ASSESSING STATE LONG RANGE TRANSPORTATION PLANNING INITIATIVES IN THE NORTHEAST FOR CLIMATE AND ENERGY BENEFITS

FINAL REPORT

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PREFACE

The following report addresses the long-range transportation planning (LRTP) process presently being undertaken by state Departments of Transportation (DOTs). The purpose of the analysis is to evaluate how effective this process is in addressing other concerns of the states, namely their energy use and their greenhouse gas (GHG) emissions. The LRTP process is but one tool that can have an effect on reducing fossil fuel use by states and reducing GHG emissions; hence, the conclusions of this study need to be viewed in this context. Moreover, because the LRTP process is conducted by state DOTs, it principally involves programs and projects within the purview of these agencies. However, there are significantly more actors within a state that impact transportation energy use—including metropolitan planning organizations (MPOs), other state agencies, and transportation authorities (for example, those that oversee airports and their operations); therefore, the LRTP process cannot be expected to be a single comprehensive strategy for managing transportation for energy and climate outcomes within states. In many cases, at best, state DOTs can act as "honest brokers" among these actors; such an activity, however, is generally deemed outside the purview of LRTPs.

Finally, this research project was conducted between October 2004 and September 2005. During this time the domestic price of crude oil rose from less than $30 per barrel to more than $60 per barrel. In addition, storm surge from coastal hurricanes caused substantial damage to transportation infrastructure in several southern states, particularly in the Gulf Coast region. The effect of these events on state DOT strategic direction is too recent to be included in this study. However, it is hoped that the results of this study may be useful to state DOTs as they begin to develop their strategic response to these events through their on-going long range planning processes.

GLOSSARY OF TERMS

BAU	Business as Usual
CAA	Clean Air Act
CACPS	Clean Air and Climate Protection Software
CAP	Climate Action Plan
CCAP	Climate Change Action Plan
CCCEF	Center for Climate Change and Environmental Forecasting
CO_2	Carbon Dioxide
CPP	Climate Protection Plan (Massachusetts CAP)
DOT	Department of Transportation
EOT	Executive Office of Transportation (Massachusetts DOT)
FHWA	Federal Highway Administration
GHG	Greenhouse Gases
ISTEA	Intermodal Surface Transportation Efficiency Act
ITLUP	Integrated Transportation and Land Use Plan
LRTP	Long Range Transportation Plan
MPO	Metropolitan Planning Organization
NAAQS	National Ambient Air Quality Standard (Clean Air Act)
MMT	Millions of Metric Tons
NEG-ECP	New England Governors-Eastern Canada Premieres
OCD	Office of Commonwealth Development (Massachusetts)
RGGI	Regional Greenhouse Gas Initiative
SACOG	Sacramento Area Council of Governments (an MPO)
SDP	Sustainable Development Principles (Massachusetts)
SEP	State Energy Plan (New York)
SIP	State Implementation Plan (Clean Air Act)
STIP	State Transportation Improvement Plan
TEA-21	Transportation Equity Act for the 21st Century
TDM	Transportation Demand Management
TIP	Transportation Improvement Plan
T/LU	Transportation/Land Use
TMA	Transportation Management Association
VMT	Vehicle Miles Traveled
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

This is the final report of a year-long study of state long-range transportation planning practice for climate protection and energy efficiency outcomes. The purpose of this study was to identify best national long range transportation planning (LRTP) practice in this area and how such practice could be improved, especially in the four states that were partners in this study: Massachusetts, Maine, New Jersey, and New York.

Oil is the source of more than 97 percent of total transportation energy in the U.S. and the transportation sector now represents over 70 percent of total domestic oil consumption. It is also responsible for more than 30 percent of total domestic emissions of greenhouse gases (GHG) and is the fastest growing source of such emissions.[1] Given increased national policy attention to the national security associated with rapidly rising levels of domestic oil consumption and growing global attention to the challenge of GHG emissions, an analysis of strategic transportation planning initiatives to address how well energy and climate change issues are addressed in long range transportation planning is appropriate.

On the basis of interviews with LRTP professionals, a literature search, and a review of state long range transportation plans in the 29 states with Climate Action Plans or gubernatorial initiatives directing state agencies to coordinate planning for climate and energy efficiency outcomes, 15 state transportation plans were selected for further review. These plans were then studied to evaluate long range planning processes, policies and planning tools that contain both a specific intention to integrate climate and energy outcomes into long range transportation planning, and achieve best practice by a state Department of Transportation (DOT) in this area. Table A delineates the identified best practice in each of these areas. (Chapter 1 contains a more detailed analysis of these results, along with a description of the research methodology and a review of the existing state long-range transportation planning framework.)

[1] This number is based on 2004 data from the International Energy Administration and is consistent with 1996 guidelines on greenhouse gas emissions calculations issued by the Intergovernmental Panel on Climate Change (IPCC). This analysis calculates United States GHG emissions in the transportation sector as 30.8% of all domestic GHG emissions. The data includes emissions from domestic air transport, road vehicles, rail, pipeline transport, national navigation and non-specific transport. Consistent with IPCC guidelines it does not include international aviation or marine bunker fuels. Sources and sector uses of GHG emissions worldwide and domestic, by geographic region (including states) can be found at the Climate Analysis Indicators Tool (CAIT) at http://cait.wri.org

Table A: Best Practice for Long Range Transportation Planning

Area of Practice	Best Practice
Long Range Planning Process	- Linkage of the long range planning process with broad societal goals of reducing criteria air pollutants, greenhouse gas emissions, energy use, and impacts on land, -Linkage to these societal goals through process requirements that engage sister agencies and the public and DOT itself in plan scoping, development, implementation, evaluation, and updates.
Long Range Policy	Adoption of policy direction with the expressed intent to improve transportation system energy efficiency and/or reduce transportation-related GHG emissions
Tools and Methods	Development and refinement of data collection and modeling techniques to go beyond trend analysis to provide policy-sensitive data on transportation energy efficiency and GHG emissions so that performance can be tracked, ideally at the project level

Interviews were then conducted with state long range transportation planners in the four partner states, their sister environmental and energy planning agencies and, where relevant, state leaders from non-governmental organizations (NGOs). Partner state practice was subsequently compared to best national practice among all states for energy and climate outcomes, and with each other. Gaps in best practice among partner states were identified along with opportunities for overcoming these gaps.

This analysis revealed that the four partner states set or closely duplicate best national long range transportation planning practice for energy and climate protection outcomes. However, leadership in the form of policy direction came from sources external to the

state DOTs in all four cases. All are in the process of transitioning from a traditional program focus on system expansion to a more specific focus on system preservation, integration and management to meet new travel demand.

Barriers to best practice in these states include institutional obstacles (i.e., lack of coordination between transportation and land use, weak policy framework), poor data collection and analysis (i.e., reliance on estimates), financial barriers (i.e., cost of data collection, reduced revenues from increased system efficiency), and cultural barriers (i.e., agency resistance to shaping as well as serving travel demand). (Chapter 2 contains a more detailed discussion of the state partner interview results and analysis.)

Finally, lessons learned from this research were developed along with recommendations for further action. These were organized within two categories: those that are intrinsic to the LRTP process; and those that, while beneficial for inclusion in state LRTPs, can also be implemented outside of the LRTP process. (Chapter 3 contains detailed analysis, outcomes and recommendations for specific actions.)

Among the lessons learned that are intrinsic to the LRTP process are:

- **LRTPs Have Been Important but Limited Tools:** Where states have established by law, gubernatorial action, or another policy process a strong commitment to improving statewide energy and climate outcomes, state DOTs have made efforts to respond in a supporting role consistent with their core transportation mission. In all four partner states, such a statewide commitment exists, both in their Climate Action Plans (CAPs) and through more specific directives. However, absent such an external policy framework, state DOTs, as reflected in their Long Range Plans, have difficulty setting internal policy in support of these outcomes due to the primacy of their core transportation mission. The conclusion, therefore, is that *strong gubernatorial or cross-agency leadership is required to achieve strategic management of transportation for energy and climate outcomes*. These need to be supplemented by *specific performance requirements, milestones for their achievement, and implementing protocols* to effectively implement the LRTPs. To help facilitate this, a specific function should be considered within DOT statewide planning agencies to identify and participate in sister state agency energy and climate planning activities.

- **The LRTP Process Must be Ongoing:** Long range transportation planning is not a static exercise. It is an on-going process, only part of which is the development and publication of a long range plan or plan update. Therefore, processes and collaborations undertaken between plan updates to engage the agency on climate and energy issues are as much a part of LRTP development as

the formal process of plan development and adoption. To facilitate this ongoing process, each state should consider developing an energy and climate "process map" outlining the various points in the long range planning cycle where opportunities exist to better coordinate transportation planning for these outcomes. In addition, state DOTs should consider establishing internal capacity to plan for energy efficiency in system development and management across divisions.

- **Few LRTPs Recognize that Policies to Manage Congestion Often Coincide With Those to Support Energy and Climate Outcomes:** Many of the strategies being adopted by state DOTs to manage congestion (Travel Demand Management or TDM) also achieve energy and climate outcomes. At present, however, the connection between managing travel demand and managing for energy and reduced GHG emissions has not yet been made in Long Range Transportation Plans. Hence, both state DOTs and sister agencies should work together so that the policy linkage between transportation demand management and strategies to achieve energy and climate outcomes is made *explicit* in future Long Range Transportation Plans or updates. Towards this end, state DOTs should consider engaging sister state agencies, land use planning agencies, non-governmental organizations, Transportation Management Associations (TMAs) and other interested organizations in promoting TDM strategies.

- **The Most Effective Policy to Meet Energy and Climate Outcomes in LRTPs is to Include Them as Criteria in Project Decisions:** This feature was only included in two plans, California and Massachusetts. However, even where made, it is weak. State DOTs should consider developing protocols to more directly assess the climate and energy outcomes of project construction and operation in future project decisions. In addition, the energy intensity and resulting impact on GHG emissions of all project alternatives should be assessed, as well as long term effects on transportation system energy use and GHG emissions.

Among the lessons learned in areas that, while beneficial for inclusion in state LRTPs, can also be implemented outside of the LRTP process, are:

- **The CMAQ Program is a Potentially Effective Transportation Management Tool for Climate and Energy Outcomes:** While there has been some disappointment in the past with the effectiveness of this program, which is applicable to Clean Air Act non-attainment and maintenance areas, it has specific characteristics that could make it a unique and effective tool. First, it cannot fund projects that increase capacity for single-occupant vehicles. Second, it allows state DOTs to enter into partnerships with non-governmental organizations

(NGOs) to implement its goals. Third, alternative fuel vehicles and vehicle infrastructure are explicitly eligible for funding. And fourth, the federal share is substantial, 80 percent. State DOTs, which manage CMAQ funds, may want to add consideration of other factors related to their policies including promotion of energy efficiency and climate protection as funding criteria for CMAQ-funded projects, in addition to air quality and congestion relief. In addition, state DOTs should consider adding a policy statement to their LRTPs indicating their CMAQ programs will also be managed for climate and energy outcomes.

- **Transportation Data on Energy Use and GHG Emissions Needs Improvement:** Data used to inform the long range planning process as well as policymaking is not well developed. Where data is collected to inform agency action, it tends to be concentrated on system condition, not system performance. The exception is in the area of air quality, a public outcome mandated by federal law with specific limits on mobile (transportation) sources of air pollution. In response to this gap, state DOTs should consider initiating a pooled research program to design protocols to identify and develop up-to-date data sets of travel behavior and system energy use that are policy-sensitive.

- **Partnerships are Problematic Between State DOTs and Other Agencies to Manage for Energy and Climate:** Despite the fact that all states included in this study have adopted energy or climate action plans, the lead non-DOT implementing agencies (usually environmental or energy agencies) are not reaching out to effectively engage state DOTs in support of these plans. In general, these agencies, as regulatory agencies, appear unaware of ways to collaborate with state DOTs to manage transportation systems for energy and climate outcomes outside the regulatory process. Consideration should therefore be given to embedding energy and climate professionals in state DOT planning processes and conducting cross-training in transportation, energy and climate planning. This process could include the creation of joint action teams among all the agencies responsible for developing strategies, action plans and mutually beneficial performance measurements, all with the goal of achieving desired energy and climate outcomes.

Finally, the opportunities for improving strategic planning for energy and climate outcomes in state DOT long range planning processes are substantial through closer cross-state collaboration. Cross-state collaboration (perhaps in support of existing gubernatorial compacts promoting regional cooperation on GHG emissions reduction) could supply the external leadership needed to support these internal agency initiatives. By explicitly and strategically managing their transportation systems for climate and energy outcomes, the four partner states could significantly improve their collective

transportation system performance and advance their core transportation mission. These benefits would be completely complementary to any climate or energy policies that may also be adopted that promote technological improvements in vehicle fuel efficiency and fuel technology.

ASSESSING LONG RANGE TRANSPORTATION PLANNING INITIATIVES IN THE NORTHEAST FOR CLIMATE AND ENERGY BENEFITS FINAL REPORT

BACKGROUND AND PLANNING FRAMEWORK

I. Background

This report summarizes the results of an analysis of state long-range transportation planning practice for climate change and energy outcomes.[2] The goals of this research were:

- To establish an initial baseline of best state long-range transportation planning practices intended to reduce transportation-related greenhouse gas (GHG) emissions and transportation-related energy use;
- To evaluate progress within four state partner transportation agencies in adopting best transportation planning practice for these outcomes (New York, New Jersey, Massachusetts and Maine)[3];
- To identify barriers to achieving state best transportation practice for the four states and strategies for overcoming such barriers; and
- To summarize lessons learned and make recommendations for improvement.

The BBG Group, a sustainable transportation consulting firm specializing in transportation and climate change strategies, conducted this study for the USDOT Center for Climate Change and Environmental Forecasting (CCCEF)

[2] Energy use and greenhouse gas emissions (contributors to climate change) are intimately related to each other. A major source of greenhouse gas emissions is fossil fuels. Oil is the fossil fuel enjoying the greatest use in the U.S., and it is principally used in the transportation sector. Strategies to reduce greenhouse gas emissions necessarily involve reducing the use of oil by the transportation sector, either by improving the efficiency of the oil use or by using another fuel that emits less carbon, the primary greenhouse gas produced by oil combustion.

[3] The four participating state partners—New York, New Jersey, Massachusetts and Maine—all agreed to the following components of their partnership: provide information on their long range planning process; agree to be interviewed on site for the report; and review and edit drafts of the report. While they did not commit to instituting the recommendations of the report, they did indicate potential interest in doing so.

This final report includes the baseline analysis; the partner state assessment; barriers and strategies analysis; and lessons learned and recommendations for improvement are included in this final report. The appendices include:

- individual state partner agency reports; and
- the results of a literature and website search for additional helpful information on this research topic.

The study expands on a previous study conducted by the Volpe National Transportation System Center ("The Volpe Center") for the USDOT CCCEF.[4] The Volpe study concluded that the primary impetus to reduce transportation-related greenhouse gas (GHG) emissions in state and local planning came from outside the transportation sector, especially the energy, environment and land-use sectors. It also documented strong state and local interest in identifying ways to introduce planning for climate and energy outcomes into transportation planning without compromising the mission of state transportation agencies to provide for the mobility and access needs of the traveling public. The purpose of this present study is to follow up on the Volpe study's conclusions and identify and evaluate ways to incorporate planning for climate and energy into state DOT long-range transportation planning processes and policies.

A. Scope

This study addresses statewide long-range transportation plans, and planning processes used to inform present decisions about the future uses of public transportation funds. It explores whether, and to what extent, such plans and processes acknowledge and specifically support implementation of statewide climate change and energy policies and programs. It also addresses the implementation of statewide transportation plans, either internally within state Departments of Transportation (DOTs) or in partnership with other state agencies, for climate change and energy outcomes. Unlike the CCCEF study, it does not address sub-state plans and processes such as regional long-range transportation plans required within Metropolitan Planning Organizations (MPOs).[5] It does, however, address state DOT support for (1) transportation-related elements of state Climate Action Plans (CAPs), (2) MPO initiatives in furtherance of climate and energy outcomes, and (3) other sister state agency climate initiatives as long as the state DOT demonstrates a specific intention to support implementation of such initiatives.

[4] William M. Lyons, Scott Peterson, Kimberly Noerager, *Greenhouse Gas Reduction Through State and Local Transportation Planning*, USDOT Center for Climate Change and Environmental Forecasting, Report No. DOT-VNTSC-RSPA-03-02 (September 2003) (hereinafter "CCCEF Report").
[5] 23 U.S.C. 134(e).

The present study explores evidence of specific intention—and actions—in support of the societal goals of reducing transportation-related greenhouse gas (GHG) emissions and improving the energy efficiency of the transportation sector as expressed or represented in the state long-range transportation planning process.

B. Methodology

This research project was divided into four tasks as follows:

1. **Best Practices Analysis**: A baseline analysis was conducted of 15 state Long Range Transportation Plans (LRTPs), including the four partner states, to establish best existing state DOT practice in calibrating state long range planning in support of climate and energy outcomes.[6] This included a literature and website search of relevant research on this subject and interviews with experts in the area of integrated transportation and environmental planning. The results of the baseline research are included in Chapter One of this report. The results of the literature and website research are included in Appendix A, and the list of experts interviewed is included in the acknowledgements.

2. **State Partner Interviews**: On the basis of the baseline research, an interview guide was developed and both on-site and telephone interviews were conducted with statewide transportation and air quality planning officials in the four partner state DOTs. Where appropriate, independent interviews with sister energy and environmental agencies were also conducted. The purpose of these interviews was to understand: (1) the process by which each state developed its LRTPs and state Climate Action Plans (CAPs), (2) the level of cross-agency (transportation, energy, environmental protection) involvement in LRTP and CAP development, and (3) the extent to which such collaboration resulted in specific initiatives to manage state transportation programs for climate and energy benefits. The results of these interviews are included in the individual state reports included in Appendices B through E.

[6] The 15 state plans were California, Connecticut, Delaware, Georgia, Maine, Maryland, Massachusetts Minnesota, New Jersey, New York, Oregon, Pennsylvania, Utah, Vermont and Washington. The goal was to achieve geographic diversity while focusing on states that had expressed interest in climate and energy issues, though not necessarily through their long range plans. Where noteworthy state initiatives outside of this 15-state group were identified through the literature search or conversations with experts, these initiatives were also explored for their relevance to establishing best agency practice.

3. **Gap and Possible Strategies Analysis**: On the basis of the state interviews, the four partner state practices were compared to national best practice to identify: (1) gaps in existing best practice in these states and barriers to progress; and (2) opportunities to address these gaps to improve statewide transportation planning to manage transportation for climate and energy outcomes. This phase of the research also evaluated the means by which these plans were put into practice within the four partner states (specifically, process initiatives, policy initiatives, and technical initiatives) and compared and contrasted approaches within these states. The results of this analysis are described in Chapter Two.

4. **Lessons Learned and Recommendations for Action**: Finally, the study culminated with the identification of specific opportunities for states to overcome barriers and meet or exceed best LRTP planning practice for climate protection and energy conservation. These lessons learned and recommendations are found in Chapter Three.

The four partner states of New York, New Jersey, Massachusetts and Maine were selected for particular study for the following reasons:

- All four states have committed to reducing statewide GHG emissions to 1990 levels or below and have adopted Climate Action Plans (CAP) or their equivalent to achieve this objective[7];
- The transportation sector is a primary contributor to GHG emissions in all four states; and
- Proximity within the Northeast increases the opportunity to identify and implement cooperative strategies to control transportation-related GHG emissions.

While this report focuses primarily on efforts within these four Northeastern states to manage long-range transportation planning for climate change and energy outcomes, many of the lessons learned and opportunities identified can be applied in other regions of the country. As transportation energy prices continue to climb (especially the price of gasoline but also the energy costs of system construction, maintenance and management) strategies to improve transportation system energy efficiency are likely to become more

[7] The focus of this report is on GHG emissions mitigation since the four partner states have all developed clear mitigation commitments. However, where the author identified planning, policies or programs having to do with climate adaptation (adapting to the adverse impacts of climate change), these are mentioned in the report.

salient to transportation policy throughout the country.[8] Therefore, a more thorough analysis of how all 52 states and territories are managing their transportation systems for energy efficiency is recommended.

