMA?
What traffic levels can WMA be used on?
Where can I get more information on WMA?

Technology Transfer

- Conferences
- Workshops
- Technical Meetings

- State & Local Agencies
- Contractors
- University Researchers
- Consultants
- Federal Highway Administration



Communication & Support

- Write publications
 - Research briefs, conference papers, magazine articles
- Answer phone calls, email inquiries, surveys
 - University graduate students, NCHRP, US EPA
- Advise Michigan Tech undergraduate student project
- Support MnDOT, local, & other state agencies
 - Write specs, observe construction, QC/QA testing, monitor performance



National Perspective on WMA

Credits:

Kent Hanson & Matt Corrigan
2nd International WMA Conference
September 2011
St. Louis, MO



International Conferences

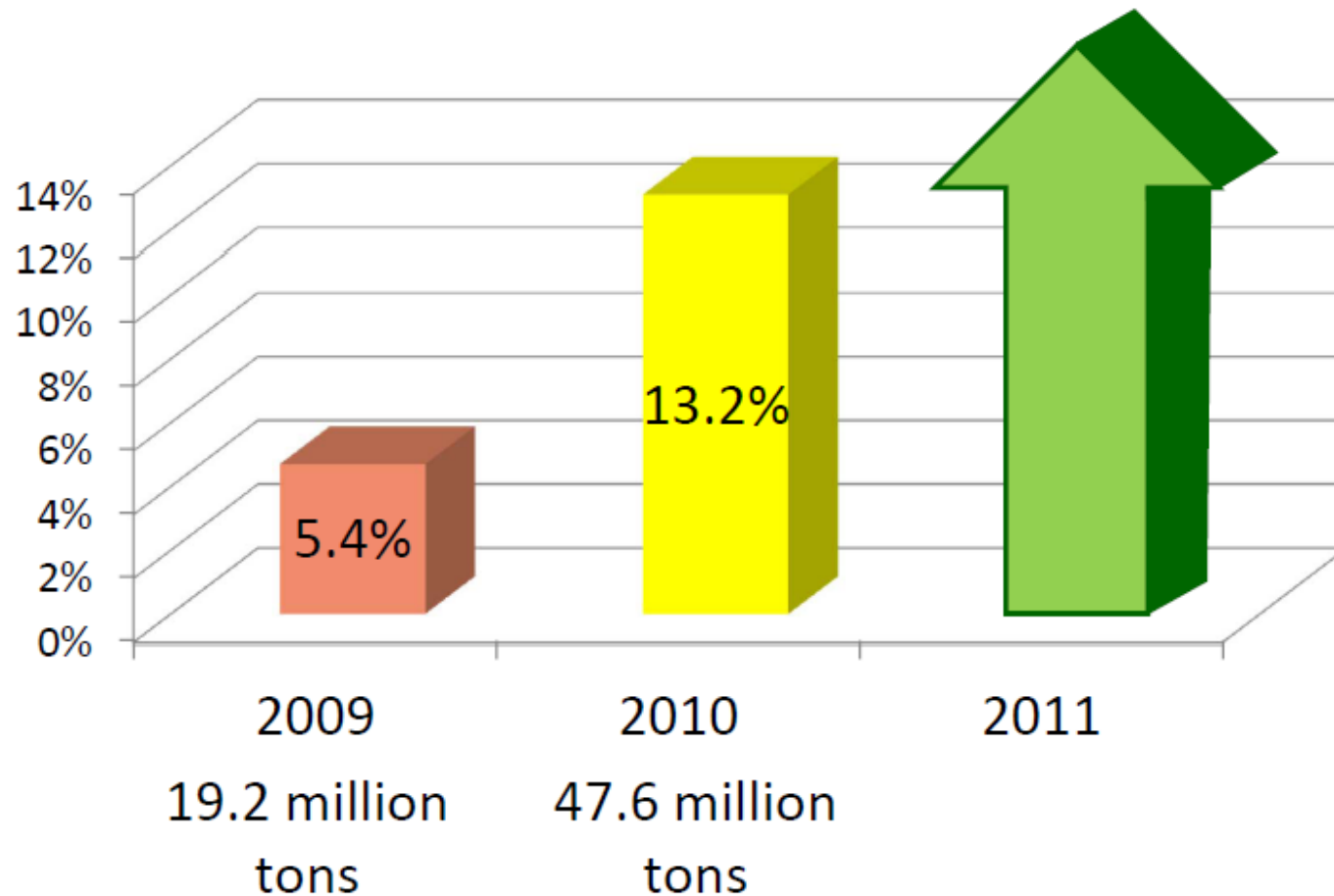
- 1st International Conference
 - November 2008 in Nashville, TN
 - Processes, Mix Production & Placement, Energy Consumption, Mix Design, Material Properties
- 2nd International Conference
 - October 2011 in St. Louis, MO
 - Lab & Field Properties, Design & Performance, Health & Environment, RAP, Binder & Mix Properties, Moisture Susceptibility, Construction
- 3rd International Conference won't be necessary



