Integrating Transportation, Land Use, and Pricing Policies – Part I: A National View

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presented by
Joanne R. Potter
Cambridge Systematics, Inc.

Transportation leadership you can trust.
Transportation’s Contribution to U.S. GHGs

U.S. GHG Emissions by End Use Economic Sector 2006
- Residential: 5%
- Commercial: 6%
- Agriculture: 8%
- Industry: 20%
- Transportation: 28%
- Electricity Generation: 33%

Other Breakdown by Mode
- Light-Duty Vehicles: 59.3%
- Heavy-Duty Vehicles: 19.6%
- Other: 2.0%
- Rail: 2.7%
- Marine: 4.9%
- Aircraft: 11.5%

Federal Action on Transportation and Climate Change

- U.S. DOT Report to Congress on Transportation and Climate Change - Earth Day 2010
- Federal transportation authorization bill likely to include provisions for considering GHG emissions
- Energy legislation will address national GHG reduction targets and include funding for MPO/state target setting
State and Local Action on Transportation and Climate Change

- Climate Action Plans
- Executive orders
- GHG reduction targets
- Legislative requirements
Strategies to Reduce GHG Emissions Vary
Study Objective:

- Examine the potential of VMT and travel efficiency strategies to reduce GHG emissions
- Moving Cooler targets 2 of the 4 “legs”
- McKenzie study addresses vehicle technology and fuels
Moving Cooler Sensitivity Tests to 2050

- **High Fuel Price/Low VMT:** Fuel prices increase dramatically, resulting in lower VMT and improved vehicle technology.
- **Low Fuel Price/High VMT:** Lower fuel prices drive higher VMT growth and less investment in improved technology.
- **High-technology/High VMT:** Technology progresses rapidly, leading to decreased driving cost and higher VMT.

**National On-Road GHG Emissions (mmt)**

- Study Baseline
- Obama Administration Proposal
- High Fuel Price, Low VMT
- Low Fuel Price, High VMT
- High-tech, High VMT

American Clean Energy and Security Act 2020 Target (83% of 2005 emissions)

American Clean Energy and Security Act 2050 Target (17% of 2005 emissions)
Wide Range of Strategies Examined

- Pricing, tolls, Pay As You Drive (PAYD) insurance, VMT fees, carbon/fuel taxes
- Land use and smart growth
- Nonmotorized transportation
- Public transportation improvements
- Regional ride-sharing, commute measures
- Regulatory measures
- Operational/ITS strategies
- Capacity/bottleneck relief
- Freight sector strategies
# Moving Cooler: Example Findings

## Individual Strategies

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Cumulative Percent GHG Reduction from Baseline (2050)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMT Fees</td>
<td>0.4-4.9%</td>
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<tr>
<td>Speed Limit Reductions</td>
<td>1.7-3.5%</td>
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<tr>
<td>PAYD Insurance</td>
<td>1.1-3.2%</td>
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<tr>
<td>Congestion Pricing</td>
<td>0.8-1.8%</td>
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<tr>
<td>Eco-Driving</td>
<td>1.0-2.6%</td>
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<tr>
<td>Land Use/Smart Growth</td>
<td>0.2-2.0%</td>
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<tr>
<td>Urban Public Transit LOS/Expansion</td>
<td>0.3-1.1%</td>
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<tr>
<td>Employer-Based Commute/Parking Pricing</td>
<td>0.4-1.7%</td>
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<tr>
<td>Operational and ITS Improvements</td>
<td>0.3-0.7%</td>
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</tbody>
</table>
“Bundling” Strategies Will be Key

- Combined effectiveness
- Interactions, synergies, antagonistic effects
- Cost
- Other societal impacts/co-benefits/externalities
- Equity effects
Strategy Bundles
Illustrative Analysis

- Near-Term/Early Results
- Low Cost
- Facility Pricing
- System and Driver Efficiency
- Long-Term/Maximum Results
- Land Use/Nonmotorized/Public Transportation
Example: System and Driver Efficiency Bundle

- Combination of strategies to enhance the efficiency of transportation networks
  - Congestion pricing, transit LOS, HOV lanes, car sharing, speed limits, system operations and management, multimodal freight strategies
  - Improve travel speeds, reduce congestion and idling, create viable alternatives to driving alone
Example: Land Use / Transit / Nonmotorized Bundle

- **Urban transit**
  - Fare reduction
  - Increased transit service
  - Urban transit expansion

- **Land use – increased density**

- **Pedestrian/bicycle**

- **Parking pricing/parking restrictions**

- **Congestion pricing**

- **High-speed rail/intercity passenger rail expansion**

- **Urban consolidation centers (freight)**

- **HOV expansion**

- **Car sharing**

- **Signal enhancement**

- **Traveler information**
Range of Annual GHG Reductions of Six Strategy Bundles
Aggressive and Maximum Deployment

1990 & 2005 GHG Emissions – Combination of DOE AEO data and EPA GHG Inventory data
Study – Annual 1.4% VMT growth combined with 1.9% growth in fuel economy
Aggressive Deployment Levels – Range of GHG emissions from bundles deployed at aggressive level
Maximum Deployment Levels – Range of GHG emissions from bundles deployed at maximum level

Note: This figure displays the GHG emission range across the six bundles for the aggressive and maximum deployment scenarios. The percent reductions are on an annual basis from the Study Baseline. The 1990 and 2005 baseline are included for reference.
Economy-Wide Pricing

- Mechanisms – Carbon pricing, VMT fee, and/or PAYD insurance

- Strong economy-wide pricing measures added to bundles achieve additional GHG reductions
  - Aggressive deployment – additional fee (in current dollars) starting at the equivalent of $0.60 per gallon in 2015 and increasing to $1.25 per gallon in 2050 could result in an additional 17% reduction in GHG emissions in 2050