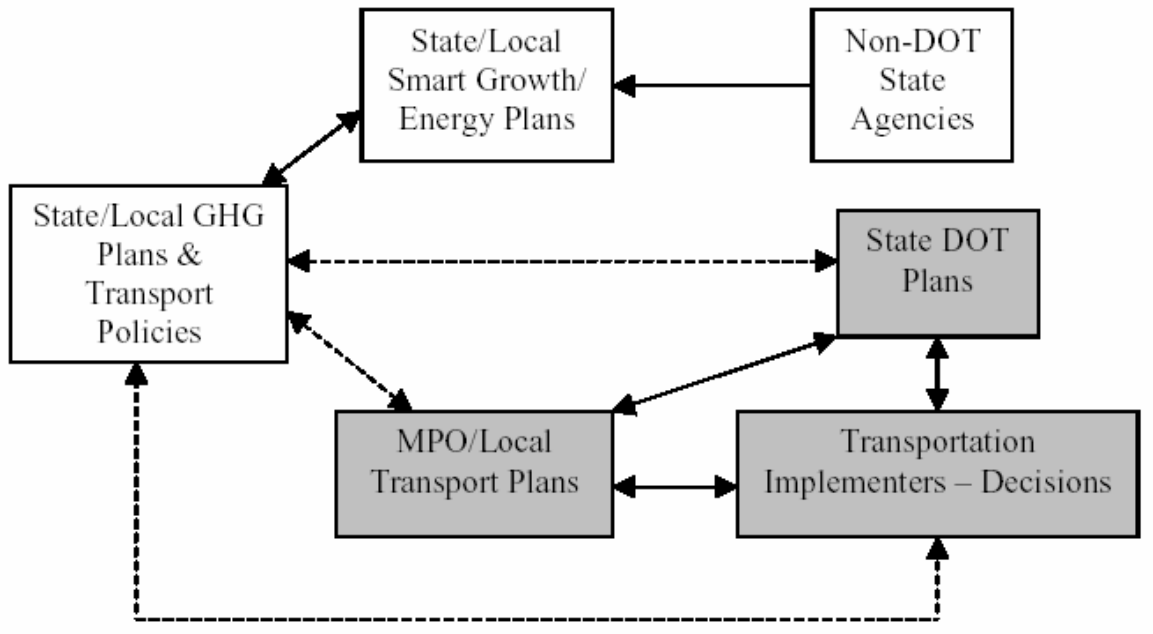
II. Planning Framework

The requirement that state DOTs develop statewide transportation plans as a condition of receiving federal transportation assistance was first contained in the federal Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA).[9] ISTEA replaced an earlier requirement that state DOTs develop a statewide "program of projects" with a new requirement of a statewide long range plan that addresses 20 "planning factors" reflecting national goals and objectives. When Congress reauthorized ISTEA in 1998 as the Transportation Equity Act for the 21st Century ("TEA-21") the 20 planning factors were streamlined to seven, including the requirement that such plans consider projects and strategies that will "protect and enhance the environment, promote energy conservation and improve quality of life."[10]

ISTEA and TEA-21 both required that long range plans be developed "in cooperation" with Metropolitan Planning Organizations (MPOs). In contrast, they only provided that statewide agencies, the public, freight shippers, transit users and others have "a reasonable opportunity to comment" on the proposed plan.[11] Despite this difference in language, state DOTs are becoming increasingly inclusive of sister state agencies in the development of statewide transportation plans and programs. The evolving linkages between state DOTs and sister state agencies on integrating climate change and transportation planning are identified in the CCCEP report as a key factor in establishing a firm intention within state DOTs to manage transportation plans and programs for climate and energy outcomes. The search for such linkages was therefore a key element of the present study.

The CCCEF report provides a clear diagrammatic description of the present state of inter-agency and state-regional coordination in statewide transportation plan development:[12]

[8] See Robert Noland, William Cowart, Lewis Fulton, "*Travel Demand Policies for Saving Oil During a Supply Emergency*, (TRB Paper CD-ROM) 2005.
[9] Pub. Law 102-240, (December 18, 1991)
[10] 23 USC Section 135 (c)(D).
[11] 23 USC 135(e)(3)(A).
[12] Lyons, et. al., *Op. Cit.,* p.5.



This diagram presents direct links between transportation planning processes and GHG emissions abatement, smart growth and sustainable development planning as solid lines and evolving links as broken lines. The traditional planning process is identified with shaded boxes.

The present study covers three areas of national LRTP planning practice that could strengthen the linkages outlined in this planning diagram:

- **Process Initiatives**, including the processes by which states develop and implement Long Range Transportation Plans, and the extent of non-transportation state agency participation in such planning activities:

- **Policy Initiatives,** including both (1) policies adopted by state DOTs with the intention of advancing state climate change and energy policies, and (2) policy support within state DOTs for sister agency policy initiatives in this area; and

- **Technical Initiatives**, including, in particular, technical improvements in transportation data collection to accurately identify transportation-related GHG emissions by mode, project and region (MPO level and statewide), and technical support in tracking such emissions. While it is too early to assess the relative

efficiency of alternative options for reducing statewide transportation-related GHG emissions at a fine-grain (policy-specific) level, it is possible to provide sufficient technical support to inform public policy regarding the contribution of the transportation sector to overall GHG emissions and the reductions needed within the sector to meet statewide GHG reduction goals.

This report examines these initiatives in the context of statewide transportation planning. It does not evaluate regional (MPO-level) or local (project level) initiatives to measure, track and control transportation-related GHG emissions unless the state DOT specifically funded the regional or local activity for this purpose. This distinction is made for two reasons: (1) to focus the research on statewide transportation planning processes under state DOT control, and (2) to eliminate initiatives that do not reflect a state DOT intention to co-manage transportation plans and programs for climate change and energy efficiency outcomes.

CHAPTER ONE: REVIEW OF NATIONAL BEST AGENCY LONG RANGE PLANNING PRACTICE

Summary: *Three areas were reviewed to determine best practice in Long Range Transportation Planning (LRTP): the process for developing statewide long range transportation plans and their implementation; policy initiatives established in the LRTP to achieve specific outcomes; and the tools and models used in the LRTP process to inform policy choices and to track agency performance in achieving policy goals.*

Best practice for state DOT long range transportation planning processes involve (1) the linkage of the process with broad societal goals of reducing criteria air pollutants, greenhouse gas emissions, energy use, and impacts on land; and (2) the linkage to these societal goals through process requirements that engage sister agencies and the public in LRTP development and the DOT itself in plan implementation for energy and climate outcomes. For many states, processes for long range plan development are becoming more inclusive, especially of sister state agencies and the general public as the ultimate customer of transportation services.

Best practice for LRTP policies is the adoption or endorsement of policies with the specific intent to improve system energy efficiency and reduce greenhouse gases. Several state long range plans now contain specific commitments to increase system energy efficiency and reduce system GHG emissions, and to alter decisions on how state transportation funds are allocated in support of these goals.

Finally, best practice in LRTP tools and methods practice involves the use of planning tools, data analysis, models and forecasts that do not simply track past trends into the future but are policy-sensitive. While several states are making promising progress in this area, data is still less than optimal for tracking performance. State DOTs could benefit substantially from the adoption of better tools for data collection, modeling and measurement of total system energy use so they are able to inform public policy choices.

I. Best Practice Analysis: Process Initiatives

A process initiative refers to the process for developing statewide long range transportation plans and their implementation. A distinction is made here between process and policy. In most states the process of developing, adopting, implementing, tracking performance and updating long range plans is a continuous process, and it is this iterative planning process that is addressed in this section. Policy refers to specific courses of action adopted during this planning process and contained in the LRTP. (Policy initiatives specifically included in LRTPs are discussed in the following section.) Table 1 summarizes best practice for the LRTP process, policy initiatives and tools and methods.

Table 1: Best Practice for Long Range Transportation Planning

Area of Practice	Best Practice
Long Range Planning Process	- Linkage of the long range planning process with broad societal goals of reducing criteria air pollutants, greenhouse gas emissions, energy use, and impacts on land, -Linkage to these societal goals through process requirements that engage sister agencies and the public and the DOT itself in plan scoping, development, implementation, evaluation, and updates.
Long Range Policy	Adoption of policy direction with the expressed intent to improve transportation system energy efficiency and/or reduce transportation-related GHG emissions
Tools and Methods	Development and refinement of data collection and modeling techniques to go beyond trend analysis to provide policy-sensitive data on transportation energy efficiency and GHG emissions so that performance can be tracked, ideally at the project level

Through interviews with state DOTs and their sister agencies, this research explored the LRTP planning processes and their relative intention and success in integrating in climate and energy interests. A scan of state LRTPs and interviews with experts and state DOT planners were conducted to establish a baseline for best national practice in LRTP planning process. The four partner states were then interviewed in greater detail to determine if additional efforts to coordinate statewide transportation, climate and energy planning were being undertaken that are not described in the plans themselves. Since such efforts are in their early stages, exploration of all initial cooperation and

coordination undertakings are important to uncover evidence of state DOT intention to calibrate agency policies, plans and programs in support of energy and climate outcomes.[13]

A. Best Practice Standard

As noted earlier, 15 state LRTPs were selected to establish a baseline of best practice for linking transportation, energy and climate planning through statewide, long range transportation planning.[14] These state plans were first reviewed to determine the processes by which they were developed, adopted and implemented. Process elements demonstrating an intention or at least receptivity to addressing climate and energy issues in the planning process, and therefore constituting best agency practice, include:

- Engaging climate change and energy agencies in the process of plan development, especially sister state agencies;
- Conducting public outreach activities that included involving climate and energy experts in plan development;
- Collecting data on energy use and transportation-related GHG emissions as part of the planning process;
- Collecting data on climate and energy impacts as part of the planning process;
- Involving state DOTs in energy and climate change plan development; and
- Engaging state DOTs, energy and climate change agencies continuously between planning cycles on climate and energy issues.

While there is no one best process for developing LRTPs for climate and energy outcomes, there are some noteworthy practices that demonstrate leadership in this area.

B. Noteworthy State Planning Processes for Climate and Energy Outcomes

1. Outreach to Climate and Energy Agencies.

[13] The earlier Volpe Center evaluation of state Long-Range Transportation Plans includes the following caveat: "Unless otherwise specified, all discussions refer to planning efforts as described in the actual Statewide Long-Range Transportation Plan. It is likely that additional efforts are underway in the statewide planning process. However, it is beyond the scope of this review to analyze efforts that are not described in the plan."(Lyons, et. al, *Op. Cit.,* p 3, footnote 1).

[14] The budget for this study did not allow for a review of all 52 state and territorial long-range transportation plans. Since the CCCEP report (2003) established that only a few state DOTs are presently engaged in climate and energy planning as part of the long range planning process a review of 15 state LRTPs in states with existing Climate Action Plans was considered adequate to establish best agency practice.

Several state DOTs included sister state climate and energy agencies in the LRTP planning process in varying ways. In some cases (New Hampshire, New Jersey, Massachusetts), these agencies are invited to participate in drafting the scope of work to make sure climate and energy concerns are addressed in the long range plan, but they are not directly involved in plan development. In other states, sister agencies are invited to serve in an on-going consulting capacity as the plan is developed. In New York, where the state DOT has an office at the executive level, this office serves as a liaison to other state agencies in securing their input on the plan. In Oregon, by contrast, the state energy planning agency is represented on the LRTP planning team. Based on these experiences, the more continuous and robust the involvement of these sister agencies in the LRTP development process, the more likely the plan is to include specific policies promoting climate change and energy benefits.

Several state DOTs also participate on climate and energy planning workgroups initiated by sister state agencies and then make efforts to better align their transportation plans and programs with the products of these workgroups; these include the transportation long range plans. Such experiences include:

- Six states (Maine, California, Oregon, Massachusetts, Connecticut, and New York) included state DOTs in Climate Action Plan (CAP) or GHG Task Force development.

- Three states involved state DOTs in CAP implementation (Maine, Massachusetts, New York).

- Two states (Connecticut and California) specifically commit to DOT participation in climate action committees set up by other state agencies (in Connecticut, the Governor's Steering Committee on Climate Change, in California, the Western Governor's Global Warming Initiative), and to implementing recommendations from these committees that fall under DOT control.[15] While other states such as Washington and Massachusetts acknowledge the importance of climate and

[15] In the Connecticut plan, the Connecticut DOT (ConnDOT) makes a commitment to consider and address the needs of owners of alternative fuel vehicles when constructing and reconstructing transportation facilities, encourage transportation research and projects that explore innovative solutions to GHG emissions, encourage efforts to focus on risk assessment and emergency response preparedness on issues arising from climate change (presumably storm surge along the coast and threats to transportation infrastructure), and increase DOT efforts to promote bicycling and walking under the Statewide Bicycle and Pedestrian Plan. The California plan commits to implementing AB 1493, the new state law regulating tailpipe GHG emissions from passenger vehicles and light duty trucks.

energy issues, only these two states make specific commitments to have the state DOT serve on non-DOT climate and energy planning committees.[1617]

2. Public Outreach

A few states went beyond inter-agency outreach to engage climate and energy advocates directly in the LRTP planning process. Inclusion of the public in a decision-making role in the LRTP process increases the transparency of decision-making, elevates agency accountability to its public customers, and encourages closer attention to such public goals as energy conservation and climate change.[18]

In New York State, a climate advocate and an energy company executive were included in the citizens' advisory panel that was commissioned by New York DOT (NYSDOT) to help the state identify issues for inclusion in the statewide transportation master plan.[19] This advisory panel conducted 16 public hearings and presented its findings and recommendations on elements to include in the master plan to the NYSDOT Commissioner in 2004 prior to the development of the plan.[20] Furthermore, in New Hampshire, a Citizen Advisory Committee (CAC) has been convened not only to help establish and monitor the public engagement plan, but to actually develop the plan in collaboration with the state DOT.[21]

3. Data Collection

As noted earlier, data collection is an important component of the process involved in developing a long term plan. New York State DOT has assumed a unique role in this area, encouraging MPOs to conduct carbon dioxide (CO_2) emissions analysis and

[16] Several more DOTs, including most s in states that are signatories to the New England Governor's Climate Action Initiative, actually serve on such committees but do not mention such service in their LRTPs.
[17] Many of the plans reviewed have not been updated in the last two years. Since this 15-state review did not go beyond the plans themselves and, where relevant, their state climate action plans, the state of present cross-agency CAP/LRTP collaboration may be higher than reflected in this study.
[18] In New Hampshire the state energy agency was included in the scoping process of the LRTP but not in development of the plan itself.
[19] The two public participants were James T.B. Tripp, General Counsel of Environmental Defense, and James Newman, President of NOCO Energy Corporation.
[20] See *Transportation-Trouble Ahead*, Report of the New York State Advisory Panel on Transportation Policy for 2025 (November 2004).
[21] New Hampshire's state plan was not among the 15 state plans included in this screen but was identified as a potential best practice in the research due to its inclusion of community representatives in a decision-making role.

energy analysis when updating their Transportation Improvement Plans (TIPs). To support this effort, it has issued a detailed methodology template for MPOs to follow in conducting these assessments.[22] This data collection process will be used both in project analysis and in development of statewide strategies addressing climate and energy objectives in the LRTP update.

4. Land Use Planning

Several state DOTs make significant efforts to coordinate state transportation planning processes with state, regional and local land use planning. Synchronization of transportation and land use planning can have beneficial climate and energy efficiency results in terms of reducing trip length, diversifying trip selection (more trips taken by alternative modes that use less fuel such as walking or using public transit) and reducing the overall need for travel as measured in vehicle miles traveled (VMT). No state LRTP, however, specifically mentions the climate and energy conservation benefits in integrated transportation and land use planning as the motivation for such process improvements. Instead, congestion management and travel demand management—core agency missions—are mentioned as the primary motivating factors behind improved transportation and land use coordination.[23] Actions by states to accomplish such synchronization in the long range planning process include:

- Involving MPO representatives in the LRTP scoping process (New Hampshire, New York and New Jersey)
- Putting MPO representatives on the state LRTP planning team (New Hampshire).
- Cooperating on data collection and analysis, such as VMT calculations and system-wide energy use (New York and Massachusetts).
- Encouraging cross-agency training of state and MPO staff to work together more effectively on the technical aspects of planning, such as traffic, air quality and energy modeling (New Jersey and Massachusetts).

[22] NYSDOT, "Draft Energy Analysis Guidelines for Project Level Analysis," November 23, 2003.
[23] The absence of statements of intent within state LRTPs to better coordinate transportation and land use planning for climate and energy outcomes is particularly striking in light of the fact that federal law specifically requires that state DOT planning processes provide for consideration of projects and strategies that "promote energy conservation." 23 USC 135(c)(1)(D).

- Encouraging cross-acceptance of state and MPO LRTPs where efforts are made to synchronize state and regional land use policies for long range planning (New Jersey and Washington).

In states that include land use planning agencies in the long range planning process, the main justification for making this linkage is to improve mobility and accessibility through improved coordination of land use and transportation planning. As noted below, some land use policies contained in LRTPs are justified for their ancillary benefits in energy savings, air quality and overall quality of life.

5. Visioning and Alternative Scenario Planning

Some DOTs do scenario planning for the purpose of allocating limited state resources among various demands for transportation services (e.g., maintenance, highway expansion, transit expansion, etc.). However, none of the 15 LRTPs reviewed used *alternative land use* scenario planning as a process tool for developing the LRTP.

Several state DOTs support integrated transportation and land use planning at the regional level, a best practice demonstrating state DOT interest in this process. The California DOT (Caltrans) supported the scenario planning effort by the Sacramento MPO, the Sacramento Council of Governments (SACOG), which conducted interactive regional fora at three different levels to analyze alternative land use and growth scenarios in order to reach agreement on a preferred regional growth strategy.[24] The Utah DOT participated in the "Envision Utah" project that used scenario planning for engaging the public in alternative growth scenarios along the Wasatch mountain range. While the political and technical challenges of conducting alternative land use planning on a statewide scale are formidable, especially for state DOTs that have traditionally regarded land use as beyond their jurisdiction, increased gubernatorial interest in interagency collaboration on land use may open up opportunities in this area.[25]

[24] In an expression of intent to support these processes, the California Business, Transportation and Housing Agency, the parent agency of Caltrans, recently announced a $5 million "Regional Blueprint Planning Program" to fund integrated transportation and land use scenario planning at the regional level similar to the SACOG effort. See www.dot.ca.gov/hq/tpp/.

[25] See, for example E.O 2003-4, issued by Governor Jennifer Grandholm of Michigan, creating a Michigan Land Use Leadership Council. The Council, with includes the State DOT Director as an *ex officio* member, is charged with identifying "the trends, causes and consequences of unmanaged growth and development" and with providing recommendations to the governor on solutions, including initiatives to "better manage the cost of public investments in infrastructure to support growth.", www.Michigan.gov.

State DOTs are also increasingly interested in processes for collaborating with sister agencies, as well as regional and local agencies, for the purpose of integrating transportation and land use planning.[26] However, these processes presently focus on corridor planning and project development, not long range planning. Also, where an effort is made to include land use planners and land use planning agencies in the LRTP development process, the stated motivation for such inclusion is for transportation and land use outcomes, not climate and energy outcomes. Nevertheless, inclusion of land use planners and planning agencies in LRTP development has influenced the policy goals and objectives emanating from such plans.

The noteworthy statewide transportation planning processes just reviewed extend significantly beyond a state DOT's statutory duty to provide stakeholders with "a reasonable opportunity to comment on the proposed (long range) plan."[27] They also reflect efforts by state DOTs to reach well beyond their core transportation mission to embrace multi-sectoral concerns, including climate and energy concerns, as a focus of state long range transportation planning.

The process barriers to more extensive inclusion of these concerns within the long range transportation planning include:

(1) several implementation strategies (such as improved fuel efficiency or use of vehicle technologies, land use regulation,) utilize mechanisms over which state DOTs presently have no regulatory control;
(2) the lack of a federal mandate (e.g., climate issues) for inclusion of these interests in state transportation planning constrains state efforts; and
(3) the lack of familiarity of state DOTs and their planning consultants with broader societal issues and how to address these issues within the transportation planning process necessarily limits their usage.

These barriers and potential strategies to address them are discussed in Chapter Three.

[26] The American Association of State Highway and Transportation Officials (AASHTO) recently conducted its first peer-to-peer training session on "Coordinating Transportation and Land Development" for state DOT CEOs, their planning staff, and regional and local agencies and officials in Irvine, California, September 6-8, 2005. The proceeding of this seminar will be published under NCHRP Project 20-24(45).
[27] 23 USC Section 135(e)(3)(A).

II. Best Practice Analysis: Policy Initiatives

A policy initiative is a course of action adopted to achieve a specific outcome, or set of outcomes. Policies differ from process initiatives in that they focus on achieving a specific result. While a process improvement such as expanded citizen participation or improved inter-agency coordination can be a policy goal, this section addresses initiatives in state LRTPs that, in whole or in part, are adopted for the purpose of decreasing climate impacts or reducing the usage of oil (through efficiency or low-carbon-emitting alternative fuels) of transportation programs.

A. Best Practice Standard

This study concludes that the best practice standard for policy development in a state LRTP is when a state DOT *adopts or endorses policy direction in the plan with the expressed intention to make transportation systems more energy efficient or less carbon intensive, or to reduce GHG emissions.* Few state LRTPs meet this standard because state DOTs justify adoption of policies based upon improved mobility and accessibility; that these policies may also have climate and energy benefits is seen as an incidental benefit not relevant to their core mission. (See Table 1 for a summary of best practice for the LRTP process, policy initiatives and tools and methods.)

State policy leadership for meeting energy and climate goals is generally assigned to the state environmental or energy agency, or a regulatory board outside the influence of the state DOT. Such initiatives also tend to focus on technology-based strategies, not infrastructure development and operational strategies. Therefore, a best state long range planning policy standard is most often the result of a state DOT pro-actively adopting technology-based policies in its long range plan to advance climate and energy goals; examples could include purchasing alternative-fueled vehicles for the state DOT fleet or installing alternative fuel infrastructure along state highways.[28]

Adoption of policies with climate and energy benefits is more difficult for state DOTs where they appear to conflict with traditional transportation mobility goals, expressed as overall level of travel such as vehicle miles traveled (VMT) or as a desired level of traffic flow, called Level of Service (LOS). However, an increasing number of state DOTs have adopted policies designed to minimize and manage new travel, called Travel Demand Management (TDM). To date TDM strategies have tended to focus only on car and truck travel demand management; hence, expansion of transit and non-motorized (bicycle,

[28] To meet climate goals, the alternative fuel needs to emit fewer greenhouse gases per mile driven than oil-based fuels.

pedestrian and streetscape) facilities—which actually increases travel—are considered TDM strategies by most DOTs.

For purposes of this study a state DOT policy shift towards TDM in its LRTP as a strategy for meeting agency core transportation goals does not qualify by itself as best practice for energy and climate outcomes. Instead, TDM policy initiatives must expressly mention climate and energy benefits as at least a corollary reason for adopting TDM policies to meet the best practice standard.

