



# Warm-Mix Asphalt

An Opportunity for Environmental Protection

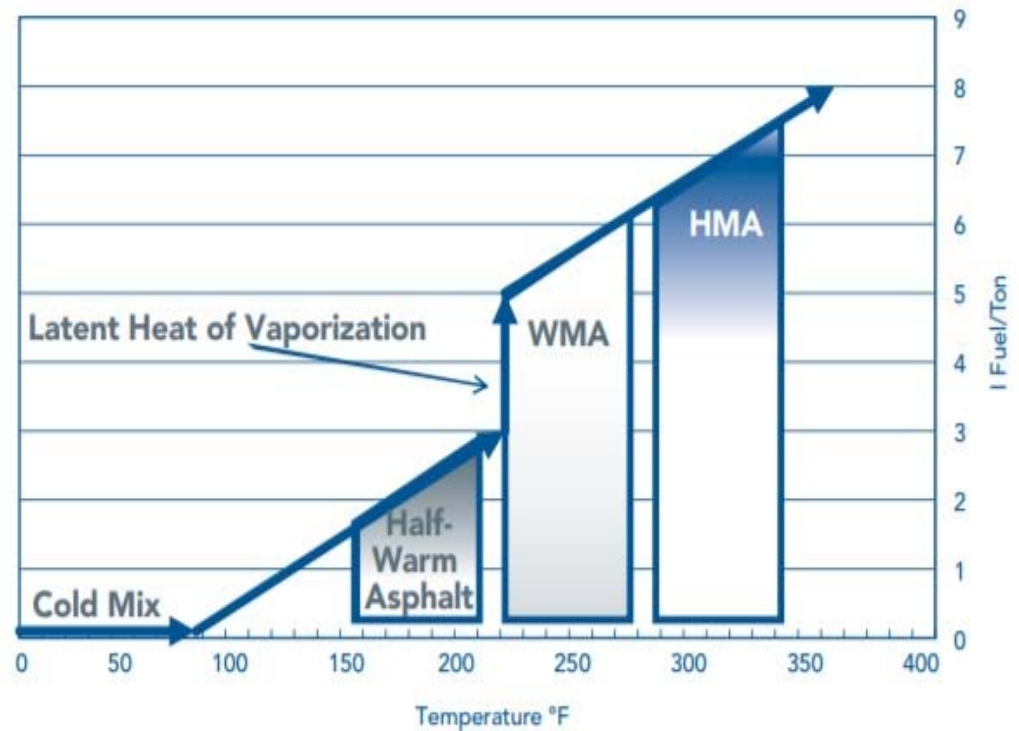
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# What is Warm-Mix Asphalt?

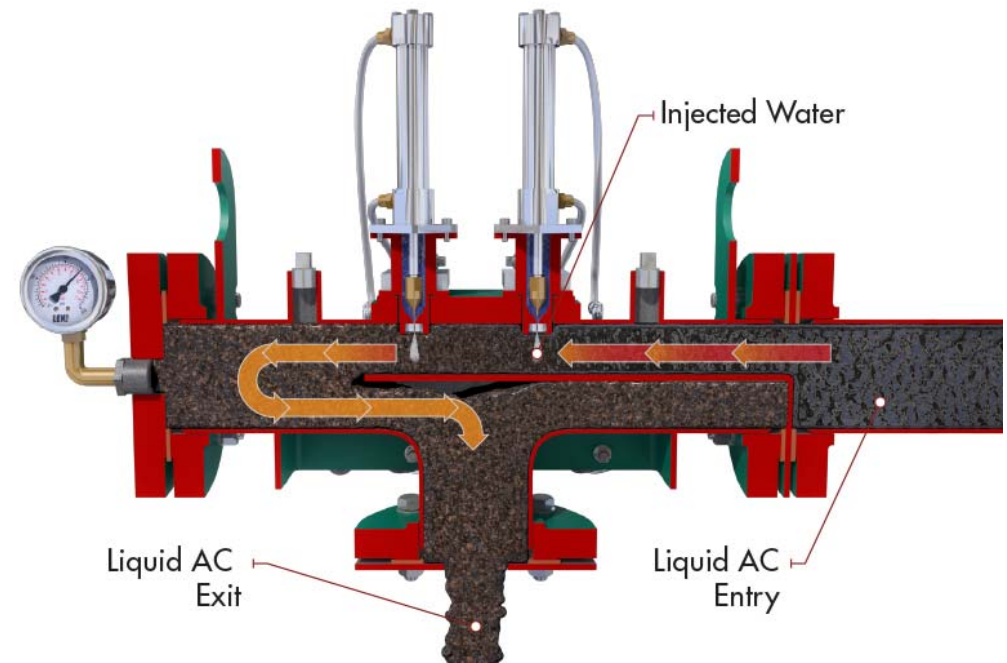
- Hot-Mix Asphalt (HMA)
  - 94% of all roads
  - Asphalt Binder + Aggregate
  - 280°F - ~350°F
- Warm-Mix Asphalt (WMA)
  - Binder + Aggregate + Additive
  - 212°F - 280°F
  - 31.2% of total tonnage





