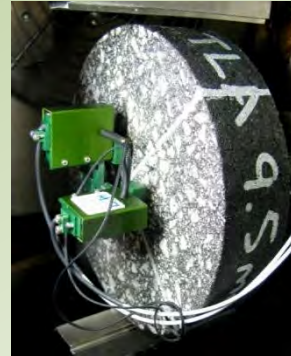




at AUBURN UNIVERSITY

# Implementation and Discussion



# Overview

- WMA
- RAP
- RAS
- Combinations

# Sources



## Warm Mix Asphalt *“The Path Forward”*

Matthew Corrigan, P.E.  
Asphalt Pavement Engineer  
Federal Highway Administration  
Office of Pavement Technology  
Washington D.C.

**2<sup>ND</sup> INTERNATIONAL  
WARM-MIX CONFERENCE**

4



# Sources



## *Recycling Materials Survey*

**RAP ETG**

**Irvine, Ca**

May 10, 2011

Jim Pappas  
DelDOT

# Sources



## RAP, RAS & WMA Survey WMA Only

Kent R. Hansen, P.E.  
Director of Engineering  
National Asphalt Pavement Association





# WMA Technologies Available in U.S.

In 2005





# WMA Technologies Available in U.S.

In 2011

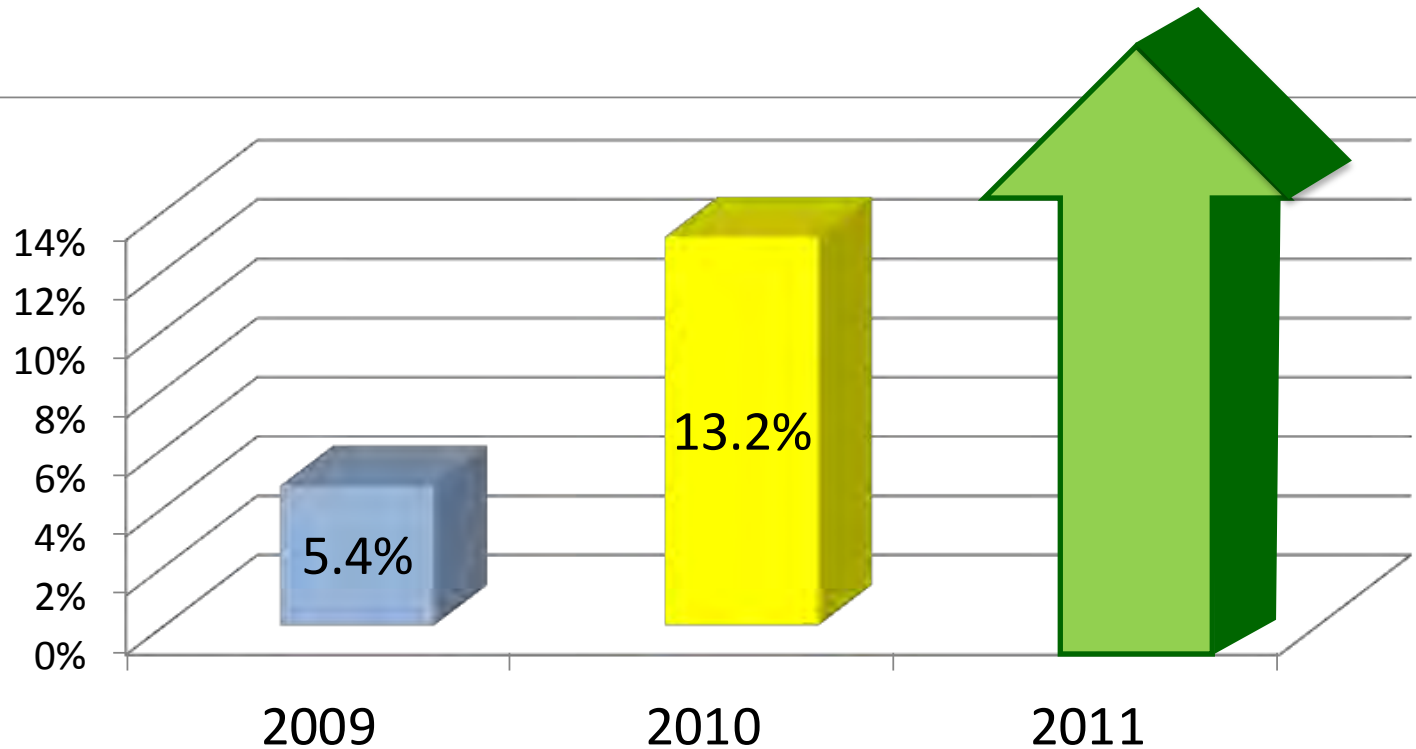
30+





# WMA Usage

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

