



STUDY TOUR 2012

5th EURASPHALT & EUROBITUME CONGRESS

ISTANBUL

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 calculators & energy analysis
climate change impacts, societal concerns

4. Health & Safety

- Construction of road works, health considerations for bitumen and asphalt products

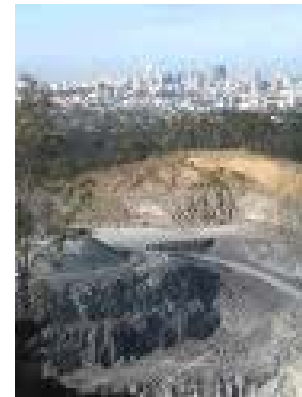
5. Procurement Systems

- Proprietary products (Avis Technique, HAPAS, etc.), “green” procurement, REACH, responsible sourcing, PPP and contract models

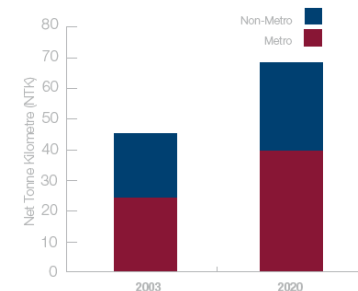
Topic 3: Sustainability

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



Heavy Vehicle NTK



“Twice the Task”

Topic 3: Sustainability

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



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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



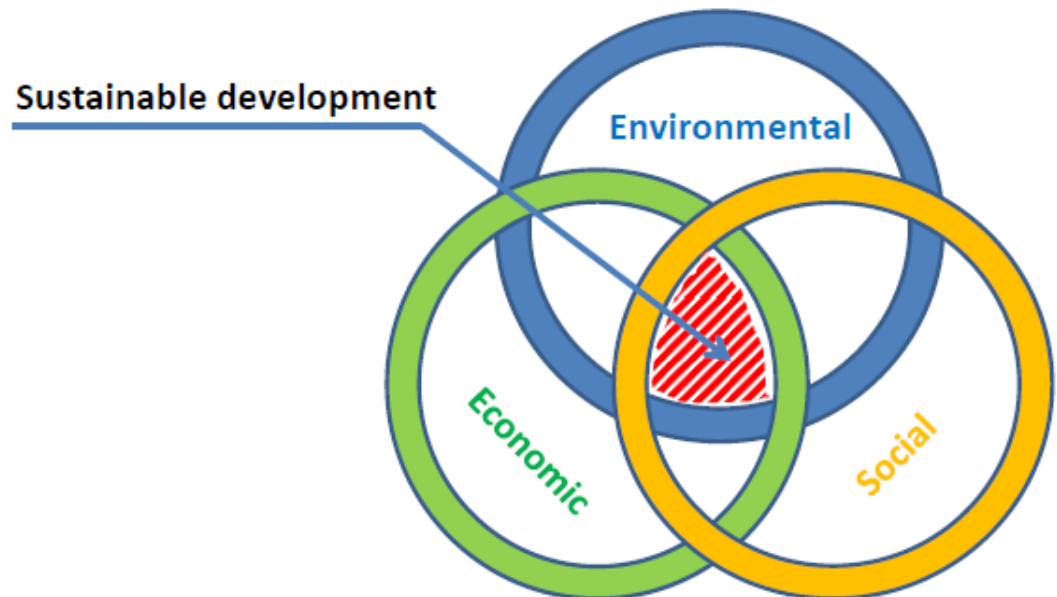
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"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

United Nations World Commission on Environment and Development

3 Pillars

- Environmental
- Economic
- Social well-being
- Today and Tomorrow.



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EU goal to reduce primary energy use 20 % in 2020

UK targets

Reduction in GHG

2020	34 %
2050	80 %

Swedish targets

Reduction in GHG

2012	4 %
2020	40 %
2050	no net emissions

Baseline year 1990

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

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- 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 \neq Lowest Carbon Footprint?