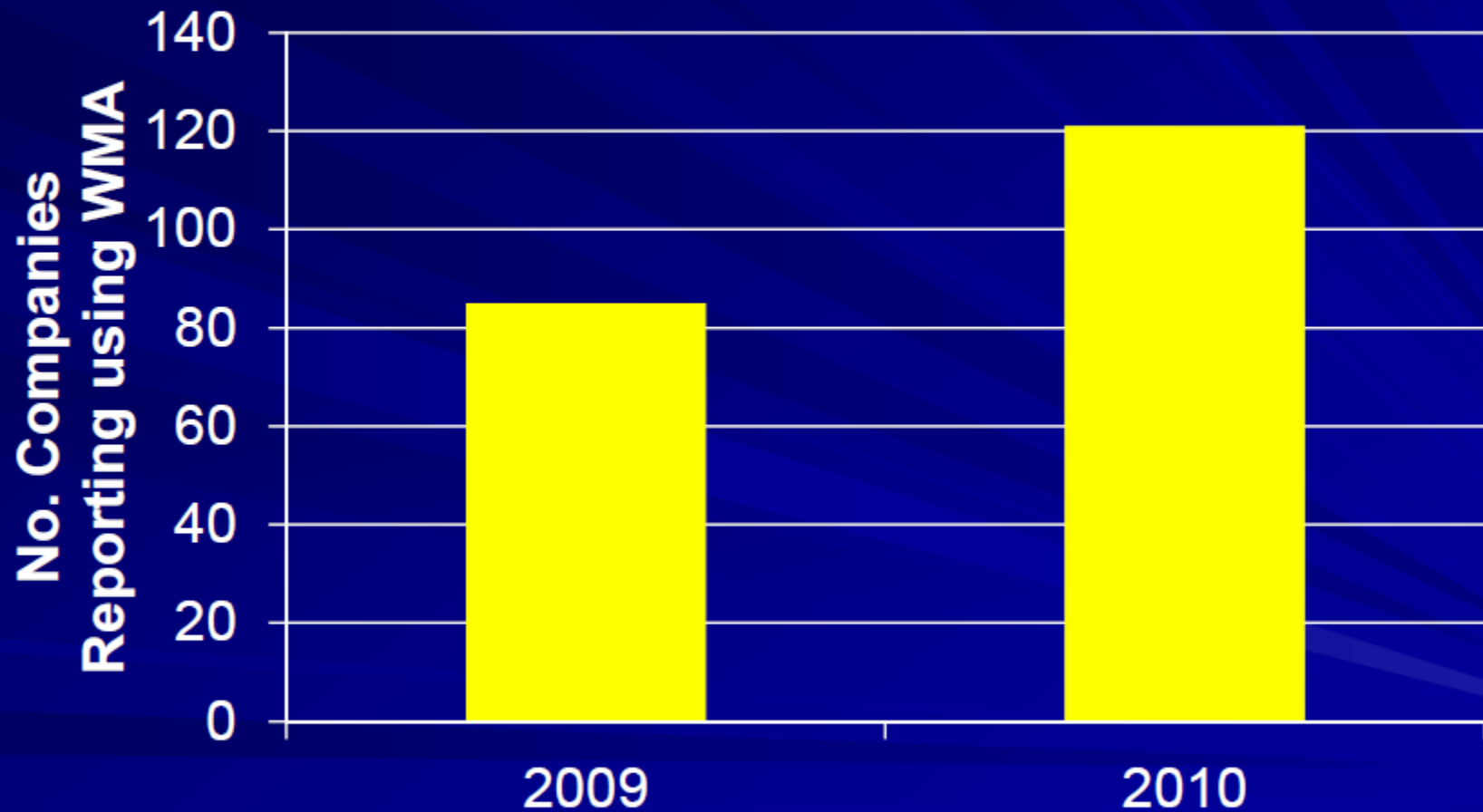


WMA Usage

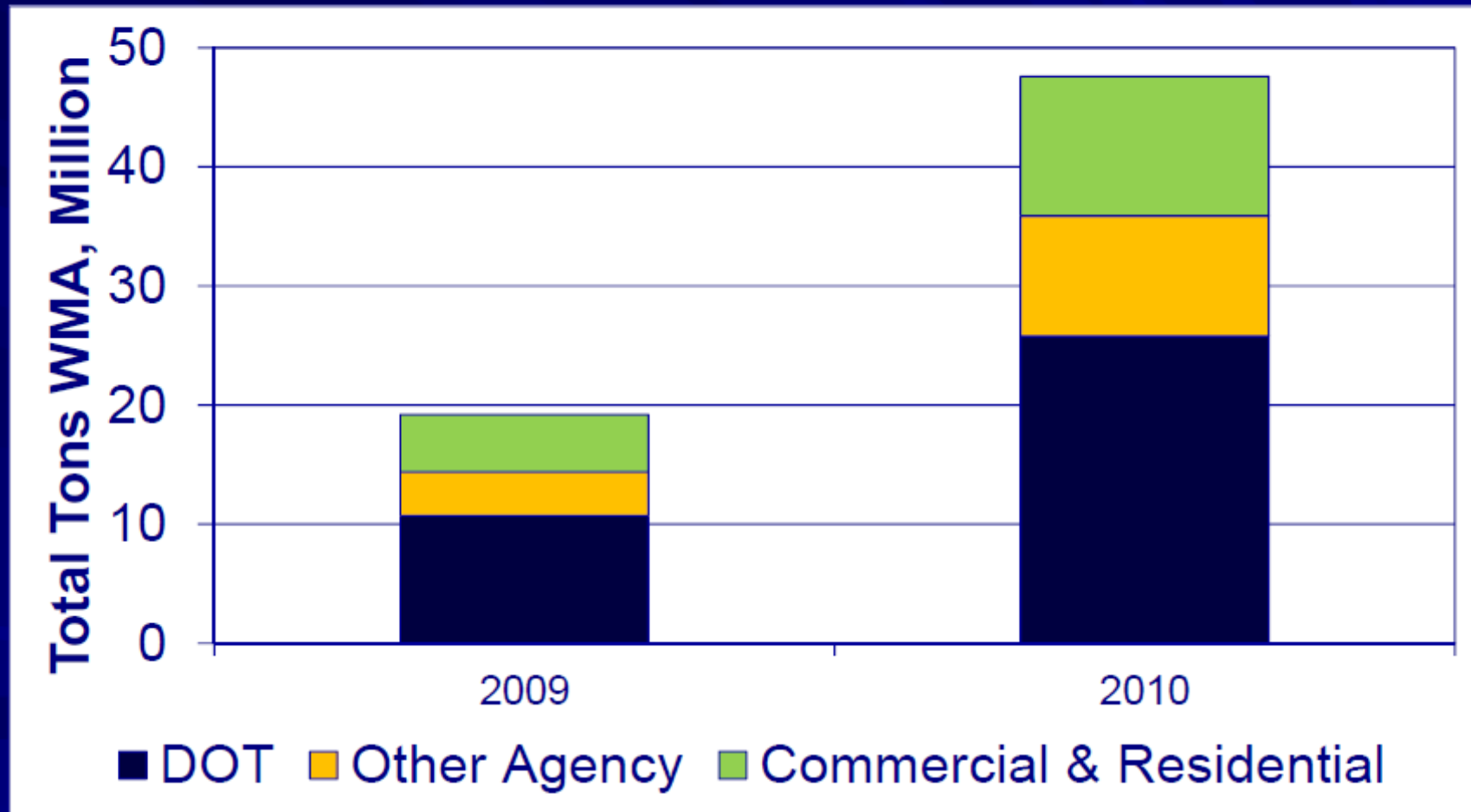
Percentage of **Total** Asphalt Production in US
source: National Asphalt Pavement Association