B. Noteworthy State Policies for Climate and Energy Outcomes

Specific examples of noteworthy policies contained in state LRTPs for climate and energy outcomes include:

1. Direct Support for State Climate and Energy Plans

Massachusetts makes the most direct commitment in support of its state climate program by committing in its draft LRTP to "implement the requirements of the Massachusetts Climate Action Plan."[29] A review of the transportation elements of the Massachusetts CAP reveals seven policies for advancing climate goals through transportation actions:

- Use sustainable development principles to integrate transportation and land use;
- Favor transit-oriented development around Massachusetts Bay Transit Authority (MBTA) stations;
- Include energy use and GHG emissions data as criteria in transportation decisions;
- Maintain and update transit services;
- Increase parking at train stations to encourage use of public transit;
- Improve the efficiency of transit vehicle movement; and
- Develop new bicycle and pedestrian policies, programs and facilities.[30]

[29] *A Framework for Thinking--A Plan for Action: Transportation in the Commonwealth of Massachusetts,* draft, Executive Office of Transportation, http://166.90.180.162/eot/downloads/longrangeplan/FWFTReport.pdf, March 2005, p.116. Hereinafter referred to as "*Framework Plan.*" This plan also acknowledges that reductions in GHG emissions, "as much as 75%-85% below current levels", may be needed to meet state climate goals, but it does not commit the transportation sector to fulfilling its proportionate share in meeting these goals.

[30] *Massachusetts Climate Protection Plan,* http://www.mass.gov/Eocd/docs/pdfs/fullcolorclimateplan.pdf, May 2004, p 36-37.

The draft LRTP carries through on each of these principles by specifically mentioning them as policy goals of the LRTP. Most noteworthy is the commitment to use climate protection as a criterion in project selection:

> "EOT (Executive Office of Transportation), in cooperation with the Commonwealth's Metropolitan Planning Organizations and local officials, will include climate protection as a criterion when making decisions on transportation projects."[31]

In support of this commitment, the EOT is developing a disclosure policy and protocol for transportation-related carbon dioxide emissions and energy use. While the relative weight of the climate protection criterion in project evaluation remains undefined, this commitment stands out as the most unequivocal state LRTP commitment to advancing climate protection affirmatively in transportation decision-making.[32]

The California Transportation Plan (CTP) almost matches the Massachusetts commitment to climate and energy outcomes by adopting the following "strategies" under its broad policy goal, "Enhance the Environment":

- Develop or amend transportation planning tools to include land use impacts, demand management, efficient use of energy, and modal alternatives analysis;
- Enhance education, planning tools, and performance standards on energy efficiency**,** air quality and climate implications of transportation decision-making;
- Analyze the cost-effectiveness of transportation options that improve energy efficiency and reduce emissions of greenhouse gases and criteria pollutants;
- Establish stable and secure funding sources with innovative and effective financing mechanisms for transportation energy programs;
- Mainstream energy efficiency and conservation measures into state, regional and local transportation planning, program and project development; and
- Encourage local governments to incorporate considerations of transportation air emissions and energy efficiency into general plans.[33]

The CTP also supports "collaboration" with the California Energy Commission, the California Air Resources Board and the State Consumer Services Agency to "research and develop strategies to reduce demand for petroleum fuels, reduce

[31] *Framework Plan*, p. 121.
[32] For a more detailed analysis of the Massachusetts *Framework Plan* see Appendix D.
[33] California Transportation Plan (CTP) 2025, draft, http://www.dot.ca.gov/hq/tpp/ctp/2025/index.htm, p. 56-60.

emissions of greenhouse gases, and increase transportation energy efficiency."[34] This collaborative plan explicitly includes transportation strategies to implement Assembly Bill 1493 to reduce greenhouse gas emissions from passenger vehicles and light duty trucks.

At the time of publication of the draft CTP in May 2004, California had no CAP.[35] However, on June 2005, California Governor Arnold Schwarzenegger issued Executive Order S-3-05 establishing the following GHG reduction targets for California to reduce GHG emissions to:

- 2000 levels by 2010
- 1990 levels by 2020
- 80 percent below 1990 levels by 2050.

The CTP estimates that the transportation sector consumes 50% of all energy in California and that transportation fuel consumption will increase by approximately 40 percent in the next 20 years. Hence, synchronizing Caltrans' programs with this executive order will require an aggressive implementation program in order to meet the state's new energy and climate policy commitments.

2. Ferries, Passenger Rail and Intermodal Hubs

Promotion of alternatives to light vehicle (cars, vans, SUVs and light trucks) access is identified as an energy efficiency and GHG-emission reduction strategy by a few states. Maine DOT has launched an initiative called *Explore Maine*, which supports tourism through the promotion of transportation choices that reduce dependence on the private automobile. This initiative is included in, and endorsed by, the Maine LRTP, and includes specific measures to expand passenger rail service, increase use of coastal ferries, and creation of intermodal hubs that encourage automobile travelers to utilize coordinated motor coach services to tourist attractions.[36] However, the effectiveness of such alternative transportation initiatives for energy efficiency and GHG reduction, especially ferry service, has been questioned in the absence of significant concurrent controls on motor vehicle access.[37] While it is mentioned here

[34] CTP 2025, p. 60.
[35] CTP 2025 has not yet been signed. However, it has been posted on the Caltrans website since May 2004. The author therefore has considered it to be the operational LRTP for California for purposes of this research project.
[36] Maine Transportation Plan 2000-2020, January 2001, p. 32.
[37] See CALSTART, "Passenger Ferries, Air Quality, and Greenhouse Gases: Can System Expansion Result in Fewer Emissions in the San Francisco Bay Area?", http://www.calstart.org/info/publications/ferryreport/ferryreport.pdf , July 23, 2002. This study estimates

as a strategy that is *intended* to have climate and energy efficiency benefits, it awaits measurable verification.

3. Smart Growth Programs

Several state LRTPs make a specific commitment to subordinate or at least link the funding of major transportation investments to land use planning or "smart growth". The most action-forcing smart growth policy appears to be that of Massachusetts, where the LRTP both agrees to fund local land use planning activities, and conditions state capital funding on local smart growth actions:

> "EOT (Executive Office of Transportation) is committed to work with affected communities to fund appropriate activities, including land-use planning, growth management initiatives, zoning modifications, or other activities, to ensure that the transportation ad development impacts are analyzed and addressed by communities before a major expansion project in built."[38]

In Maine, by state law, all transportation planning decisions, capital investment decisions and project decisions must be "consistent with the purposes, goals and policies of the statewide comprehensive planning and land-use regulation act.[39] In addition, the Delaware LRTP (2002) explicitly states that it will "direct our programs, services and facilities in support of *Livable Delaware*", the statewide comprehensive plan.[40] And the Maryland LRTP supports the "priority places" program of the Department of State Planning that seeks to guide state infrastructure investment to areas designated for growth.

In New Jersey, the state DOT is a voting member of the State Planning Commission, the body established under the State Planning Act of 1986 to ensure implementation of the State Development and Redevelopment Plan (SDRP), which serves as the cornerstone of smart growth in New Jersey. The SDRP contains policies that encourage growth in areas where public infrastructure exists or is planned, and limit growth in areas identified for preservation, such as farmland, forests and open space. NJDOT coordinates its transportation investments in support of the SDRP though

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that induced demand from increased and more efficient ferry and landside transportation will increase travel by about 30%, thus reducing the energy and climate benefits of a more efficient transportation system. It concludes that "factors, such as the impact of induced demand reviewed here, demonstrate that is not possible to reduce congestion in urbanized areas by increasing transportation system capacity by any method."(p. ES-6).

[38] *Framework Plan,* p. 123.

[39] Maine Sustainable Transportation Policy Act, Section 3F, p. 20.

[40] Delaware Statewide Transportation Plan (2002), p. 2.

participation on the Interagency Smart Growth Team ("I-Team"). This cross-agency policy initiative has the specific intention of favoring investments that promote mobility and access in an energy efficient manner.

While adoption of smart growth strategies within state DOTs is a notable practice, it is not a best practice since none of these states specifically acknowledge that such coordination yields climate and energy efficiency benefits. Instead, the justifications stated for such policies are an intention to improve mobility and cost-effectiveness of DOT projects.

4. "Greening" Vehicle Fleets and Developing Alternative Fuel Infrastructure

State DOTs appear most open to addressing energy issues within their own vehicle fleets and on the transportation infrastructure they own and operate, mainly interstate and state highways. Massachusetts, Maine and California have adopted policies of "greening" their vehicle fleets to support energy efficiency and GHG emissions reduction goals. The California LRTP pledges to consider the state's alternative fuel infrastructure needs, customer information for fueling facilities in California and neighboring states, and marketing the advantages of owning and operating alternative fuel vehicles.[41] Massachusetts has prohibited the purchase of SUVs for state use unless needed for job-related activities.[42] The Connecticut LRTP (2004) makes several explicit policy commitments, including "agreement to consider and address the needs of owners of alternative fuel vehicles when constructing and reconstructing transportation facilities," and "research and projects that explore alternative fuel solutions to GHG emissions."[43] The Massachusetts and California plans mention anti-idling infrastructure support (mainly electric power supplies for trucks at rest areas) as an energy-saving and GHG-reducing strategy. New Jersey also supports anti-idling campaigns but does not mention it in its existing plan.

[41] CTP 2025, p. 48. NB: alternative fuel use is only a climate mitigation tool if the GHG emissions from this fuel are less than from a traditional oil-based fuel.
[42] This policy is not yet included in the Massachusetts LRTP.
[43] The Clean Cities Initiative, sponsored by the U.S. Department of Energy, focuses on local efforts to develop the infrastructure needed for alternative fuel vehicles, for the purpose of lowering emissions of local pollutants, rather than greenhouse gases. Some of the fuels used in this Initiative, such as compressed natural gas, appear to have marginal climate benefits. No state long range plan reviewed in this study expressed policy support for this program. This is a potential area for advancing best practice through state-local partnerships in support of alternative fuel vehicle infrastructure *if the fuel has climate benefits*.

5. Risk Assessment and Emergency Response

While the focus of this report is on what states are doing to mitigate the risks of climate change, especially by reducing transportation sector carbon emissions, it is also important to plan for the effects of climate change, popularly referred to as "adaptation". A few state DOTs are participating in efforts to assess the risk of climate change to transportation infrastructure and possible emergency response to climate-related storm surge, subsidence (loss of coastline) and other specific climate-related threats. Connecticut has made a policy commitment in its LRTP to focus on risk assessment and emergency response preparedness on issues arising from climate change. Other states undertaking risk assessments include New York, California, Florida and Louisiana, but such efforts are not yet included in their LRTPs.

6. Intermodal Freight: Rail, Maritime and Truck Transport

More efficient allocation of freight between rail and trucks, and more efficient inter-connection between freight rail, ports and trucks can yield considerable energy and climate benefits. The California plan notes that one freight train can substitute for 280 trucks and save the energy equivalent of 1,100 passenger vehicles.[44] Other state plans provide policy support for enhanced rail freight service as a congestion relief effort, which may yield some energy and climate benefits as well. Strategies to reduce emissions from maritime operations are primarily focused on engine and fuel technologies and, to date, have not been addressed in the 15 state LRTPs included in this research.[45]

7. Bicycling and Walking

The Massachusetts and California LRTPs specifically identify increased investment in bicycling and walking infrastructure as a climate and energy efficiency initiative. There are three primary approaches for promoting bicycling and walking in these plans:

(1) direct funding of bicycle and pedestrian facilities;
(2) promotion of street and road designs that encourage bicycling and walking; and
(3) promotion of urban design, including transit-oriented development, to increase density, reduce trip length and thus make walking and bicycling more convenient.

[44] CTP 2025, p. 15.
[45] For a good discussion of maritime emissions see Henry Hugo, "Overview of State and Local Air Quality Needs and Requirements to Reduce Emissions at Marine Ports," MARAD Workshop on Maritime Energy and Clean Emissions, Washington, D.C. January 29-30, 2002.

The California CTP 2025 includes all these strategies in its LRTP, along with a commitment to increase total walking and bicycling trips by 50% by 2010.[46] The Massachusetts commitment is less direct; it commits to implement the Massachusetts CAP, which includes a strong policy statement in support of bicycling and walking as a climate strategy.[47]

C. Analysis of System-wide Energy Use and CO_2 Emissions

New York and California are beginning to model statewide energy use for transportation. The California LRTP makes a commitment to develop tools that improve data collection, analysis and modeling for state and local project planning, which include efforts to help incorporate consideration of air emissions and energy efficiency into general plans.[48] Massachusetts, to date, tries only to model transportation project-level energy use but is developing an integrated statewide energy model.[49] Connecticut and New York have issued guidelines to their MPOs on how to model CO_2 emissions from MPO plans. Massachusetts is in the process of developing such guidelines.

D. Targeting Congestion Mitigation and Air Quality Funding

Several states support, through the Congestion Mitigation and Air Quality (CMAQ) program, efforts by air quality agencies and MPOs in non-attainment areas to meet clean air goals.[50] Best practice appears to be where states prioritize CMAQ funding for projects that provide for energy and climate benefits as well as improve air quality. Massachusetts, in particular, prioritizes CMAQ funding on projects that help meet its climate and energy commitments, for example, bicycle, pedestrian and transit projects,

[46] CTP 2025, pp. 47, 64.
[47] While the references to bicycling and walking in the *Framework Plan* provide general support, the CAP makes a specific commitment to "improve bicycling conditions by developing a new bike plan that will guide efforts to expand, improve and link much of the state's on- and off-road network of bike paths. (*Massachusetts Climate Protection Plan*, p 37).
[48] CTP 2025, p. 60.
[49] Greenhouse Gas Emissions and Energy Intensity Disclosure Policy in Transportation Planning (Massachusetts Office of Community Development, August 2004, internal memo).
[50] 23 USC Section 149. It is important to note that several have criticized the effectiveness of CMAQ funds in terms of prompting good air quality programs. However, few states have looked strategically in allocating their CMAQ funds, for example, to increase trip choices or to leverage private funding. New Jersey is a promising example of adopting a more strategic approach—targeting its CMAQ funds to develop public-private Transportation Management Associations to improve employee trip choice.

while minimizing use of these funds for vehicular traffic flow improvements which may improve air quality but have negative energy and climate effects.[51]

E. Aviation Policy

One sector excluded from discussion in any state plan, at least with respect to its contribution to GHG emissions and energy use, is aviation. The regulatory framework of aviation in the U.S. inherently limits state control of aviation. Aviation emissions that impact climate include CO_2, water vapor (which may have a greenhouse effect, and occasionally produces contrails, which also may have a greenhouse effect), nitrogen oxides, oxides of sulfur, unburned or partially combusted hydrocarbons (also known as volatile organic compounds (VOCs)), and particulates. In addition, emissions of nitrogen oxides affect atmospheric levels of ozone and methane, which also contributes to climate change. Aviation represents about 10 percent of the transportation sector's contribution to GHG emissions, or about 2.7 percent of the national greenhouse gas inventory.[52] However, the total warming effect of such emissions is substantially higher since emissions at high altitudes have over twice the warming effect of surface level emissions per unit of fuel burned. Improved airframe and engine technologies (mainly lightweight, high-strength materials and improved energy control systems) have reduced the energy intensity of air travel by 75 percent over the last 40 years. These technological efficiencies are expected to continue to improve, to the point where air travel may soon be as or even more energy efficient as automobile travel, at least at longer distances.[53] Nevertheless, at the present state of technology, increases in air travel are expected to increase the total greenhouse gas emissions from aviation by 60 percent by 2025.[54]

The Federal Aviation Administration is working at the national level to address aviation emissions through various voluntary programs. For example, to reduce emissions from ground transport equipment and other airport vehicles, FAA developed the Inherently Low-Emissions Airport Vehicle (ILEAV) pilot program, with EPA and DOE, to demonstrate air quality improvements with alternatively fueled ground support

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[51] *Framework Plan*, p. 135. Improved traffic flow tends to improve the energy efficiency of individual vehicles since the fraction of their time spent in inefficient idling modes is reduced; however, as traffic flow improves, more vehicles generally use the road space, using more fuel. Hence the benefits of reduced idling are canceled by the increased volume of vehicles.

[52] FAA, *Aviation and Emissions: A Primer,* January 2005, www.faa.gov/regulations_policies/policy_guidance_envir_policy/media?AEPRIMER.pdf, p. 10.

[53] Automobile energy intensity in 2005 is about 3,543 Btu/passenger mile compared to 3,666 Btu/passenger mile for air travel. However, emissions are especially heavy at take-off and landing so short flights have increased energy intensity compared with this average, while longer flights have less. See *Aviation and Emissions* p. 11.

[54] *Aviation and Emissions*, p. 10.

equipment. As a result of the success of the ILEAV pilot program, FAA and EPA have expanded the initiative by creating the Voluntary Airport Low Emission (VALE) program. The VALE program, through funding and emission credit incentives, supports the conversion of airport vehicles and ground support equipment to low emissions technologies, modification of airport infrastructure for alternative fuels, provision of terminal gate electricity and air for parked aircraft, a pilot program to explore retrofit technology for airport ground transport equipment, and other related emissions improvements. These are just a couple of the various programs FAA has to address air quality and GHG emissions.

III. Best Practice Analysis: Tools and Technical Initiatives

Policies and processes to implement policy are only as good as the planning devices supporting these efforts. They include tools and models to inform policy choices and to track agency performance in achieving policy goals. In particular, a state LRTP must cover "a minimum 20-year forecast period for all areas of the state."[55] Research to date reveals that all state DOTs interpret this language as a requirement that the LRTP include a travel-demand forecast for at least a 20-year time horizon. Hence, the planning tools used to develop and assess the impacts of this forecast are critical.

A. Best Practice Standard

Best planning practice entails the use of planning tools, data analysis, models and forecasts that do not simply track past trends into the future, but are also sensitive to different policy options. *Hence, they have the ability to model the effect on future travel demand of changes in such strategies as land use policies, pricing policies, level of service performance standards, design standards, and access controls.* (See Table 1 for a summary of best practice for the LRTP process, policy initiatives and tools and methods.)

In addition, best practice involves the use of tools and methods that:

- Accurately measure transportation-related energy and GHG emissions at the project, regional and statewide level;
- Accurately account for all sources of transportation emissions across all transportation modes, including rail, marine and air travel, and freight and passenger road travel;
- Are based on actual measurements, not estimates; and

[55] 23 USC 135 (e)(1).

- Are comprehensive in that they measure the total energy used in providing transportation services, including construction and management of transportation infrastructure and accessing, refining and delivering transportation fuel, rather than simply the energy consumed by transportation vehicles themselves

B. Noteworthy Tools and Technical Support for Climate and Energy Planning

Few states attempt to measure total system energy use and GHG emissions using any of the parameters described above. Where they do, measurement is usually limited to rough estimates of total vehicle miles traveled (VMT) on the system, which are then converted to gallons of fuel used, based on average vehicle fuel economy ratings or direct sales of transportation fuel within the state. Measurements based on estimates of VMT, and on gas tax receipts as a surrogate for fuel use, are not comprehensive and thus tend to underestimate total transportation sector energy use.[56] . Noteworthy practices to develop tools and methods to more accurately compute transport system energy use include:

1. Transportation Energy Analysis

As previously noted, most states estimate fuel consumption either by using tax receipts from fuel purchases (including motor oil and boat fuel), or by calculating the product of VMT figures and average fleet fuel economy, both as surrogates for accurate energy consumption *measurement*. A few states are beginning to develop protocols for more accurate calculation and cross-verification of these metrics. Best practice appears to be embodied in California, New York, and Massachusetts. [57]

California, which now regulates tailpipe GHG emissions, is attempting to correlate fuel consumption, fuel efficiency and VMT calculations to cross-verify these calculations.[58] One of the significant aspects of the California quantification process is the method for tracking aircraft and marine emissions. Most states that track emissions do not track aircraft or marine emissions. California, however, tracks these

[56] Gas tax fraud, where taxes are not paid on fuel used, is a significant problem. Hence, fuel usage estimates based on gas tax receipts do not count consumption of gas on which no taxes are paid. In addition, EPA designations of fuel economy are widely recognized to be overly optimistic and do not reflect actual on-road fuel economy. Hence, fuel usage estimates based on fuel economy figures are necessarily low.

[57] The New York State Energy Plan requires state agencies to direct state transportation funding to energy-efficient transportation alternatives, while Caltrans is charged with supporting AB 1493 regulating motor vehicle greenhouse gas emissions.

[58] Conversation with John Zamurs in New York who says New York is trying to improve these calculations as well.

emissions both domestically and internationally. A separate line in the inventory is used to differentiate domestic from international sources.

While California does an excellent job in producing a clear, detailed inventory of GHG sources, the state's analysis does not specifically address possible problems with transportation-related data sources. This practice is not limited to California. In each of states that currently are at the forefront of state energy analysis assessments, yearly VMT calculations are still based on estimated changes from a base year that is only updated every few years. Weaknesses in VMT calculations can therefore create significant problems in effectively calculating GHG emissions. Without accurate data, tracking the results of policies designed to reduce such emissions becomes difficult as well.

To help ensure more accurate data for energy use calculations, experts point to the Netherlands and Australia as models for a better way to calculate use of road fuels.[59] The Netherlands conducts annual vehicle usage and fuel consumption surveys while Australia undertakes similar surveys on a three-to-five year timeline. Best practice includes measuring transportation energy from freight traffic (trucks, rail, marine and air freight) and all modes of passenger travel.

2. Air Quality Modeling

Transportation conformity is a way to ensure that federal funding and approval goes to those transportation activities that are consistent with air quality goals. Conformity applies to transportation plans, transportation improvement programs (TIPs) and projects funded or approved by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA) in metropolitan areas that do not meet or previously have not met national air quality standards for ozone, carbon monoxide, particulate matter, or nitrogen oxide. Presently, carbon dioxide is not regulated as an air pollutant under the Clean Air Act.

There is no requirement that LRTPs "conform" to clean air plans developed to improve air quality in areas that do not meet federal clean air requirements. This is because LRTPs cover a 20-year time horizon and are not sufficiently project-specific to be able to determine if they support the state clean air plan (called a State Implementation Plan or SIP). However, each state must also prepare, and update every two years, a State Transportation Improvement Plan (STIP). This latter plan includes capital projects approved by regional metropolitan planning agencies

[59] Conversation with Lee Schipper, EMBARQ, World Resources Institute.