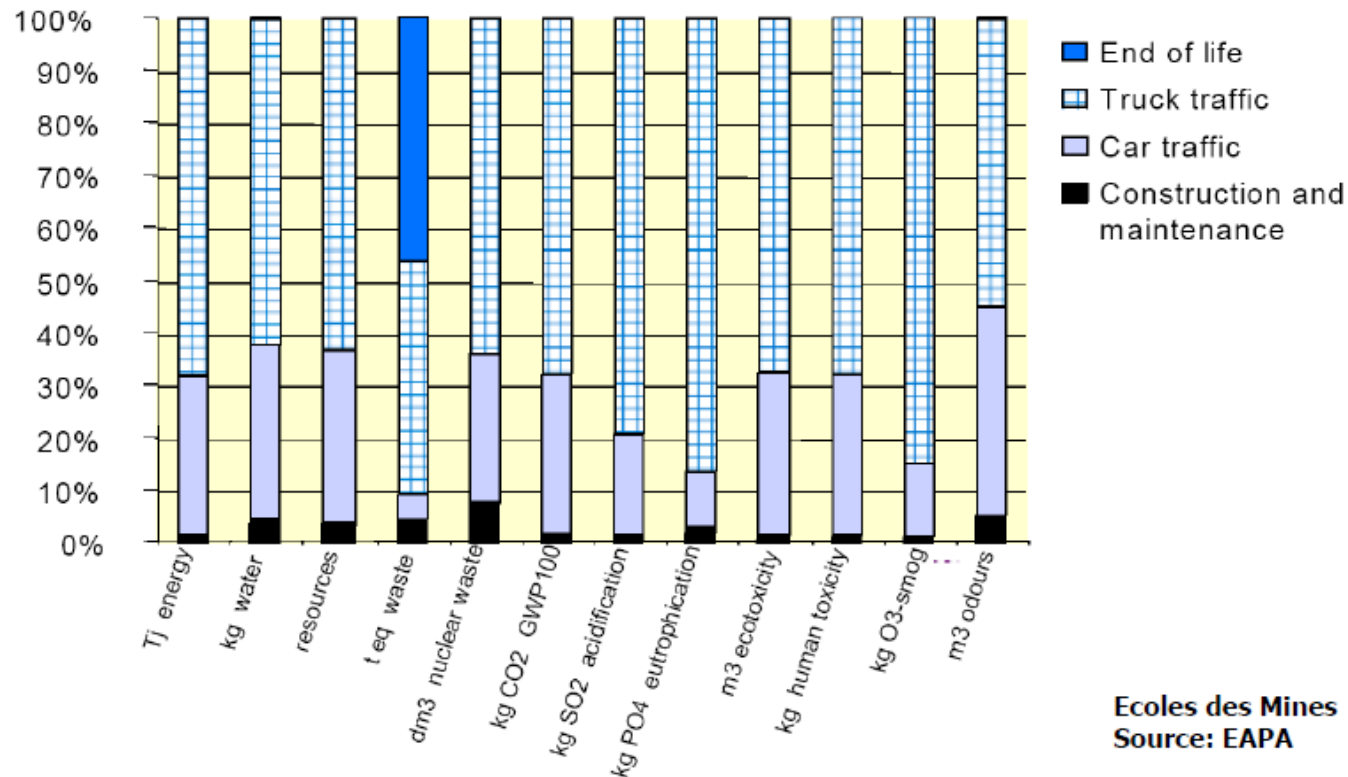
Topic 3: Sustainability

- European standardisation work - sustainable use of natural resources.
- *CEN TC350 Sustainability of Construction Works*
 - Designed, built and demolished so that the use of natural resources is sustainable.
 - Environmental product declarations (EN 15804) contain core rules
- Recycling, durability and environmentally compatible raw materials.



