

**NASTO BOARD BRIEFING**  
**Impacts on State DOT's of**  
**Global Warming / Greenhouse Gas Impacts**  
June 2008

*Issue initially presented June 2007 to NASTO Board as an Alert from the Air Quality Committee.*

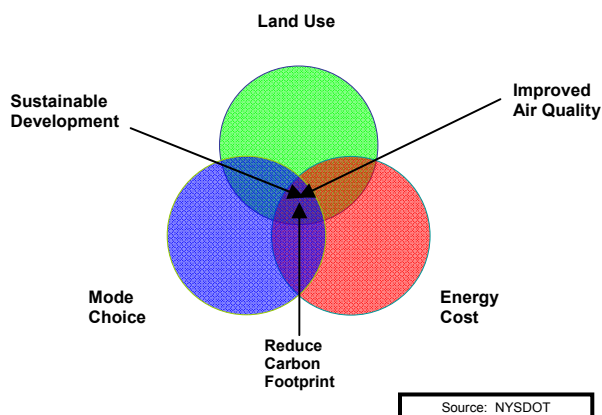
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**Issue:**

Global warming is caused by accumulation of greenhouse gases (GHG) in the atmosphere. Reduction of GHG emissions is linked to sustainability and energy efficiency measures, particularly those which reduce consumption of fossil fuels. Accordingly, state energy and GHG/Climate Change policies are necessarily inter-related. State DOTs are stakeholders in the planning and implementation of financial, programmatic, adaptation, mitigation and research aspects of this challenge.

State, regional and federal efforts to reduce global climate warming are increasingly moving to identify emissions reductions goals which will affect state DOT operations, infrastructure, priorities, programs, missions and funding. Lead agencies vary among the states, but are predominantly the state's environmental agency and/or energy agency. The issue has high recognition and support among elected officials and the public.

**Figure 1:**  
**Transportation Inter-Relationships**  
**Getting To Efficient Transportation**



The potential magnitudes of U.S. reductions needed to contain warming are huge: Some 25 billion tons of CO<sub>2</sub> equivalents by 2050. Reductions of this magnitude and schedule have been called more difficult than “an overnight conversion of the WWII - era industrial sector into a vast machine capable of churning out 60,000 tanks and 300,000 planes.”<sup>i</sup> Reductions from the transportation sector are cited as large and significant, particularly in concert with reduction in petroleum use and energy efficiency, since transportation accounts for approximately two thirds, or 67%, of US petroleum consumption.<sup>ii</sup> Total emissions reductions across all economic sectors are cited as 60-80% from 1990 levels.<sup>iii</sup>

Reductions of this magnitude and schedule will not prevent warming, but can mitigate it to a “manageable” scenario. Conservation, technology, alternative energy sources, and revised development and industrial practices are necessary to achieve such aggressive goals. Scientists cite a “business as usual” scenario, in which very large emissions reductions are not achieved by 2020 and 2050, results in severe human and environmental consequences.

**What are Greenhouse Gases?**

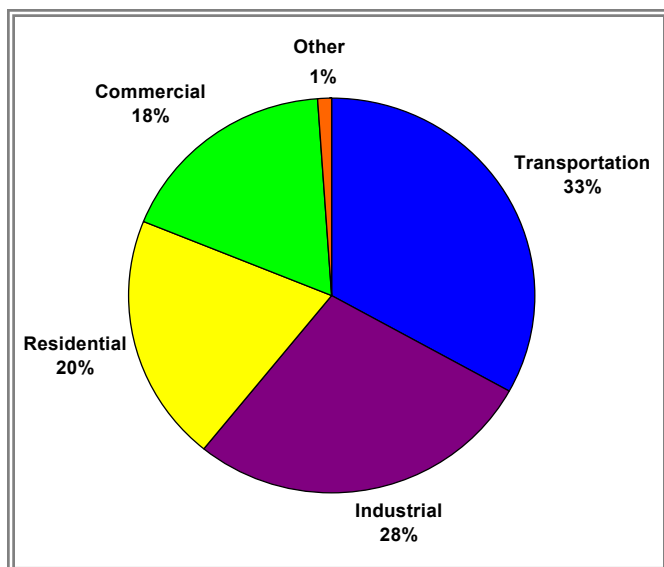
Of the anthropogenic<sup>iv</sup> greenhouse gases identified by USEPA, carbon dioxide (CO<sub>2</sub>) is the most prevalent. Others include chlorofluorocarbons (CFC), hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulfur hexafluoride (SF<sub>6</sub>), methane and nitrous oxide. GHGs also naturally occur as CO<sub>2</sub>, methane, nitrous oxide, ozone and water vapor. The impacts and persistence of each gas vary widely<sup>v</sup>, and total greenhouse gas emissions are often expressed in terms of CO<sub>2</sub> equivalents

(tonsCO<sub>2</sub>-e). Figure 2 portrays the US inventory of GHG emissions for fuel consumption sector. Approximately 78% of the transportation sector's emissions are from highway vehicles.

