Transportation in Service of a Sustainable Society

Sustainability Peer Exchange
May 27-29, 2009
Summary

American Association of State Highway and Transportation Officials
The Voice of Transportation

Federal Highway Administration
Peer Exchange Attendees

- AASHTO
- American Public Transportation Association (APTA)
- Colorado Department of Transportation
- Federal Highway Administration
- Federal Transit Administration
- Illinois Department of Transportation
- Maryland Department of Transportation
- New York Department of Transportation
- North Carolina Department of Transportation
- Oregon Department of Transportation
- Pennsylvania Department of Transportation
- Southeastern Pennsylvania Transportation Authority
- Transit Authority of River City
- Transportation Research Board
- Washington Department of Transportation
Meeting Agenda

• Federal perspectives
• Framing the issues
• DOT case studies
• Transit agency perspectives
• Best practices (breakouts)
• Defining sustainability (breakouts)
• Measuring and tracking sustainability (breakouts)
• Challenges and goals
Defining Sustainability in Transportation

- Need for a common language
- Definitions should reflect organizational needs
- Definitions should reflect the diverse functions of a transportation agency
- Need for scale in definition
Sustainability is…

“…development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

What are the challenges?
Defining transportation’s role in a sustainable society
Clarifying terms and improving communication

1. Codifying
2. Sending the message
3. Decodifying
Focusing on both broad outcomes and specific problems and solutions

“I drove to the garden centre for a tree to offset my carbon footprint... so now I’ve got to go back for another one...”
Using life-cycle cost evaluations in transportation decision-making

www.greenhome.huddler.com
Integrating sustainability principles into agency policies and practices

TIGER  RHINO  ELEPHANT  SUV

ENDANGERED SPECIES
Developing and advancing best practices for climate change adaptation and mitigation
Enabling creative, mode-neutral transportation decision-making
Developing programmatic and project-level metrics for outcomes
Advancing sustainability voluntarily as federal and/or state regulatory requirements grow
Integrating land use planning and environmental considerations into programs and decisions
Meeting the challenges
Meeting the Challenge

• Ultimate Goals
  – What direction? Where do we want to go?

• Long term goals
  – Next 3 decades

• Short term goals
  – Next decade
7 example focus areas to frame the discussion

• Social well being and responsibility
• Material flows and management
• Energy, fuel and climate
• Habitat, ecosystems, and stormwater
• Economic efficiency
• Health and Safety
• Land use
Goals Disclaimer

- The following goals are examples only
- The goals were developed during participant brainstorming as an example exercise
  - Relevant to an agency’s internal operations or how it manages the transportation system
- The goals are not necessarily endorsed or supported by AASHTO or the participating organizations
### Social Well Being and Responsibility – Example Goals

<table>
<thead>
<tr>
<th>Ultimate Goals</th>
<th>Long term Goals</th>
<th>Short Term Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Universal access to affordable transport</td>
<td>- Transit stop near residences</td>
<td>- ID gaps &amp; opportunities for connectivity – build investments around these</td>
</tr>
<tr>
<td>- Transportation improves quality of life</td>
<td>- DOT actions in concert with overall plan for achieving social well-being</td>
<td></td>
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<tr>
<td>- Connectivity among modes</td>
<td>- Realizing the benefit of the investments</td>
<td>- Compare programs &amp; projects against overarching sustainability metrics</td>
</tr>
<tr>
<td>- Access to needed goods &amp; services</td>
<td>- Increase # of transit stops</td>
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<tr>
<td>- Reliable transportation</td>
<td>- Sustainability metrics reflected in decision-making</td>
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</tr>
<tr>
<td>Ultimate Goals</td>
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<td>Short Term Goals</td>
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<tr>
<td>---------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>-Zero waste</strong></td>
<td><strong>-70% reuse</strong></td>
<td><strong>-Effective management systems to determine lowest life cycle cost</strong></td>
</tr>
<tr>
<td>-Use/manage materials with lowest life cycle cost</td>
<td>-Promote process for evaluation of new materials &amp; techniques</td>
<td><strong>-Knowledge transfer &amp; sharing of BMPs</strong></td>
</tr>
<tr>
<td>-Materials longevity</td>
<td></td>
<td><strong>-Review &amp; revise specifications to meet goals</strong></td>
</tr>
<tr>
<td>-On-site reuse &amp; recycle all materials</td>
<td></td>
<td><strong>-Adopt and promote “buy local” policies</strong></td>
</tr>
<tr>
<td>-Maximum use of local materials</td>
<td></td>
<td><strong>-Institutionalize best practices depending on context</strong></td>
</tr>
<tr>
<td>-Paperless processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-No toxics</td>
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</tr>
</tbody>
</table>
## Energy, Fuel and Climate – Example Goals

