AAPA 2012 Study Tour to Europe – Sustainability

Sustainability

2012 Study Tour Key Topics

1. Long life pavements
   - Experience, design systems, use, durability & performance
2. High performance asphalt & binders
   - High modulus asphalt (EME, HIMA), modifiers
3. Sustainability
   - RAP/WMA, bitumen substitutes, carbon calculator & energy analysis
   - Climate change impacts, societal concerns
4. Health & Safety
   - Construction of road works, health considerations for bitumen and asphalt products
5. Procurement Systems
   - Proprietary products (Avi Technique, HAPAS, etc.), “green” procurement, REACH, responsible sourcing, PPP contract models

Topic 3: Sustainability

Overview of reasons - Challenges

- Climate Change – Green House Gases
- Future Carbon Tax
- Increasing Demand - Limited Resources
- Ageing Infrastructure - Rehabilitation
- Waste Reduction - Focus on Recycling
- Reduced Construction Periods – Minimise Delays
- Society’s Perceptions & Funding Constraints

Questions

- Recycled Asphalt Pavement (RAP)
  - How Extensively Used / Percentage Added
  - RAP Materials – QA, Binder Types, Ownership
  - Mix Design Changes – Binder Type & Quantity
  - Production Issues – Blending, Mixing, “wet” RAP
  - Placing Issues
- Warm Mix Asphalt (WMA)
  - How Extensively Used
  - What Technologies – Most common
  - Design & Testing Changes
  - Problems / Performance Issues
- RAP in WMA
- Other Low Temperature Technologies

Questions

- Bitumen Alternatives
  - Long Term Binder Availability
  - Reliance on Oil
- Carbon & Energy Calculators
  - What, When, Where & Why are they used?
- Climate Change
  - Is it being considered?
  - What Material / Specification changes?
- Societal Concerns
  - Perceptions of Asphalt Industry
  - Other Recycling Opportunities

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

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3 Pillars

- Environmental
- Economic
- Social well-being
- Today and Tomorrow.
EU goal to reduce primary energy use 20% in 2020

- EU’s Emission Trading Scheme, where CO2- licences are sold
- Technique is not the problem, problems are always political and managerial

UK Decision Makers
- Policy is not an obstacle - opportunity for the local industry
- New Technologies
- Competitive Advantage
- Most Rapidly Growing Sector
- Generates Jobs
- Export Opportunities

European Recession and Financial Crisis
- Lowest Capital / Whole Life Cost ≠ Lowest Carbon Footprint?

Main environmental loads come from the use of the road, not from the initial investment.
- Low rolling resistance pavements => 3−5% reduction in fuel consumption

Recycled Asphalt Pavement (RAP)
- 1st goal is Recycling of RAP
  - same function as in the original application
  - adding the reclaimed asphalt to new asphalt mixes
- 2nd option is Re-use of RAP
  - lesser function than in the original application
  - foundation, fill or base course material

Recycling, durability and environmentally compatible raw materials.

Globally CO2 footprint asphalt construction

- Recycled Asphalt Pavement (RAP) to reduce the demand for raw materials
- Warm Mix Asphalt (WMA) techniques to reduce the energy demand during asphalt production.
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**Reclaimed Asphalt Recycling Trends**

<table>
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<th>Netherlands</th>
<th>France</th>
<th>Italy</th>
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**Circular letter of the French Ministry of Ecology**

February 9, 2009

Two recommendations:

1. Authorize the incorporation of 10% of recycled asphalt in the asphalt concrete without type testing (NF EN 13108).
2. Integration, into government contract, of criteria which encourage the use of recycled asphalt.

**Approaches to Increasing RAP Content**

**The Netherlands - “Rijkswaterstaat” (RWS) adopted a market approach**

- Use functional specifications and give design freedom to the market.
- Do not prescribe solutions unless there is a specific reason.
- Do not prescribe recycling, low energy asphalt, sustainable materials.
- Challenge the market to come forward with innovations (techniques, materials, processes).

**Increasing asphalt recycling requires:**

- Stronger support from the authorities and engineering community/consultants.
- Adapt asphalt specifications.
- Regulations with regard to dumping/tipping of reusable material.
- RAP should be regarded as a building material and not as a waste.
- Client stimulus to recycle.
- Legislation to stimulate recycling.
Some Benefits

- Construction and demolition waste (mixtures of concrete and masonry) as high quality base and subbase layers. May be improved by foamed bitumen or cement stabilization.
- Slags from the metallurgical industry
- Ground tyre rubber (GTR)
- Polyolefin plastics recovered from waste streams
- Sulfur - “desulfurisation” to meet new sulfur limits in various light petroleum products

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WASTE / BY-PRODUCTS / SURPLUS

- Some waste materials have a negative market value
- Who takes the long term risks?

![Graph showing WMA in France]

Source: IDRRM - May 2011

WMA in France
- 2008 = HALF million tonnes
- 2010 = ONE million tonnes
- 40 millions tons/year of HMA

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- Benefits of WMA recognised
  - Reduced energy costs
  - Reduced emissions
  - Better working conditions
  - Less oxidative hardening
  - Use of higher RAP contents
  - Extended paving seasons
- Some questions remain to quantify WMA efficiency
  - Reduced energy consumption
  - Environmental benefits
  - Performance of WMA mixes as compared to their HMA
  - Stiffness and rutting resistance (due to reduced oxidative ageing)
  - Water sensitivity
  - Low temperature performance
  - Relevance of the RTFO short term ageing procedure

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- A high degree of recycling gives far bigger effect on carbon emissions than low production temperature.
- The high recycling percentage should not be sacrificed to get lower production temperature.
- Both of these can be reached with WMA-process.
- RAP represents major stakes for both bitumen and aggregate resource conservation.
- Better and more optimal RAP management
- Waste / by-products must not reduce the quality of asphalt or restrict future recycling of that asphalt.
Topic 3: Sustainability

- Three pillars: environment, society and economy
- Sustainable development gives opportunities, it is not only a threat
- High quality durable pavements with long life
  - Reduce risk of premature failure
  - High quality during the asphalt production and paving
  - Well trained workers
  - Good knowledge of asphalt as a construction material

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TRL - England
Brussels Colas - France Germany