Transportation sources predominantly emit CO<sub>2</sub> from the combustion of fossil fuels. CO<sub>2</sub> emissions from motor vehicles are not currently regulated by USEPA, and are little affected by vehicle emissions inspection and maintenance (I/M) programs.<sup>vi</sup>

Some GHGs, particularly CO<sub>2</sub>, may be sequestered naturally, such as into plants and trees through the photosynthesis process. Others may persist in the atmosphere for long durations before their molecular structures change. The specific compound, amounts emitted, and atmospheric persistence are important.

**Figure 2:**  
**U.S. Greenhouse Gas Emissions from Fossil Fuel Combustion by Fuel Consuming, End-Use Sector**  
(Source: Maryland Department of the Environment)



### What are Greenhouse Gas Sinks?

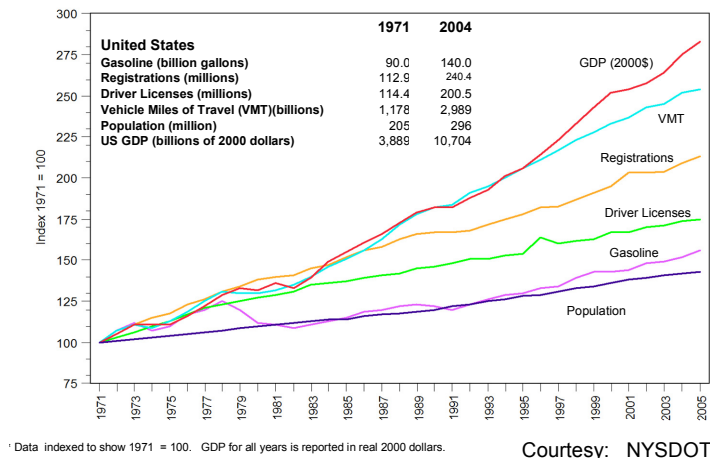
The sequestration of GHG in “sinks” such as forests, wetlands, and grasslands is also a key element in GHG reduction. Destruction of GHG sinks, i.e., through land clearing, both releases GHGs through the operations involved and how the materials are used or allowed to decompose, and obviates future sequestration by that sink. Replacement or augmentation of sinks damaged or destroyed through man’s activities is a means to mitigate impacts.

### Synopsis:

The potential impacts of climate change are profound and will have significant influence on ecosystems, energy use, economic activity, agriculture and infrastructure. The majority of state governments<sup>vii</sup> have commenced studies, issued policy statements or passed legislation addressing the issue. Several regional initiatives have commenced to address CO<sub>2</sub> emissions, including the Regional Greenhouse Gas Initiative (RGGI), a cooperative effort by Northeast and Mid-Atlantic states to reduce GHG emissions from electrical generating stations. Figure 3 shows key national trends, the disproportionate increases in VMT vs. other measures, and increases in gasoline consumption.

The transportation sector contributes approximately one-third of GHG emissions resulting from fossil fuel combustion, by end use sector (Figure 2).<sup>viii</sup> CO<sub>2</sub> emissions from electricity generation are accounted for at end user sector.

**Figure 3:  
Key National Transportation Trends  
National Trends: 1971-2005**



The United States relies on electricity to meet a significant portion of its energy demands, e.g. lighting, electric motors, heating and air conditioning, and industrial processes. Electricity generation consumed 36% of U.S. energy from fossil fuels and emitted 41% of the CO<sub>2</sub> from fossil fuel combustion in 2006.

Initiatives generally include policy and legislative options, developed for all sectors, to reduce greenhouse gas (GHG) emissions by a substantial amount in the near term (i.e., 10% below 1990 baseline by 2020) and long terms (i.e., 75-85% below 2001 baseline by 2050). This issue has gained significant support from elected officials in the past year.

Transportation is likely to be asked to contribute reductions similar to its contribution. These reductions will be both internal to state DOTs (i.e., project development, fuel consumption) and external to DOTs (i.e., regarding the emissions resulting from travel in a state).

**Key Aspects:**

State DOTs are addressing five key aspects of the challenge from the transportation sector:

- Financial, including both revenue generation and new expenditure needs.

- Programmatic, including new/revised planning needs.
- Adaptation to changes induced by global warming.
- Mitigation of future GHG emissions to minimize future impacts.
- Research to better understand local impacts and adaptation approaches, and to reduce future emissions.

**Recent Actions – National, Northeast**

Multiple recent actions have accelerated the consideration of and actions to mitigate global warming, of which several are of specific interest to the transportation community. Table 2 provides a synopsis of NASTO member’s activities.