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<th>Ultimate Goals</th>
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<th>Short Term Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Zero GHG emissions</td>
<td>- Fuel source planning</td>
<td>- Inventory &amp; vulnerability analysis of assets</td>
</tr>
<tr>
<td>- 100% renewable energy sources</td>
<td>- Using carbon footprints for decision-making</td>
<td>- Understanding carbon footprints for decision-making</td>
</tr>
<tr>
<td>- Least energy consumed per person trip made</td>
<td></td>
<td>- Reduce fossil fuel use by 25%</td>
</tr>
<tr>
<td>- Carbon negative projects</td>
<td></td>
<td>- Improving methods for measuring GHGs</td>
</tr>
<tr>
<td>- 100% green transit and vehicle fleets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Eliminate vulnerability of existing assets</td>
<td></td>
<td></td>
</tr>
</tbody>
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**Ultimate Goals**

- Zero GHG emissions
- 100% renewable energy sources
- Least energy consumed per person trip made
- Carbon negative projects
- 100% green transit and vehicle fleets
- Eliminate vulnerability of existing assets

**Long term Goals**

- Fuel source planning
- Using carbon footprints for decision-making

**Short Term Goals**

- Inventory & vulnerability analysis of assets
- Understanding carbon footprints for decision making and prioritization
- Reduce fossil fuel use by 25%
- Improving methods for measuring GHGs
## Habitat, Ecosystems, and Stormwater – Example Goals

<table>
<thead>
<tr>
<th>Ultimate Goals</th>
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<th>Short Term Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>- <strong>Species recovery</strong></td>
<td>- Retrofit key facilities in the system to adapt to physical climate change</td>
<td>- <strong>Inventory performance of stormwater facilities</strong></td>
</tr>
<tr>
<td>- Maintain contiguous habitat areas/corridors</td>
<td>- Vegetation requires no chemical management</td>
<td>- <strong>Gather local climate modeling data to assess future needs for stormwater</strong></td>
</tr>
<tr>
<td>- Alignment with resource agency adaptation policies</td>
<td></td>
<td>facilities**</td>
</tr>
<tr>
<td>- Zero roadkill</td>
<td></td>
<td>- <strong>Design for decreased mowing and vegetation control</strong></td>
</tr>
</tbody>
</table>

- **Alignment with resource agency adaptation policies**
# Economic Efficiency – Example

## Goals

<table>
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<th>Ultimate Goals</th>
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<th>Short Term Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Life cycle decision-making</td>
<td>- Pricing</td>
<td>- Decouple energy &amp; transportation funding</td>
</tr>
<tr>
<td>- Best life cycle contracting decisions</td>
<td></td>
<td>- Develop life cycle costing tools</td>
</tr>
<tr>
<td>- Manage the externalities</td>
<td></td>
<td>- Pilot funding sources</td>
</tr>
<tr>
<td>- Cost structure reflects user cost vs. system cost</td>
<td></td>
<td>- Reduce congestion</td>
</tr>
<tr>
<td>- Generate revenue adequate to sustain system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Maximize economic development &amp; efficiency</td>
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</tbody>
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## Health and Safety – Example Goals