(MPOs) as well as those in regional transportation improvement programs (TIPs). While the STIPs are not subject to the conformity requirement, projects included in the TIPs are required to conform. Since the STIPs are made up of TIP projects that are required to conform to clean air requirements and the STIP must be "consistent" with the LRTP, there is a strong incentive for state DOTs to endorse clean air goals in their LRTPs. Most state DOTs use the U.S. Environmental Protection Agency (USEPA) model, MOBILE6, for calculating whether their SIPs and TIPs conform to Clean Air Act requirements. This model also has the ability to roughly calculate project-level CO_2 emissions.

3. Greenhouse Gas Modeling

Best practice for CO_2-reduction modeling involves the use of local air pollution models that have been amended to include the capacity to measure CO_2 emissions and are used by state DOTs to track these emissions. No state DOT presently attempts to model CO_2 emissions across all modes as an LRTP goal or practice. New York DOT (NYDOT) has, however, undertaken a detailed effort to quantify local level GHG emissions resulting from MPO activities. This DOT has encouraged MPOs to conduct emissions analysis of proposed projects when large-scale, regionally significant transportation projects are proposed or when completing their required TIP updates. In particular, NYDOT promotes that MPOs calculate the energy requirements of each project listed in the TIP or Long Range Plan and compare them to a "No Build" alternative. This is designed to provide a better understanding of the impact of new projects on GHG emissions.

While NYDOT makes use of an emissions "template" that provides a straightforward approach for quantifying GHG emissions from local transportation projects, it currently relies on a fairly dated Caltrans quantification scheme based on fuel efficiency and vehicle mixes from the 1980s. Massachusetts has identified updated tables that can be used to better estimate current fuel efficiency and vehicle mixes and plans to utilize this new methodology in its program. According to its Climate Action Plan, this state is attempting to create an integrated statewide energy consumption model for the transportation sector.

Another approach has been pursued by the State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA-ALAPCO). They have developed a new Windows-based, user-friendly software product called "Clean Air and Climate Protection Software" (CACPS) that

does model CO_2 emissions.[60] While a few state DOTs have begun to provide technical assistance to MPOs for CO_2 emissions modeling, in many areas around the country the methodologies have been evolving more rapidly at the MPO level. Considering that to date, MPOs have had more experience in CO_2 modeling than states, this is an area where state LRTP best practice may well evolve from MPO practice.

On the micro-scale, new models are also being developed to allow individuals to calculate CO_2 emissions resulting from their personal transportation choices. Such models, once refined, could be integrated into public education campaigns to encourage changes in travel behavior, especially if financial incentives (tax benefits of commuter choice) and institutional support are provided.[61]

4. Policy-Sensitive Land Use Modeling

Models that can accurately predict the interaction between future transportation investments and future land use development can help state DOTs develop policies and programs to minimize growth in travel demand, with consequent energy and GHG-reduction benefits (at least with respect to business as usual baseline growth figures). Several state LRTPs endorse integrated transportation and land use planning as a strategy for reducing long term growth in travel demand (Maine, Washington, Vermont and Minnesota). Thus, there is a need for good transportation/land use (T/LU) models as an element of any effective state DOT-led energy or climate change policy focused on managing or reducing travel demand.

Best practice in T/LU modeling appears to be models showing area-wide effects of alternative development patterns, including the distribution of jobs and housing. While precise predictions cannot be made, the relative or order-of-magnitude differences between alternative development patterns can be measured. Many models try to do this but one of the most comprehensive yet straightforward is the Places3 model used in the Portland, Oregon and Sacramento, California MPO regions.[62]

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[60] Background on this software can be found at www.cleanairworld.org/software.html.

[61] For an example of a good individual transportation CO_2 calculator, see www.travelmatters.org. For an expanded discussion of these models see Travel Matters: Mitigating Climate Change with Sustainable Surface Transportation, TCRP Report 93 (TRB 2003).

[62] For a good discussion of the Places-3 model see Places-3, The Energy Yardstick, Center of Excellence for Sustainable Development, Office of Energy Efficiency and Renewable Energy, USDOE (1996). Several experts contacted also mentioned a sophisticated interactive model called TRANSIM, developed at the Los Alamos National Laboratory, which attempts to model air quality impacts of alternative land development pattern. Portland, Oregon was cited as the MPO that has done the most to implement this model. However, it is apparently so complicated, and requires so much data collection, that it is not widely used. FHWA also

In California, Caltrans is expanding its successful Regional Blueprint Exercise, which utilized the Places3 model to quantify GHG emissions from alternative land use decisions. It has funded a $5 million roll-out of the model for use by MPOs besides Sacramento. The creation and use of the Places3 model represents a concrete action that Caltrans is taking to help improve modeling capabilities (an LRTP goal). This joint project between Caltrans and the California Energy Commission has provided an effective channel to improve modeling capabilities that advance the understanding of policy impacts of land use decisions on GHG emissions.

5. Early Action Compacts

USEPA has developed a new planning tool called "Early Action Compacts" in which the impacts of travel demand management (TDM) programs and land use strategies are modeled, with the goal of improving regional air quality. This tool is being developed in anticipation of a projected 40 percent increase in designated clean air non-attainment areas as a result of new standards for ground-level ozone.[63] Localities that participate in the compact, including MPOs, must submit plans for meeting the new 8-hour ground level ozone standard; their non-attainment designation is then deferred as long as the localities meets milestones outlined in the plan. These compacts, while new, could well be adapted to manage for reduced GHG emissions.[64]

The improved planning models just reviewed in this section are an actual best practice in support of long range transportation planning. Most of these new models require state DOTs to develop strategic partnerships with other agencies, especially MPOs, which have data collection capabilities not available in DOTs. MPOs benefit from these partnerships as well because they generally do not have the analytical capabilities available in state DOTs or other state agencies. Use of these various transportation, land use and air quality models to co-plan for transportation energy and climate outcomes is a new area of best agency practice. However, as noted previously, good models require good data. Hence model improvements need to go hand-in-hand with better quality data collection.

This preliminary scan of (1) the literature, (2) transportation, air quality and energy experts, and (3) state transportation planning practice, reveals several promising areas for further study on strategies to integrate energy and GHG reduction strategies into long

has a program, the Transportation Modeling Improvement Program (TMIP), which funds research on incremental improvements to existing traffic models.

[63] The new standards can be found at 40 CFR Part 81 (issued April 15, 2004).

[64] For more information on Early Action Compacts see www.epa.gov/air/eac.

range transportation planning. Even absent such research, some early state DOT adopters are beginning to establish emerging best practice. Efforts in the four partner states to set or adopt best practice are the subject Chapter Two of this report.

CHAPTER TWO:
PARTNER STATE PLANS, GAP ANALYSIS, AND BARRIERS TO IMPROVEMENT

Summary: *The four partner states (Maine, Massachusetts, New Jersey and New York) set or closely duplicate best national long range transportation planning practice for energy and climate protection outcomes. However, leadership in the form of policy direction comes from sources external to the state DOT in all four cases. In response to this external direction, only Massachusetts makes a firm commitment in its Long Range Transportation Plan (LRTP) to meet state climate protection goals. The other three partner states focus on implementing specific actions contained in Climate Action Plans (CAPs) that are under their direct control; examples include the purchase of fuel efficient vehicles and the installation of energy efficient equipment in the state transportation system.*

All four states are in the process of transitioning from a traditional program focus on system expansion to a more specific focus on system preservation, integration and management to meet new travel demand. This change in program orientation significantly expands agency options for co-managing their transportation systems for climate and energy outcomes since efforts to manage or even reduce travel demand yield energy and climate co-benefits. However, other than in New Jersey, where a cross-agency team co-manages state transportation and "smart growth" planning, inter-agency collaboration is weak. More generally, co-management of transportation systems for multi-sectoral goals as a strategy for advancing the core DOT transportation mission is more evident in practice than in long range planning in all four states.[65] *Barriers to best practice include institutional obstacles (i.e., lack of coordination between transportation and land use, weak policy framework), poor data collection and analysis (i.e., reliance on estimates), financial barriers (i.e., cost of data collection, reduced revenues from increased system efficiency), and cultural barriers (i.e., agency resistance to shaping as well as serving travel demand). Nevertheless, each partner state, in varying ways, is undertaking initiatives to overcome these gaps and barriers. Significant improvement is possible through increased partner cross-state collaboration to accomplish common climate and energy efficiency goals. The*

[65] State DOTs only own and manage a portion of the transportation network in all four states. Airports, ports, and transit facilities, as well as local road systems, bicycle facilities and sidewalks are usually (but not always) under regional or local ownership and management. Also, other state agencies, such as Health and Human Services, control large amounts of transportation funding for people with special needs. The relevant point is that state DOTs play at best an "honest broker" role in the management of a large portion of transportation services in all four states. This is consistent with general state DOT practice.

summaries of the four partner state analyses are contained in Appendices B through E attached to this report.

I. Methodology and Planning Framework

State transportation practice is largely influenced by federal law since most major transportation systems (air, transit, roads and highways) are funded through federal transportation trust funds. Federal law and policy places various conditions and restrictions on state use of these funds. Moreover, state transportation practice also varies according to state law and the statewide planning framework within which they operate consistent with federal funding requirements. The following is an overview of the methodology used in this study to understand transportation planning practice in the four partner states and the policy framework within which they operate.

A. Methodology

Group and individual interviews were conducted with twenty-four state transportation, energy and environmental officials directly involved in the development of the four partner state climate action plans and long-range transportation plans. Additional officials were contacted in all state agencies involved in calculation of state-level transportation energy and GHG emissions as well as measurements of statewide travel. In two states (Maine and New York), where non-governmental organizations (NGOs) played a prominent role in plan development (either the CAP or the LRTP), these NGO participants were also interviewed. A list of interviewees is included in each state report.

In each partner state the relevant state DOT official most closely involved in transportation planning for energy and climate outcomes was provided a copy of Chapter One of this report along with the interview questions (contained in Appendix A). These questions were the basis for the interviews, which then focused on the primary topics of the research—the processes, policies and tools and methods adopted or applied to integrate climate protection and energy conservation into the state LRTPs. Where states are in the process of updating the LRTP, both the existing LRTP and the draft of the new LRTP (if available) were reviewed and discussed. In addition, the extent of cross-agency participation in the CAP and the LRTP was analyzed. The present status of the planning process in relation to both the CAP and LRTP in the partner states is shown in Table 2.

Table 2: Status of State Long Range Plans and Climate Action Plans

State	Last LRTP Update	Last CAP Update	Status of New LRTP
Maine	January 2001[66]	December 2004	In scoping process, Due 2006
Massachusetts	1995	May 2004	Draft *Framework Plan* issued March 2005
New Jersey	March 2001	1999	In scoping process, due 2006
New York	1996	2003[67]	Internal draft in circulation

The state partner analysis also included a review of the state policy framework in which the LRTPs were developed. This research evaluated the extent to which the partner state DOTs operate under legislative or executive directives to advance climate and energy conservation goals and, if so, whether such directives require specific state DOT action. If specific state DOT action is required, state DOT actions in response to such directives were assumed to be intended, at least in part, to meet these climate and energy goals.

B. Partner State Policy Framework

The policy framework in support of energy and climate outcomes in the four partner states is robust:

- Two states (Massachusetts and Maine) are signatories to the Climate Change Action Plan (CCAP) adopted by the six New England state governors and Eastern Canadian provincial premiers (NEG-ECP) in July 2001, which commit to reduce statewide or province-wide GHG emissions to 1990 levels by 2010 and to 10 percent below 1990 levels by 2020.
  All four partner states have adopted Climate Action Plans (CAPs) incorporating the CCAP goals.[68]
  One state (Maine) has incorporated the CCAP goals into state law.[69]
  One state (Maine) has adopted a state law directing that a study be conducted of

[66] Technical update was published in 2005.
[67] Report of the New York Governor's Greenhouse Gas Task Force (hereafter referred to as New York State CAP)
[68] New York adopted the more aggressive short term goal or reducing GHG emissions to 5% below 1990 levels by 2010. Its 2020 goal is the same as the CCAP goal.
[69] 121 Maine State Legislature L.D. 845, "*An Act to Provide Leadership in Addressing the Threat of Climate Change.*"

> "the costs and benefits and actual or predicted transportation energy efficiency results of other initiatives, including…long-term traffic and modal demand management plans of the Department of Transportation, anti-idling campaigns and fuel economy standards for state fleets."[70]
>
> One state (Massachusetts) has restructured its transportation department to consolidate all state airport, port, highway and regional transportation authorities within one department, to require the preparation of a "comprehensive and coordinated intermodal transportation plan for the commonwealth," and to further require that this plan "be prepared in coordination with comprehensive urban transportation plans."[71]
>
> One state (Maine) has issued an Executive Order directing state agencies to track overall fuel economy and vehicles miles traveled of the state fleet, and to evaluate the costs and benefits of using clean and alternative fuel technologies in the fleet. It also directs the state Department of Environmental Protection to calculate annually the CO_2 emissions associated with the transportation sector of the state government.[72]

These state legislative and gubernatorial actions impose specific requirements on the four partner state DOTs to consider energy and climate outcomes in their planning activities. However, they mandate no specific outcomes. In the one state (Maine) that has adopted a law requiring development of a plan to meet a measurable statewide goal for GHG emission reductions, no specific reduction target was imposed on the state DOT for transportation-related emissions. The focus of this analysis is on evaluating how closely the four partner states come to best national practice in their consideration of climate and energy outcomes in their state LRTPs in the context of this policy framework.

II. Comparative Analysis of Partner State Practice for Energy and Climate Outcomes.

A discussion of the processes, policies and tools/methods adopted by each partner state, and their relationship to climate and energy outcomes are included in the state profiles

[70] RESOLVES 2003, Chapter 50 (L.D. 1184), Sec. 1 (5).
[71] Chapter 196 of the Acts of 2004, sec. 4. The "said other agencies" referred to in the paragraph are "all of its constituent agencies and authorities (of the Commonwealth) that own or operate transportation facilities."
[72] Executive Order of March 17, 2004. The declared basis for this gubernatorial initiative is that "Maine has committed to being a leader in addressing the serious risk climate change poses to the economy, environment, and human health, a risk that the vast majority of the world's scientists have concluded is, in part, due to emissions of greenhouse gases from human activity."

contained in the appendices. The following is an evaluation of these practices in comparison to best national best practice as determined in Chapter One.

A. Partner State Processes

Comparison with National Best Practice: The standard set out in Chapter One for best transportation planning process for energy and climate outcomes was two-fold:

> *(1) linkage of the long range planning process with broad societal goals of reducing criteria air pollutants, greenhouse gas emissions, energy use, and impacts on land; and*
> *(2) linkage to these societal goals through process requirements that engage sister agencies and the public in LRTP development and the DOT itself in plan implementation for energy and climate outcomes.*

Table 3 compares partner state practice with national best practice.

1. Climate Action Plan Development

Each of the four partner states has different processes for involving the state DOT in CAP Development:

- The state DOT was involved at the executive level in Maine (Deputy Secretary) and in Massachusetts (Director of Planning).
- In all states, the DOT provided travel data to the CAP;
- In all states except New Jersey, the state DOT made recommendations for the transportation elements of the plan.
- In Massachusetts, the Office of Commonwealth Development (OCD), which coordinates the activities and policies of three cabinet agencies including the Executive Office of Environmental Affairs (EOEA) and the Executive Office of Transportation and Construction (EOTC), was the lead agency in CAP development.[73]

In general, the newer Long Range Transportation Plans developed in 2004 (Massachusetts and Maine) reflected stronger state DOT commitment to Climate Action Plan implementation than the older LRTPs (New Jersey, 1999, and New York, 1996).

[73] The third agency coordinated by OCD is the Executive Office of Economic Development (EOED) which includes the Department of Housing and Community Development.

Table 3: Comparison of Partner State Planning Processes with Best Practice

State Rating Relative to Best Practice	Process Linkage Characteristics	Implementation Linkage Characteristics
Maine: Strong	-High public involvement in plan development -DOT involved in CAP development -DOT provided travel data for CAP	-Links to growth management process in state -DOT involved in CAP implementation
Massachusetts: Medium	-No public process for draft LRTP development -DOT involved in CAP development -DOT involvement in energy planning unclear -DOT provided travel data for CAP	-Links to process for project-level emissions analysis -Links to land use planning -DOT involved in CAP implementation
New Jersey: Medium	-TMAs involved in LRTP development -Public outreach through public website -DOT provided travel data for CAP	-Links to land use planning through I-TEAM -no links to energy planning
New York: Strong	-Citizen-led process for LRTP scoping -Energy representation on LRTP development -provided travel data for CAP	-Links to process for project level emissions analysis -Links to land use planning unknown

Stakeholder and community involvement in the CAP also varied:

- Massachusetts and New Jersey had little or no non-agency involvement in development of the CAP.
- Maine developed its CAP with extensive and continued outside participation by both stakeholder and community interests. It established a Transportation and Land Use Subcommittee consisting of 36 agency, stakeholder and community participants supported by outside technical experts.[74] Maine DOT provided the funding for the work of this subcommittee.

[74] The Center for Clean Air Policy provided technical and policy support to this subcommittee.

- In New York, the Governor's Greenhouse Gas Task Force included citizen and NGO membership.

2. Long Range Transportation Plan Development

The four partner states also adopted varying processes for sister agency and public participation in LRTP development:

- In the two states that last updated their plans in 2001 (Maine and New Jersey), engagement was limited to participation by the state environmental agencies in the general process of inter-agency coordination. In both states, the focus of involvement was almost exclusively on air quality, with no discernible emphasis (as expressed in the interviews) on climate or energy issues. In the states with new draft LRTPs (Massachusetts and New York), climate and energy agencies were centrally involved.

- In Massachusetts, the draft LRTP was developed in-house by the EOTC with no public involvement.[75] The OCD, which developed and published the CAP, reviewed and approved publication of the draft LRTP. Public review of the draft plan is now underway. OCD oversight of the LRTP process is reflected in the fact that the CAP goals are expressly adopted as agency objectives in the draft plan.[76]

- New York appointed a Citizens Commission to lead an extensive public outreach process prior to plan development. National leaders in the area of climate and energy policy are represented on the Commission. In addition, NYSDOT has assigned responsibility for energy issues to an executive level position. This executive represents the NYSDOT on implementation of the State Energy Plan (SEP).[77]

[75] OCD explained deferral of public involvement until publication of the draft LRTP on the grounds that the public needed something to comment on to have the opportunity for meaningful participation. In the view of OCD, because the draft LRTP is guided by 10 Sustainable Development Principles that were developed with public input and apply across all state agencies, the need to engage in a new process to guide initial plan development is unnecessary.

[76] *Framework Plan,* p. 121.

[77] This executive is John Zamurs, Director of the Air Quality Section of the Environmental Analysis Bureau.

B. Partner State Policies

Comparison with National Best Practice: The standard set out in Chapter One for best transportation planning policies in support of climate and energy outcomes was:

> *The Long Range Transportation Plan adopts or endorses policies with the specific intent to improve system energy efficiency and reduce greenhouse gases.*

Table 4 compares partner state practice with national best practice

Uniquely among the four partner states, Massachusetts sets a new national standard of best policy support for climate and energy outcomes. This new best practice is the decision to subordinate strategic transportation policy as outlined in the *Framework Plan* (the draft LRTP) to Commonwealth-wide Sustainable Development Principles (SDP). This is the strongest policy commitment found in any plan that explicitly requires transportation investments to conform to principles of sustainable development. In some respects the *Framework Plan* is not a policy document at all but rather an implementation plan for policies contained in the SDP. By establishing the SDP as a common frame of reference for planning for all state agencies, transportation policy becomes integrated with a broader set of statewide goals, including climate protection and energy conservation. In short, the SDP expresses an intention that *every* decision within the Executive Office of Transportation (EOT)[78] adhere to these principles.

The other partner state policies summarized above reflect, but do not exceed, national best practice in long range planning. In general, the partner states are well aware of national best practice in long range planning and have incorporated most of these practices into their long range plans. In particular, all partner states have moved well beyond the concept of the statewide long range plan as a 20-year travel demand modeling exercise coupled with a construction plan to meet these travel demand forecasts. All plans are policy-based, not project-based, and reflect a pro-active approach to managing transportation to serve broader community goals, expand transportation choices (including bicycling and walking), and implement statewide policies beyond transportation service delivery. Unless otherwise noted in this paper, however, these best practices are not explicitly linked to climate or energy policy objectives.

[78] The EOT manages all the transportation-related agencies in the state including transit, air, highway and port authorities.

Table 4: Comparison of Partner State Policies in LRTP with National Best Practice

State Rating Relative to Best Practice	Improved Energy Efficiency/Reduced Use of Petroleum	Reduction of Greenhouse Gases
Maine: Strong	-Plan makes energy efficiency commitment in support of CAP -Commits to slowing growth of VMT in infrastructure investments -Funds *Explore Maine* to encourage tourism using alternative transportation modes.	-Plan calls for annual calculation of CO_2 emissions for state vehicles -Commits to slowing growth of VMT
Massachusetts: Strong	-Energy conservation is included in sustainability principles that drive infrastructure investments -Prioritizes CMAQ funding for projects that promote energy conservation -Links project funding to local land use planning -Prohibits state use of SUVs except if job so requires -Commits to an anti-idling campaign for transit vehicles and buses.	-Commits to implementing state Climate Protection Plan (CPP) with many transportation action items (see more detailed discussion) -Includes GHG emissions as a project selection criterion -Measures transit fleet CO_2 emissions performance -Links project funding to local land use planning
New Jersey: Medium	-Commits to higher transit funding -Funds Transportation Management Associations (TMAs) through CMAQ -Identifies, but does not quantify, plan performance measures.	-Commits to implementing Inspection and Maintenance (I&M) program
New York: Medium	-Supports guidelines for project level energy use calculations[79]	-Supports guidelines for project level CO_2 emissions calculations
All Partner States	-Commit to purchasing energy efficient and alternativel fuel vehicles	-Commit to purchasing energy efficient and alternative fuel vehicles[80]

[79] The draft NYS DOT plan is still in internal review. This commitment is contained in the citizen report for the LRTP.

[80] As noted earlier, to be climate-friendly, the alternative fuel vehicle must emit fewer GHG emissions per mile than its traditional oil counterparts.