- The US Supreme Court ruled in Massachusetts v. EPA<sup>ix</sup> that EPA does have the authority to regulate greenhouse gases, and directed EPA to prepare scientific information regarding potential regulation of these compounds in accordance with the Clean Air Act.
- EPA announced an advance NPRM on climate change is to be released on June 21<sup>st</sup>.
- The Energy Independence and Security Act of 2007 calls for a 40% increase (to 35 mpg) in overall light duty motor vehicle fuel efficiency by 2040, and creates aggressive targets for biofuels to offset petroleum use.
- The National Highway Transportation Safety Administration has proposed new corporate average fuel efficiency (CAFE) standards to achieve a 25% increase in fuel efficiency by light duty vehicles between 2011 and 2015.<sup>x</sup> This proposal would implement elements of the Energy Independence and Security Act of 2007.
- Twelve states co-signed letter to President Bush regarding federal action to support states initiatives regarding the recently proposed federal CAFÉ standards and their

pre-emption of state initiatives (includes 7 NASTO members).<sup>xi</sup>

- The Council on Environmental Quality was petitioned to add climate change analyses to the National Environmental Policy Act (NEPA) regulations. The petition was filed on February 28, 2008 by the International Center for Technology Assessment, the Natural Resources Defense Council, and the Sierra Club.
- On December 19, 2007, the USEPA denied a waiver that would have allowed California to implement new motor vehicle emissions standards to reduce CO<sub>2</sub> emissions from vehicles. This is being litigated by CA and multiple other states.
- Eighteen governors signed a declaration on climate change on April 18, 2008, including 8 NASTO members.<sup>xii</sup>
- Approximately 38 states are in discussions on this issue, of which some 16 have adopted a plan, issued an executive order or passed legislation. Several regional GHG reduction organizations exist. Canadian provinces are taking action, and there are several US state-Canadian province organizations addressing the topic.
- Multiple bills related to global warming and GHGs are pending in Congress, of which Senate Bill 2191 (“Lieberman-Warner Bill”) and proposed amendments (i.e., Boxer S. 3036) may be the most comprehensive to be considered in the near future.
- Ten Northeastern and Mid-Atlantic states have joined the Regional Greenhouse Gas Initiative (RGGI). Most of the other area states and the Canadian Eastern Provinces are official observers. RGGI is implementing a cap and trade program on emissions from electricity generation, and in the future may regulate GHG emissions from other sources.<sup>xiii</sup>

- AASHTO is forming a clearinghouse on Climate Change issues affecting transportation agencies, facilities and services.

### Potential Ramifications for NASTO

#### Members:

Most NASTO states are at significant risk to elevation of sea levels, flooding, and more extreme and more frequent weather events forecast under various climate change scenarios. Some State DOTs are being charged with new responsibilities and priorities, which may alter certain aspects of the DOT’s missions and necessitate new means and authority to meet the new challenges.

Figures 4 and 5 portray CO<sub>2</sub> emissions from highway motor vehicles. This data uses recent USDOE projections of VMT, fuel consumption, recent motor fuels prices, and the impacts of the Energy Independence and Security Act of 2007.

