The (Dutch) situation

Warm Mix Asphalt

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Present status

- Many techniques available
- Quite a few trials - mainly at "lower" organisations
- Several meetings
- Lots of discussion
- Quite some promotion
- No widespread application
- Experiments with durability in contracts
- Energy or CO₂

Things to talk about

- Understanding the status & future of warm mix asphalt
- Effectiveness
- Technology
- Economics
- (Public) opinion

Techniques: Energy = CO₂ = odour = …..?

- Additives: waxes, zeolith, surface-active chemicals: 110 – 150 °C
- Foamed bitumen: LT Asphalt, LEAB: 90 – 110 °C
- Shell WAM process: 130 °C
- Emulsion: KanwaEco²: 15 °C
- Pestfall (tar free RAP recycling): 80 °C
- Partial drying: 80 - 90 °C
- Bio-bitumen: 150 - 165 °C
- Higher RAP content: 170 °C

Effect RAP on energy → CO₂

Effect on energy:

- Lower temperature
- Less energy
- Less CO₂
- Less odour

But also:
- Same durability
- Higher stability
- Faster opening of road
- Less compaction effort
- Winter options

Waxes
KonwEco2

Partial drying

- Dry coarse minerals to 140 °C
- Dry (part of) sand to 140 °C
- Mix with bitumen → temperature ca. 140 °C
- Add wet sand + RAP → temperature ca 85 °C
- Foaming of bitumen due to water in sand & RAP
- Energy saving related to water content

Partial drying

- Room temperature
- HMA quality
- Maximum energy saving

Biobitumen – CO₂ neutral asphalt production

- Rapeseed needs 9 t CO₂/ha
- 1 ha yields 1,5 ton of oil
- Oil partially replaces bitumen

Biobitumen – CO₂ neutral asphalt production

- CO₂ compensation: 15 kg/ton asphalt
- Lower production temperature
- Fewer emissions
- Less alteration

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Energy savings: 20 – 40%; 80 – 100% (depending on reference)

Effects

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- Reduction in emissions (present focus CO₂): idem

Effects

- Less ageing → potential lifetime increase
- Easier compaction → less fuel asphalt set
- Additional (non durability) effects

Effectiveness: the bigger picture

- The impact of RAP on CO₂
  > Energy-reduction convenant
  > CO₂ emission trading system
  > Higher Recycling rates

Effectiveness: the bigger picture

- Asphalt production is only part of the total chain
  > Pre-production: 40%
  > Production: 25%
  > Hauling & laying: 16%
  > Removal: 19%

Effectiveness: the bigger picture

- Bad weather? → more heat!
- Energy in production vs other durability items

What do we want?

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Stakeholders: who wants what at what cost?

- Contractor (production + placement)
- Government (legislation + ambition)
- Government (client)
- Private client
- Public

Drivers & stoppers

- Drivers
  - Reduction in CO₂: 20 – 50%
  - Prescribed in contracts
  - Odour & other emissions
  - Promotion / Image / Policy / HSE
  - Additional benefits
- Stoppers
  - Extra cost 2 – 3 euro / ton
  - Uncertainty long term behaviour?
  - Extra guarantees asked
  - Relativity of measures
  - Investments
  - RAP

• Technology is not the issue
• Effectiveness is an excuse to discard
• What do we (the world) think is important?
• The real stakeholder has not yet been born

• Forget the sheep with 5 legs
• Grab what you can get

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