WISCONSIN HIGHWAY RESEARCH PROGRAM

Year in Review
October 1, 2007 – September 30, 2008

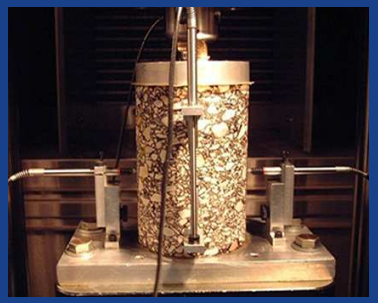
Wisconsin Update

1. Flexible Pavement TOC Activities

2. Asphalt Research Group (UW) Activities

Hussain Bahia
University of Wisconsin – Madison

NCAUPG Annual Meeting
February 4-5, Madison, Wisconsin



WHRP Progress to Date

Completed and ongoing research

- **WHRP --- is 10 years old**
  - *59 completed projects, 32 in progress*
    (as of Oct. 2008)
  - ***Flex TOC:***
    - *20 projects completed (as of Oct 2008)*
    - *In 2008, 4 projects completed*
    - *In 2008 6 in progress*

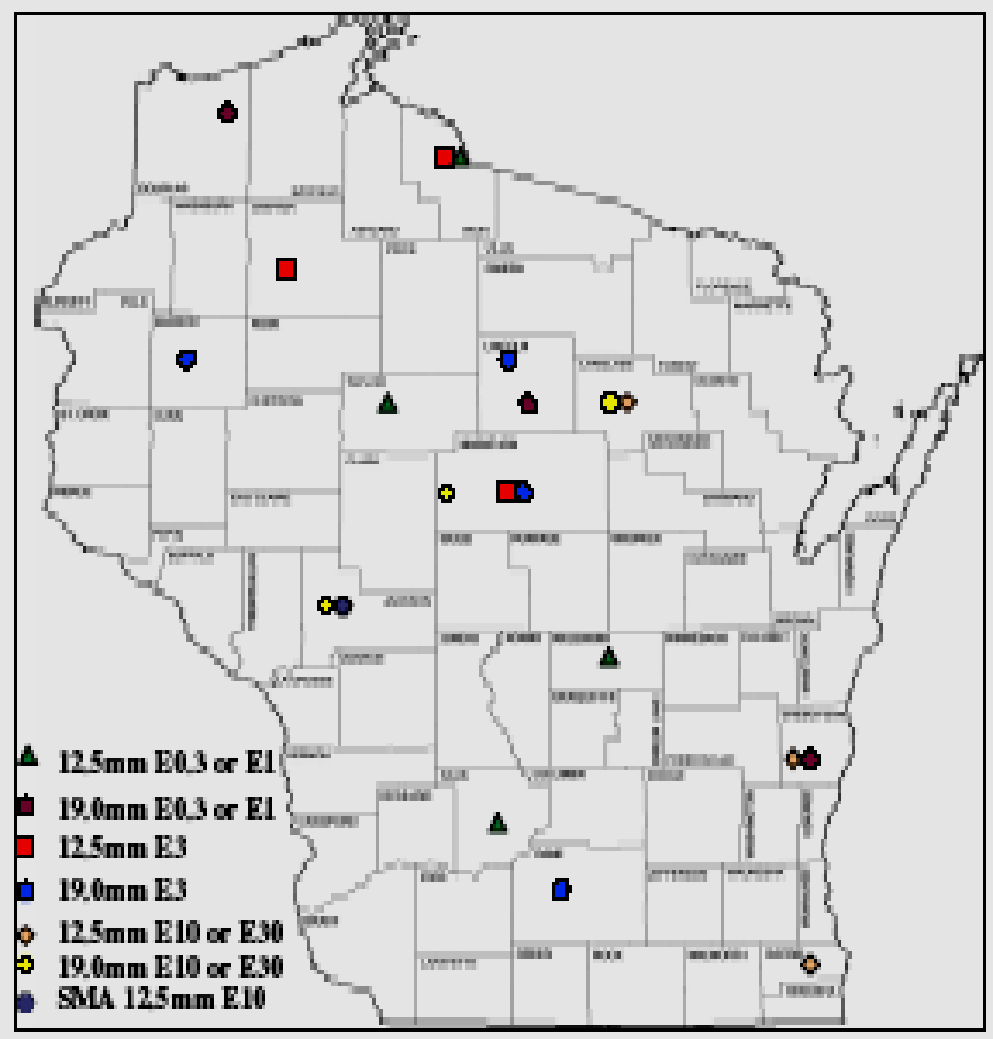
Flex TOC Update
Research Completed – 2008