Despite this progress, there are areas where partner state policy does not reflect national best planning practice for climate protection and energy conservation. These include:

- Of the four existing state LRTPs, only New Jersey establishes *measurable performance standards* for evaluating success in meeting plan objectives. Even in the case of New Jersey, the DOT regards the LRTP as a policy document, not a performance document, and does not measure performance against plan.[81]

- Other than the Massachusetts initiative to improve the efficiency of aircraft movements at Logan Airport and provisions for demand management through peak hour pricing, GHG emissions from *aircraft operations* are not measured or addressed in any state partner LRTP.[82] In the interviews, all states indicated that they do not consider aviation emissions from fuel burn in their plans, nor do they consider improvements in aviation fuel efficiency in their CAPs. This is not surprising considering the fact that the regulatory framework of aviation in the U.S. inherently limits state control of aviation. The Federal Aviation Administration has undertaken various initiatives to address aviation emissions both from airport ground emissions and aircraft operations.

- No partner state plan addresses the unique challenges to climate protection and energy conservation presented by growth in freight movement. Even the anti-idling initiatives in the Massachusetts *Framework* focus exclusively on reducing unnecessary idling of public buses and transit vehicles, not private freight vehicles. The Northeast, especially New England, is a net freight importer and, as a border region with an extensive coastline, freight movements into the region must often return empty.[83] This increases energy use per volume of freight moved. While the LRTPs of some states in the region, such as Connecticut, acknowledge freight as posing a particular threat to state energy and climate

[81] The Massachusetts *Framework Plan* is self-described as a "plan for action" and each chapter terminates with an "action plan" of bulleted initiatives. However, of 130 total action plan items, only 11 are measurable, the rest being qualitative steps to "encourage," "seek," "advocate for" etc. This makes tracking progress against the plan difficult. The one firm commitment it does make in respect to study outcomes is to "implement requirements of the Massachusetts Climate Protection Plan." (p 136). However, the referenced plan sets out measurable climate protection goals for all sectors combined, without delineating the particular contribution requested from the transportation sector. To be measurable against plan, a particular GHG emission reduction goal for the transportation sector is needed.

[82] *Framework Plan,* p. 169.

[83] A study of net freight flows for partner states was beyond the scope of this study and no information about such flows are included in any state plan. The *FrameworkPlan* simply states that "no (freight) import statistics are available for states." (p.51).

goals, this concern is not reflected in any partner state plan.[84]

Despite these gaps, the four partner states have adopted an approach to long range transportation planning that extends significantly beyond the traditional LRTP focus on facility condition and performance in meeting long range vehicular travel demand. All four plans reflect a much broader view of the goals and objectives of transportation service, explicitly embracing social, environmental, and economic goals ("quality of life") as the ultimate purpose of, and need for, transportation. This creates a more flexible policy environment where the goals of climate protection and reduced oil use can be more easily integrated into the long range planning process. Such a broader view of agency mission, and its reflection in the LRTP, is an essential prerequisite to policy leadership in this area.

1. Alternative Fuel and Energy Efficient Vehicles

All four states have adopted policies directing state agencies to purchase alternative fuel vehicles or energy efficient vehicles for the purpose of saving energy and reducing GHG emissions (the latter requirement reduces the number of eligible alternative fuels since not all alternative fuels reduce GHG emissions). However, none of the state plans meet best national practice as reflected in the Connecticut Plan, which includes specific commitments to address the needs of owners of alternative fuel vehicles when constructing or reconstructing transportation facilities.

Maine has an Executive Order requiring state agencies to:

- improve overall fuel economy of the state fleet;
- calculate life-cycle costs of hybrid vehicles in making purchasing decisions;
- consider regional or national partnerships in vehicle purchases;
- purchase most fuel-efficient, lowest emission vehicles by vehicle class;
- encourage use of technologies that reduce state employee VMT; and
- calculate CO_2 emissions of state vehicle fleet annually. [85]

The New Jersey LRTP adopts as specific measures of LRTP performance both the percentage of NJDOT and NJ Transit fleet using alternative fuels, and the percentage of private vehicles using alternative fuels.[86]

[84] The Maine CAP supports "locally grown produce" as a way to reduce VMT generated from buying produce outside the region. This concept of actively supporting transportation that links local products to local markets to reduce VMT growth does not appear in any state transportation plan.
[85] Executive Order of March 17, 2004.
[86] *Transportation Choices 2025*, March 2001, p. 120.

Massachusetts has had a policy since 1998, established through executive order, on the purchase of alternative fuel vehicles. The Massachusetts draft LRTP documents progress in these efforts (38% of the MBTA bus fleet is CNG-powered) but does not include a specific target goal for success.

2. Policy Support for Climate Action Plan

The state LRTPs differ in their reference to and support for each state's Climate Action Plan.

- The Massachusetts draft LRTP explicitly adopts the CAP goal of reducing GHG emissions to 1990 levels by 2010 and to 10% below 1990 levels by 2020.[87] However, the plan does not establish a target for the transportation sector contribution to this goal or a strategy for achieving the goal, stating only that the plan itself represents its commitment to implementing the CCAP adopted by the New England Governors in 2001. Neither the state's CAP nor its LRTP discloses the percentage of total statewide GHG emissions represented by the transportation sector.[88] In the interviews, OCD acknowledged the lack of specificity in establishing targets for the transportation contribution to CAP goals, preferring to focus on concrete actions that can be taken now. The most unique initiative in the *Framework Plan* in support of the state CAP is a commitment to work with the MPOs and local officials to include climate protection considerations when making decisions on transportation projects. This policy is already being implemented through the Program for Mass Transportation (2003), which estimates and discloses the CO_2 savings of alternative capital public transportation investments and includes these relative savings in a qualitative evaluation of such investments. OCD is also researching the barriers to estimating the life-cycle CO_2 implications of highway and street investments at the project level and is working on a statewide model.

- Maine state law embraces the same climate goal as Massachusetts but that commitment is not yet incorporated in the LRTP since the law was enacted in 2004, three years after the last LRTP update. In the interviews, the state DOT, which participated in the development of the CAP and partially funded the Transportation and Land-Use Working Group, expressed an intention to address

[87] *Framework Plan,* p. 121.
[88] Unpublished calculations by the Center for Clean Air Policy, which provided policy support to the CAP, estimate the transportation sector contribution to total GHG emissions at 47%.

CO_2 emissions in the 2006 LRTP update. Maine estimates the transportation contribution to total statewide GHG emissions at about 28%.

- The New Jersey plan does not mention the CAP and contains no commitment to achieve state climate objectives. In the interviews, the consensus of the participants was that the contribution of the transportation sector was about 30% of total GHG emissions. The lack of a federal mandate to regulate CO_2 emission and the inattention of the New Jersey Department of Environmental Protection to the voluntary CAP initiative since it favors a mandatory Regional Greenhouse Gas Initiative (RGGI) establishing a cap-and-trade program for stationary sources has discouraged NJDOT from addressing CO_2 emissions in the LRTP.

- Since the existing New York LRTP was adopted in 1996, it does not include the GHG reduction goals adopted in both the State Energy Plan or SEP (2002) and the Governor's Greenhouse Gas Task Force Report (2003). However, since the report of its Advisory Panel on Transportation Policy for 2025 has recommended that "all the transportation recommendations of the Greenhouse Gas Task Force should be adopted," there is a high likelihood that the soon-to-be-released draft 2025 LRTP will address climate protection.

3. Policy Support for Energy Conservation

In comparing the policy approaches to energy conservation in the partner state LRTPs, the Massachusetts approach stands out as holding the most potential for integrating energy conservation into the plan. As with climate, the plan adheres to the Sustainable Development Principles that require a commitment to pursuit of energy efficiency and energy conservation in all state transportation actions, including actions in partnerships with regional and local agencies. By establishing energy conservation as an over-arching value OCD believes better results are achieved than if treated as a stand-alone program.

All four partner states have adopted some policy commitment to saving energy in the transportation sector. These include:

- New Jersey has adopted Improved Inspection and Maintenance and Improved Transit Service that reduces energy use. In the interview, NJDOT stated that the most important energy conservation initiative undertaken by the agency, although not included in the LRTP, was the replacement of all traffic lights with light-emitting diodes (LED). This initiative has significantly reduced energy costs in the

Department's budget.

- Through its adoption of the Sustainable Development Principles, Massachusetts has endorsed increasing the supply of renewable energy and reducing waste of water, energy and materials. As is the case with the CAP, OCD views the entire plan as a commitment to use transportation energy efficiently and to invest in transportation that minimizes total energy use such as, among other initiatives, transit-oriented development, context-sensitive solutions, improvements to the pedestrian environment, safe routes to school, a variety of TDM strategies, expansion of transportation choices and fix-it-first (fixing existing transportation infrastructure, rather than expanding it).

- Maine has followed the Massachusetts example of including energy conservation as a general policy goal of the LRTP under the Environmental Protection title. Its unique contribution to this goal is the inclusion of *Explore Maine*, an initiative that supports tourism through provision of alternative transportation choices.

- In New York, the final report of the NYSDOT 2025 Panel includes a recommendation that the NYSDOT "assume a leadership role in achieving the state's environmental and energy goals" and that the LRTP "be fully compliant with the State Energy Plan to ensure a cleaner and healthier environment." Since the draft LRTP itself is not yet available for public review, it was not possible to review the draft to see if these goals are indeed reflected in the plan.

3. Other Policy Initiatives

Both the Massachusetts and Maine CAPs contain additional transportation initiatives. Since senior-level DOT staff participated in the development of both plans (and, in the case of Massachusetts, OCD was the primary author of the plan), these transportation initiatives deserve special attention in this analysis. Massachusetts has already incorporated these initiatives in the draft *Framework*:

- Support HOV lane access to clean vehicles;
- Implement stronger vehicle emission standard;[89]
- Eliminate the unnecessary idling of buses;
- Maintain and update transit services;
- Integrate transportation and land use through Sustainable Development Principles;
- Use clean train engine technology to reduce diesel soot; and
- Improve aircraft movement efficiency.

[89] The Massachusetts Motor Vehicle Registration, a division of EOT, manages the I&M program.

In Maine, since the interviews took place soon after publication of the CAP in December 2004 but before the scoping process for the new LRTP was complete, these initiatives have not yet been addressed in the transportation planning process. However, state DOT participation in their development implies an intention to do so. The measures include:

- Develop policy packages to slow growth of VMT such as transit-oriented development, expanded transportation choices and "transit-based incentives to improve the attractiveness of low-GHG travel choice;"
- Maximize use of non-petroleum, renewable or other low GHG-fuels for state vehicle fleet
- Fund infrastructure or develop incentives to reduce truck, locomotive, and marine engine idling; and
- Expand infrastructure for low-GHG fuels.

C. Partner State Tools and Methods

Best national practice for state DOT tools and methods for climate protection and energy conservation is:

> *State DOTs use LRTP planning tools, data analysis, models and forecasts that do not simply track past trends into the future but are policy-sensitive, so they are able to inform public policy choices and track performance based on these choices, ideally at the project level.*

Ironically, this standard is set by New York and Massachusetts, yet both states have few tools that allow them to meet this standard. No partner state DOT measures and includes GHG emissions from transportation in their LRTP. These calculations, when made at all, are developed by state environmental and energy agencies and included, if at all, in state CAPs. However, these calculations rely on state DOT data which, for reasons stated in Chapter One (see Tools and Methods), is not very accurate.

Maine and New Jersey have even fewer tools to effectively measure and track transportation energy use and GHG emissions. Both rely on federal travel data from the Federal Highway Administration publication, Highway Statistics, which itself is based on three-year rolling averages of travel counts on selected segments of the federal-aid system (the interstate system and state roads). This makes it very difficult to measure the effect of a policy initiative on a particular road segment (such as travel demand management) or even the effect of a system-wide initiative (such as lowering the speed limit). New Jersey, by intention, does not measure performance against policy goals,

instead choosing to regard the LRTP as a policy document, not a performance document. The intentional decision not to measure performance against plan is the basis for the describing New Jersey tools and methods for energy and climate planning as "weak."

Table 5 compares state practice with national best practice in this area.

Table 5: Comparison of Partner State Tools and Methods in LRTP with National Best Practice

State Rating Relative to Best Practice	Tools Used	Trend Analysis?	Policy Sensitive?
Maine: Medium	-VMT calculator -Consensus estimates of experts -Cost-effectiveness analyzer -Land use planning	Yes Unknown No Yes	Yes Yes No Unknown
Massachusetts: Strong	-Project-level energy and GHG emission analysis tool -VMT calculator -Motor vehicle registrations -Land use planning	Yes Yes Yes Yes	Yes, for transit (build/no build) Yes, for transit No No
New York: Medium	-Project-level energy and GHG emissions analysis tool -VMT calculator	Yes Yes	Unknown Unknown
New Jersey: Weak	-VMT calculator -Land use planning	Yes No	No No

The effectiveness of the New York project-level energy and emissions calculator is unknown because its evaluation is outside the scope of this study. Massachusetts is developing a project-level calculator similar to New York's but it is not yet in use. However, Massachusetts does have a tool for measuring VMT, energy use and emissions for transit investments which is policy sensitive at the "build/no build" level.

Travel Measurement and Forecasting: The only state in the 15-state long range planning study that has expressed a commitment or intention to do project-level travel forecasting for energy and GHG emissions is Massachusetts, but the commitment is

indirect. In the *Framework Plan* the Commonwealth makes the unequivocal commitment to "implement requirements of the Massachusetts Climate Protection Plan" (CPP).[90] The CPP includes a commitment to "include energy use and GHG emissions as criteria in transportation decisions."[91] It further describes this commitment as one to be implemented "in cooperation with regional planning groups and local officials," and represents a commitment to "include climate as a criterion when making decisions on transportation projects." The mechanism for making climate a relevant criterion is to "provide training to the Regional Planning Agencies and local transportation planners on the assessment of CO_2 emissions from transportation projects and ensure that the energy intensity of projects is disclosed, including secondary impacts of such projects."[92]

Taken together, the Massachusetts CPP and *Framework Plan* documents reflect an intention to measure transportation-related GHG emissions at both the statewide and project levels, to train regional and local officials in these disciplines, and to incorporate projected GHG emissions and energy intensity as criteria in transportation decision-making at the plan- as well as the project-level. While CO_2 emission calculations are already being used in the ranking and selection of transit projects under the state's "Program for Mass Transportation", similar calculations for highway projects—involving emissions from all types of vehicles, driver behavior, road conditions, and topography—are much harder to model. In the interviews, state officials confirmed their intention to apply project-level calculations to highway as well as transit projects, indicating that studies are already underway to develop methodologies that provide such a decision-making tool.[93]

This new tool appears to represent national best practice in efforts to incorporate climate protection and energy conservation into the project-selection process. OCD staff indicated that a statewide model is also being developed to allow calculations of GHG emissions and energy intensity of the entire statewide network, as well as additions to the network through implementation of state transportation improvement plans (STIPs). These calculations will inform decision makers on projected progress towards meeting the LRTP goals for the transportation sector and allow for policy intervention if those goals are not being met.

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[90] *Framework Plan*, p. 136.
[91] *Massachusetts Climate Protection Plan (CPP)*, Office of Commonwealth Development, May 2004, p 36.
[92] *Ibid*, p. 37.
[93] These methodologies use fuel consumption data, fuel consumption rates, free-flow fuel consumption data, and calculated energy from construction and maintenance of transportation projects to develop energy and GHG emission calculations at the project level. It is not clear what travel demand forecasts are used to project such calculations, and where travel induced by project construction is included in the methodology. A more detailed inquiry into these issues goes beyond the scope of this analysis.

This new analytical tool is similar to efforts underway in both New York and California to develop better project-level data on GHG emissions and energy intensity. As noted in Chapter One, the California LRTP includes a commitment to "mainstream energy efficiency and conservation measures into state, regional, and local transportation planning, programming, and projects development," and "implement measures to lower emissions of GHGs and other criteria pollutants in transportation options."[94] The New York energy calculator tools are predicted to be able to measure transportation energy use at the regional (MPO-wide) level as well as at the project-level.

III. Gap Analysis

The purpose of the gap analysis is to identify institutional, technical, or policy barriers that are preventing partner states from attaining national best practice in managing long range plans and programs for climate and energy outcomes. While these four partner states in many respects represent national best practice in these areas, some gaps and barriers were identified. Possible strategies for overcoming these barriers will be discussed in the final chapter of this report.

A. Institutional Gaps and Barriers

The lack of a strong state policy framework directing the state DOT to incorporate specific climate and energy goals presents a clear barrier in one partner state, New Jersey. The CAP in that state, adopted in 1999 by a previous administration of the opposite party, is a voluntary program that includes only a few, unquantified DOT action items (e.g., support public transit, purchase alternative fuel vehicles, improve the vehicle inspection and maintenance program). In addition, the present state administration has chosen to focus its GHG emission reduction efforts on a mandatory cap-and-trade program that applies only to stationary, not mobile, sources. While New Jersey DOT officials said they could pay more attention to this issue if directed to do so, in the absence of such direction it is difficult for them to justify the effort. On the other hand, where strong policy direction exists—state law adopting specific GHG emission reduction targets (Maine), or sustainable development principles applying statewide policies for energy efficiency, alternative energy, and natural resource conservation to state DOT actions (Massachusetts)—state DOTs are responsive.

[94] *California Transportation Plan 2025*, p. 60.

All partner states cited lack of state DOT control over land use as a barrier to control of travel demand (VMT growth) and therefore control of transportation-related GHG emissions. Even where state law requires local growth management planning, it is hard to enforce and to connect to transportation decisions. Restricting grants of access permits to developers (access roads) and residents (driveways) as a tool for preserving system capacity and reducing travel on the state road system has political and jurisdictional problems. There is some evidence, however, that partner states are increasingly willing to employ these strategies to preserve system capacity. Massachusetts, for example, is beginning to condition state grants for local infrastructure investments on local adoption of smart growth development policies.

B. Data Gaps and Barriers

The methodologies for calculating VMT, VMT growth, and resulting transportation-related GHG emissions remain flawed. Data is often old, fuel economy assumptions are optimistic, and tax information on fuel sales is under-reported. The result appears to be a significant under-estimation of the growth in such emissions in all states, leading to delays in needed policy intervention.

The challenges to securing and verifying calculations using multiple VMT and fuel use databases are discussed in more detail in the state survey reports in the appendices. They are summarized below.

1. New Jersey

The New Jersey CAP estimates that GHG emissions resulting from VMT growth will increase from 43.4 million metric tones (MMT) in 1990 to a business as usual (BAU) estimate of 46.2 MMT in 2005, with a reduction to 43.3 MMT if the transportation-related policy measures in the CAP are implemented.[95] However, actual transportation-related emissions had already reached 48.4 MMT in 2001 (the latest actual figures available), and were estimated to increase to 50.6 MMT in 2003. Transportation-related GHG emissions are now estimated to exceed projections by more than 25 MMT by the end of 2005, negating the total GHG emission reduction target from all sectors (assuming all non-transportation targets are met) of about 20.4 MMT.

These figures were calculated by the New Jersey Department of Environmental Protection (NJDEP), not NJDOT, and were not transmitted to NJDOT for their input. This process exposes three barriers to action: (1) the VMT projections and resulting

[95] All measurements are in terms of CO2 equivalent.

GHG emissions projections are low; (2) actual transportation-related emissions, once calculated, are not transmitted to NJDOT for its review nor for its use in implementing relevant policies and programs, and (3) in the absence of external pressure from sister agencies, NJDOT considers policy options to reduce such emissions unnecessary, especially in the absence of a federal mandate to do so.

2. Massachusetts

While Massachusetts is creating national best practice in developing a methodology to estimate future GHG emissions and energy consumption implications of present transportation decisions, it lacks a methodology to accurately track present transportation-related GHG emissions resulting from previous decisions. Neither the Climate Protection Plan (CPP) nor the *Framework Plan* includes estimates of actual transportation-related GHG emissions. The CPP does estimate that transportation-related CO_2 emissions will increase 33% in the period 1990-2020, but from an unstated baseline.[96] VMT has grown 17% in the 12 years from 1990 to 2002 alone (from 45 billion miles to 53 billion miles) and fuel economy has decreased.[97] If this trend continues the 33% increase in CO_2 emissions form 1990 levels will be reached by 2012.[98] While Massachusetts is fully committed, according to the *Framework Plan*, to implementing the CPP goals, failure to either estimate and track total transportation-related GHG emissions, and track and verify actual VMT growth estimates represent barriers to meeting national best practice for climate protection and energy conservation.[99]

3. Maine

The Maine CAP contains detailed estimates of transportation-related GHG emission reductions from 11 separate strategies to meet GHG reduction targets. However, almost all reductions are calculated from VMT growth figures, which do not appear to be accurate. The 1990 baseline for VMT is 11.8 billion miles. However, no agreement exists on VMT growth figures from that point forward. The Maine LRTP (2001) indicates VMT grew 40% between 1990 and 2001 but *Highway Statistics* indicates that VMT grew 26% between 1990 and 2003 to 14.9 billion miles. Looking forward, the Maine LRTP estimates VMT to grow 18.8% between 2000 and 2020, an

[96] *CPP*, p. 35.
[97] Independent contractor report from the Center for Clean Air Policy, unpublished.
[98] Ibid.
[99] The *Framework Plan* (p.56) also discloses that, while the population of Massachusetts increased 5.5% during the period 1990-2000 (Census figures), the Massachusetts Registry of Motor Vehicles reported an increase of 48% in the number of registered motor vehicles over the period 1992-2002. These figures, if accurate, have significant implications for VMT growth projections.

unusually low figure given actual VMT growth rates in the previous ten years. The U.S. Department of Energy estimates transportation fuel use in New England to increase about 40% in the period 2000-2020, which implies a significantly higher VMT growth rate throughout the region, including Maine.[100]

The Maine CAP estimates that total transportation-related GHG emissions will increase 48% for the period 1990-2020, from 8.3 MMT to 12.25 MMT absent intervention (BAU). The CAP indicates that transportation-related GHG emissions in 2010 will be 8.5 MMT, an implausible figure if the 1990 baseline was 8.3 MMT and VMT grew in the 26% to 40% range indicated by FHWA and DOE over 1990-2001 time period. These varying estimates, both on past VMT and GHG emission growth, and future projections, are a significant barrier to policy action.

