



Transportation and Climate Change Resource Center

AASHTO/ FHWA/ FTA Climate Change Symposium

***Innovative Approaches and Lessons Learned:
Summary Webinar***

***Presented by
Michael Grant and Anne Choate, ICF International***

September 15, 2010
1-3 PM EST



Today's Agenda

- Quick Overview of Web Technology
- Symposium Background & Objectives
- The Challenge of Climate Change
- Mitigation Strategies: Highlights & Discussion
- Adaptation Strategies: Highlights & Discussion
- Next Steps

Technology - Webinar Control Panel

The image shows a screenshot of the GoToWebinar control panel interface. The interface is divided into several sections: a top menu bar with 'File', 'View', and 'Help'; a 'Questions' section with a 'Questions Log' and a text input box for questions; an 'Audio' section with 'Audio Mode' options and a 'MUTED' status indicator; and a bottom section with the webinar title 'GoToWebinar Test 2' and ID '745-284-455'. The GoToWebinar logo is at the bottom.

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AASHTO/FHWA/FTA CLIMATE CHANGE SYMPOSIUM



August 5th–6th, 2010
Washington Court Hotel
525 New Jersey Avenue, NW
Washington, DC 20001



Symposium Background

- Partnership Effort
 - AASHTO
 - Environmental Technical Assistance Program
 - Climate Change Technical Assistance Program
 - Standing Committee on Planning
 - FHWA
 - FTA



Symposium Objectives

- Provide policy-oriented and technical information to support state DOTs in their efforts to address the challenges of climate change
 - Both GHG emissions reduction & climate adaptation
- Strengthen relationships among state DOTs to advance knowledge sharing and best practices



Symposium Overview

- Day 1
 - Policy perspective on transportation and climate change
 - Focus on mitigation (GHG reduction strategies)
- Day 2
 - Focus on climate change impacts and adaptation approaches



Symposium Agenda—Day 1

- **Session 1:** The Challenge of Climate Change
- **Session 2:** Federal Policy Status Report
- **Session 3:** Integrating GHG Reduction Strategies in Transportation Planning: State Policy Developments
- **Session 4:** EPA's MOVES Model
- **Session 5:** Transportation Strategies to Reduce GHG Emissions: A National Perspective
- **Session 6:** Transportation Strategies to Reduce GHG Emissions: State Initiatives
- **Session 7:** Small Group Discussions (GHG Mitigation Strategies)
- **Session 8:** Report-Outs