- Completed Research
  - 02-13: Evaluation of Interlayer Bonding in HMA Pavements
  - 03-13: Field Evaluation of Wisconsin Modified Binder Selection Guidelines
  - 04-07: Testing Wisconsin Asphalt Mixtures for the MEPDG
  - 06-01: Perpetual Pavement Instrumentation for the Marquette Interchange Project

Evaluation of Interlayer Bonding in HMA Pavements

- Slippage can be minimized with sufficiently thick or stiff surface layers.
- Higher stiffness ratio of top to 2nd layer can help pavement resist slippage and related distress.
- Construction quality is very important to slippage resistance.

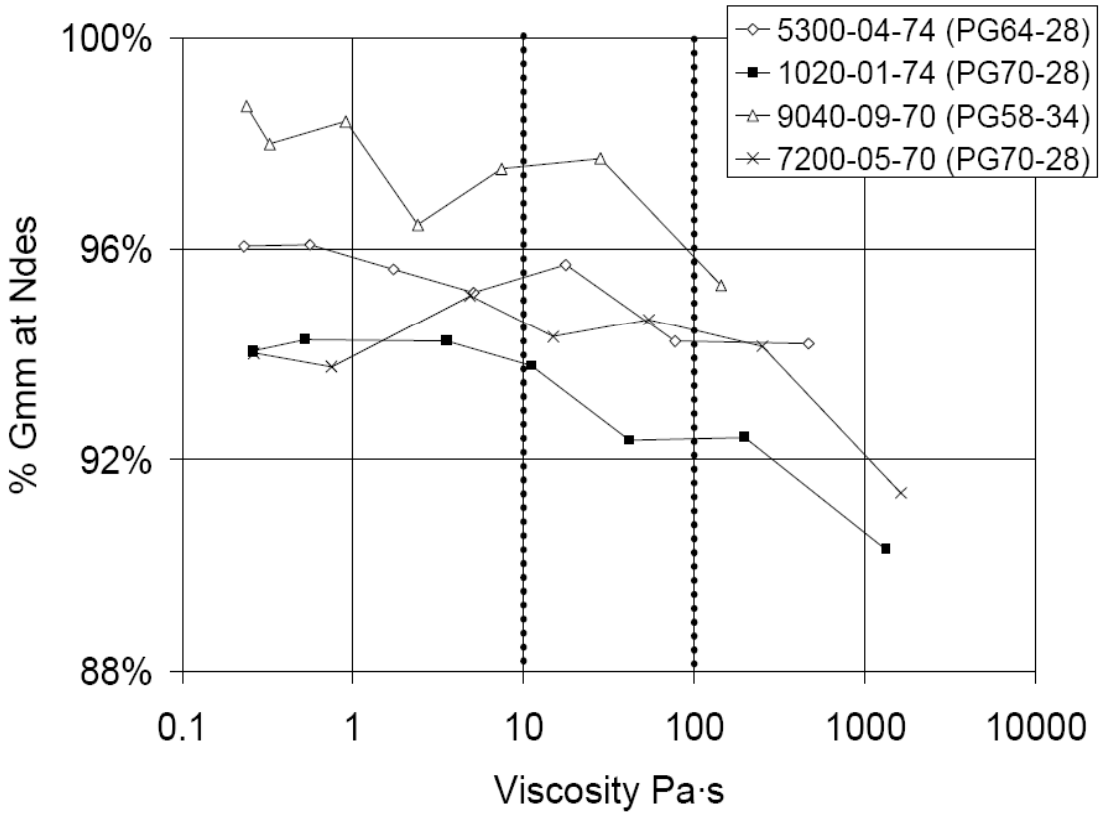
Testing Wisconsin Asphalt Mixtures for the MEPDG