4. New York

The New York State Energy Plan (SEP) estimates that total CO_2 emissions will grow by 7.76% under business-as-usual (BAU) assumptions in the period 1990 to 2020 from 219 MMTCO_2equivalent (CO_2E) to 236 MMTCO_2E.[101] However, transportation emissions are projected to grow much faster, from 76.2MMTCO_2E to 108.5MMTCO_2E, a 36.8% increase.[102] Presently, transportation-related CO_2 represents 35% of total statewide CO_2 emissions and this is expected to grow to 44% of total emissions under BAU.[103] The main driver is VMT growth, which is expected to grow 57% between 1990 and 2020.[104] Transportation CO_2 emissions growth is the primary barrier to achievement of the SEP CO_2 reduction goal of 5% below 1990 levels by 2010 and 10% below 1990 levels by 2020. In fact, absent the growth in transportation-related CO_2, total statewide CO_2 emissions would decline.

In addition to the problems already cited with regard to data on VMT growth, data on motor vehicle registrations, both actual and trend, are suspect. In Massachusetts, for example, the population increased 5.5% from 1990-2000 but motor vehicles registrations reportedly increased 48% in the period 1992-2002. Licensed drivers increased 12% in the same period. The Massachusetts *Framework Plan* acknowledges

[100] While the Department of Energy estimate of future fuel use is a regional estimate, participants in the Transportation and Land Use Working Group of the CAP accepted it as a reasonable estimate of future transportation energy consumption for Maine as well.
[101] Independent contractor report from Center for Clean Air Policy, unpublished.
[102] Ibid.
[103] Ibid.
[104] Choate, Anne, *Estimating Transportation-Related Greenhouse Gas Emissions and Energy Use in New York State*, ICF report, 2004, p. 16.

that demographic trends "do not completely explain" this large reported increase in registered vehicles.[105]

Opportunities to resolve these apparent inconsistencies in VMT and transportation-related GHG emission baselines, reported growth rates, and estimated future growth rates will be discussed in Chapter Three of this report. Partner state agreement on a common methodology to track these measurements would set a national best practice standard for cooperative data collection and analysis in this area.

C. Financial Barrier

Several partner states noted the cost of managing transportation for climate protection and energy conservation as a barrier to state action. Three types of costs associated with such a goal were raised:

1. The Costs of Measuring and Tracking Performance Against Goals

Measuring total transportation-related GHG emissions and the energy intensity of the statewide transportation network is difficult and time-consuming. New Jersey, which represents best state practice in identifying measurable standards of performance against policy goals in the LRTP, initially tracked performance against plan goals but stopped due to financial constraints.

2. Opportunity Costs of a Transportation Program in Climate and Energy in the Absence of a State or Federal Mandate:

All four states contain within their borders metropolitan areas that are not in compliance with Clean Air Act standards (referred to as called National Ambient Air Quality Standards (NAAQS)). Given the lack of a federal mandate to meet specific GHG reduction goals, and the potential penalties resulting from not meeting NAAQS, incremental actions devoted solely to advancing climate and energy outcomes are not a priority. The priority is meeting NAAQS.

3. Loss of Tax Revenues

Success in reducing transportation-related GHG emissions depends heavily on reducing growth in VMT and the promotion of energy-efficient technologies, which

[105] *Framework Plan,* p. 56.

means tax revenues from gasoline sales would go down. State DOTs rely on such revenues for the financing of their transportation system. Maine, in particular, noted this counter-incentive to increasing fuel and vehicle efficiency as a potential barrier to planning for climate and energy outcomes.

D. Culture Barriers

All partner states mentioned the "American love affair with the automobile" as a cultural barrier to climate and energy action. The economic costs of dependence on car travel, especially among lower income groups, are discussed in the Massachusetts *Framework Plan*, and Maine DOT expressed the need for public education on this subject in the interviews. Opportunities for state DOTs to influence public opinion will be explored with partner states in the final chapter of this report. (For additional gaps and barrier analysis, see the state interview reports in the appendices).

IV. Conclusion

In summary, the four partner states appear to be at or near national best practice levels for integrating climate protection and energy conservation into long-range transportation planning practice. The situation in New York is unclear since its draft LRTP is still under internal review. However, the strong support the NYSDOT has demonstrated for both the state energy plan (SEP) and the recommendations of the Governor's Greenhouse Gas Task Force by helping to develop and implement these plans suggests that it intends to integrate these objectives in its plan.

Interestingly, all partner states viewed external incentives and direction such as gubernatorial Executive Orders in support of climate and energy goals, or Climate Action Plans, as consistent with their core transportation mission of meeting the mobility and access needs of the traveling public. All of them found such direction consistent with the common agency goal of improving the management of the transportation system and constraining growth and travel demand. With system capacity and agency finances highly constrained in all four states, any incentive for reducing pressure on the system through reduced travel demand appears welcome by all partner state DOTs.

Despite this admirable level of effort in all four partner states, internal inconsistencies in data makes policy implementation difficult since it is almost impossible to determine if good LRTP processes and good LRTP policies for climate and energy outcomes is having any effect. To the contrary, available trend data indicates that transportation performance for these outcomes is getting worse, not better, in all four partner states.

Recommendations with regard to the gaps discovered in the LRTP process will be discussed in Chapter Three of this report.

CHAPTER THREE: LESSONS LEARNED AND RECOMMENDATIONS FOR FURTHER RESEARCH

The discussion below highlights major lessons learned, some cross-cutting and some specific to the process, policy or technical aspects of this report's review. In all cases, the lesson learned is followed by a specific recommendation for further action or research.

I. State LRTPs: Lessons Learned and Recommendations

A. LRTPs Have Been Important but Limited Tools

The core mission of virtually every state DOT is to serve the mobility and access needs of its citizens and businesses. The sources of funds used to meet these needs (mostly state and federal gas taxes, sales taxes, motor vehicle registration taxes) contain a wide variety of restrictions on the uses of these funds, but almost all require that they be used for transportation purposes. Where states have established by law, gubernatorial action, or another policy process a strong commitment to improving statewide energy and climate outcomes, state DOTs have made efforts to respond in a supporting role consistent with their core transportation mission. In all four partner states such a statewide commitment exists, both in their Climate Action Plans (CAPs) and through more specific directives. In Maine, it is the Sustainable Transportation Act. In Massachusetts, it is a set of Sustainable Development Principles (SDP) developed through a Commission set up by the Governor for this purposes and applied across all state agencies. In New Jersey, it is the State Development and Redevelopment (Smart Growth) Plan, and in New York, it is the State Energy Plan (SEP). These statewide initiatives, all external to the state DOT, create a policy framework within which these four partner state DOTs co-manage their transportation programs for these external outcomes. Absent such an external policy framework, state DOTs, as reflected in their Long Range Plans, have difficulty setting internal policy in support of these outcomes due to the primacy of their core transportation mission. The lesson learned, therefore, is that state DOTs have the capacity to implement statewide policies in pursuit of broad multi-sectoral goals, but not in setting such policies through the Long Range Transportation Plan.

Recommendation: To address this problem, *strong gubernatorial or cross-agency leadership is required to achieve strategic management of transportation for energy and climate outcomes*. These need to be supplemented by *specific performance requirements, milestones for their achievement, and implementing protocols* to effectively implement the LRTPs. A specific function should be considered within DOT statewide planning agencies to identify and participate in sister state agency energy and climate planning

activities, and to explore opportunities for information-sharing and potential application of energy efficiency initiatives that advance the DOT's core mission. In addition, state energy and environmental agencies should be included in the scoping team for the state LRTP and their participation should continue through to plan development and implementation. State DOTs might also request periodic evaluations from sister agencies on their success in implementing statewide climate and energy policies, which could include an exploration of opportunities for mutual support.

B. LRTP Process Must be Ongoing

Long range transportation planning is not a static exercise. It is an on-going process, only part of which is the development and publication of a long range plan or plan update. The principles, policies and action plans contained in an LRTP are the result of many on-going processes, which are then assembled and arranged to reflect the agency's strategic choice of direction, with varying levels of input from sister agencies, stakeholders and the general public. The plan itself then generates additional outreach activities and collaborations based on the leadership assumed by the agency and public expectations generated by the plan. Implementation actions occur throughout the planning cycle as do performance measurements. Therefore, processes and collaborations undertaken between plan updates to engage the agency on climate and energy issues are as much a part of LRTP development as the formal process of plan development and adoption.

Recommendation: Each state should consider developing an energy and climate "process map" outlining the various points in the long range planning cycle where opportunities exist to better coordinate transportation planning for these outcomes. This is already done for other transportation-related outcomes such as context-sensitive solutions, safety initiatives, and transportation security. In addition, state DOTs should consider establishing internal capacity to plan for energy efficiency in system development and management across divisions (i.e., statewide planning, project planning and development, design, construction, operations etc.), as well as including the establishment of this capacity in the long range plan itself.

C. Few LRTPs Recognize that Policies to Manage Congestion Often Coincide With Those to Support Energy and Climate Outcomes

Many of the strategies being adopted by DOTs to manage congestion (Travel Demand Management or TDM) also achieve energy and climate outcomes. These strategies include road pricing (tolls), parking restrictions, auto-free zones, managing access to the roadway (driveways and curb cuts), High Occupancy Vehicle (HOV) lanes, mobility

management, integrated transportation and land use strategies, and subsidies for alternative travel choices. As state DOTs transition from a focus on building new transportation capacity to more cost-effective strategies for managing new travel demand, the confluence of interest between congestion management and managing for energy and climate outcomes is becoming increasingly evident. At present, however, the connection between managing travel demand and managing for energy and reduced GHG emissions has not yet been made in Long Range Transportation Plans. Hence, a real opportunity exists for both state DOTs and sister agencies to work together so that LRTP updates in the future reflect the convergence of these two strategies.

Recommendation: The policy linkage between transportation demand management and strategies to achieve energy and climate outcomes should be made *explicit* in Long Range Transportation Plans. Towards this end, state DOTs should consider engaging sister state agencies, land use planning agencies, non-governmental organizations, Transportation Management Associations (TMAs) and other interested organizations in promoting TDM strategies. Furthermore, consideration should be given to conducting research on place-based TDM combinations (e.g. implementing pricing strategies, access controls, and increased trip choices simultaneously) that maximize TDM outcomes.[106] Moreover, DOTs should consider employing tools and methods available through these new partners to establish performance measures, milestones and tracking protocols for measuring success in meeting access and mobility needs though TDM strategies that also advance energy and climate goals. [107]

D. Most Effective Policy to Meet Energy and Climate Outcomes in LRTPs is to Include Them as Criteria in Project Decisions

This feature was only included in two plans, California and Massachusetts. However, even where made, it is weak. In Massachusetts, climate impacts are only one of several environmental factors which, together, constitute only one of seven criteria for project selection, and only in the area of public transit investments. In California, the LRTP only promises to "mainstream" energy efficiency and to "implement measures to lower GHG emissions" in transportation options.

Recommendation: State DOTs should consider developing protocols to more directly assess the climate and energy outcomes of project construction and operation in future project decisions. In addition, the energy intensity and resulting impact on GHG

[106] In Europe these combined TDM packages are called Integrated Transportation Strategies (ITS).
[107] If one were to try to translate these recommendations to the federal level, there may be complexities involved.

emissions of all project alternatives should be assessed, as well as long-term effects on transportation system energy use and GHG emissions. Massachusetts, New York and California are making most progress in developing these protocols and would benefit from cross-agency assistance and modeling help.

II. Other Options for States to Manage Transportation for Energy and Climate Outcomes

This study also identified other opportunities for further action by state DOTs to achieve climate and energy outcomes that, while beneficial for inclusion in state LRTPs, can also be implemented outside of the LRTP process. These are summarized below.

A. CMAQ: Potentially Effective Transportation Management Tool for Climate and Energy Outcomes

The CMAQ program has the potential to be an effective policy link between transportation, energy and climate outcomes. While there has been some disappointment in the past with the effectiveness of this program, which is applicable to non-attainment and maintenance areas, it has specific characteristics that could make it a unique and effective tool. First, it cannot fund projects that increase capacity for single-occupant vehicles. Second, it allows state DOTs to enter into partnerships with non-governmental organizations (NGOs) to implement its goals. Third, alternative fuel vehicles and vehicle infrastructure are explicitly eligible for funding. And fourth, the federal share is 80 percent.[108] Massachusetts uses this program very effectively for climate and energy outcomes; opting to integrate alternative transportation modes into the transportation system; in contrast, other states have often opted for funding traffic flow improvements with less, or negative, climate and energy benefits. Maryland uses CMAQ funds to support commuter choice programs which encourage non-driving commute trips. New Jersey uses the program to fund Transportation Management Associations (TMAs), business-funded NGOs to provide more employee transportation choices.

Recommendation: State DOTs, which manage CMAQ funds, should add energy efficiency and climate protection as funding criteria for CMAQ-funded projects, in addition to air quality and congestion relief. In addition, state DOTs should consider adding a policy statement to their LRTPs indicating their CMAQ programs will also be managed for climate and energy outcomes.

[108] 23 USC Section 149.

B. Transportation Data on Energy Use and GHG Emissions Needs Improvement

Data used to inform the long range planning process as well as policymaking is not well developed. Where data is collected to inform agency action, it tends to be concentrated on system condition, not system performance. In the area of performance, data tends to focus on measurements of congestion (volume and speed of traffic, volume-to-capacity ratios etc.) which are measurements of vehicular behavior, not measurements of system performance (reliability, safety, access, community outcomes etc.). The exception is in the area of air quality, a public outcome mandated by federal law with specific limits on mobile (transportation) sources of air pollution. This could imply, therefore, that the generation of good data is enhanced with the existence of a federal mandate.

In the specific area of energy and climate data, the lesson learned is that most travel data is based on estimates of vehicle miles traveled, not actual measurements. These estimates are based on rolling, three-year estimates. Such a method of data collection makes it difficult to measure short-term variations in travel behavior based on policy actions, price of fuel, or associated land use actions at the corridor level. Hence, while tools exist to better measure system utilization and vehicle behavior, they are not presently being used to manage for energy efficiency and GHG-emission reduction

Recommendation: State DOTs should consider initiating a pooled research program to design protocols to identify and develop up-to-date data sets of travel behavior and system energy use that are policy-sensitive. The four partner states, plus California, all of which have made specific commitments in their long range plans to conserve energy and to reduce transportation-related GHG-emissions, could lead this effort. Models developed by environmental agencies to measure air quality implications of project-level transportation decisions could assist in this effort. So could land use models such as Places3 used by the Sacramento MPO, SACOG, to model regional growth patterns. Other tools not covered in this study are available as well, such as real-time transportation management technologies using global positioning systems. Several state DOTs are already increasing their capacity to conduct real-time management of regional transportation networks. This new capacity could be used to manage system energy use and GHG emissions.

C. Partnerships are Problematic between State DOTs and Other Agencies to Manage for Energy and Climate

Despite the fact that all states included in this study have adopted energy or climate action plans CAPs, the lead non-DOT implementing agencies (usually environmental or energy agencies) are not reaching out to effectively engage state DOTs in support of these plans. In general, these agencies, as regulatory agencies, appear unaware of ways to collaborate with state DOTs to manage transportation systems for energy and climate outcomes outside the regulatory process. The result is that state DOT support for these outcomes is frequently limited to actions taken only for specific objectives that also save DOTs money. Examples include the purchase of fuel efficient vehicles, measuring and tracking fuel use by state agencies, implementing inspection and maintenance programs and installing energy-efficient lighting in traffic lights.

***Recommendation**:* Consideration should be given to embedding energy and climate professionals in state DOT planning processes and conducting cross-training in transportation, energy and climate planning. This process could include the creation of joint action teams among all the agencies responsible for developing strategies, action plans and mutually beneficial performance measurements (e.g. transportation energy use per capita, per trip, per revenue mile, per passenger mile, etc.), all with the goal of achieving desired energy and climate outcomes. Towards this end, consideration should also be given to adapting energy and environmental planning tools (such as air quality models) for the benefit of transportation outcomes (efficient movement of people and freight) as well as to reflect impacts on energy use and GHG emissions. State DOT buy-in could be achieved by making improvement of transportation performance an explicit goal of joint efforts

Finally, the opportunities for improving strategic planning for energy and climate outcomes in state DOT long range planning processes are substantial through closer cross-state collaboration. Cross-state collaboration (perhaps in support of existing gubernatorial compacts promoting regional cooperation on GHG emissions reduction) could supply the external leadership needed to support these internal agency initiatives. By explicitly and strategically managing their transportation systems for climate and energy outcomes, the four partner states could significantly improve their collective transportation system performance and advance their core transportation mission. These benefits would be completely complementary to any climate or energy policies that may also be adopted that promote technological improvements in vehicle fuel efficiency and fuel technology.

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23 USC Section 149

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Massachusetts Chapter 196 of the Acts of 2004, sec. 4

APPENDIX A: INTERVIEW QUESTIONS FOR STATE PARTNERS JANUARY 2005

- **Please share with us your general feedback on the Task One Report and the project itself.**

  -Any questions about the project, its purpose, its process and the partnership?
  -Relevance to your LRTP planning process?
  -Completeness, accuracy, clarity, usefulness?
  -We would appreciate any editorial suggestions, marked-up copies etc.

- **What is the purpose and function of the LRTP in your state? Is it relevant as a focus of efforts to integrate climate and energy outcomes into the transportation planning process? How is the plan used to influence agency direction, actions and performance, if at all?**

  -What do you see are the biggest opportunities to integrate climate and energy outcomes into the LRTP planning process and what are the most significant barriers to such integration?
  -What is the present state of the long range transportation planning process in your state and is there a timeline for the next LRTP update or rewrite?
  -Is there a special window of opportunity for collaboration when the results of this study would be especially helpful in the consideration of climate and energy outcomes in the plan? If so, when is that window?

- **Is there a deliberate effort in the LRTP planning process to coordinate with the state energy agency and the state environmental agency to address energy efficiency and climate change issues in the LRTP? Is there any collaboration between the DOT and these agencies in development and implementation of the transportation element of the Climate Action Plan in the LRTP planning process?**

  -What is the role of state agencies concerned with energy, environment, land development and climate change in the development of the LRTP? Do the state DOT and these agencies perceive a strong common interest in managing traffic growth in pursuit of their respective agency missions and, if so, how effective is your collaboration in support of this common objective? How much does each agency know about your respective efforts to manage VMT growth?

-How early in the planning process, and in what manner, are citizens or citizen representatives engaged in the development of the long-range transportation plan?

- **Regardless of any specific effort to address climate and energy efficiency outcomes in the LRTP what, if any, initiatives that are in the plan have the ability, if successfully implemented, to improve transportation energy efficiency and reduce GHG emissions?**

  -For example, does the LRTP influence what gets into the STIP and are there any environmental screens for selection or ranking of projects in the STIP?

  - Is there a demand management policy within the State DOT? If so, are any of the following strategies considered in this policy, and how?
  -Integrated Transportation and Land Use Planning
  -Targeted CMAQ and Transportation Enhancements to TDM projects
  -Transit-Oriented Development (TOD) and/or other methods to coordinate state, regional and local support for transit.

  - Does the state (1) manage or (2) finance any TDM strategies such as commuter choice, TMA support, congestion pricing, parking, ridesharing or other efforts? If so, do specific performance targets or measures of success exist for such programs and how are they doing against such targets and measures?

- **What in the LTRP plan, in your judgment, are the biggest opportunities for the transportation planning process to manage transportation for energy and climate outcomes and what are the most significant barriers to their adoption and implementation?**

  -What planning tools and methods are used by your agency to integrate climate change and energy efficiency into the transportation planning process?
  -How does the state calculate VMT and transportation energy use, statewide and regionally? What assumptions or estimates are used, and how could the process be improved? How are the results used? Could this process be adapted to model GHG emissions as well? Has there been any effort to do so?
  -More generally, how well does your state DOT collaborate with environmental, energy and land development agencies in the development of planning tools to track and manage VMT growth, energy consumption, and GHG emissions?
  -Do long range travel demand forecasts incorporate land use changes over time? -
  -What models does the DOT use for integrated transportation/land use modeling?

-What is the present state of STIP/SIP conformity? What models are used to determine conformity? Could such models be adapted to estimate GHG and/or C02 emissions?
-Are there any other planning tools and methods that you would like this study address that would help overcome barriers to consideration of energy and climate outcomes in LRTPs?

Thanks for agreeing to be a partner state in this study. We look forward to working with you on the next phase of this study, which is to identify specific opportunities for consideration of climate and energy outcomes in LRTPs.

APPENDIX B:
NEW YORK STATE REPORT

TASK 2: PARTNER STATE INTERVIEWS AND GAP ANALYSIS—NEW YORK

I. Interview Process

Due to the difficulty of conducting a common interview with all of the relevant parties in New York State, BBG interviewed by phone:

- John Zamurs – New York Department of Transportation (NYSDOT), Head of Air Quality Section in the Environmental Analysis Bureau
- Tom Clash – NYSDOT, Director of Statewide Planning
- Patrick Lentile—NYSDOT
- Paul DeCotis—New York State Energy Research and Development Authority (NYSERDA)
- James Tripp—General Counsel of the Environmental Defense Fund, and Member of the New York State Advisory Panel on Transportation Policy for 2025
- Anne Choate—ICF Consulting, author of *Estimating Transportation-Related Greenhouse Gas Emissions and Energy Use in New York State*.

Because of the significant role of the State Energy Plan in establishing greenhouse gas targets for the state and transportation-related policies to reduce emissions and energy use, much of this report focuses on the Energy Plan.