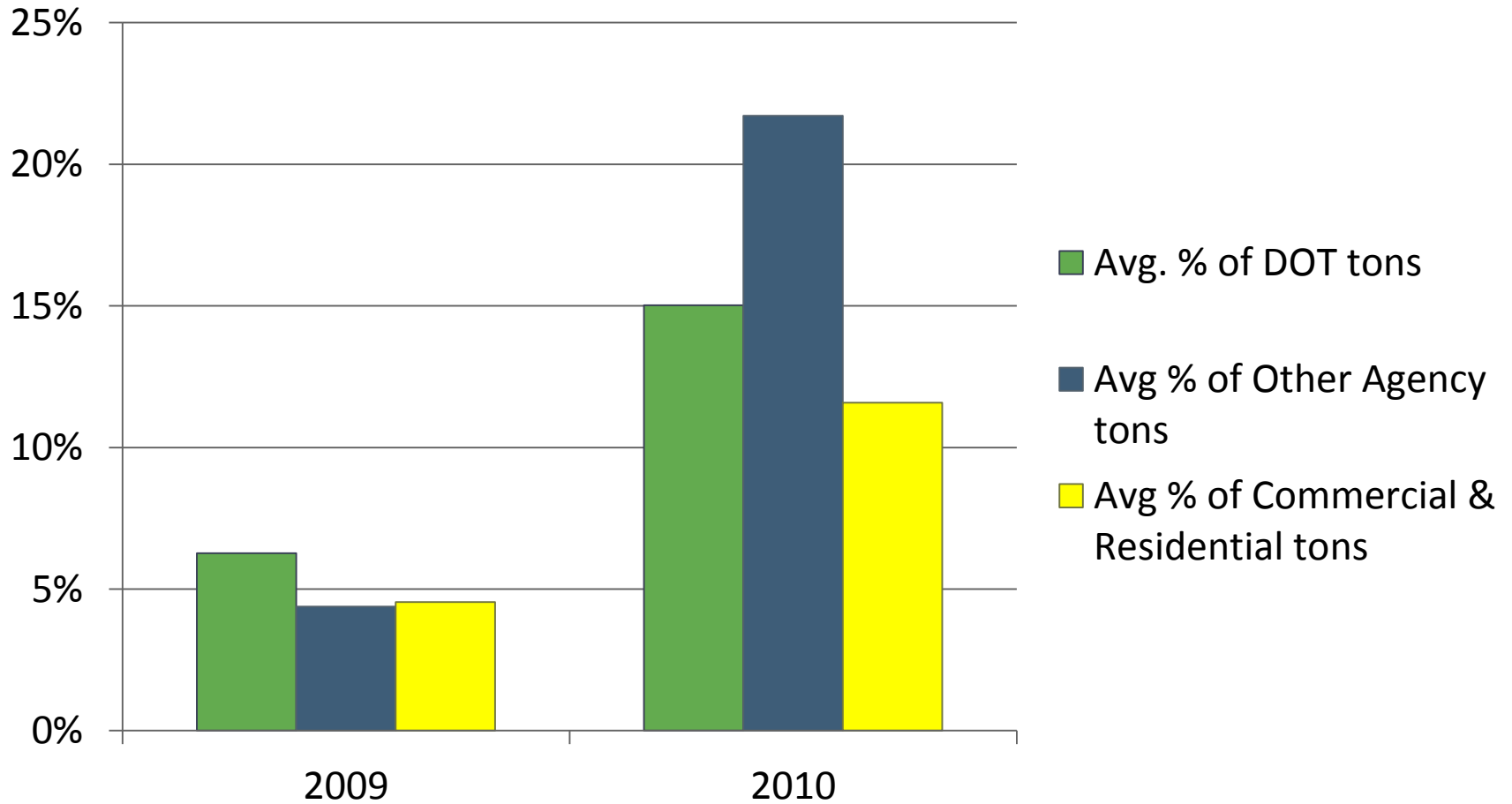


19.2 million  
tons

47.6 million  
tons



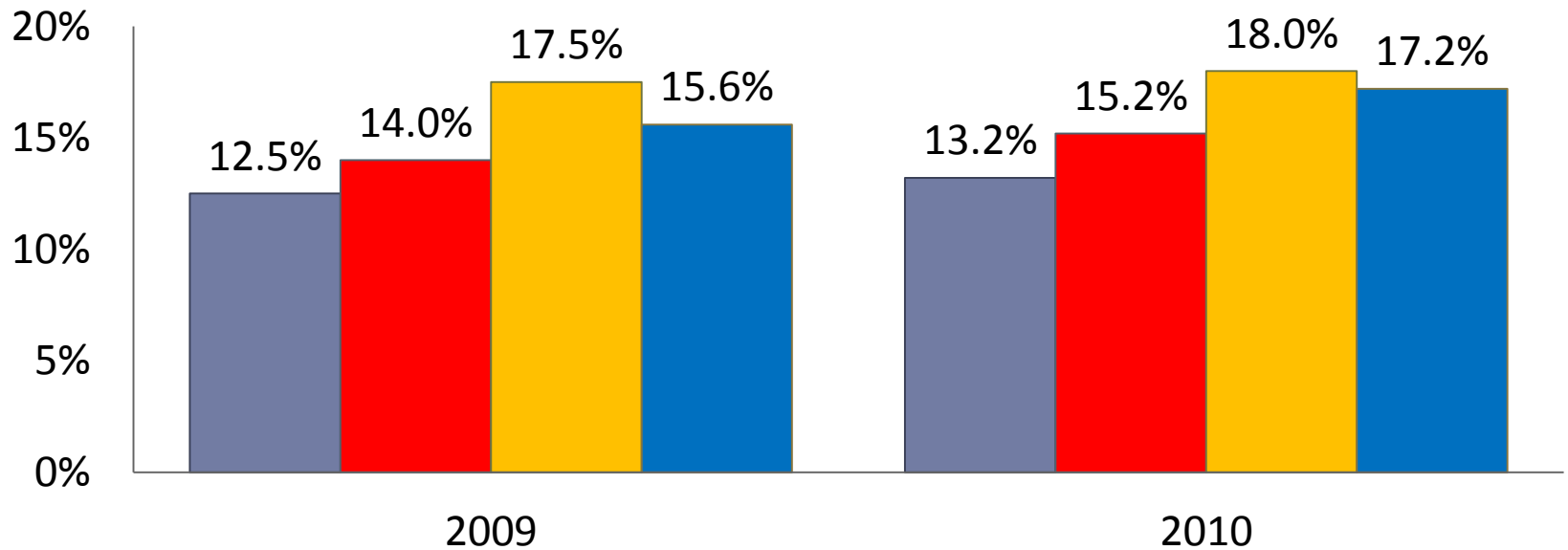
# Reported WMA Percent of Mix Tons



# Challenges for WMA

1. Keeping track of new WMA Technologies
2. Definition of WMA
3. Developing a Mix Design Process that works for all WMA Technologies
4. Improving plant burner efficiencies
5. Lab tests that contradict field performance