Library of E* & FN values

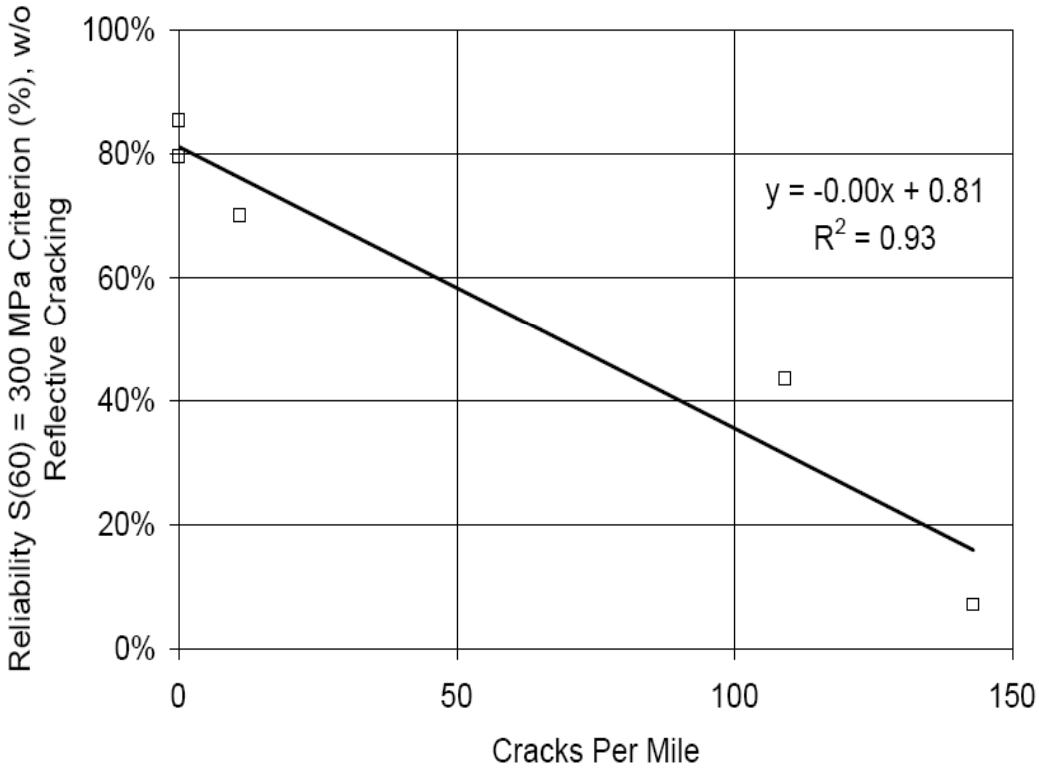
Field Evaluation of Wisconsin Modified Binder Selection Guidelines

- **Mixing and compaction.** Field results show that mixing can be effective at a temperature roughly 20° C lower than current practice. The study specified a viscosity parameter that allows a cooler compaction temperature.



Field Evaluation of Wisconsin Modified Binder Selection Guidelines

- **Low-temperature cracking.** The primary Superpave parameter for low-temperature cracking



Flex TOC Update
Research in Progress

- Research in Progress
  - 07-01: Investigation of the use of OGFC in Wisconsin
  - 08-06: Wisconsin Mixture Characterization Using The SPT on Historical Aggregate Structures
  - 09-02: Performance Evaluation of Tack Coat Materials
  - 08-09: Pre-Overlay Repair of Existing Concrete and Asphalt Pavements

Flex TOC Update
Research in Progress

- Research in Progress
  - 07-17: Relationship Between Lab and Field Compaction
  - 08-07: Evaluation of Intelligent Compaction Technology for Densification of Roadway Sub-grades and Structural Layers (Joint with Geotech)