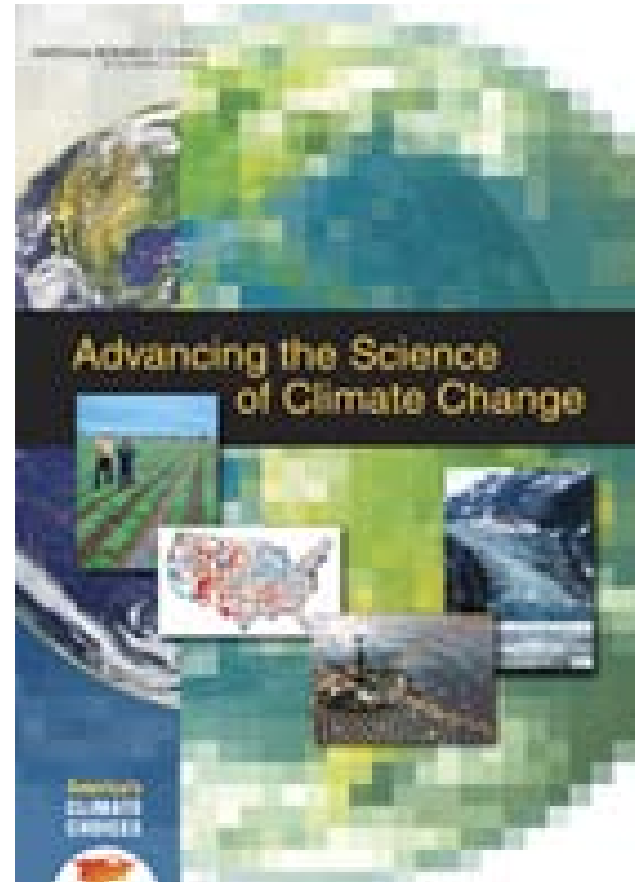
Symposium Agenda—Day 2

- **Session 1:** Setting the Stage: Adaptation's Role in State Climate Action Plans, Federal Climate Policy, and State Climate Policies
- **Session 2:** Understanding the Effects of Climate Change on Transportation
- **Session 3:** National Efforts to Reduce the U.S. Transportation System's Vulnerability to Climate Change Effects
- **Session 4:** State-Level Adaptation Initiatives
- **Session 5:** Charge for Breakout Discussions
- **Session 6:** Breakout Groups on Adaptation
- **Session 7:** Report-Outs
- **Session 8:** Where Do We Go from Here?

Latest NAS Report: America's Climate Choices

“A strong, credible body of scientific evidence shows that climate change is occurring, is caused largely by human activities, and poses significant risks for a broad range of human and natural systems.”

-- June 2010





The Challenge of Climate Change

The public policy challenge:

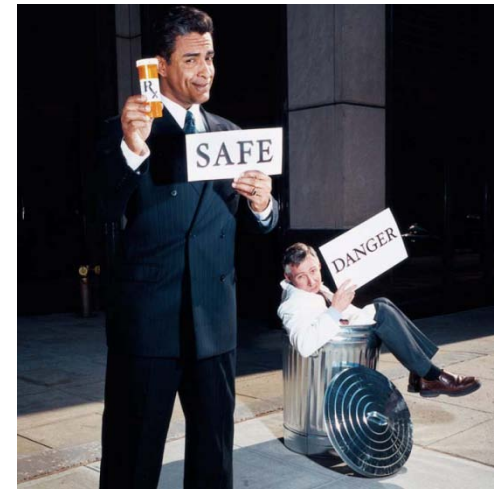
- Science is complex and uncertainties are significant
- Impacts and associated costs are long-term, but mitigation costs are near-term
- Impacts are effectively irreversible
- **Risks of not acting in response to climate change far outweigh the costs**

- *Steve Seidel, Pew Center*

Communicating Climate Science

Threats to climate literacy:

- Science Under Attack: FUD Campaigns



Michaels, David: "Doubt is Their Product." *Scientific American*. June 2005, page 96.

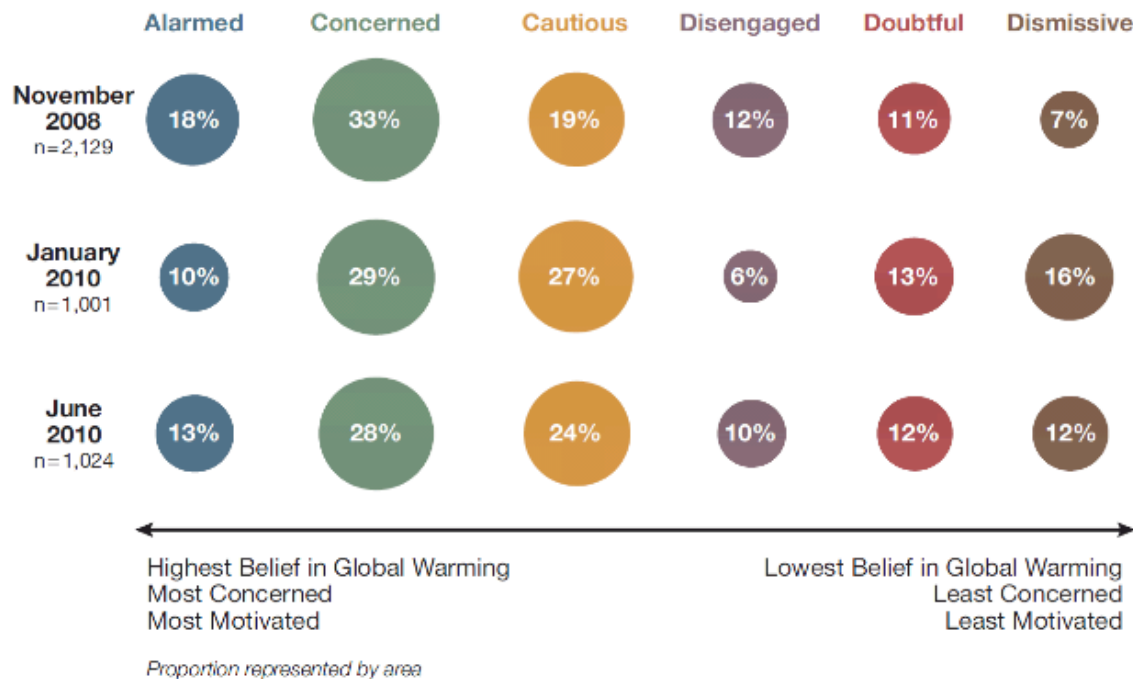
- Media "balance as bias"