**Figure 4:**  
**National CO<sub>2</sub> Estimates**  
**from Highway Vehicles**

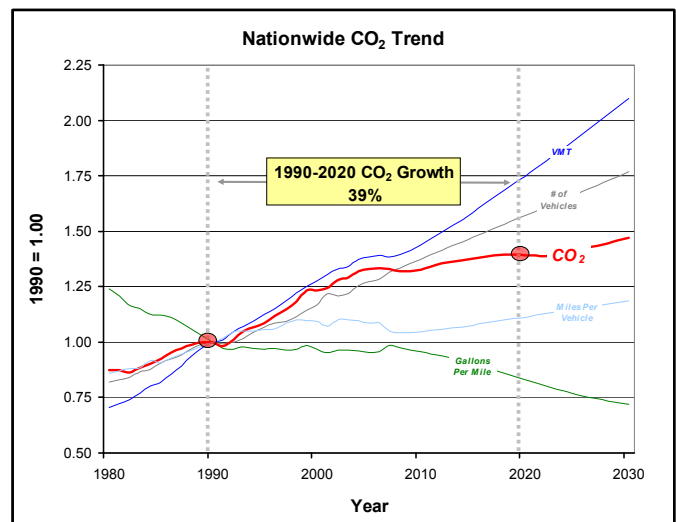


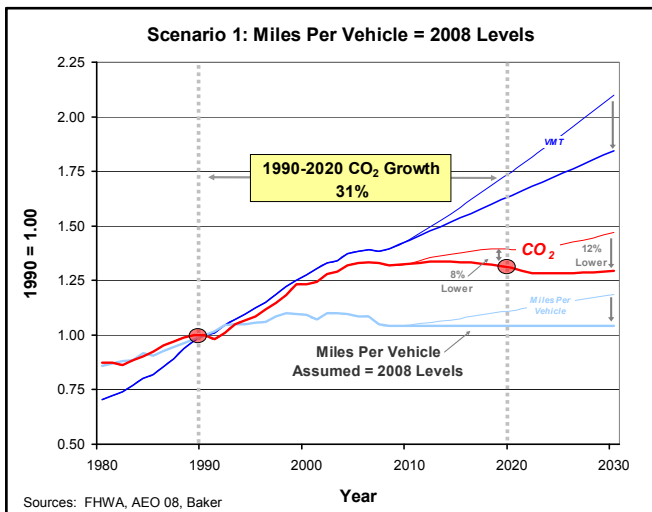
Figure 4 shows current trends or “business as usual” (BAU) data, including increasing VMT per registered vehicle, increasing fleet size, and increasing miles per vehicle. It reveals that CO<sub>2</sub> emissions will level off then resume an upward trend, although at a slower rate, as increasing VMT overcomes current vehicle technology and

fuels requirements. Total CO<sub>2</sub> emissions grow 39% from 1990 to 2020, in contrast to suggestions that these emissions need to decrease.

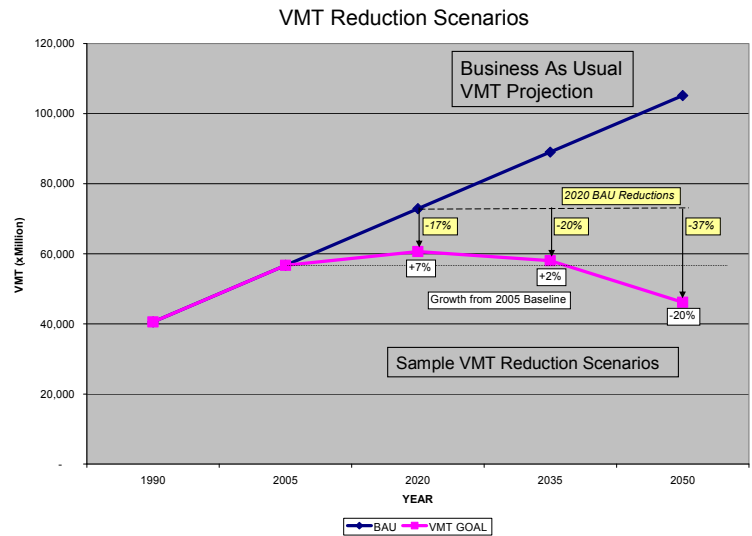
Figure 5 portrays the impacts on CO<sub>2</sub> emissions if future VMT per registered highway vehicle is held constant at 2008 levels while the nation's population and number of motor vehicles increases. Under this scenario, total highway vehicle CO<sub>2</sub> emissions grow 31% from 1990 to 2020, but are stable through 2030 at year 2000 levels. This projection indicates that additional vehicle technology, fuels, VMT decreases and/or other factors are necessary to achieve larger CO<sub>2</sub> reductions from current projections, such as a return to or decrease from 1990 emissions levels.

Figure 6 portrays several sample scenarios to in which VMT is reduced from current BAU projections for the year 2020 towards 1990 levels over the period 2020-2050. Compared to Figures 4 and 5, it illustrates the key differences between VMT and CO<sub>2</sub> impacts during a period in which CO<sub>2</sub> emissions per mile are expected to decrease, and particularly that motor vehicle emissions and VMT are not interchangeable. VMT reductions of the magnitude illustrated would be challenging to achieve.

**Figure 5:**  
**Estimated CO<sub>2</sub> Emissions if 2008 VMT per Registered Vehicle Held Constant**



**Figure 6:**  
**Sample VMT Reduction Scenarios**



Key ramifications of the need to reduce CO<sub>2</sub> emissions from highway motor vehicles are presented below. Table 1 presents a more extensive listing.

#### Financial

- Funding transportation projects and programs will be more difficult as consumption of petroleum-based motor fuels and fuels-based taxes decrease. Changes to funding mechanisms may be appropriate to accommodate this dynamic.
- Increased needs, particularly but not solely due to relocation and strengthening of existing infrastructure, may increase financial demands on DOTs.

#### Programmatic

- Liaison and joint projects and programs with other state agencies.
- Inclusion of climate change priorities in the transportation planning process, transportation improvement programs, long range plans and statewide plans.
- State, regional and local endeavors addressing land use – transportation dynamics.
- Creation of metrics and a performance measurement system to assess progress.

## Adaptation

- Identify at-risk infrastructure.
- Protect vulnerable infrastructure through strengthening, relocation, and other approaches.
- Assess project prioritization criteria to meet climate change needs.
- Prepare for increased frequency and intensity of natural events/disasters, and any corresponding evacuation / emergency plan needs.
- Project design changes (i.e., higher bridges) to implement adaptation measures.
- Address operational and structural changes impacts of higher and longer duration summer temperatures.