- Two factors would drive this increased reduction
  - Reduction in vehicle-miles traveled (VMT)
  - More rapid technology advances
Economy-Wide Pricing

Total Surface Transportation Sector GHG Emissions (mmt)

- Study Baseline
- Aggressive
- Economy-Wide Pricing

1990 & 2005 GHG Emissions – Combination of DOE AEO data and EPA GHG Inventory data
Study Baseline – Annual 1.4% VMT growth combined with 1.9% growth in fuel economy
Aggressive – GHG emissions from bundle deployed at aggressive level without economy-wide pricing measures
Conclusions

- Combinations of GHG reduction strategies can achieve reductions
- Some strategies are effective in achieving near-term reductions, reducing the cumulative GHG challenge in later years
- Investments in land use and improved travel options involved longer timeframes but would have enduring benefits
Scale of Implementation

- Both national level and state/regional/local strategies are important
- GHG reductions should be viewed relative to the scale of potential implementation
  - While effect on national emissions may be modest, some strategies may be more beneficial at regional scales
Other Societal Goals

- Many strategies contribute to other social, economic and environmental goals while reducing GHGs
- Some strategies have significant equity implications that should be examined and addressed
Next Steps – Policy and Practice

- Regionally-tailored strategy packages
- Climate action planning and implementation
- Performance tracking and adaptive management of action plans
- Further research on effective GHG strategies
# Transportation GHG Reduction Strategies & Responsibilities

<table>
<thead>
<tr>
<th>Strategy Group</th>
<th>State Transp.</th>
<th>Metro Transp.</th>
<th>Local Transp.</th>
<th>Local Other</th>
<th>State Other</th>
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</table>
1. Establish baseline: GHG effects of current program
2. Set target and timeframe for GHG reduction
3. Select strategies and define parameters
4. Estimate GHG reduction from individual strategies
5. Bundle strategies and estimate combined impacts
6. Assess effectiveness in meeting GHG target
Maryland’s Response to Climate Change

April 2007
Governor O’Malley’s Executive Order

August 2008
Climate Action Plan (CAP)

May 2009
2009 GHG Emission Reduction Act

25% reduction by 2020 from 2006 baseline
Established Maryland Commission on Climate Change:
16 agency heads
6 General Assembly members
Private sector
NGOs
Local governments

42 Policy Options Across All Sectors
8 Transportation and Land Use Policy Options
Land Use
Transit
Intercity Travel
Bike / Ped
PAYD
Pricing
Technologies
GHG Impact Analysis

Established agency implementation requirements and set 2020 target (25% below 2006)
No funding; No sector-specific GHG emission targets
- Dec. 2011 – Submit Draft Implementation Plan
- Dec. 2012 – Final Implementation Plan Adopted
- 2016 - General Assembly will Conduct a Mid-Course Review
MDOT’s Draft Implementation Status Report - Analysis

- Update 2006 inventory and 2020 base forecast
- Establish transportation sector GHG emissions reduction target
- GHG emissions assessment by Category (GHG reductions and costs)
  1. Technology and fuel programs
  2. Open and funded projects 2006-2020 (CTP, MPO TIPs/LRTPs)
  3. TERMS open and funded 2006-2020
  4. Transportation and Land Use (TLU) strategies
Maryland DOT Climate Action Implementation Plan

Preliminary GHG Emissions Modeling Results

- 37.77 Base 2020 forecast
- -3.76 National CAFE Standard
- -1.00 Maryland Clean Car
- -0.28 Renewable Fuels Standard
- -1.38 Funded Plans and Programs
- -0.73 Funded TERMS
- -1.62 TLU Policy Options (range of strategies)
- -3.16 Target Shortfall 3.86 – 2.32 mmt

25% Reduction Goal

Maryland Department of Transportation
MDOT’s Draft Implementation Status Report - Results

Percent of mobile source GHG emissions target reduction in 2020:

- 40% - National Fuel Economy Standards, MD Clean Car, National Renewable Fuel Standards
- 17% - MD Plans and Programs and TERMS
- 13–25% - TLU policy options (44 strategies capable of implementation by 2020)
- 18–30% - Remaining target shortfall
**SHRP 2 – C09:**

*Incorporating GHG Emissions Into the Collaborative Decision-Making Process*

- Develop strategies for incorporating GHG emissions in key points of decision-making framework
- Identify relevant information and materials that are already produced by the transportation planning process and the gaps that exist for GHG analysis
- Prepare materials and methods for dealing with these gaps
- Prepare a Practitioner’s Handbook that can be used in the planning and decision making process
Information Sources on GHG Strategy Effectiveness

- NCHRP Project 20-24, Task 59 Report, Strategies for Reducing the Impacts of Surface Transportation on Global Climate Change

- Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions

- U.S. DOT - Transportation’s Role in Reducing U.S. Greenhouse Gas Emissions

- International Energy Agency - Saving Oil in a Hurry

- McKinsey & Company - Pathways to a Low-Carbon Economy

- Center for Climate Strategies and Others – State Climate Action Plans
State workshops to test strategies

Finalize GHG strategy for each key decision point and incorporate in handbook/Web tool

Provide user with information on how to incorporate GHG considerations
- Roles and responsibilities
- Supportive data, tools, and technology
- Associated best practices

Project complete fall 2010
For More Information…

jpotter@camsys.com

SHRP 2 Collaborative Decision Making:

www.transportationforcommunities.com

Moving Cooler:

http://movingcooler.info

http://www.uli.org/Books