Companies Reporting Using WMA



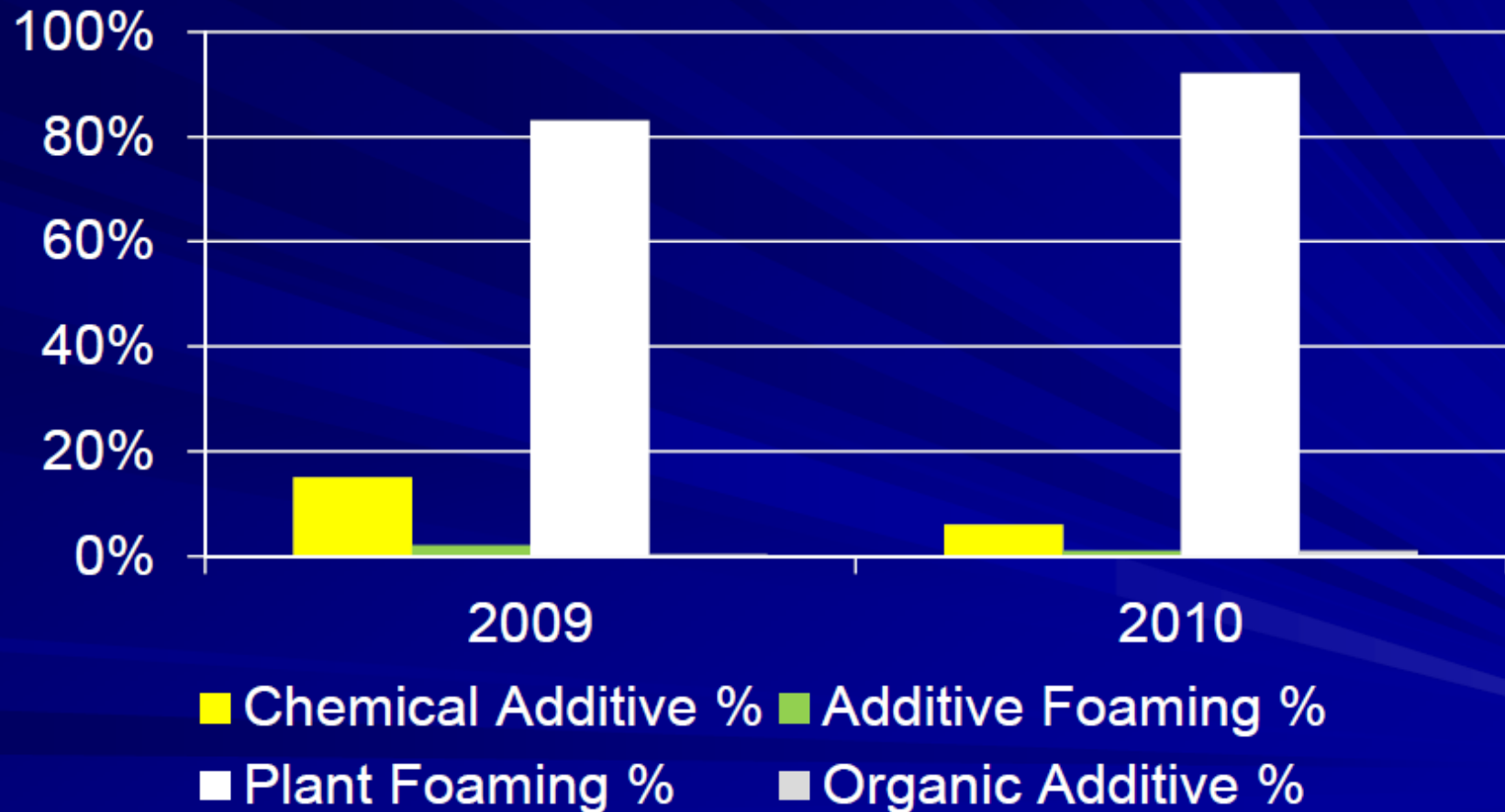
Estimated Total Tons WMA



148% increase 2009-2010



Reported WMA by Type



Summary

- WMA will continue to gain market share
- New innovations will continue
- Research will be challenged to keep up
- Demand for knowledge and training will grow



Questions?



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