## Mitigation

- External to DOT:
  - Behavior changes to meet potential fuel consumption/GHG/VMT reduction goals:
    - Increased mode share for high capacity and non-motorized modes.
    - Trip reduction and decreases in VMT growth.
    - Motor truck / freight emission reductions.
  - Effective land-use changes to reduce future trip generation rates and travel needs.
  - Joint efforts with environmental, economic development, and other agencies.
  - Increased management of roadways to reduce congestion and wasted fuel.
  - Reduce fossil fuel use through vehicle technology and alternative fuels.
- Internal to DOT
  - Reduce fossil fuel use by DOT activities, facilities, and employee commute and job travel.
  - Increased management of facilities and services to reduce congestion and wasted fuel.
  - Accelerate new vehicle and fuel technologies into the on- and off-road fleets.

- Planning and project development processes that examine climate change impacts in the TIP/Plan, project environmental analyses, preserves/replaces carbon sinks, and mitigates remaining impacts.
- Project designs that minimize or reduce GHG emissions.

## Research

- Quantification and mapping of new potential flood zones and other hazard areas.
- Construction materials and techniques appropriate to changes in temperature extremes or durations, exposure to hazards, and reduced GHG emissions.
- Mitigate barriers regarding transportation participation in activities now not common or currently prohibited (i.e., transportation – land use integration at the local level).
- Methods to reduce general public's transportation-related fossil fuel consumption and GHG emissions.
- Economic and societal impacts of potential transportation-related GHG reduction strategies.

## **Potential State DOT and NASTO Actions**

The Air Quality Committee suggests several activities beneficial to NASTO and its individual members. Table 2 provides a brief summary of specific GHG / Climate Change initiatives by NASTO members.

1. Tracking and pro-active participation in regulatory and legislative processes at federal and state levels. Climate change impacts on transportation may come from multiple sources, including new federal legislation (transportation, environmental and energy-related), federal regulations under existing law, and state actions.
2. Closely monitor the Administration and Congress, which are widely anticipated to directly address global warming and GHG emissions reduction issues in general, and specifically regarding transportation



technology, VMT, and land use-transportation inter-relationships.

3. Participate in state and regional efforts to ensure suitable, achievable transportation goals are developed to address GHGs. NASTO may participate to represent the interest of northeastern states in the broader national discussion. State DOTs will need to place a higher priority on addressing the issue, in concert with state plans/policies/legislation and any future federal regulation or legislation.

4. Research new financial mechanisms to offset the impacts on DOT funding from increasing fuel economy, tax preferences for non-petroleum fuels, and potential VMT reductions. These impacts are already being felt and will continue for the foreseeable future.

Explore the potential of accessing funds generated by the RGGI as a potential financial mechanism for DOT activities regarding climate change. RGGI is a term for regional groups of states/provinces which are auctioning off GHG emissions allowances to electricity producers. Auctions are forecast to create a substantial revenue stream, use of which varies by state.

5. Support national initiatives regarding vehicle and fuel technology, which will play a strong role in increasing fuel efficiency and reducing GHG emissions. Consider supporting California's next generation emissions and fuel standards, which EPA has not allowed to proceed.
6. Develop materials to support DOT outreach to elected officials regarding transportation and climate change issues. Include state DOT roles and limitations regarding general public and commercial travel behavior, land use, and related issues.
7. Standardize language and metrics regarding transportation-related GHG emissions

issues. Research methodologies for project analysis and for tracking progress towards goals at the state and, potentially, local level.

8. Compile existing data and commission new research as appropriate regarding the potential for VMT and trip reduction re/development using integrated land use – transportation planning as applicable in the northeast. Research legal, regulatory and inter-governmental mechanisms and institutional arrangements which may present barriers to certain actions or levels of effectiveness.
9. Educative efforts regarding internal-DOT actions to reduce GHG emissions, such as use of no or low-carbon motor fuels, energy efficiency improvements in typical existing DOT facilities, and use of Leadership in Energy and Environmental Design (LEED) standards for facilities.
10. Research means to integrate global warming/GHG considerations in TIPs, long range plans, state transportation plans, and the transportation planning process among state and local agencies.

#### **Acknowledgements**

The NASTO Air Quality Committee thanks all its members and participants in this endeavor. PennDOT sponsored consultant assistance from Michael Baker Jr., Inc. to draft this paper. New York and Maryland DOT staff contributed several figures and provided key input during the development of this paper.