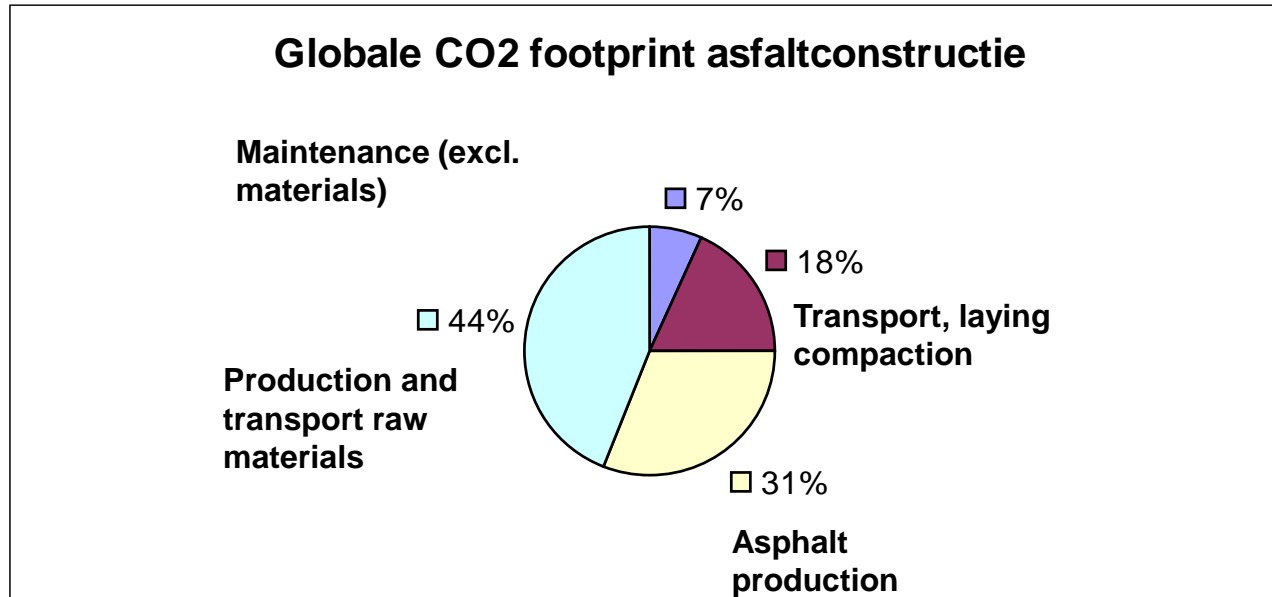
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Reduction in Delays has a big Effect on Pollution



- 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

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



Topic 3: Sustainability

Recycled Asphalt Pavement (RAP)