II. Status of Long-Range Transportation Plan

New York State is in the midst of revising its Long Range Transportation Plan (LRTP). NYSDOT expects to release the draft plan for public comment in late May or early June, and to release the final plan by the end of the year. The plan was most recently revised in 1996. In addition, voters will consider a major transportation bond measure in November 2005, and, according to NYSDOT, the plan provides support and rationale for the bond measure.

Four key factors have affected the consideration of climate change and energy outcomes in the development of the plan. Two of the developments are internal to NYSDOT, while two are external.

Internally, the long range plan is driven by new priorities that Commissioner Joseph Boardman identified. In 2001, the Commissioner identified a new vision and five over-arching priorities for guiding transportation planning and management. Environmental improvement was one of the five priorities, and this was a first step in giving the environment and energy the same priority as other concerns.

Second, the Commissioner appointed a twelve-person advisory panel to provide expert and public input prior to developing the long range plan. The New York State Advisory Panel on Transportation Policy for 2025 ("the 2025 Panel") held nine public hearings across the state to get input to the plan. Climate change and energy concerns and outcomes emerged as a key issue from both expert members of the panel, as well as the public hearings. The panel issued a report, *Transportation-Trouble Ahead* (November 2004), to the Commissioner which reflects an important priority should be given to climate and energy outcomes.

The external factors that have driven the inclusion of climate change and energy outcomes in the LRTP are the State Energy Plan and Governor Pataki's Greenhouse Gas Task Force. These two efforts operated largely in parallel, and both include the State's target of reducing its greenhouse gas emissions.

The State Energy Plan is the only adopted, legally binding state document that addresses greenhouse gas reduction in New York. The overall Plan focuses on five broad goal areas that range from a safe and secure energy infrastructure to a healthy environment. These broad goals are supplemented with fifteen policy strategies that deal with a broad array of energy-related areas. The most important strategy related to greenhouse gas emissions is the stated commitment "to a statewide goal of reducing greenhouse gas (GHG) emissions 5% below 1990 levels by 2010, and 10% below 1990 levels by 2020" (New York State Energy Plan 2002, p. 1-44). The Plan further states its intention that New York should "lead the nation in taking actions to reduce greenhouse gas emissions, stressing the aggressive implementation of existing programs, and development of new technologies and strategies that would significantly reduce emissions" (p. 1-42).

The emission reduction goals are overall goals for the State, and no sector has specific goals, although NYSDOT staff report that transportation is expected to contribute its share. The Plan also includes many specific policies for the transportation sector that are aimed at reducing greenhouse gas emissions or energy use.

State law requires that its Energy Plan be updated every four years. The State began that effort in 2001 and concluded it in 2002. In June 2001, Governor Pataki issued an Executive Order establishing the Greenhouse Gas Task Force, and it issued its final report in early 2003. The Task Force provided input to the New York State Energy Plan.

Because the development of the Energy Plan, in particular, preceded the current revision of the LRTP, NYSDOT has already began work on implementing the policies contained in the Energy Plan, especially efforts to improve measurement of the greenhouse gas emissions associated with transportation projects.

The current internal draft of the LRTP articulates policy goals within Commissioner Boardman's five priority areas, including the environment, and it endorses the key climate change and energy elements of the Energy Plan.

III. Inter-agency Coordination in Long-Range Transportation Plan Development for Climate and Energy Outcomes

NYSDOT was directly engaged in the development of the State Energy Plan, which the New York State Energy Planning Board oversees. The NYSDOT Commissioner serves on the Planning Board, and John Zamurs served on the five-agency working group that worked with the key energy agencies – the Planning Board and NYSERDA – to develop it. The Commissioner of the New York Department of Environmental Conservation, the primary environmental agency, also serves on the Planning Board. The Planning Board submitted the plan for public comment, and received comments urging adoption of greenhouse gas emission reductions targets, programs to measure greenhouse gas emissions, and specific strategies, such as improved mass transit, that could lower greenhouse gas emissions. Since the development of the Energy Plan, NYSDOT and NYSERDA have concentrated on implementing the transportation aspects of the plan, while the Department of Environmental Conservation has focused on aspects of the Plan that reduce emissions in the power sector.

The special NYSDOT 2025 Panel identified climate and energy outcomes as an important transportation goal. Some key members were from the environmental community, and climate and energy outcomes were raised at least one of the public sessions. The Panel's final report specifically urges a focus on climate and energy outcomes, saying that:

- NYSDOT should "assume a leadership role in achieving the State's environmental and energy goals."

- "All the transportation recommendations of the Greenhouse Gas Task Force should be adopted."
- "The State Transportation Master Plan must be fully compliant with the State Energy Plan to ensure a cleaner and healthier environment."

Moreover, the Panel's report emphasizes new strategies that could reduce greenhouse gas emissions and energy use, although the report does not make the link to climate and energy outcomes. The report says:

- NYSDOT "must lead the effort to link land use and transportation decisions."
- NYSDOT "must develop and implement solutions to manage demand."
- NYSDOT "has traditionally focused on adding capacity through construction or technology" and "tempering demand must not be an afterthought."

IV. Policy

At the time of this report, the State Energy Plan is the predominant driver of transportation policies that specifically aim to reduce greenhouse gas emissions or affect energy production and consumption. Because of its nature as an energy plan, it is fair to conclude that the intent of all of its transportation-related measures is aimed at achieving energy or climate outcomes.

But the Energy Plan[1] also explicitly supports climate change and energy outcomes in the transportation sector through a variety of policy mechanisms. In particular, under the heading of "promoting and achieving a cleaner and healthier environment", the Plan calls for the State to take actions that would specifically change transportation planning or demand through a variety of strategies, including:

- "Redirect transportation funding toward energy-efficient transportation alternatives, including public transportation, walking, and bicycling, and provide incentives to encourage greater use of related alternatives that improve transportation efficiency."
- "Include in the State transportation planning and State Environmental Quality Review Act (SEQRA) related processes, consideration of CO_2 production and mitigation strategies, as appropriate."

[1] New York State Planning Board, *2002 State Energy Plan and Final Environmental Impact Statement.* All references to transportation policies can be found at pages 1-36 – 1-44. The Energy Plan can be viewed at http://www.nyserda.org/Energy_Information/energy_state_plan.asp.

- "Target open space funding to prevent suburban sprawl, promote Quality Communities, reduce vehicle miles traveled, and support, adopt, and enhance transportation measures that reduce energy use and pollutant emissions."
- "Support, adopt, and enhance transportation measures that reduce energy use and pollutant emissions, such as Commuter Choice, Ozone Action Days, diesel vehicle retrofits, improved traffic signal coordination with light emitting diode (ED) replacement technology, transportation system management, and other similar actions."
- "Working with regional and local planning organizations, analyze and quantify the energy use and air pollution emissions expected to result from transportation plans and programs."

Other parts of the plan also refer to changes that could or should be made in the transportation system that could reduce greenhouse gas emissions or energy use. The Plan identifies a key over-arching objective which is that "The State will continue its efforts to reduce traffic congestion and delays and increase energy efficiency in transportation through a complement of actions that includes supporting public transit, transportation management, intelligent transportation systems, and capital construction." As a part of this effort, the Plan also says that:

- "The State will work to ensure that transportation planning and construction is compatible with current and planned community development."
- "The State supports expanding inter-modal freight capabilities as a means to reduce transportation sector energy use."
- The State's emphasis on maintaining its existing transportation infrastructure through capital construction programs will be continued."

In addition, the Plan calls for specific strategies to reduce emissions and energy use from the transportation sector through the adoption of new and improved technologies for vehicles and fuels, including:

- "Adopt a specific plan to develop an indigenous bio-fuels industry in New York to produce, refine, and market transportation and other fuels from indigenous biomass resources."
- "The New York Alternate Fuels Tax Credit Program…should be extended and consideration given to enhancing it by including all types of alternative-fueled vehicles."
- "Work with automobile and truck manufacturers to develop new technologies to reduce emissions from such vehicles, and promote the introduction of such technologies into the marketplace."

- "Promote the introduction of clean fuels, including renewables, low-sulfur diesel, and other alternative fuels by purchasing vehicles that use such fuels for use in the State fleet and developing incentives to encourage their use in the private sector.
- "Expand research, development, and demonstration (RD&D) of energy and GHG-efficient vehicle technologies, add GHG goals to vehicle tax credits and incentives, and coordinate with other states to encourage improvements in vehicle fuel economy."

NYSDOT believes that technologies to reduce greenhouse gas emissions from vehicles and fuels are most effective in the short term, while reducing emissions by reducing transportation demand will provide emission and fuel use reductions over a longer time. Transportation Demand, measured in Vehicle Miles Traveled (VMT), is increasing in New York, but not as much as in other states.

NYSDOT officials report that some of the Energy Plan objectives also help with meeting Clean Air Act requirements, especially in downstate New York. They read the Plan as giving a much higher priority to improved operations of existing systems, especially in downstate New York, and they note that the need to manage travel more effectively will also help achieve energy and climate objectives.

With regard to other possible policies, feebates are seen to be tough to implement politically. Truck stop electrification has been in place in a couple of places.

V. Performance Measurement

The most significant element of the transportation-related Energy Plan policy measures has been the requirement for NYSDOT to work with regional and local planning organizations to analyze and quantify the energy use and air pollution emissions expected to result from transportation plans and programs. NYSDOT officials report that this is part of a much broader effort to improve performance measurement and management in the Department's five priority areas.

In early 2004, NYSDOT developed guidance for all of the Metropolitan Planning Organizations (MPOs), and has been working through its regional offices to implement the requirement. The State requires MPOs to quantify the greenhouse gas emissions associated with projects that are contained in their Transportation Improvement Plans (TIPs). In essence, MPOs are required to conduct a Build/No Build analysis of the greenhouse gas implications of projects, and to provide this information to the State and the public.

NYSDOT officials believe that this requirement is now becoming institutionalized across the State. Initially, MPOs were both uncertain of the State's commitment to undertake this new activity, were concerned that it was a new requirement with no new funding, or had difficulty understanding or working with the State's guidance document. The State is unclear whether MPOs are changing their transportation choices as a result of this new analysis, in part because there are other NYSDOT policies that might steer MPOs towards projects with lower greenhouse gas emissions or energy use.

The calculations of transportation energy and greenhouse emission in New York depend on two key factors, each of which contains considerable uncertainty. First, MPOs typically use their own transportation demand models to develop these estimates. The State does not have good information about the assumptions and other factors contained in the models.

Second, most of the data depends on estimates of vehicle fuel economy that the California Department of Transportation (Caltrans) developed in 1980. Given that the composition of the fleet has changed substantially since then, the use of the Caltrans approach, which is the best in the field today, probably creates inaccuracies in measuring or estimating greenhouse gases.

New York State Methodology
Calculating Greenhouse Gas Emissions from Transportation Projects

NYSDOT has created a detailed methodology template for MPOs to follow in conducting the energy assessments. Two methods are provided. The first and suggested method is the Urban Fuel Consumption Method. It should be used when the travel time and average speed of vehicles is known. There are six basic steps in this method:

1. Divide Roadway Into "Links" with Grade Information if Known
2. Determine the Base Year Fuel Consumption Rate
3. Multiply by VMT
4. Correct for Future Year Fuel Consumption
5. Correct for Grade Changes
6. Convert to Energy Consumption (Btu).

While the NYSDOT emissions template provides a straightforward approach for quantifying GHG emissions from local transportation projects, it currently relies on a fairly dated Caltrans quantification scheme based on fuel efficiency and vehicle mixes from the 1980s. In many of the steps (steps 2, 4, and 5), look-up tables based on this dated information are provided to access pertinent factors for inclusion in the formulas. These look-up tables provide out-dated factor information that then produces inaccurate overall energy estimates. Massachusetts is looking to update New York's template to help rectify this problem. Massachusetts has identified updated tables that can be used to better estimate current fuel efficiency and vehicle mixes. New York should look to incorporate these changes in future revisions of its approach to improve accuracy.

The second method provided by NYSDOT is the VMT Fuel Consumption Method. While this method is not as accurate as the urban fuel consumption method, it can be used when only the VMT for an area is known. There are three basic steps in this method:

1. Calculate Energy Consumption (VMT/ Fuel Economy)
2. Convert to Energy Consumption (Btu)
3. Repeat Steps 1 and 2 for each vehicle type. Then sum the results for each vehicle type for total Direct Energy Consumption.

This method obviously lacks the specificity of the urban fuel consumption method. It also is based on look tables with outdated information. The tables identified by Massachusetts should also be used in this method to help improve accuracy.

Energy Assessments in Practice: New York City and Albany MPOs

Both the New York City and the Albany MPO have or will have soon completed energy assessments of their TIPs. New York City's Assessment will be available in June of this year. No other information is currently available on New York's approach.

Albany completed its Assessment for the 2003-2008 TIP. The Energy Assessment shows the energy impacts of the "Build" vs. "No Build" scenarios. What is particularly interesting about the results is that the No Build scenario returned higher carbon emissions than the Build scenario. The Albany MPO explained that their transportation demand strategies will help to dampen VMT growth and, therefore, decrease carbon emissions.

Table 10 from the Report provides an example of how these results are presented. Note that the reductions that are claimed come from the 2003 base year. Because the State Energy Plan's goal is based on the base year of 1990, it would be more helpful to present a column that shows movement towards or away from the 1990 target, thus tying the policy goals of the State Energy Plan to local implementation.

GREENHOUSE GAS IMPACTS OF THE ALBANY TIP AND NEW VISIONS[2]

	Greenhouse Gas Emissions Resulting from the Operation of Motor Vehicles				Regionally Significant Projects: 5 Year TIP Tons of Carbon Emitted from Construction
Scenario	Vehicular Travel (Miles K/Day)	Carbon Emissions (tons/year)	Percent Increase in Carbon Emissions from 2003	Annual Motor Vehicle Tons of Carbon Emission Net Change: TIP Build vs. No-Build	
Year 1990	17,740				
Year 1996	20,470				
Year 2003	23,498	800,912	Na		
Year 2008 No-build	24,774	846,046	6%		0
2008 with 2003-08 TIP and Financially Constrained New Visions Plan [3][3]	23,167	788,290	-2%	(57,756)	20,263
Year 2015 No-build	26,526	888,323	11%		
2015 with 2003-08 TIP and Financially Constrained New Visions Plan [1]	23,780	786,122	-2%	(102,200)	
Year 2015 with full New Visions Plan [4][4]	22,734	748,224	-7%	(140,098)	
Year 2021 No-build	27,756	927,828	16%		
2021 with 2003-08 TIP and Financially Constrained New Visions Plan	24,942	815,998	2%	(111,831)	
Year 2021 with full New Visions Plan [2]	23,796	775,346	-3%	(152,483)	

[2] Table 10 from the assessment of the greenhouse gas emissions for "Build" vs. "No Build" strategies for the 2003-2008 TIP for the Albany MPO.

VI. Gap Analysis

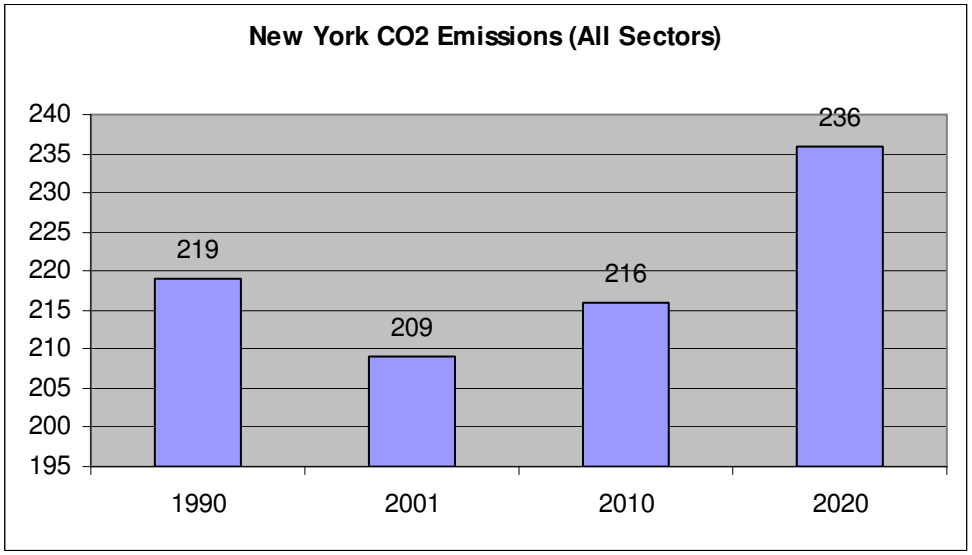
Introduction

New York has set ambitious goals for the reduction of Greenhouse Gas (GHG) emissions through its State Energy Plan. Along with many other energy objectives, the Plan's goals include reducing greenhouse gas emissions 5% below 1990 levels by 2010 and 10% below 1990 levels by 2020. While the size of these goals places New York at the forefront of national efforts to decrease greenhouse gas emissions, the Plan lacks a targeted action strategy to ensure measurable sector-based outcomes. The lack of such a targeted strategy is particularly problematic for the transportation sector. The transportation sector is the largest current and projected generator of greenhouse gas emissions in New York. The lack of a detailed action agenda to deal with this sector could pose serious problem for achieving Plan goals. This section presents an analysis of the extent of greenhouse gas emissions from the transportation sector in New York.

All Sector CO_2 Emissions Projections

CO_2 emissions in New York are projected to grow overall by 7.76% from 1990 to 2020. The growth over this period will not, however, be steady. CO_2 emissions actually fell from 1990 to 2001 and are projected to continue to be below 1990 levels until 2010. These lower emissions levels result from the shift from coal to other forms of energy in New York (ICF 2004, p. 10). This trend of lower emissions of CO_2 will not continue past 2010, however. All of the growth in projected CO_2 emissions for the entire period is projected to occur between 2010 and 2020 (Figure 1).

Figure 1

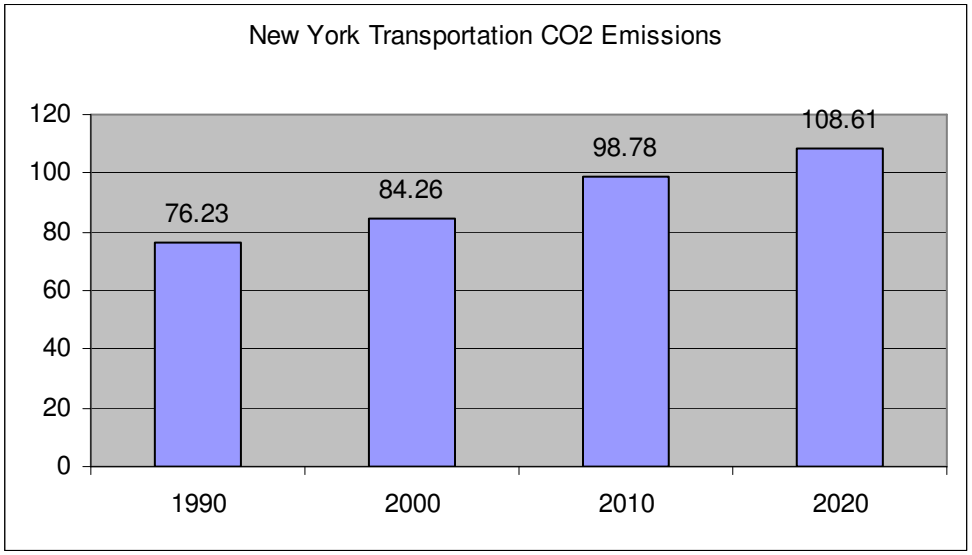


Transportation Emissions

Much of the cause of this growth in CO_2 emissions can be attributed to the transportation sector. According to the report of the Greenhouse Gas Task Force, transportation is the largest source of all greenhouse gas emissions with 35% of the State's emissions (Figure 2). In 1990, transportation's greenhouse gas emissions were 76.23 Million Metric Tons of CO_2 in 1990 and they are expected to increase to 108.61 in 2020 – a 42.5% increase.[5]

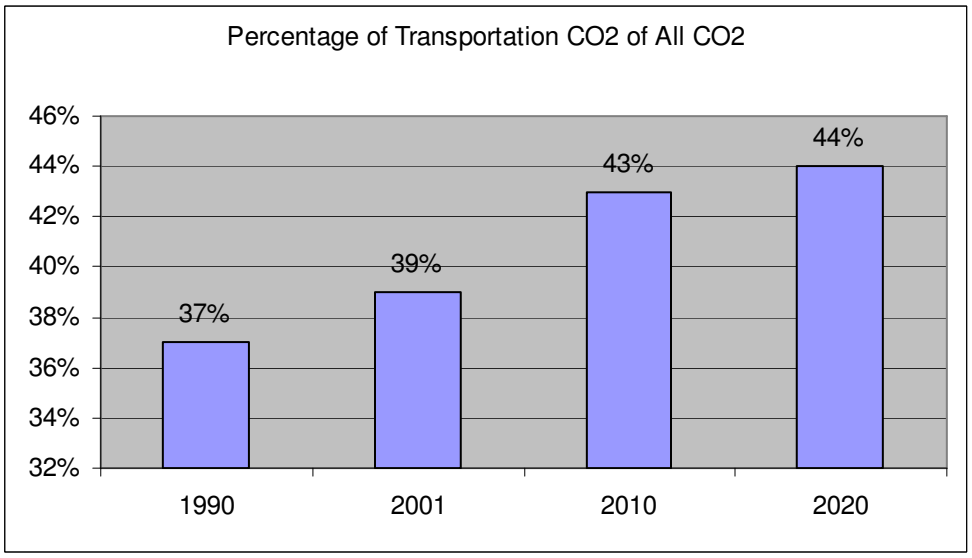
[5] Center for Clean Air Policy, *Recommendations for Governor Pataki for Reducing New York State Greenhouse Gas Emissions,* April 2003, pp. 131-132.

Figure 2



Moreover, transportation's share of emissions will continue to grow. The share of transportation CO_2 of all CO_2, for example, will rise to from 37 percent to 44 percent by 2020 (Figure 3).