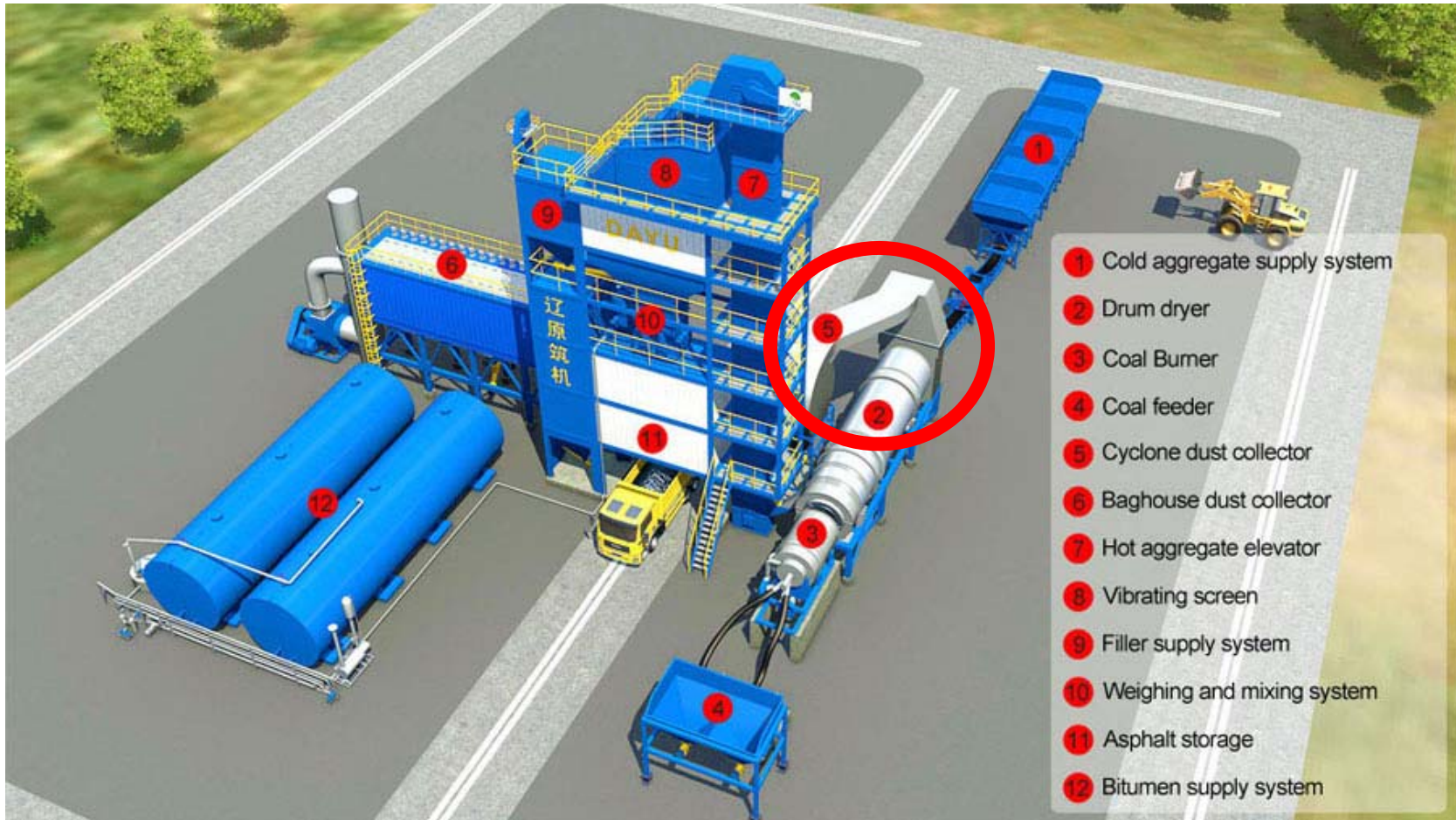
# How is Warm-Mix so cool?

- Reduced Viscosity
  - Aggregate coated easier at lower temperatures
- 3 methods:
  - Water injection (foaming)
  - Organic Additives (waxes)
  - Chemical Additives





# Asphalt Manufacturing







# Environmental Benefits

- Reduces Air Pollution & GHGs:
  - VOCs – 50%
  - NO<sub>x</sub> – 60%-70%
  - SO<sub>2</sub> – 30%-40%
  - CO – 10%-30%
  - PM – 20%-25%
  - CO<sub>2</sub> – 30%-40%
- Reduces Odors & Fumes
- Improved Conditions for Workers
- LEED Credits





# Economic Benefits

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- Lowering temperatures reduces fuel use by 20%-35%
- Increased Production
- Shorter project timelines
- Longer hauls
- Increased use of Reclaimed Asphalt Pavement
- Cold-weather paving



