Using LCA to Evaluate the Sustainability of SMA Mixtures

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1st International Conference on Stone Matrix Asphalt
“As good environmental stewards, the tollway's capital program promises to be the "cleanest and greenest" program in tollway history.”

Tollway Executive Director, 2011
2014 Statistics were focused on recycling

Nearly 1.4 million tons of recycled concrete, asphalt and aggregate in the construction of new roads – enough to build a nearly 2,700-mile bike path from Boston to San Francisco.
Rating Systems are Different From LCA

The focus is increasing sustainability

<table>
<thead>
<tr>
<th>Rating System</th>
<th>Life Cycle Assessment</th>
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<tbody>
<tr>
<td>Qualitative</td>
<td>Quantitative</td>
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<tr>
<td>Social, Economic, and Environmental</td>
<td>Environmental</td>
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<tr>
<td>Rates a system</td>
<td>Typically for a product (eg. pavement, car, etc.)</td>
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<tr>
<td>Result is Points</td>
<td>Result is Detailed Inputs and Impacts</td>
</tr>
</tbody>
</table>
You get what you measure

- All aspects of the Tollway program
- Report status and progress to customers
- Use a common language

Tollway LCA is Full Roadway System
LCA is cradle to grave interaction of environment and a production system.
Understanding LCA Impacts for SMA

SMA impacts vary across phases

Use phase impacts are most significant
- Smoothness
- Rolling resistance
- Extended Life

There is a difference between SMA and Dense Graded

Global Warming Potential
There is a difference between binder and surface mixes

Global Warming Potential

Similar impacts of GTR or SBS

Global Warming Potential
A bit about a few of the factors

Haul distance to the plant drives impact
• Mixes ranged from 92 to 1,211 miles to get raw materials
• Typically ~500 miles of trucking to get all materials to plant

Total recycle content drives impact (if recycled is close)
• Recycled binder replacement from 0 to 48%

In summary...

SMA is most valuable because of the extension of life

SMA mixes can be constructed with low impacts

Recycling matters

Haul distances matter
Questions

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