RECYCLING OF ASPHALT
Environmental and sustainability issues

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No problems?

If recycling material is coming from old roads, how can this material cause problems in a new road?
.. some problems

• knowledge on dangerous substances has changed: polycyclic aromatic hydrocarbons (PAH) in tar, asbestos

☞ environmental laws and regulations have changed

• dangerous substances have been added illegally: PCB, waste oil, ......

• in pavements substances are immobilized - during recycling they can be “reactivated”

Sources of emissions

<table>
<thead>
<tr>
<th>Recycling steps</th>
<th>Type of emissions</th>
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</thead>
<tbody>
<tr>
<td>Milling, demolishing</td>
<td>• dust, leaching</td>
</tr>
<tr>
<td>Storage, processing</td>
<td>• dust, leaching</td>
</tr>
<tr>
<td>Paving</td>
<td>• hot: fume</td>
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<tr>
<td></td>
<td>• cold: leaching</td>
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</tbody>
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Recycling of tar-containing asphalt

Background
• large amounts of tar have been used in Switzerland
• pavement layers contain between 0 and 100% tar
• tar contains large amounts of toxic PAH (Polycyclic Aromatic Hydrocarbons)
• >90% of RAP is recycled hot

Question
• concerning occupational health, which is the maximum tar content for hot recycling

Fume-Generator
Temperature dependence of fume emission

Main source of emissions
Regulations

• **Money** it the most effective regulator
• Standards and laws are necessary
• Regulations and limit values are very different in europe
→ "Waste-tourism"

Open questions

• is the harmonization of limit values sensible?
• can we avoid (or limit) the testing on harmful substances?
• what to do with contaminated RAP?
• how to improve the negative image of recycling materials (waste in EU)?
• Recycling products with CE-marking?
• How to avoid the “contamination” of asphalt with new harmful compounds?
Where is the knowledge?

- Jan van der Zwan, Ministry of Transport, NL
- K. Krass, Ruhr-Universität Bochum, D
- V. Mouillet, LCPC, France
- M. Hugener, Empa Dübendorf, CH
- A. J. Kriech, Heritage Research Group, USA
- I. Burstyn, Wageningen University, NL
- P. Bonnet, Institut National de Recherche et de Sécurité, Vandoeuvre, France