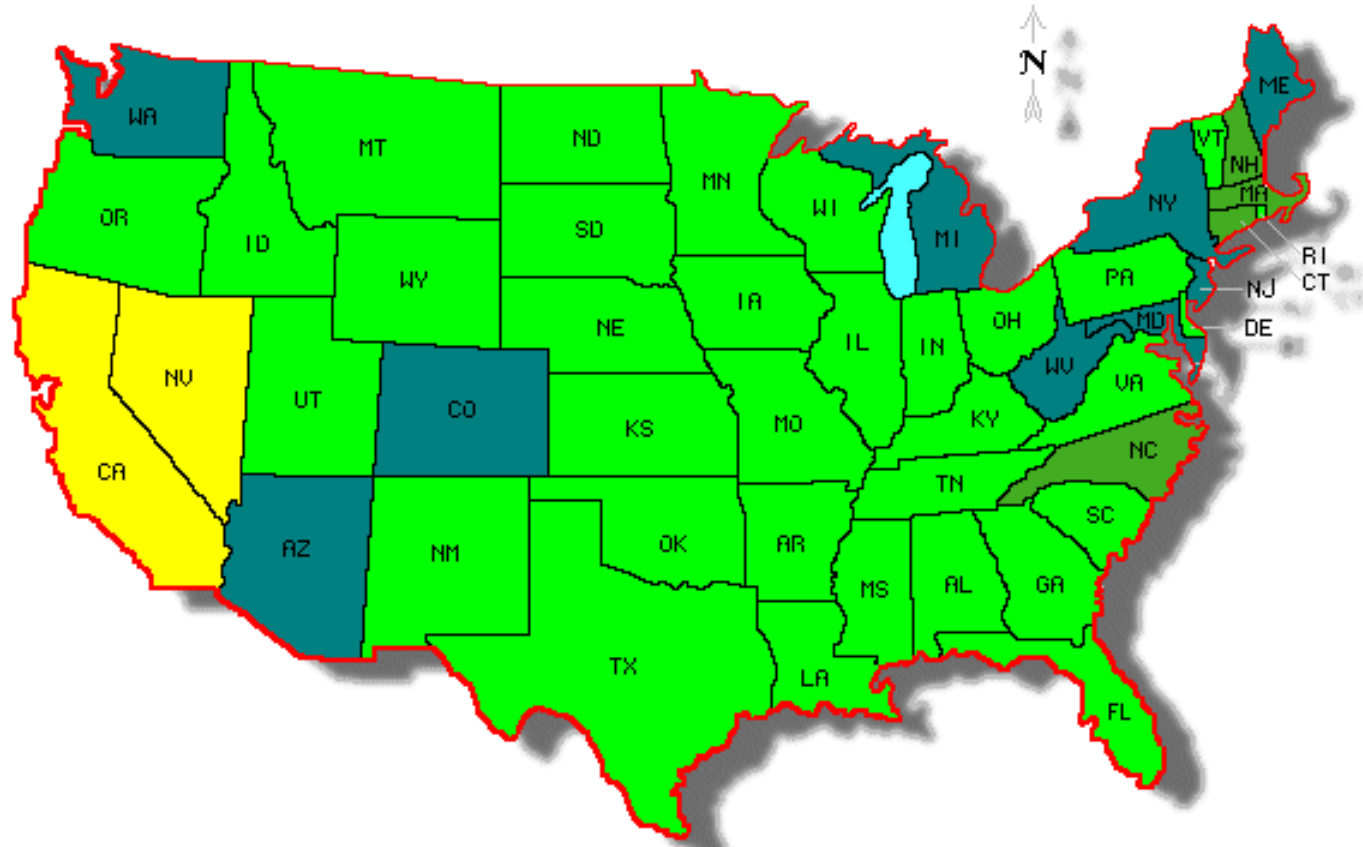
# RAP Usage: Percent of Mix Tonnage



- Avg. % for DOT mixes
- Avg % for Other Agency mixes
- Avg % for Commercial & Residential
- National average all mixes