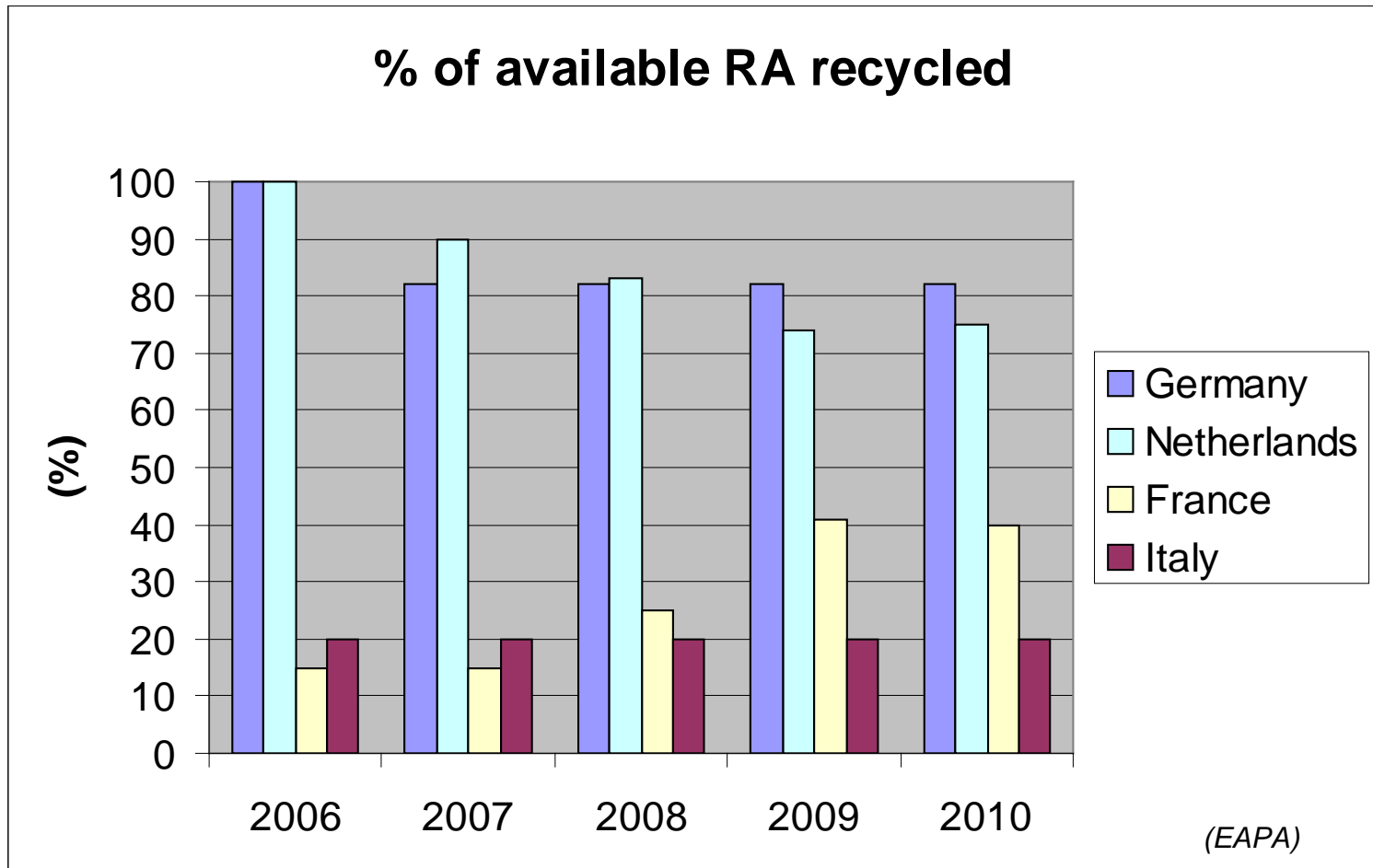
- 1st goal is Recycling of RAP
 - same function as in the original application
 - adding the reclaimed asphalt to new asphalt mixes
- 2nd option is Re-use of RAP
 - lesser function than in the original application
 - foundation, fill or base course material