- *David Herring, NOAA*

Communicating Climate Science

Global Warming's 'Six Americas'

Figure 1: Proportion of the U.S. Population in the Six Americas



Important to
foster dialogue
between the
public,
scientists, and
politicians

- *David Herring,*
NOAA

Leiserowitz, A., Maibach, E., & Roser-Renouf, C. & Smith, N. (2010) *Global Warming's Six Americas*, June 2010. Yale U. and George Mason U. New Haven, CT: Yale Project on Climate Change.



GHG Mitigation Strategies: Day 1 Highlights

- Several states have begun integrating mitigation into their transportation planning efforts – often as a result of state legislative requirements (Session 3)
 - New York
 - Washington State
 - Oregon
 - California
- Many states have developed Climate Action Plans, which identify potential transportation strategies – However, CAPs are very different from long-range transportation plans (Diane Turchetta, FHWA)



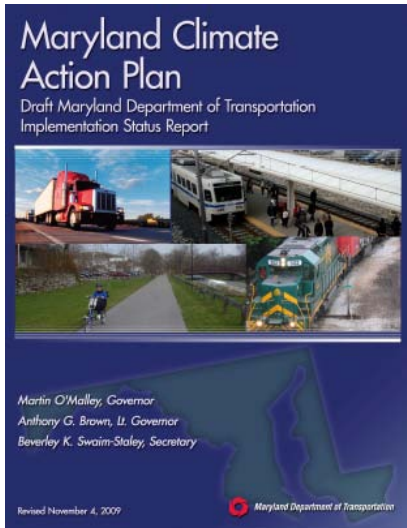
GHG Mitigation Strategies: Day 1 Highlights (cont'd)

- MOVES 2010 has improved emission estimates by accounting for different operating modes (e.g. braking, cruising, idling) (Laura Berry, U.S. EPA)
- Advances in technologies and alternative fuels will play a vital role in helping the transportation sector achieve GHG reductions (David Greene, Oak Ridge National Laboratory)

Innovative GHG Mitigation Strategies

- **Transportation and Land Use Planning**
Maryland DOT (Don Halligan, Office of Planning)
- **Transportation Operations**
New York State DOT (Gary McVoy, Operations)
- **Carbon Sequestration**
Minnesota DOT (Frank Pafko, Office of Environmental Services)
- **Pavements**
Texas DOT (Diane Noble)

Maryland DOT: Transportation-Land Use Strategies



GHG Reduction Strategies	GHG Reduction (mmt)	Total Added Cost 2010 -2020 (billion \$)
TLU-2 Land Use and Location Efficiency	0.18 – 0.24	N/A
TLU-3 Public Transportation	0.45	\$1.7
TLU-5 Intercity Travel	0.02	N/A
TLU-6 PAYD Insurance	0.26	N/A
TLU-8 Bike and Pedestrian	0.10 – 0.15	\$0.59 - \$0.82
TLU-9 Pricing	0.41 – 1.84	\$2.5 - \$3.4
TLU-10 Transportation Technology	0.20	\$0.50
TLU-11 Evaluate GHG Impacts of Major Projects & Plans	N/A	N/A
Total 2020 GHG Reduction	1.62 – 3.16	\$4.8 – \$6.0

New York State DOT: Operations Strategies



New York's Clean Pass Program

- Multi-agency (NYSDOT, NY DMV, NYSDEC) program
- Allow eligible low-emission, energy-efficient vehicles to use the 40-mile Long Island Expressway High Occupancy Vehicle (LIE/HOV) lanes.
- Will result in an estimated reduction of 6,000 tons of greenhouse gas emissions and savings in excess of 500,000 gallons of gasoline.