# Allowable RAP Usage

- - <15%
- - <20%
- - <25%
- - >30%

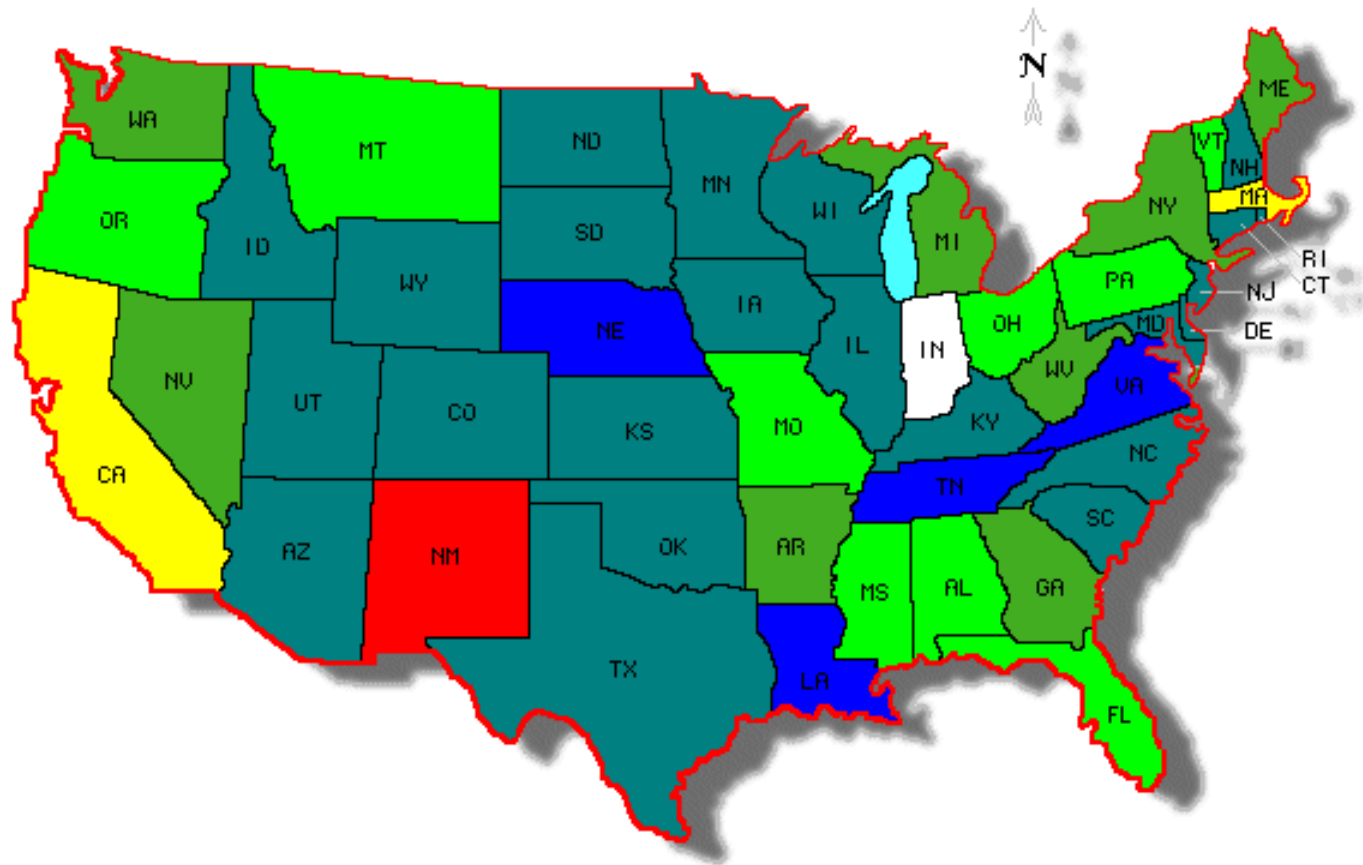