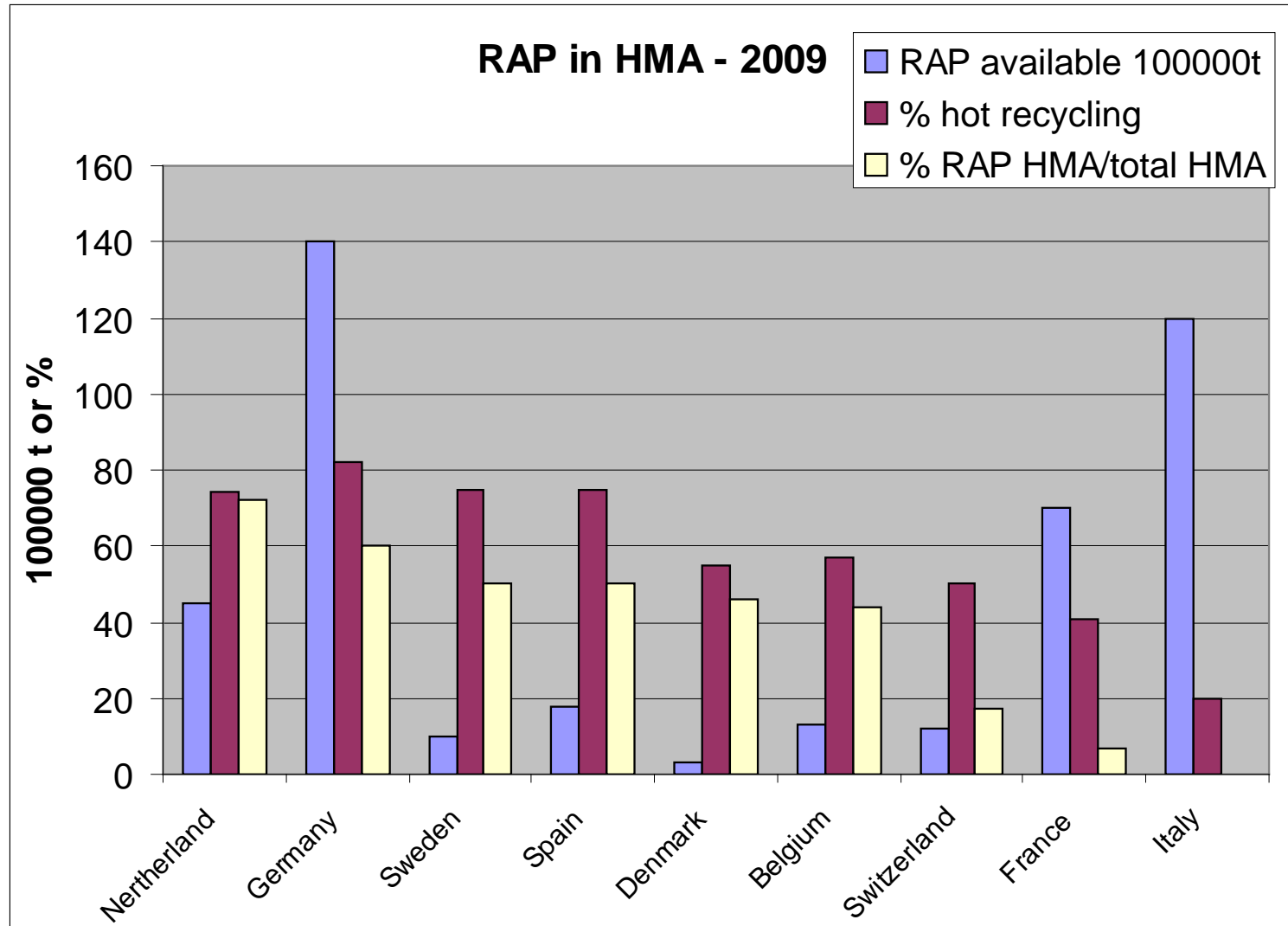


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Reclaimed Asphalt Recycling Trends



Topic 3: Sustainability





Topic 3: Sustainability

- %RAP depends on the type of mix (The Netherlands):
 - Stone Mastic Asphalt Nil
 - Porous Asphalt Concrete 20%
 - All other mixtures and layers 50%
 - Allowable amount of RAP will increase in the future
 - Mixtures made of 100% RAP have been produced.
- Dutch practice is to mill off and separate each different mix type into separate stockpiles
- French place strong emphasis on homogenous stockpiles of RAP
- More optimal RAP management is needed to fully utilise the recycling potential



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Approaches to Increasing RAP Content

Circular letter of the French Ministry of Ecology February 9, 2009

Two recommendations

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



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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)

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Increasing asphalt recycling requires:

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



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WASTE / BY-PRODUCTS / SURPLUS

- 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 metallurgic industry
- Ground tyre rubber (GTR)
- Polyolefin plastics recovered from waste streams
- Sulfur - “desulfurisation” to meet new sulfur limits in various light petroleums