Traffic Management / ITS

- LED replacements
- Signal timing
- Ramp Metering
- Incident Response
- Commercial Vehicle Operations



Minnesota DOT: Carbon Sequestration on Roadsides

**Looking for
sites like this**



- Reforestation of wide ROW areas where compatible
- Passive reforestation—simply stop mowing and let the forest regenerate
- Forest enhancement if cost effective
- Grassland enhancement

Texas DOT: Sustainable Pavements

- **Recycled Asphalt Pavement and Recycled Asphalt Shingles**
 - Less raw material and cost savings (potential to save TxDOT between \$50 million and \$150 million each year)
- **Warm Mix Asphalt (WMA)**
 - Due to the lower temperature at which it is produced WMA creates less emissions, smoke & odor
 - 12 to 50 % reduction in fuel consumption has been claimed in recent literature
 - More durable pavement
- **Permeable Friction Course Asphalt (PFC)**
 - Increased cost is offset by the longer expected life of PFC
 - Safety benefits: Drains the water off the roadway quicker, reduces spray and glare, improves visibility of traffic markings
- **Recycled Concrete and Flyash**
 - Use is approximately equal to reducing 279,337 metric tons of CO2 emissions



Day 1 Breakout Groups: GHG Mitigation Strategies

- Three topic areas:
 1. Integrating GHG reduction in transportation planning
 2. Integrating GHG in transportation construction, maintenance, and operations
 3. Climate change action plans

Day 1 Breakout Groups: GHG Mitigation Strategies

- Responding to 5 questions:
 1. What mitigation actions are your states taking or exploring?
 2. What have you found regarding effectiveness of strategies?
 3. What challenges have you faced?
 4. What research are you undertaking?
 5. What research is needed?



Mitigation Breakout Group Discussion Highlights

What mitigation actions are your states taking or exploring?

- *Planning*—engaging stakeholder groups; developing land use planning tools
- *Construction, Maintenance, and Operations*—increased recycling (e.g. tires, concrete); solar and/or geothermal technology at rest stops
- *Climate Action Plans*—solar panels at maintenance facilities; concentrated land use efforts



Mitigation Breakout Group Discussion Highlights

What have you found regarding effectiveness of strategies?

- *Planning*—improved communication tools; leadership action in assisting land use planning efforts
- *Construction, Maintenance, and Operations*—bundling strategies achieves the greatest results
- *Climate Action Plans*—significant impact and lack of control over public behavior and perception



Mitigation Breakout Group Discussion Highlights

What challenges have you faced?

- *All*—political (short- and long-term); funding
- *Construction, Maintenance, and Operations*—environmentally preferred materials are not readily available
- *Climate Action Plans*—state DOT organizational structure can have negative impact



Mitigation Breakout Group Discussion Highlights

What research are you undertaking?

- *Planning*—examining social & economic impacts of reducing VMT; improved public outreach; land use in rural areas
- *Construction, Maintenance, and Operations*—GHG estimation tools; travel system efficiency modeling



Mitigation Breakout Group Discussion Highlights

What research is needed?

- *Planning*—improved methods for applying performance measures
- *Construction, Maintenance, and Operations*—developing better measures of baselines to quantify benefits of strategies; promoting behavior change
- *Climate Action Plans*—improved education tools for communicating with the public; establishing improved GHG emissions baselines/inventories

Mitigation Discussion Questions

- Regarding GHG mitigation strategies:
 1. What GHG reduction strategies are you considering or implementing?
 2. What research is needed?