# RAP Usage (Contractors)



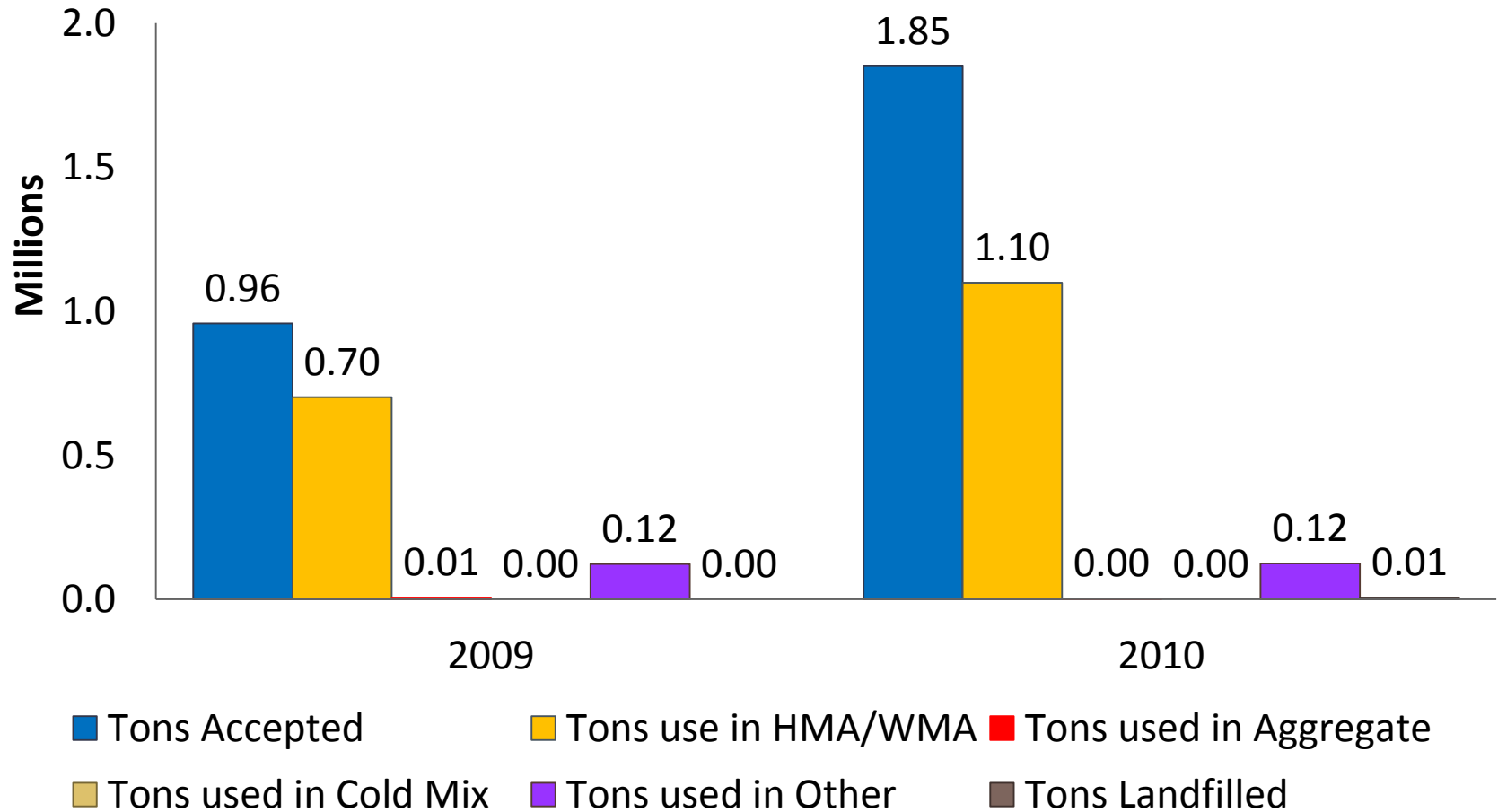
- - 0%
- - <10%
- - <15%
- - <20%
- - <25%
- - >30%