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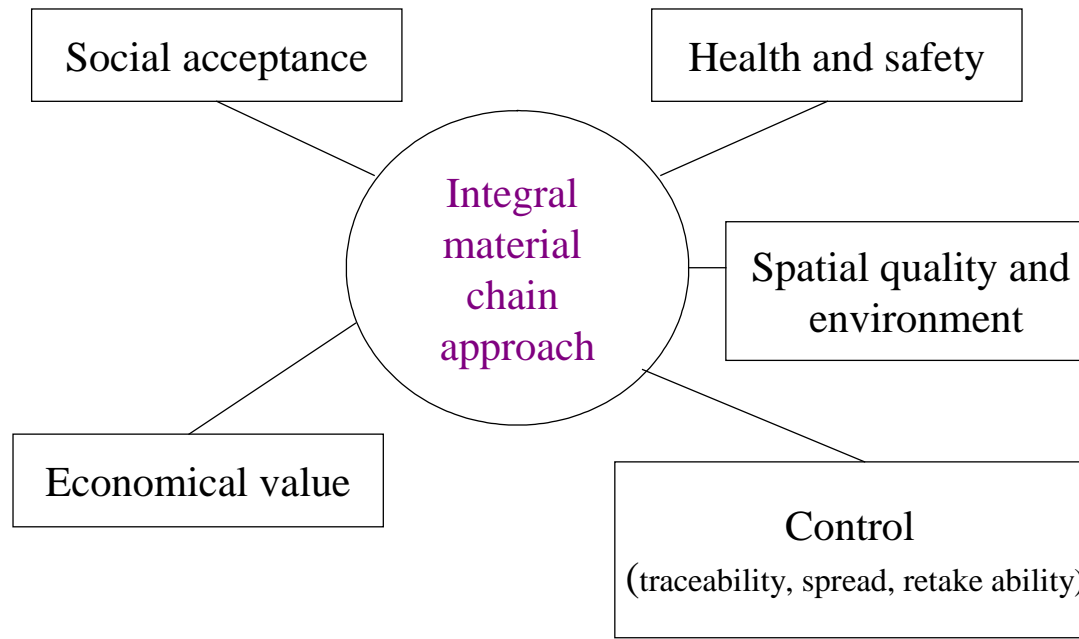
WASTE / BY-PRODUCTS / SURPLUS

- “Re-recycling” of waste recycled asphalt pavements with respect to hazards and performance.
- Waste products in asphalt should not subsequently restrict the recycling of that asphalt.
- Adaptation or devising new test methods / specifications / mix design / pavement design for these new materials.
- The quality of asphalt must not be risked by solving a recycling problem of another material.

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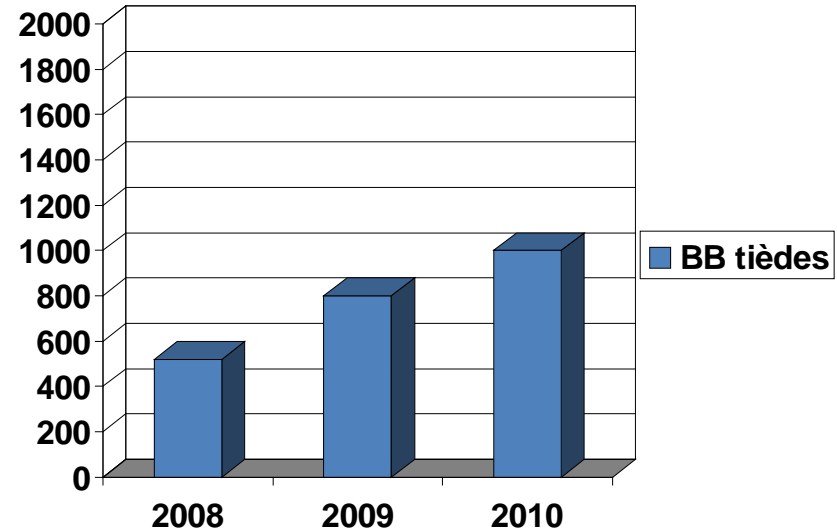
WASTE / BY-PRODUCTS / SURPLUS

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



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- Many Warm Mix Asphalt production techniques originate in Europe
- Relatively limited use of the technologies
- EAPA Environment Group's *2012-2014 Work Plan for Sustainability* - stimulate the use of Warm Mix Asphalt



Source IDRRIM – 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 RTFOT 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