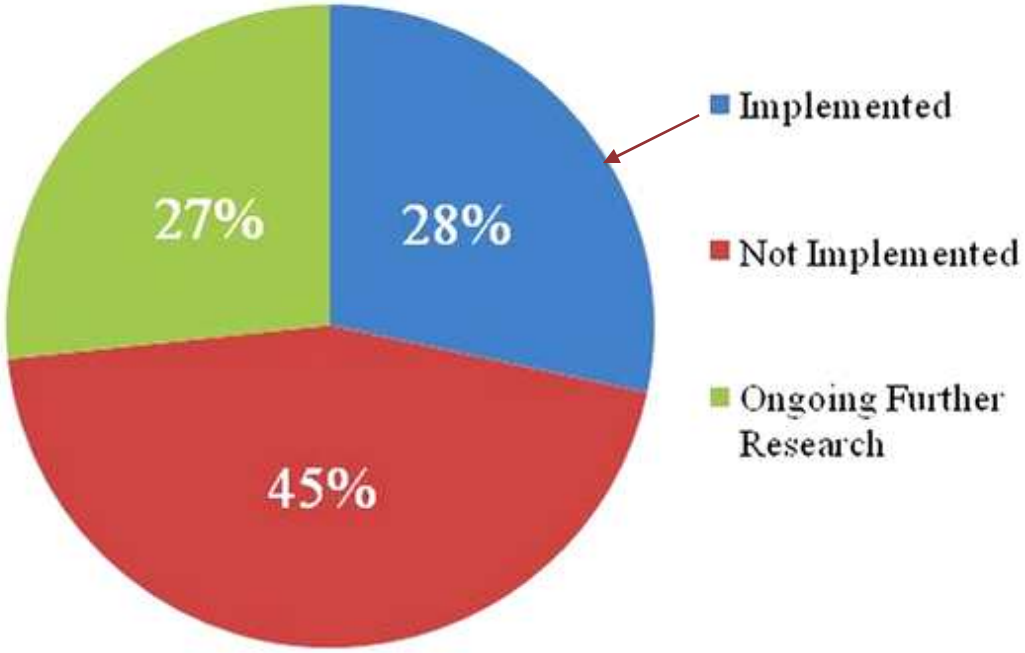
Impact of Completed Research Projects

~ 60 Completed Projects… What is the impact?

Defined two categories

- Implemented
  - Changed Practice
  - Validated Current Practice
- Not Implemented:
  - Not Implementable
  - Further Research
  - Implementation Project
  - Pending Action

Impact of Completed Research Projects



- Performance Measure – Projects Implemented
  - Average for all TOCs: 28%
  - Range for TOCs: 15% - 45%

Implemented Projects
Flex TOC

- Validated Practice
  - 00-04 – *Minimum Pavement Thickness for Superpave Design:* Verified Layer thicknesses in 460.3.2 were appropriate.
  - 05-07 – *Guidance for Rubbilization*: Current Guidelines were verified.
- Change in Practice
  - 45-98 – *Field and Lab Evaluation of FAA:* Table 460-2 in specifications changed to include the statement that FAA values are for design, not construction.
  - 00-06 – *Temperature Density Relationship of HMA:* Density criteria in Section 460.3 were modified.
  - 07-22 - *Overlay Design Procedures for Flexible Pavements:* Analysis tool and modification to FDM 14-10-30 to increase reliability of overlay design (AASHTO ’93 method).

WHRP Support of MEPDG – Past Efforts

- TOCs have 14 projects from 2002 - 2008
  - Flex: 2 In Progress, 4 Completed
  - Rigid: 1 In Progress, 1 Completed
  - Geotech: 4 In Progress, 2 Completed

- Projects include:
  - Materials Characterization
  - Monitoring of Performance / Calibration

Other Asphalt Research in WI

- **NCHRP 9-45:**
  - Test Methods and Specification Criteria for Mineral Filler Used in HMA
- **Asphalt Research Consortium:**
  - Emulsions and Cold Mixtures Technologies
  - Warm Mix Asphalt Guidelines
  - Testing binders in RAP without Extraction