**Table 1:  
Potential Ramifications of Climate Change on State DOTs**

<p><u>Financial</u></p> <ul style="list-style-type: none"> <li>▪ Consumption of petroleum-based motor fuels is expected to decrease significantly through increase fuel economy and VMT reduction strategies. Increases in motor fuel costs are currently affecting fuel consumption and tax receipts. Funding transportation projects and programs will be more difficult as consumption of petroleum-based motor fuels decreases due to increased fuel economy, tax preference for non-petroleum fuels, and potentially VMT reduction strategies. Changes to funding mechanisms may be appropriate to accommodate this dynamic.</li> <li>▪ Increased needs, particularly but not solely due to relocation and strengthening of existing infrastructure, may substantially increase financial demands on DOTs. States with extensive or expensive infrastructure in existing and forecast future tidal, flood-prone or otherwise at-risk areas are most affected.</li> <li>▪ Increased costs for overall planning, project planning and engineering, programs and disaster and evacuation planning and responses.</li> </ul>
<p><u>Programmatic</u></p> <ul style="list-style-type: none"> <li>▪ Liaison and joint projects and programs with other state agencies.</li> <li>▪ Inclusion of climate change priorities in the transportation planning process, transportation improvement programs, long range plans and statewide plans.</li> <li>▪ State, regional and local endeavors addressing land use – transportation dynamics.</li> <li>▪ Creation of metrics and a performance measurement system to assess progress.</li> </ul>
<p><u>Adaptation</u></p> <ul style="list-style-type: none"> <li>▪ Identify and inventory at-risk transportation infrastructure and means to protect it or reduce damage. This includes roads, bridges, tunnels, buildings, etc. in areas that are or are likely to become flood-prone or are sensitive to higher temperatures.</li> <li>▪ Assess project prioritization criteria to meet climate change needs.</li> <li>▪ Preparations for increased frequency and intensity of natural events, such as rainfall, flooding, high winds, etc.</li> <li>▪ Preparation of evacuation strategies affecting larger areas than present, and more frequently than currently experienced.</li> <li>▪ Planning for increased storm water engineering from roads and other impermeable surfaces.</li> <li>▪ Potential project design changes to implement adaptation measures (i.e., higher bridges with more robust abutments).</li> <li>▪ Potential project development change costs to examine climate change impacts in the environmental analysis phase, mitigate impacts, and replace carbon sinks.</li> <li>▪ Address operational and structural changes caused by higher and longer duration summer temperatures.</li> <li>▪ Potential infrastructure relocation.</li> <li>▪ Enhanced protection for more species of fauna and flora, including but not limited to creation of protected areas, migration corridors, special attention to cold-water fisheries, and increased number of protected species.</li> <li>▪ Cooperation among states and national organizations to meet common needs.</li> <li>▪ Strengthen monitoring capabilities (i.e., weather forecasts and conditions; water levels).</li> </ul>



**Table 1 (continued)**

Mitigation

- External to DOT:
  - Behavior changes to meet potential fuel consumption/GHG/VMT reduction goals:
    - Increased mode share for high capacity and non-motorized modes.
    - Trip reduction and decreases in VMT growth.
    - Freight emissions - motor truck, rail, air.
    - Aggressive GHG reduction goals (i.e. 20% below 1990 levels by 2010) may require economic and other non-traditional measures.
  - Effective land-use changes and partnerships to reduce future trip generation rates and travel needs.
  - Joint efforts with environmental, economic development, and other agencies.
  - Increased management of roadways to reduce congestion and wasted fuel.
  - Reduce fossil fuel use through vehicle technology and alternative fuels.
- Internal to DOT
  - Reduce fossil fuel use by DOT activities, facilities, and employee commute and job travel. These may include building retrofits to reduce energy usage (i.e. LEED<sup>xiv</sup>), reduce of fossil fuels for heating cooling and vehicles; retrofit of on- and off-road vehicles to cleaner fuels; design and specification of less GHG-intensive operational and construction approaches; reducing employee commute and on-the-job travel needs, operational changes, etc.
  - Increased management of roadways to reduce congestion and wasted fuel.
  - Accelerate new vehicle and fuel technologies into the on- and off-road fleets.
  - Planning and project development processes that examine climate change impacts in the TIP/Plan, project environmental analysis phase, then mitigates impacts and preserves/replaces carbon sinks.
  - Project designs that reduce GHG emissions.

Research

- Research activities related to the above.
- Quantification and mapping of potential flood zones and other hazard areas or magnitudes anticipated from multiple warming scenarios.
- Research regarding new or revised construction materials and techniques appropriate to changes in temperature or exposure to hazards, or reduced GHG emissions.
- Mitigate barriers regarding transportation participation in activities now not common or prohibited (i.e., transportation – land use integration at the local level).
- Detailed data analysis and planning related to avoiding unnecessary trips, reducing VMT, moving trips to more efficient modes, etc. for freight and passenger travel.
- Cooperative regional and national research into design, mitigation, adaptation, financial and other aspects of high important to multiple states.
- Economic and societal impacts of potential transportation-related GHG reduction strategies.