# Challenges for higher RAP contents

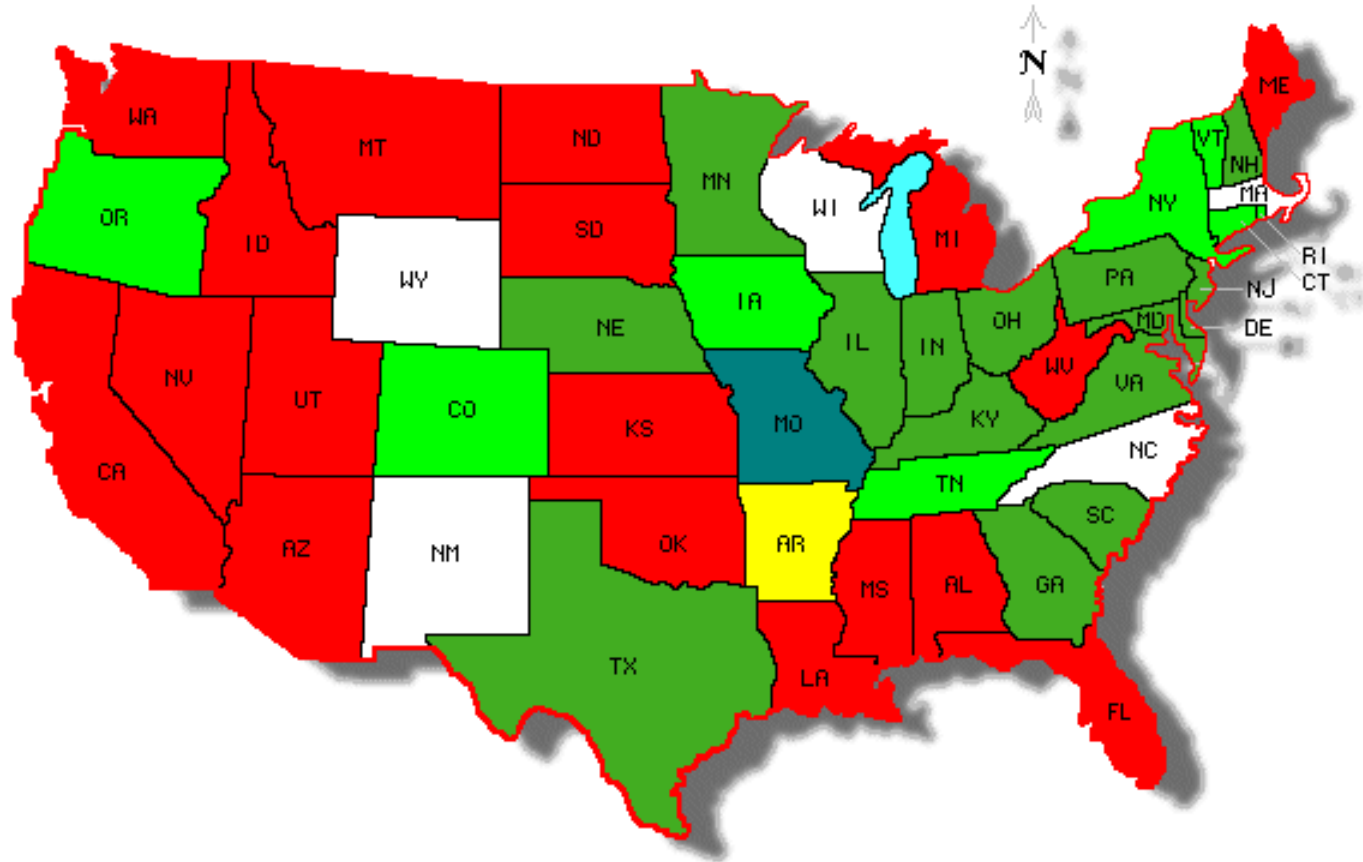
1. Determining the best way(s) to reduce cracking potential
2. Training mix designers and specifiers on nuances of high RAP content mixes

# Estimated Total RAS: Tons



# Allowable RAS Usage

- - 0%
- - 3%
- - 5%
- - 7%
- - Looking Into





# Challenges for RAS

1. Determining the best way(s) to reduce cracking potential
2. Getting more states to allow RAS
3. Training mix designers and specifiers on nuances of RAS mixes

Questions ?