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<th>Short Term Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Zero human fatalities</td>
<td>- Reduce fatalities on the national system by half by 2030</td>
<td>- Employees trained on ergonomics</td>
</tr>
<tr>
<td>- No air quality related illnesses</td>
<td>- Bicycle and pedestrian systems designed and managed at the corridor level</td>
<td>- Vending and food service vendors provide healthy food</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Employees are encouraged to take active modes of transportation</td>
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</tbody>
</table>
# Land Use – Example Goals

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<th>Short Term Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Integrate transportation &amp; land use</td>
<td>-Have an active role in land use decisions</td>
<td>-Coordinate with land use authorities on land use decisions.</td>
</tr>
<tr>
<td>-Revitalize the central city; promote TOD &amp; infill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Partner to build communities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-DOTs contribute to mixed-use, livable &amp; walkable communities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-DOTs contribute to sustainable land use</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sustainability Best Management Practices
Sustainability Best Management Practices

- Relevant best management practices (BMPs) are linked to goals and metrics
  - Planning and Multimodal
  - Design and Construction
  - Operations and Maintenance
Planning and Multimodal BMPs

- Climate Change
  - Some states have design and construction level planning for climate change
  - Infrastructure adaptation in planning for climate change
  - Assessment of vulnerable pieces of the transportation system

- Climate Change mitigation planning
Planning and Multimodal BMPs (continued)

- Linkages between land use and transportation planning processes
  - Coordinate land use and transportation
  - Importance of TODs
  - Partnerships with land use agencies
  - Coordination with local agencies to protect system
  - Regional plans based on land use
  - Model land use ordinances
Planning and Multimodal BMPs (continued)

- Demand Management
  - ITS – technology-based strategies
  - Multi-modal trip planners
  - Pricing strategies
Planning and Multimodal BMPs (continued)

• Early coordination across modes and departments
  – Integrated inter-agency approaches
  – Coordinating councils
  – BORPSAT (Bunch of the right people sitting around the table) foster trust and integration across departments
Planning and Multimodal BMPs (continued)

- Sustainability Plans
  - “Walk the talk” - internal stewardship of resources
  - Plans for transportation system management and decision-making
  - Institutionalize sustainability
Planning and Multimodal BMPs (continued)

- Innovations in Transit
  - DOTs partnering with/owning transit agencies
  - Communication with public
  - Hybrid and biofuel transit
  - Pass programs to encourage ridership
  - Bike/ped connections to transit
  - Green buildings for facilities
  - Targeted media campaigns
Design and Construction BMPs

- Climate Change
  - Adaptation – Changing practices to accommodate future physical change
    - Bridges, culverts and pavements
  - Mitigation – reducing greenhouse gases
    - Fuel use including idling policies, fuel type
  - Bridge design
  - Asset management
  - Flexibility in dealing with adaptation is key – regions set own priorities
Design and Construction BMPs (continued)

- Materials
  - Durability and recycling (asphalt, fly ash, recycled rubber, sand and gravel)
  - DOTs present have materials sustainability practices
  - Materials sourcing policies – coordinate with local land use entities
Design and Construction BMPs (continued)

• Construction Practices
  – Biofuels for construction vehicles
  – Traffic management
  – Maintenance and access to local businesses and residences
  – Reduced contract and construction time
  – Coordinated employee transport to sites
Design and Construction BMPs (continued)

- Adaptation to regulatory frameworks
- Design and construction changes relating to future transportation system
  - Future vehicle size and technology
  - Rethinking engineering standards (new construction vs. reconstruction)
  - Bridges and pavements, response to vehicle types
Operations and Maintenance
BMPs

- Fuel/Energy Use
  - Reduce vehicle fuel and facility energy use
  - Acquire hybrid vehicles
  - Video conferencing
  - Idling policies
Operations and Maintenance
BMPs (continued)

• Management Systems
  – Data management to streamline operations and maintenance

• Specific maintenance practices
  – Pavement preservation
  – LED lighting
  – Vegetation management practices
  – Wetland mitigation banks
Operations and Maintenance BMPs (continued)

• Strategic operations and maintenance approach
  – Environmental staff involved in O & M
  – Environmental, social, and economic indicators for sustainability in O & M

• Life cycle cost analysis
  – Better reflection of actual cost
  – Affects funding decisions
Measuring and tracking success
Measuring and Tracking Success

The brainstorming sessions resulted in a menu of measurement ideas by discipline.

