Sustainability at Rijkswaterstaat (RWS)
Road Pavements (and contracts)

Jan van der Zwan

Strategic targets RWS

- "Rijkswaterstaat aims to be in 2012 the leading, public orientated and sustainable (execution) organisation of the government."
- Focus sustainability:
  - Reduction energy use and production of green energy
  - Sustainable (green) procurement
  - Sustainable spatial planning

We do not start from scratch

RWS is already for decades working on sustainability:
- Large scale re-use of secondary materials: >95%
- Life-cycle cost management
- Design for recycling
- Porous asphalt: safer and quiet
- Destruction of tar containing asphalt
- Dynamic public lighting
- Ecological management of verges
- RWS manages 70% of the Dutch Ecological Main structure in the Netherlands
- Environmental impact studies

Market approach RWS

- Give functional specifications and design freedom for the market
- Do not prescribe solutions (unless...)
- So, do not prescribe recycling, low energy asphalt, sustainable materials.
- Challenge the market to come forward with innovations (techniques, materials, processes)

General preconditions

- Market in needed for achieving goals
- Market only invests in economical sound solutions
- Government is not always reliable (changing political views)
- Investment in:
  - Clear and unambiguous stable policy
  - Knowledge (performance of materials in time)
  - Hard technology
  - Standards
  - Image (champions needed)
  - Economical conditions (price performance, value based procurement)

Instruments for GPP and value procurement

- National minimum criteria
- RWS has a higher ambition:
  - CO2 performance ladder
  - Dubocalc
- Value procurement
  - What are we willing to pay for sustainability (We=RWS/society/Service level agreement)
Focus RWS GPP Road Pavements

- Focus sustainability:
  - Reduction RWS carbon footprint
    Aim: 50% reduction in 5 year
    (note: besides aspects as noise, fine dust, recycling, ecological green maintenance at cost)
  - Sustainable materials

Rijkswaterstaat Carbon Footprint 2010:
- Asphalt, Dredging + "room for rivers"
- Coastal sand suppletion
- Embankment and 2 energy use
- Groundworks-roadbuilding
- Asphalt, Road base materials
- Concrete construction
- Steel construction

All in perspective

- CO2 reduction:
  - pavements = 28 % (of Carbonfootprint)
  - earth works = 30 %
  - dredging = 21 %
  - public lighting = <0,5 %
- CO2 emission traffic 30 Mton
- Carbonfootprint RWS total 0,9 Mton
- Carbonfootprint RWS pavements 0,3 Mton
- Carbon footprint electricity use RWS 0,009 Mton

Life is never simple

- Conflicting requirements.
  - Safety
  - Environment
  - Noise
  - Comfort (e.g. water drainage)
  - Hindrance to road users
  - Speed of execution
  - Costs
- Technique is not the problem, problems are always political and managerial
- What is possible with pavements

Carbonfootprint Asphalt

Conclusions CO2 reduction pavements

- Applied instrument Dubocalc, Life Cycle Approach; CO2 emission over 30 years so incl. maintenance.
- RWS applies eternal life strategy, so in principle only wearing course to replace and after 20-30 years strengthening
- Reduction of number of tons is dominant
  - Thinner construction/ thin inlays instead replacing PA
  - Longer life time (increase quality)
  - Elongation life time existing infrastructure (sealing)
  - High recycling percentages
- Low temperature asphalt
  - Circle of influence of asphalt producer
- Concrete for road: use blast furnace cement instead of Portland cement
Conclusions CO2 reduction pavements

- In figures
  - Maintenance: Thin inlay (-8%)
  - Remix (-9%)
  - Seal techniques (LVO -15%)
  - New Roads: Thinner constructions (EME - 20%)
  - Blast furnace cement (-22%)
- General: Recycle PA in PA(-10%???)
  - Low temperature asphalt (-5/-10 %)
  - Only with same amount of recycling and same functional properties (life time)

Attention points

- Always needed same functional properties and durability
- Technical quality (durability) has an great effect but is easily neglected
- Take in consideration the inflexibility of the market (blast furnace cement, recycling)

Sustainable use of materials

- Is sustainability = CO2 reduction? Not per definition
- Road construction: materials and energy are dominating dominant
- Nature of materials determine possibilities to recycle but also management and control aspects.
- Dubocalc is LCA based. LCA does not give all answers.
  - Recycling is a fine goal
  - But not all forms of recycling is desirable

Recycling: Netherlands at the top of the world

- Use of raw materials (mostly aggregates) app 150-180 million ton
- Use of secondary materials app. 30-40 million ton annually
- Main streams concrete and masonry (>95% recycled)
- Asphalt (4 million ton, 3 million hot mix recycling, 1 million tar containing incinerated) average 50% in base course mixes
- Netherlands on the top of the world in recycling
- Tar incineration unique in the world
- Why
  - Netherlands densely populated
  - Scarcity of raw materials and space
  - Prosperous country
  - Recycling is made economic feasible

Sustainable use of materials

- Market is looking at financial possibilities
- Some waste materials have a negative market value
- Reusing/ recycling can therefore be very financially attractive
- Who takes the long term risks
- Example: Waste incineration bottom ash
  - Does not fulfil environmental criteria
  - Reuse under strict conditions
  - Or immobilisation?
- Advantages/disadvantages??

Integral material chain approach

Social acceptance
Health and safety
Spatial quality and environment
Economical value
Control (traceability, spread, retake ability)
Superior pavements
user demands
construction demands
elementary material properties
demands on raw materials and building materials

Discussion ???

Pyramid of demands

Models define relation between levels

- Safety, comfort, usability, travel time, etc.
- Friction, evenness, noise reduction, number of lanes, etc.
- Strength, bearing capacity, durability, etc.
- Resistance against fatigue, deformation, thickness, etc.
- Composition, grading, voids, degree of compaction, PSV, etc.