Focus on Sustainability …. Eco-efficiency

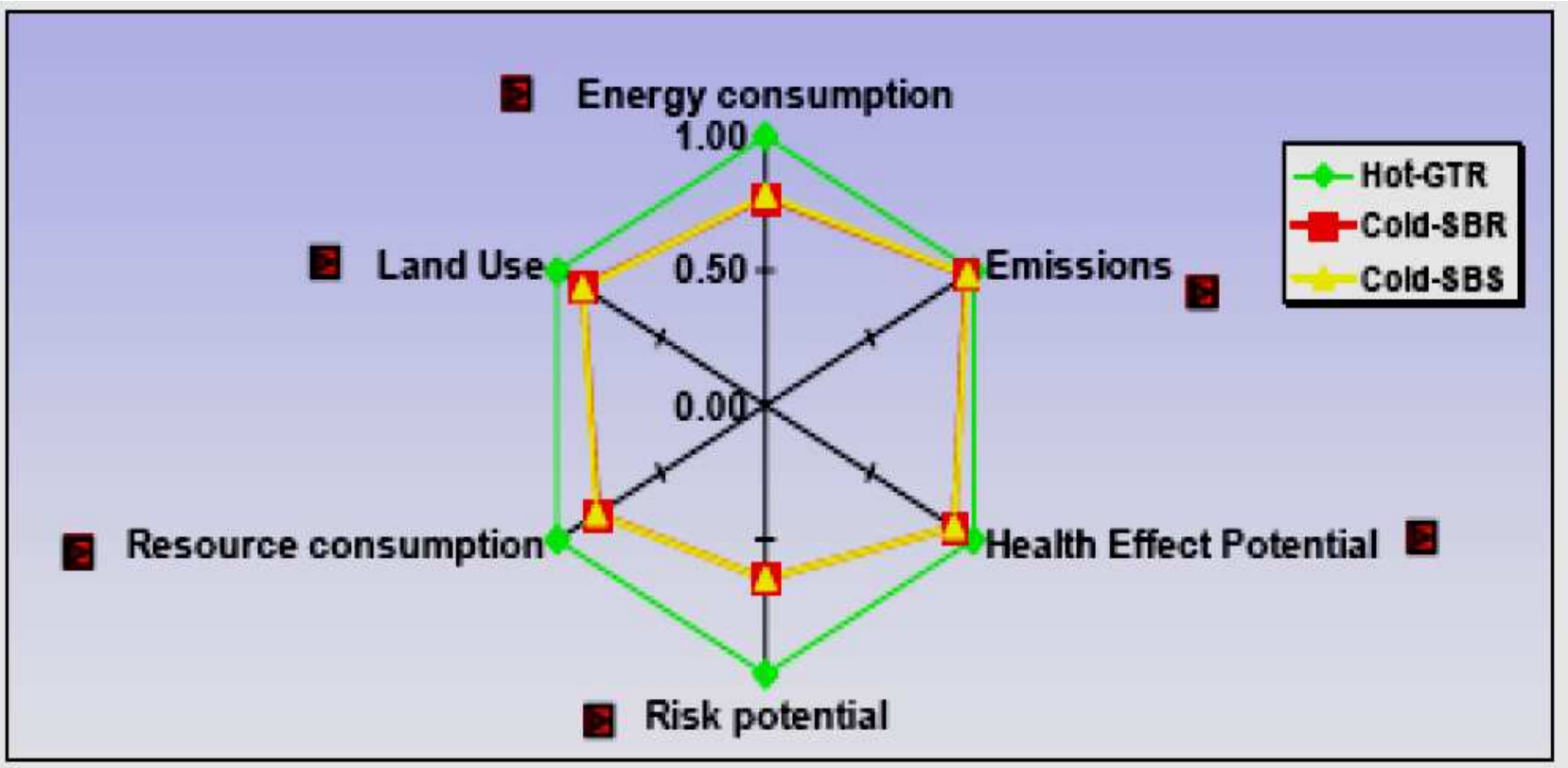


Figure 3: Eco-efficiency analysis of chip seals (Source: Wall)