**Table 2:  
Synopsis of NASTO Member's Global Warming Transportation Activities**

State (Lead Agency)	Status of Recent Initiatives Including: Executive Orders, Legislation and Policy Option Development (POD)	Overall Greenhouse Gas Reduction Goals	Specific Transportation Initiatives **	
			VMT	Fuels / Technology
<i>Connecticut (Environment)</i>	2005 - Final Climate Change Action Plan. 2007 - Latest update on progress. 2008 - HB5600 passed making GHG reduction goals mandatory.	– 10% from 1990 by 2020 – 80% from 2001 by 2050	Reduce BAU growth by 3%-19% by 2020.	– CAL LEV II Standards – Fleet Vehicle Incentives / Initiatives – Public Ed. on Low GHG Vehicles
<i>Delaware (Energy)</i>	2000 – Final Climate Change Action Plan	– 7% from 1990 by 2010	Reduce 2010 BAU total by 2.9%-20%.	– Improved fuel economy – Increased use of AFV
<i>District of Columbia*</i>	Renewable portfolio standard. US Mayors Climate Protection Agreement. Clean & Affordable Energy Act (proposed).	– 7% from 1990 by 2012	No specific VMT reduction targets. Strategies include TOD, Smart Growth, bike/pedestrian, performance based parking pilot program, and transit initiatives.	– CNG fuels for City fleet. – Hydrogen fueling pilot project. – E-85 fueling pilot program. – Clean Diesel Fuel program. – Hybrid Diesel-Electric bus program. – Feasibility study – biofuels production.
<i>Maine (Environment)</i>	2004 – Final Climate Action Plan. 2008 – Biennial Progress Report.	– 10% from 1990 by 2020 – 75%-85% from current by future date (TBD)	No specific VMT reduction targets. Goal to reduce VMT growth.	– Low GHG fuel standard – Auto emissions fuel standards
<i>Maryland (Environment)</i>	2008 – Final Climate Action Plan due to Governor and General Assembly in mid-June.	Reduce From 2006 Baseline: – 10% by 2012 – 15% by 2015 – 25% - 50% by 2020 – 90% by 2050	Reduce from 2020 per capita forecast: – 18% by 2020 – 30% by 2035 – 50% by 2050	– Low GHG fuel standard – Transportation technologies: reduce idling, green port, etc.

State (Lead Agency)	Status of Recent Initiatives Including: Executive Orders, Legislation and Policy Option Development (POD)	Overall Greenhouse Gas Reduction Goals	Specific Transportation Initiatives **	
			VMT	Fuels / Technology
<i>Massachusetts (Office for Commonwealth Development; Exec. Office of Energy &amp; Env. Affairs)</i>	2004 – Climate Protection Plan. Developed by energy, environment, housing and transportation agencies.	– 10% from 1990 by 2020 – 75%-85% from current by future date (TBD)	No specific VMT reduction targets. Strategies include TOD, and transit initiatives. Process under MEPA reviews large scale projects to identify, quantify, mitigate GHG emissions.	– HOV for clean vehicles – Stronger vehicle emission standards
<i>New Hampshire (Environment)</i>	2001 – Climate Change Challenge Report. Sep. 1 <sup>st</sup> 2008 – Climate Action Plan due to Governor.	– 10% from 1990 by 2020 – 75%-85% from current by future date (TBD)	No specific VMT reduction targets. 2001 strategies include TOD, and pricing initiatives.	– Promote use of AFVs. – Improved marine engines
<i>New Jersey (Environment)</i>	2007 – Executive Order establishes GHG Reduction Goals. 2008 – Draft Energy Master Plan (EMP). Transportation sector has not yet been released.	– 1990 levels by 2020 (~20%) – 80% from 2006 by 2050	No specific VMT reduction targets at this time.	No specific fuels / technology strategies at this time.
<i>New York (Governor’s Office, Chair)</i>	2003 – Recommendations to Governor Pataki for Reducing New York State Greenhouse Gas Emissions.	– 10% from 1990 by 2020 – Specific Transportation Goal Recommended: – 10% above 1990 by 2020	Reduce BAU growth 9.5% by 2020 (estimated impact of multiple proposed strategies)	– Truck Stop Electrification – AFVs – Enforce speed limits – Calc. GHG emissions from TIP, Plan.
<i>Ontario***</i>	2007 – Go Green. Ontario’s Action Plan on Climate Change.	– 6% from 1990 by 2014 – 15% from 1990 by 2020 – 80% from 2001 by 2050	Reduce 300 million car trips by 2020 through new and improved transit starting in 2008.	– Low carbon fuel standard – Improved fuel economy – AFVs
<i>Pennsylvania* (Independent)</i>	2007 – Energy Independence Strategy. 2008 – Climate Change Strategy (planned)	No specific GHG reduction goals in Energy Plan (see pending Climate Change Strategy)	No specific VMT reduction targets.	– All gasoline E-10 by 2017 – All diesel B-20 by 2017 – State vehicle renewable fuels std. – Financial stimulus for fuels, technology.