Symposium Agenda—Day 2

- **Session 1:** Setting the Stage: Adaptation's Role in State Climate Action Plans, Federal Climate Policy, and State Climate Policies
- **Session 2:** Understanding the Effects of Climate Change on Transportation
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Climate Impacts and Adaptation: Day 2 Highlights

- DOT is active in federal adaptation efforts including the Interagency Climate Change Adaptation Task Force (Linda Lawson, US DOT)
- States need help identifying and eliminating legal and policy barriers to adaptation (Vicki Arroyo, Georgetown Climate Center)
- State efforts to date vary widely, but most include an inventory of vulnerable assets; other common elements include call for increased coordination, review of design standards, and utilization of risk assessment/risk management strategies

Climate Impacts and Adaptation: Day 2 Highlights (cont'd)

- FHWA is actively working on adaptation
 - Adaptation Strategy
 - Regional Climate Change Effects report
 - www.fhwa.dot.gov/HEP/climate/climate_effects/effects00.cfm
 - Climate Change Vulnerability/Risk Assessment Conceptual Model
 - <http://www.fhwa.dot.gov/hep/climate/cmp.htm>
 - Peer Exchanges



Climate Impacts and Adaptation: Day 2 Highlights (cont'd)

- NCHRP 20-83(5) Study is underway; the study will include an adaptation planning framework to help state DOTs prepare their infrastructure and operations for climate change impacts (Michael Meyer, Georgia Tech)
- Ongoing interdisciplinary dialogue and collaboration is of the utmost importance (Paula Hammond, Washington State DOT)

More Focus/Better Information: A Growing National Concern

CLIMATE CHANGE IMPACTS ON THE UNITED STATES

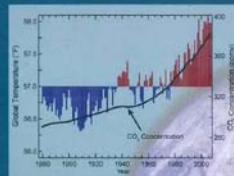
The Potential Consequences of Climate Variability and Change

Overview

National Assessment
Synthesis Team

U.S. Global Change
Research Program

Global Climate Change Impacts in the United States



U.S. Climate Change Science Program
Unified Synthesis Product

2nd Public Review Draft
January 2009
Do not cite or quote

- First National Assessment, 2000
- 21 Synthesis and Assessment Products
- Second National Assessment, 2009
- National Academies: America's Climate Choices, 2009 and 2010
- Third National Assessment, underway

Review of Projected Climate Effects

- Arctic warming will reduce sea ice causing erosion and thaw permafrost damaging infrastructure
- Loss of Shore-fast Sea Ice
- Floods and droughts will become more common
- Increases in extreme heat

Why do we care?

These effects will impact transportation

CLIMATE EFFECT	IMPACTS
Increased coastal storm intensity	<ul style="list-style-type: none">• Increased storm surge and wave impacts on roads, bridge structures , signs, etc.• Decreased expected lifetime of highways exposed to surge• Damage to infrastructure caused by the loss of coastal wetlands and barrier islands• Erosion of land supporting coastal infrastructure
Sea level rise	<ul style="list-style-type: none">• Permanent inundation of some roads and areas, reduced route options/redundancy• Erosion of road base• Reduced clearance under bridges• Exposes new areas to effects of surge/wave action, potentially causing interruptions to coastal roads• May amplify storm surges in some cases, requiring greater evacuations

States are Taking Action

- **Caltrans**—vulnerability assessment for the state's transportation infrastructure
- **Alaska DOT**—integrated climate change strategy
- **Washington State DOT**—asset management and climate change
- **Pennsylvania DOT**—Climate Change Adaptation Subcommittee on Infrastructure