Green Asphalt Technologies
Low emissions .. Less energy

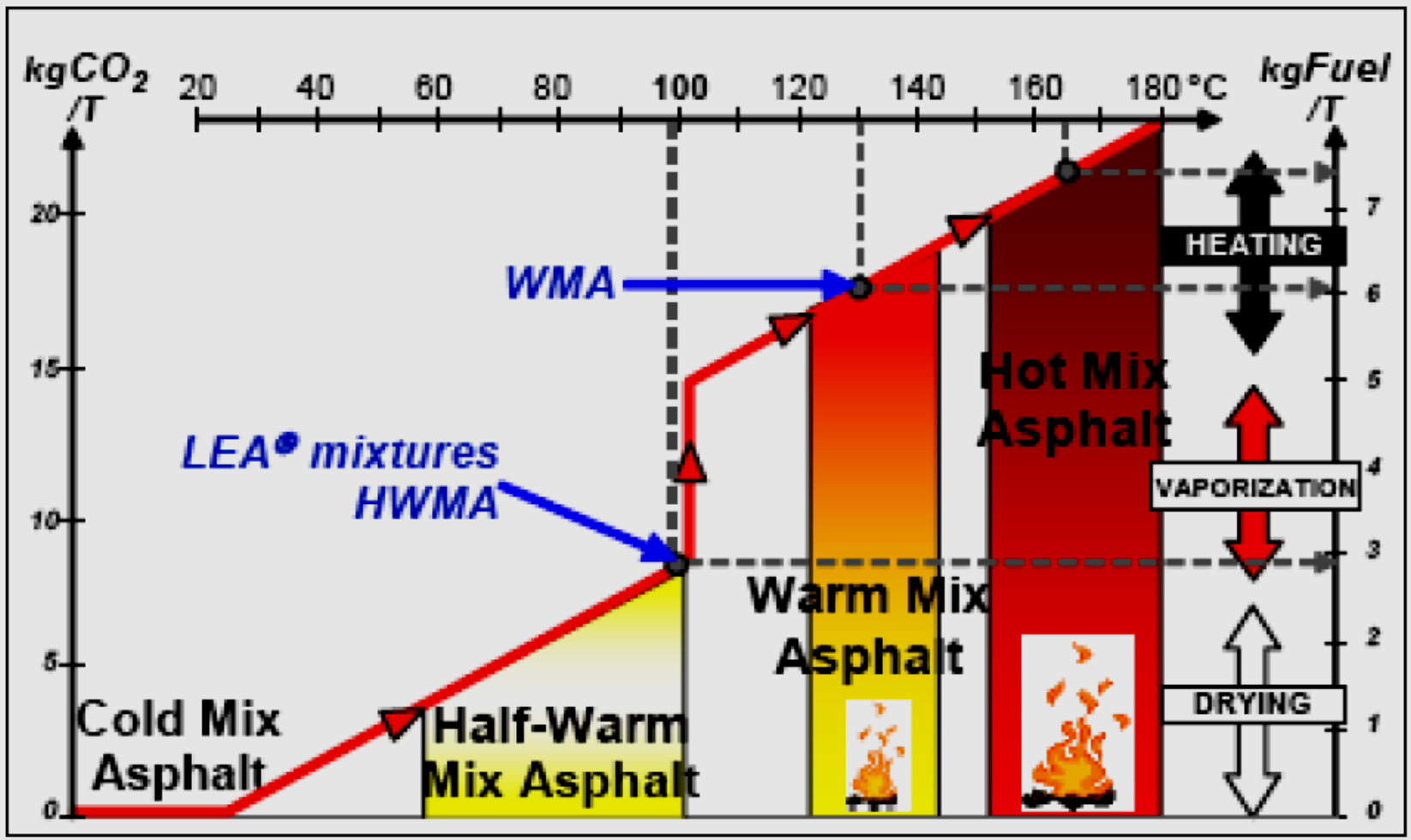
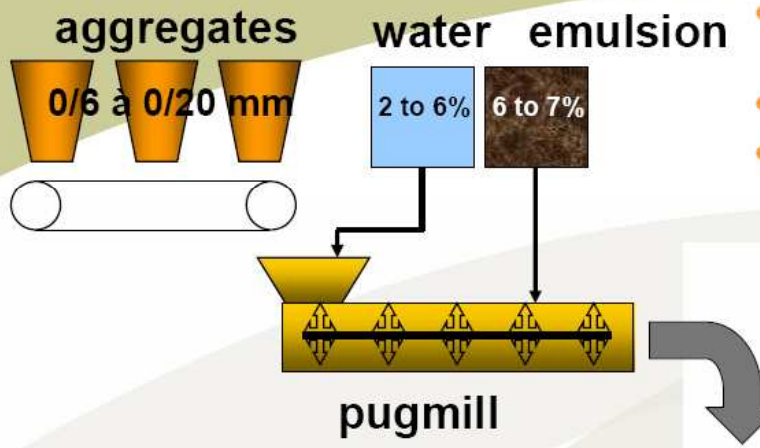


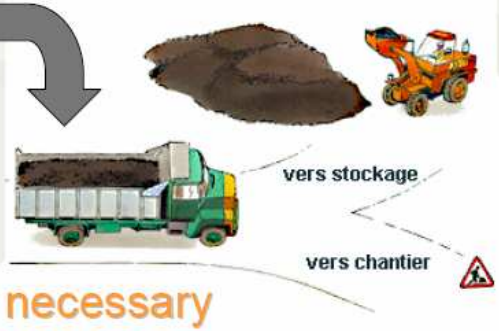
Figure 4: Fuel consumption and CO_2 emission for heating one ton of wet aggregates (Source: Olard)

Cold Asphalt Technologies As an alternative ….

Standard production scheme



- Preferentially soft asphalt PG 64-22
- Emulsion 60-65% asphalt
- Emulsifier :
  - Slow cationic 0,4 to 1 % based on emulsion weight
  - pH=2 (HCl or H_3PO_4)



Laboratory study is absolutely necessary to adapt emulsion to aggregate for this type of road application

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Green Asphalt Technologies

Tested for Wisconsin Winters and Cows !

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Thank you

- Contact us
  - Hussain U Bahia
    - bahia@engr.wisc.edu
  - Andrew Hanz
    ajhanz@wisc.edu

  - http://www.WHRP.org
  - http://www.UWMARC.org