Rejuvenators in NL

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Dutch political goals

Rijkswaterstaat strategy on asphalt construction and maintenance based on:

Until recently
• Noise - Porous Asphalt on complete network
• Costs
• Availability (traffic jams)

New political goals
• CO₂ reduction (50% in 2030)
• Reduction of Primair Materials (50% in 2030)
Rijkswaterstaat vision on Sustainable asphalt (CO2&CE)

Cradle to gate approach

Main focus points:
- Recycling in top layer
- Production at low temperature
- Longer lifetime
- Alternative fuel in production
- Rolling resistance
Recycling PA in PA (and PA in AC)

- Rijkswaterstaat validation scheme for test sections with PA/AC ≤50% RAP, and no additives:
  - Skid resistance
  - Mixing of old and virgin binder (afpelproef)
  - Penetration index
  - DSR

- Now validation requests for > 50% RAP with use of additives
  - Additional tests for additives, not yet decided
Additives

1. Several bitumen modifier companies in NL
   - Cargill
   - Latexfalt
   - ESHA
   - Kraton
   - ...

2. Focus on Bio-based products

3. Test Sections
   - Provincial roads
   - 2019-2020 on Rijkswaterstaat roads
Benchmarking

Several studies mainly on AC-binder but also on PA

e.g. van der Wall e.a. Infradagen 2018 paper on AC

• Comprehensive comparison
• 70% PR AC binder
• Several bio-based binders (> 0,1% <0,2%)
• Measurements at binder and mixture level
• Virgin and aged (RTFOT +PAV)
• Functional analysis
• Compositional analysis
Benchmarking

Composition (Mixture)
- FTIR (also aged)
- GPIC
- SARA analysis
- Peel test (‘‘slicing of bitumen layer’’)

Functional
- Stifness
- Fatigue
- ITSR
- Relaxation rate (Fc-value)
Example fatigue mixture virgin (V) and Aged (A)
Explorative research

Artificial Aging lab test TNO
• Using TNO aging protocol - 1000 h 60ºC
• Several comercial biobased additives 100% PR PA in PA
• DSR analysis
• Results are comparable to “virgin” PA

Environmental impact analysis (LCA – EN15804)
• Biobased additives have Environmental Impact > bitumen
→ A positive effect, e.g. longer life time or less primary materials, is needed.
→ “In some cases a life time of 2 years is necessary”
Possible positive effects

Biobased additives can have following effects:

- Higher compatibility aged and virgin bitumen
- Improved low T performance (Fraass)
- Improved high T performance (rutting)
- Improved diffusion → improved blending
- Improved adhesion
- ...

Not all rejuvenators have the same effect and optimisation is needed for
- Different additives
- Different mixtures
What do we need

- **Design rules:** NL- healing factor
- **Specification rules:** do we need to divided them in different types
- **Environmental impact rules:** some might have huge negative effect, others only minor.
- **(International) standardization:** test methods
- **International standardization:** mixture specification