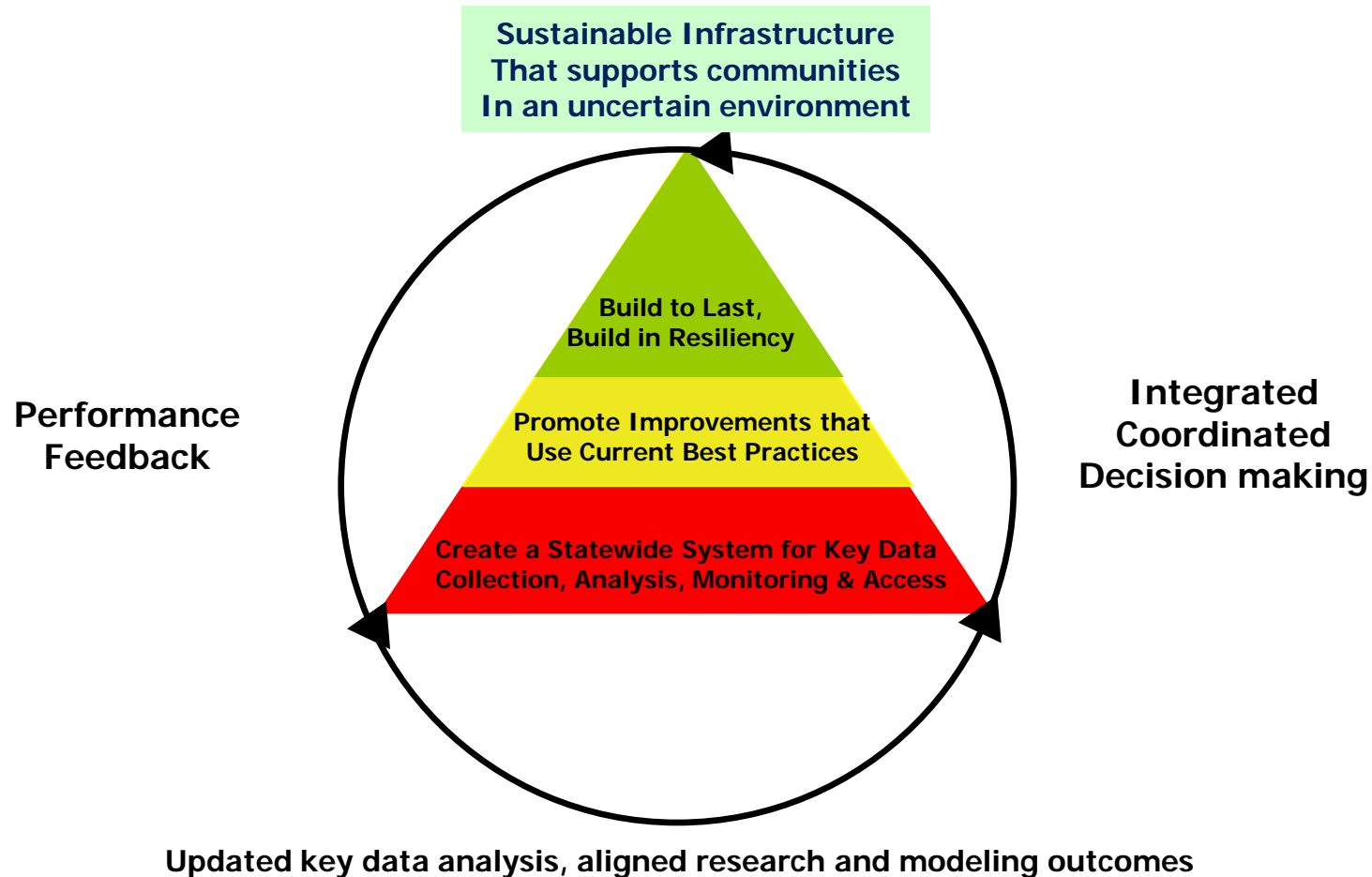


Caltrans: Vulnerability Assessment

- Assess and create an adaptation plan for California's transportation infrastructure
- Project includes:
 - Map of “hot spots”
 - Adaptation Plan

Alaska DOT: Climate Change Strategy

Process of continued, routine communication and feedback is essential to adapt and refine actions taken over time.