State (Lead Agency)	Status of Recent Initiatives Including: Executive Orders, Legislation and Policy Option Development (POD)	Overall Greenhouse Gas Reduction Goals	Specific Transportation Initiatives **	
			VMT	Fuels / Technology
<i>Quebec</i> *** (Environment)	2007 – 2006-2012 Action Plan – First-Year Results.	– 6% from 1990 by 2012	No specific VMT reduction targets.	– support cellulosic ethanol production – support municipalities who wish to adopt bylaws prohibiting idling motors
<i>Rhode Island</i> (Environment / Energy)	2002 – Greenhouse Gas Action Plan.	– 10% from 1990 by 2020 – Up to 80% from current by future date (TBD)	No specific VMT reduction targets. 2002 strategies include PAYD insurance and transit. .	– Fuel Economy Improvements – Low GHG Fuels
<i>Vermont</i>	2007 – Final Report and Recommendations.	Reduce from 1990 Baseline: – 25% by 2012 – 50% by 2028 – 75% by 2050	Reduce from baseline: – 14% by 2012 – 28% by 2028	– Alternative fuel infrastructure – Plug-in hybrids

\* Signifies NASTO member is an observer in the RGGI process.

\*\* Other transportation measures adopted outside GHG/CC endeavors are not included here. These measures include CA vehicle standards and alternative fuels. See individual state plans/policies for complete data.

\*\*\* The province of Ontario is currently an observer to the Western Climate Initiative (WCI); the province of Quebec is a partner in the WCI.

## Endnotes

<sup>i</sup> Bryan Walsh, “Why Green is the New Red, White and Blue.” *Time Magazine*, April 26, 2008, p. 46.

<sup>ii</sup> Energy Information Administration, Demand website:

[http://www.eia.doe.gov/pub/oil\\_gas/petroleum/analysis\\_publications/oil\\_market\\_basics/demand\\_text.htm#U.S.%20Consumption%20by%20sector](http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/demand_text.htm#U.S.%20Consumption%20by%20sector))

<sup>iii</sup> Growing Cooler: Evidence on Urban Development and Climate Change, Urban Land Institute, 2007, page ES 1.

<sup>iv</sup> The term anthropogenic refers to greenhouse gas emissions and removals that are a direct result of human activities or are the result of natural processes that have been affected by human activities (IPCC/UNEP/OECD/IEA 1997). Inventory Of U.S. Greenhouse Gas Emissions And Sinks: 1990-2006, April 2008, USEPA #430-R-08-005. See page ES 3 for the global warming potential of each compound.

<sup>v</sup> Ibid.

<sup>vi</sup> I/M programs were designed to ensure that emissions of ozone precursors volatile organic compounds (VOC) or hydrocarbons (HC) and nitrogen oxides (NO<sub>x</sub>), and carbon monoxide are adequately controlled, and relate to federal motor vehicle emissions standards for these pollutants and precursors.

<sup>vii</sup> USDOT reports in early 2008 that 38 states are in discussion on this issue, of which 16 have adopted a plan, issued an executive order or passed legislation.

<sup>viii</sup> Pew Center on Global Climate Change, U.S. GHG Emissions by Sector: [http://www.pewclimate.org/global-warming-basics/facts\\_and\\_figures/us\\_emissions/usghgemsector.cfm](http://www.pewclimate.org/global-warming-basics/facts_and_figures/us_emissions/usghgemsector.cfm)

<sup>ix</sup> April 2, 2007. <http://www.supremecourt.us/opinions/06pdf/05-1120.pdf>.

<sup>x</sup> Announced April 22, 2008. <http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.43ac99aefa80569eea57529cdba046a0/>

<sup>xi</sup> Signatories were CT, MD, MA, NJ, NY, PA, VT, CA, AZ, MN, OR, WA. Source: Washington Update, April 21-15, 2008.

<sup>xii</sup> Signatories Include CT, DE, MD, ME, MA, NJ, NY, VA AZ, CA, CO, FL, IL, KS, MI, NM, OR, WA. Source: Washington Update, April 21-15, 2008. see [www.yale/opa/v36.n27/story1.html](http://www.yale/opa/v36.n27/story1.html) .

<sup>xiii</sup> See [www.rggi.org](http://www.rggi.org) .

<sup>xiv</sup> Leadership in Energy and Environmental Design, a multi-step system to designing and qualifying energy efficient and environmentally sensitive buildings and site by the U.S. Green Building Council.