- Planning and Multimodal
- Design and Construction
- Operations and Maintenance
Planning and Multimodal (System/Program) Brainstorming

• Focus Areas
  - Social well-being and responsibility
  - Material flows and management
  - Energy, fuel, and climate
  - Habitat, ecosystems, and stormwater
  - Economic efficiency
  - Health and safety
  - Land use
### Example of Planning Activities and Measures

<table>
<thead>
<tr>
<th>Example focus area</th>
<th>Activities</th>
<th>Sample Measures</th>
</tr>
</thead>
</table>
| Habitat, ecosystems, and stormwater | - ID sensitive areas\(^1\)  
- Summary indices for sketch planning  
- Low impact development\(^2\)  
- Weather event management  
- Congestion/reliability\(^3\) | - Habitat connectivity  
- Acres of prime farmland or forest land\(^1\)  
- Native plant species  
- Number of stormwater treatments\(^2\)  
- Travel times\(^3\) |
Design and Construction Brainstorming

• Topic Areas
  – Social well-being and responsibility
  – Material flows and management
  – Energy, fuel, and climate
  – Habitat, ecosystems, and stormwater
  – Economic efficiency
  – Health and safety
  – Land use
Example of Design and Construction Activities and Measures

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<tr>
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<th>Sample Measures</th>
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<tbody>
<tr>
<td>Energy, Fuel and Climate</td>
<td>- Cut and fill</td>
<td>- Type of equipment used</td>
</tr>
<tr>
<td></td>
<td>- Equipment Efficiency(^1)</td>
<td>- Idling time</td>
</tr>
<tr>
<td></td>
<td>- Work zone management/ routing(^2)</td>
<td>- Productivity (production/time period)(^3)</td>
</tr>
<tr>
<td></td>
<td>- Traffic control technology(^2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Construction management technology(^3)</td>
<td>- Fuel consumption(^1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Energy consumption(^1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Queuing and delay(^2)</td>
</tr>
</tbody>
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Operations and Maintenance Brainstorming

• Topic Areas
  – Social well-being and responsibility
  – Material flows and management
  – Energy, fuel and climate
  – Habitat, ecosystems, and stormwater
  – Economic efficiency
  – Health and safety
  – Land use
### Example of Operations and Maintenance Activities and Measures

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<tr>
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<th>Sample Measures</th>
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</thead>
<tbody>
<tr>
<td>Land Use</td>
<td>- Access management/ driveway management&lt;sup&gt;1&lt;/sup&gt;</td>
<td>- Coordination process with local agencies&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>- Surplus property</td>
<td>- Integrated planning process (yes/no)</td>
</tr>
<tr>
<td></td>
<td>- DOT facility site location&lt;sup&gt;2&lt;/sup&gt;</td>
<td>- Existence of state and local law&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>- Impact of design and construction decisions on maintenance and operations needs</td>
<td>- New offices sited downtown or along transit&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Process for building siting with criteria&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
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Transportation in Service of a Sustainable Society

Moving Forward
Moving Forward

- Forums for sustainability knowledge transfer
- Communications visuals and technique development
- Foster best practices
- Coordinate on performance measures
- Information on training and life cycle costs analysis
- Menu of best practices for climate change mitigation and adaptation
Thank You

Damon Fordham, AASHTO
dfordham@aashto.org
(202) 624-3638

David Carlson, FHWA
david.carlson@dot.gov
(202) 366-6263

Joshua Proudfoot, Good Company
joshua.proudfoot@goodcompany.com
(541) 341-GOOD (4663), ext. 213

Sam Seskin, CH2M HILL
sseskin@ch2m.com
(503) 235-5000 ext. 24019

Joshua Skov, Good Company
joshua.skov@goodcompany.com
(541) 341-GOOD (4663), ext. 211