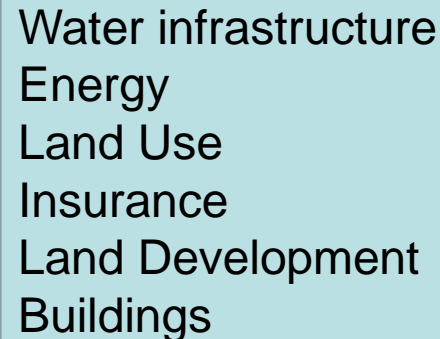
Washington State DOT: Asset Management & Climate Change

- Scenario planning
- Sea level rise mapping
- Scour monitoring
- Vulnerability assessment
- Risk assessment



Pennsylvania DOT: CC Adaptation Subcommittee on Infrastructure

- Deliver to CCAC January 2011
- Working Groups
 - Natural Resources
 - Public Health and Safety
 - Infrastructure
 - Tourism and Outdoor Recreation
- Priorities and Practical Recommendations



Water infrastructure
Energy
Land Use
Insurance
Land Development
Buildings

Transportation

Day 2 Breakout Groups: Adaptation

- 5 questions:
 1. For states that have not considered climate change effects and adaptation planning yet, what is the primary barrier to doing so?
 2. For states who have, what was the driver for incorporating climate effects into transportation planning?
 3. What are the most significant barriers to implementation of adaptive strategies? What tools are needed?
 4. Who do you see as the key partners/stakeholders in reducing vulnerability to climate effects/implementing adaptation measures?
 5. What research is needed?

Adaptation Breakout Group Discussion Highlights

- 1. For states that have not considered climate change effects and adaptation planning yet, what is the primary barrier to doing so?**
 - Sense of lack of urgency
 - Day-to-day system operations often take priority
 - Lack of political support
 - Financial difficulty
 - Unsure of how to begin

Adaptation Breakout Group Discussion Highlights

- 2. For states who have, what was the driver for incorporating climate effects into transportation planning?**
- State mandate which evolved into more advanced effort
 - Began with an environmental focus and expanded into other areas
 - Federal initiatives and support
 - Information sharing between states
 - Alaska—adaptation was a necessity—climate change effects have already begun

Adaptation Breakout Group Discussion Highlights

- 3. What are the most significant barriers to implementation of adaptive strategies?**
- Lack of available funding
 - Planning for climate change uncertainties
 - Effective communication with public
 - Moving away from project approach to system-wide approach

Adaptation Breakout Group Discussion Highlights

3. What tools are needed?

- Updating federal emergency response requirements to allow improvements
- Gathering additional LIDAR data
- Asset management tools
- Identifying best practices for emergency response communication efforts

Adaptation Breakout Group Discussion Highlights

4. Who do you see as the key partners/stakeholders in reducing vulnerability to climate effects/implementing adaptation measures?

- Governor
- Homeland security
- FEMA
- USGS
- Local partners
- Energy infrastructure
- Tribal partners
- AASHTO
- FHWA
- FTA
- Professional organizations
- Members of academia
- Public

Adaptation Breakout Group Discussion Highlights

5. What research is needed?

- Update the 100-year storm projections maps
- Update FEMA's 100-year flood boundaries
- Collect best practice adaptation strategies—salvage and reuse strategies and overlap of NEPA and climate change
- Develop a tool for cost/benefit analysis of adaptation efforts
- Identify materials for operations that are able to handle potential climate change effects

Adaptation Discussion Questions

- Regarding adaptation:
 1. What are the most significant barriers to implementation of adaptive strategies?
 2. What tools are needed?
 3. What research is needed?

Resources

- Learn more about climate change & transportation:
 - AASHTO Climate Change Website:
<http://climatechange.transportation.org/>
 - Center for Environmental Excellence:
<http://environment.transportation.org/>
 - FHWA:
<http://www.fhwa.dot.gov/hep/climate/>

FHWA / AASHTO Webinars

- View archived AASHTO/FHWA climate change and transportation webinars:
<http://climatechange.transportation.org/webinars/>
- Stay tuned for future AASHTO/FHWA climate change webinars over the next six months...

Next Steps

- Presentations and complete summary available at:
<http://climatechange.transportation.org/symposium/>
- For more information:
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