# Performance Benefits

- Compaction Aid
  - Improved in-place density
  - Better Durability – every 1% = 10% increase in pavement life
- Decreased Plant Wear
- Improved temperature uniformity
- Longer placement window
- Increased workability





# Why We Care

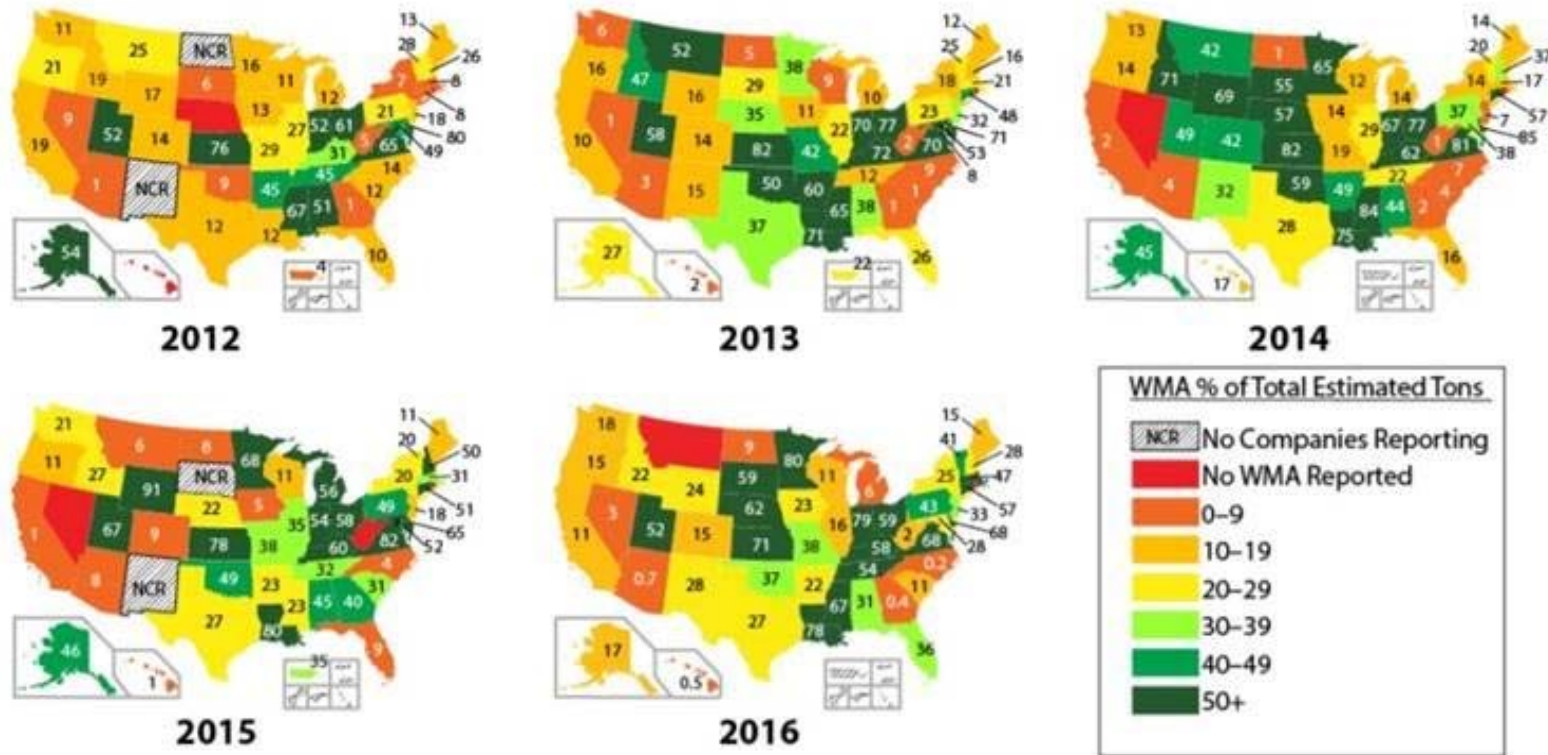


Figure 17: Estimated Percent of Total Production Using WMA by State, 2012-2016





# Outreach Efforts

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- Previously:
  - Case by case – driven by community member complaints
  - Outreach to trade associations (e.g. NAPA, State DOTs, etc.)
- Currently:
  - Illinois, Michigan, & Wisconsin
  - Municipal governments
  - Regional institutions
  - Procuring agencies
  - Utilities



# Specifications

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- Illinois Department of Transportation permits WMA use
- WMA is treated as HMA in all testing specs
- Section 403.02: Recommended Weather Conditions
  - WMA: 15°F to 30°F – 60°F to 85°F
- There are 16 companies on IDOT's approved technologies list: 12 "Mechanical" and 4 "Additive"
- WMA defined by minimum temperature of 215°F



# Obstacles

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- Specifications
- Contract bids
- Initial investment
- Lack of supply
- Lack of demand
- Lack of awareness
- Longevity & performance fears



# Going Forward

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- Published Articles
- Case Studies
- Webinars
- WMA Resources
- Research





Questions?

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