Figure 3



VMT Growth

One of the primary causes of increased CO_2 emissions from the transportation sector in New York is the growth in Vehicle Miles Traveled (VMT). Reported VMT in New York has grown 19.54% from 1995 to 2003 (Highway Statistics 1995-2003). VMT is projected to increase by 57% from 1990 to 2020 (ICF 2004, p. 16).

Over the 1990 to 2020 period, transportation energy use per capita is projected to remain fairly constant at "about 20 kg CO_2 per million Btu" (ICF 2004, p. 11). Increasing demand (increased VMT) is then the likely cause of CO_2 increases from the transportation sector.

New York State Energy Plan

The emissions reduction targets embodied in the State Energy Plan certainly place New York in the forefront of national efforts to decrease greenhouse gas emissions. The targets match the long-term goals of a 10% reduction in greenhouse gas emissions by 2020 set by other regional states such as Maine and Massachusetts. In the short term, New York's targets are even more ambitious than regional contemporaries aiming for a 5% reduction below 1990 levels by 2010.

While the targeted goals are a powerful expression of the desire to make progress on greenhouse emissions, the State Energy Plan is less successful in creating a detailed roadmap to achieve those targets. The Plan lacks a specific, quantified policy framework for achieving its goals. The lack of specificity is particularly troublesome in relation to the transportation sector.

New York's current transportation strategy is seeking more to minimize greenhouse emissions growth rather than aiming for significant decreases in overall transportation emissions.[6] Current policies are, thus, fairly scattered and non-comprehensive. While the general understanding between various state departments is that reductions in greenhouse emissions from the transportation sector should be proportional with other sector reductions[7], there does not appear to be a detailed strategy currently in place that solidifies how this is to happen.

[6] Interview with Patrick Lentile, NYSDOT, May 11, 2005.
[7] Interview John Zamurs, NYSDOT, May 16, 2005.

However, several initiatives that New York is pursuing appear promising. New York is pursuing research to quantify both the extent of transportation sector greenhouse emissions and possible targeted strategies for reduction. NYSDOT commissioned a recent study by ICF (2004) to identify the most important transportation sector greenhouse gas emission reduction strategies. The report identified feebates, freight modal shift, and truck stop electrification as the most promising strategies for reducing greenhouses gas emissions from the transportation sector. If fully implemented these strategies could provide 2% of total greenhouse gas emission savings necessary to meet the overall State Energy Plan goals. While this quantification of possible strategies is certainly a step in the right direction, the extent of the transportation sector's contribution to greenhouse gas emissions makes a much more comprehensive approach necessary if New York is to meet the goals set out by the State Energy Plan.

Another approach that shows promise is the effort by NYSDOT to quantify local level greenhouse gas emissions resulting from MPO activities. NYSDOT has encouraged MPOs to conduct emissions analysis of proposed projects when large-scale, regionally significant transportation projects are proposed or when completing their required TIP updates. NYSDOT has created a detailed quantification template for estimating the energy and greenhouse gas emissions likely to result from either a Build or No Build approach. By encouraging this type of analysis, NYSDOT has helped to institutionalize an approach that builds awareness of the impacts of transportation decisions on greenhouse gas emissions growth and, in the long term, should help to redirect spending towards lower greenhouse gas emission alternatives.

Conclusion

While the actions underway in New York may be the only politically viable measures currently available, this ad hoc approach makes it difficult to create a systematic, long term strategy for greenhouse gas emissions reductions. Without the coordinated framework, the odds of meeting the SEP goals are slim. Other regional greenhouse gas emission reduction strategies already in place in New Jersey, Maine, and Massachusetts provide much more detailed policy direction that could significantly help to improve the odds of meeting transportation greenhouse gas emission reduction goals.

APPENDIX C:
MAINE STATE REPORT

TASK 2: PARTNER STATE INTERVIEWS AND GAP ANALYSIS—MAINE

I. Interview Process

Separate interviews were conducted with the state DOT policy office, the Department of Environmental Protection (DEP) policy and air quality staff, the Maine Energy Office, and the Director of the Maine Natural Resources Council, who served on the Climate Action Plan stakeholder team. The interviews were conducted in January 2005. The Task One report was distributed to all interviewees in anticipation of the meeting. The "Interview Questions for State Partners" was the basis for the discussion.[1] Interviewees included:

- Duane Scott, Director of Policy, Maine DOT
- Chris Mann, Director of Policy Planning, Maine DOT
- Dale Peabody, Research Director, Office of Policy Planning, Maine DOT
- Malcolm Burson, Associate Director, Maine DEP
- Ron Severance, Director, Program Planning, Bureau of Air Quality, Maine DEP
- Beth Nagursky, Director, Maine Energy Office
- Sue Jones, Director, Maine Natural Resources Council

- **Maine DOT Interview**

Feedback on Task One Report: The feedback was very good. The liked the breadth of topics covered. They like that some topics like Context Sensitive Design fit in with where the Department is going. They said that Maine has not thought about infrastructure in the context of climate, so this will get people's attention and be a wake-up call.

Some of the best practices at present in Maine involve process changes. Maine has revised its public involvement process, with more engagement at the local regional level. This expanded process should be able to accommodate discussion of greenhouse gas and energy.

[1] Interview Questions are in Appendix A.

Status of LRTP Development: Maine DOT is putting the finishing touches on its biennial transportation improvement plan (BTIP), with 2006-07 project funding. It is too late to influence this plan. The LRTP is about to be updated, but an array of issues may delay its consideration until spring of 2006. The LRTP is a 20-year plan and will go to 2025. MPOs are actively involved. The LRTP tends to be somewhat conceptual, but these concepts do build into specific project ideas in the shorter term spending plans. Recently, the LRTP has focused on corridors. One recent plan laid the groundwork for Amtrak expansion to Portland. Also included is a plan to get tourists to leave their cars behind. They expect the next LRTP will focus on highways and bridges that are in need to repair.

Previous plan included "Explore Maine". Amtrak and the Bar Harbor Island bus at Acadia were key elements. There is also a lot of attention on the Route 1 corridor, as well as on the need for a new East-West highway and a North-South highway in Aroostook County. Both are billion dollar projects. These new capital needs may create a conflict with climate/energy goals. However, the main focus is on system preservation, not adding a lot of new capacity.

Past Efforts to Coordinate LRTP with Climate and Energy: Maine DOT has made no past efforts to consider climate or energy in the LRTP. Incident management systems are under consideration that will have climate/energy benefits. They do evaluate CMAQ for air quality benefits. Environmental people within DOT are involved in a way that supports these goals through the Transportation Enhancements Program. Lots of projects get NEPA review, but they don't get an air quality review. Conformity applies to both the two-year plan and the LRTP. There is a Transportation and Air Quality Working Group to facilitate this process. DOT was involved in development of the Climate Action Plan through Duane Scott and Deputy DOT Commissioner Greg Nadeau.

Possible Future Efforts to Coordinate LRTP with Climate and Energy: Maine DOT intends to take all the initiatives from the state climate plan and incorporate them. Regional planning organizations could also incorporate them as part of their input to the LRTP. One major barrier is the lack of local expertise on air quality and energy. Maine DEP does air quality; most MPOs don't have the capacity.

The DOT is starting to have conversations with communities about preserving state investment in transportation systems by not changing land use patterns through transportation investments. Maine DOT has the power to reject access permits, an important leverage point for corridor preservation. The state planning office could help in coordination of transportation with climate and energy goals. Other areas of interest to Maine DOT are: (1) marine emissions, (2) truck idling, (3) better use of CMAQ and TE

funds, especially for childhood mobility, and (4) improving the efficiency of the vehicle fleet and use of biodiesel fuels.

Barriers to Action on Climate/Energy: A lot depends on local action; there is a need for education on land use and its effect on travel demand. There are some analytical problems. It's not clear that Maine can trust VMT data. DOT extrapolates VMT projections from existing projections. It needs to update the data and run their model. DMV data on vehicle registration; models are not easy to get and are not reliable. Trend data is not available.

Long distance commute patterns are hard to change, e.g., long treks to Bath Iron Works. They also aren't sure what really works to reduce VMT. They need help answering that question. Maine is too rural to support much bus or rail service without big subsidies. Also, if VMT is reduced, transportation revenues go down. Maine DOT signed off on the climate plan, but analysis of gas tax implications has to happen. Financial issues must be addressed—it must be sold as a pocketbook and efficiency issue.

- **Maine DEP Interview**

Transportation Involvement in Climate Action Plan: DEP was the lead agency in CAP development. DOT was an active participant and partial funder. Duane Scott was the main representative. DOT was supportive but expressed concern about the impact on revenues because of fuel economy and alternative fuel provisions. The legislature enacted a bill, LD 1184, directing the state to examine the benefits of alternative fuels, and this includes a provision addressing land use and transportation.

The climate plan was very focused on black carbon, where there is little analysis. This could affect freight movement. The state has lots of road miles relative to its population, so this presents political problems on freight and passenger issues as well.

Option #17 in the climate plan focuses on VMT reductions. They weren't able to calculate the costs of all of the parts of it. There was some concern that they lack a good tool to calculate costs here. Emissions reductions from land use initiatives are also hard to calculate. DEP plans to convene a group to look at Option #17.

Land use is hard to address in Maine because there are no effective planning organizations, except the Portland MPO or COG. All towns are required to have a land use planning ordinance, but this doesn't seem to drive much local activity to do so.

DEP and DOT have a Transportation Planning Working Group that includes the MPOs, federal DOT and EPA. This is the forum for conformity decisions and for air quality planning. There has been a fair amount of focus on the one-hour standard. The conformity process doesn't drive much change in agency action, if any. This working group has not discussed climate or the climate plan. However, the group would be interested in the climate plan, and would help on meeting an overall statewide goal and develop further steps, if the governor asked it to do so.

The state does participate in the DOE Clean Cities program. Started with Portland and is now statewide.

CMAQ funds get used for various things that help. One of the most successful approaches that the state employs is vanpooling. It is over-subscribed with this program. Kids and Transportation promotes alternatives to driving. CMAQ also funds signalization improvements. None of these actions are driven by conformity requirements.

The best opportunities for making progress on climate and energy through transportation include getting people out of single occupancy vehicles. Such a strategy must make it cost-effective and address sprawl. The climate plan focuses on stopping forest loss, which sprawl causes, so there could be a connection. Ideally a program should create incentives for doing the right thing, although this runs into fiscal barriers. A scrap-and-buy program for older cars, intended to ameliorate air pollution, had its funding cut, for example.

Barriers to DOT/DEP Action on Climate and Energy: DEP sees the following barriers to progress in this area:

- Fiscal – it's hard to fund all the transit needs.
- Cultural – it's hard to get people out of their cars. People love their cars. Some people see the feebates proposal as a way to reward wealthy Volvo drivers at the expense of poor pickup drivers.
- There is no real driver for action.
- Some tools are missing. It's hard to assess cost-effectiveness of some measures.
- There has been a disproportionate amount of focus on black carbon, especially truck stop idling.
- Creating a low GHG fuel infrastructure is a difficult problem. Choices between an LNG vs. CNG infrastructure are difficult—both a re a big problem to install. Hydrogen choices are even harder. May come up in Zero Emission Vehicle discussions with the automakers.

Other opportunities: DEP is interested in biofuels, especially from wood waste or biodiesel.

- **Maine Energy Office Interview**

DOT Involvement in Energy Issues The Maine Energy Office (EO) chairs the state Energy Resource Council, which has representation from nine state agencies, including DOT.

Maine's focus on VMT started with enactment of the 1991 Sensible Transportation Policy Act. The law was the stimulus for least cost planning for roads. This led to a negotiated rulemaking. The law also set up a series of regional transportation commissions.

Biggest "bang" in addressing transportation GHG emissions is seen to be fuel economy standards. VMT is the hardest thing to address. 1980-2000 VMT grew 80%.

No one knows how to get at root causes of sprawl. EO staff believe that tax subsidies need to be addressed in order to get the fuel and other prices right. Portland has had some success in this area.

The state has issued an Executive Order for the state fleet that includes a VMT measurement goal for the state vehicle fleet.

The state Growth Management Act requires a local land use plan, although some areas do not have one. Sprawl continues.

Barriers to EO/DOT Coordination for Energy Outcomes: These include:

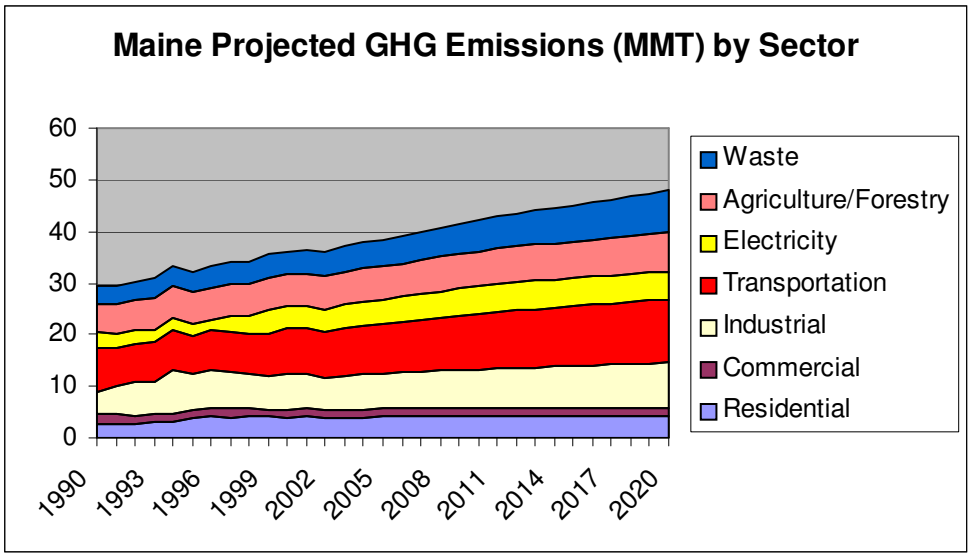
- Political hurdles – current beneficiaries of sprawl fight to keep benefits.
- Culture – the population loves cars and the freedom to drive them everywhere and live anywhere.
- Government control is limited, especially at the state level.
- Government might design good strategies, but the legislature and the public might not buy it.

II. Maine Transportation GHG Emissions and Gap Analysis

While Maine's Climate Action Plan (CAP) provides a strong conceptual framework for action in reducing transportation GHG emissions, specific policy mechanisms designed to ensure timely implementation of proposed actions are lacking. Because the calculations of GHG reductions assume timely implementation of such actions, an implementation action plan is needed. This section first examines the overall structure of Maine's CAP, followed by a detailed look at the actions designed to decrease GHG emissions from the transportation sector.

Maine Climate Action Plan: The legislature enacted legislation in 2003 to create GHG emission reduction goals that match those produced in the Northeastern Governors/Eastern Canadian Provinces Plan. L.D. 845, "An Act to Provide Leadership in Addressing the Threat of Climate Change," and directed the state Department of Environment Protection to initiate a series of GHG monitoring activates along with the creation of a Climate Action Plan. The resulting Maine Climate Action Plan (CAP), finalized in December of 2004, is a targeted effort to systematically reduce greenhouse gas emissions over time. The CAP estimates that without intervention GHG emissions in Maine will rise 63% from 29.4 MMT in 1990 to 47.8 MMT by 2020 (Figure 1)[2].

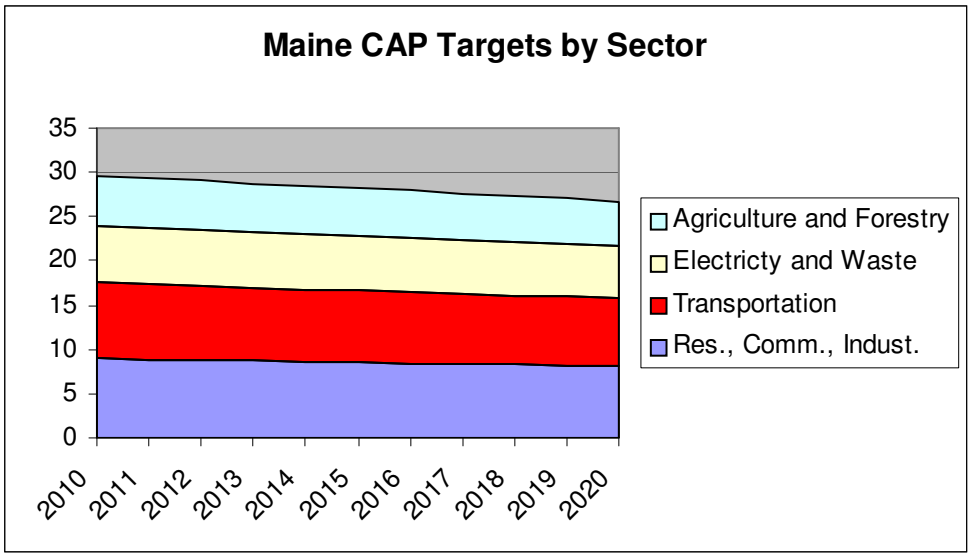
Figure 1



[2] Note: All of the raw data used in this section comes from the supporting documents and tables provided from the Maine CAP website.

The CAP aims to reduce GHG emissions to 1990 levels by 2010 and to 10% below those levels in 2020. It also aims to decrease emissions "by a sufficient amount to avert the threat of global warming over the longer term, which could be as much as 75%." (p. iii). The CAP seeks to accomplish these ambitious goals by identifying emissions reduction actions from a broad array of sectors including energy and solid waste; buildings; facilities; manufacturing; transportation and land use; and agriculture and forestry (Figure 2). Fifty-four specific actions are identified and quantified to produce plan emission savings to meet the targeted goals.

Figure 2



In addition to quantifying the GHG reductions of the fifty-four actions, the CAP identifies three key components for each of the actions. First, the CAP calculates the cost per unit of carbon saved. This is "the *net cost* of the option (cost of saved carbon minus avoided costs) divided by the carbon reductions for the option" (CAP p. 35). Interestingly, the CAP notes that half of the action options actually save money or cost very little over the course of the program (p. iv).

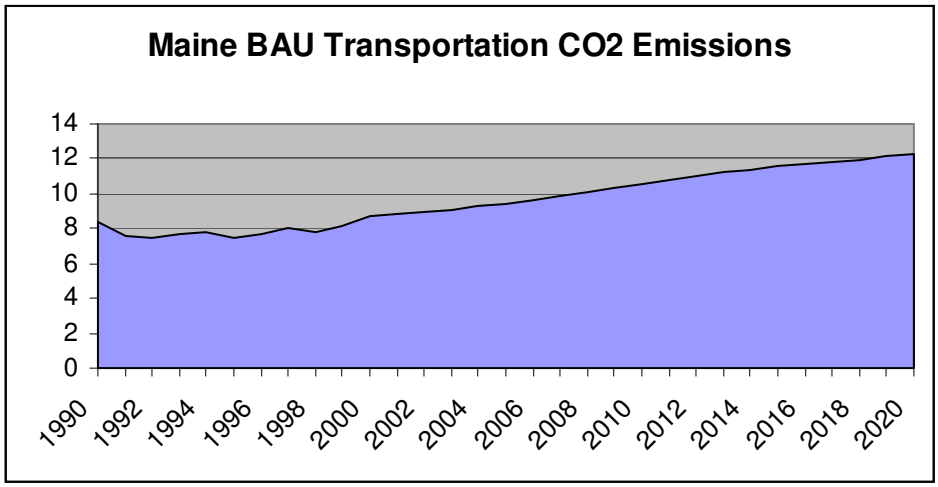
The second key component is that performance measures are included to help track the success of the CAP actions. These metrics are designed to provide feedback on the success of the CAP in meeting targeted goals.

Finally, co-benefits in addition to carbon savings are calculated to determine net costs for each strategy. The CAP expects most of the actions to produce "significant co-benefits"

(p. 16). By specifying the GHG reductions, costs, performance measures, implementation methods, and co-benefits of each of the actions, Maine's CAP provides a solid conceptual framework for advancing GHG reduction policy.

Transportation Analysis: The transportation sector represents the single largest source of GHG emissions in Maine, at about 28% of total GHG emissions (CAP, p. 13). The CAP estimates that under a Business-as-Usual scenario, GHG emissions will increase 48% by 2020 from 1990 levels of 8.3MMT to 12.25 MMT (Figure 3).

Figure 3



The CAP action framework identifies eleven specific actions designed to reduce GHG emissions from the transportation sector. Table 1 lists these actions along with the predicted carbon savings.

Table 1

Transportation Actions	*Projected Carbon Savings Through 2020 KMT*[3]
Tailpipe GHG Emission Standards	933.6
Clean Diesel Technologies to Reduce Black Carbon	740
Set a Low-GHG Fuel Standard	639.5
Pay as You Drive Insurance	379
Slowing VMT Growth	286.4
Low GHG Fuel for State Fleets	157.5
Adopt Advanced Technology Component of LEVII Standards	53
Encourage Anti-Idling Measures	29.7
GHG Feebates	18.8
Maine Bio-diesel	5.5
Low-GHG Fuel Infrastructure	2

These actions are estimated to decrease GHG emissions in the transportation sector from 8.5 MMT in 2010 to 7.7MMT in 2020, representing 28.8% of the targeted GHG emissions decrease from the entire CAP (Figure 4). One problem with this figure is the 2010 baseline figure of 8.5 MMT for transportation. As noted above, the CAP calculates 1990 transportation-related GHG at 8.3 MMT. Since various state and federal sources estimate that VMT increased 26-40% between 1990 and 1992, and presumably will continue to increase thorough 2010, a baseline estimate for transportation-related GHG in 2010 of 8.5 MMT is implausible.

In addition, while the potential transportation savings from the CAP are significant, there are currently few fully implemented polices in place to actually bring about the desired reductions. Table 2 shows the current policies that are in place for each of the CAP transportation actions. While most of the action areas have at least some preliminary policy implementation currently taking place, there is no stated start date for full implementation for most of the action items.

[3] Thousands of metric tons of CO2 equivalent

Figure 4

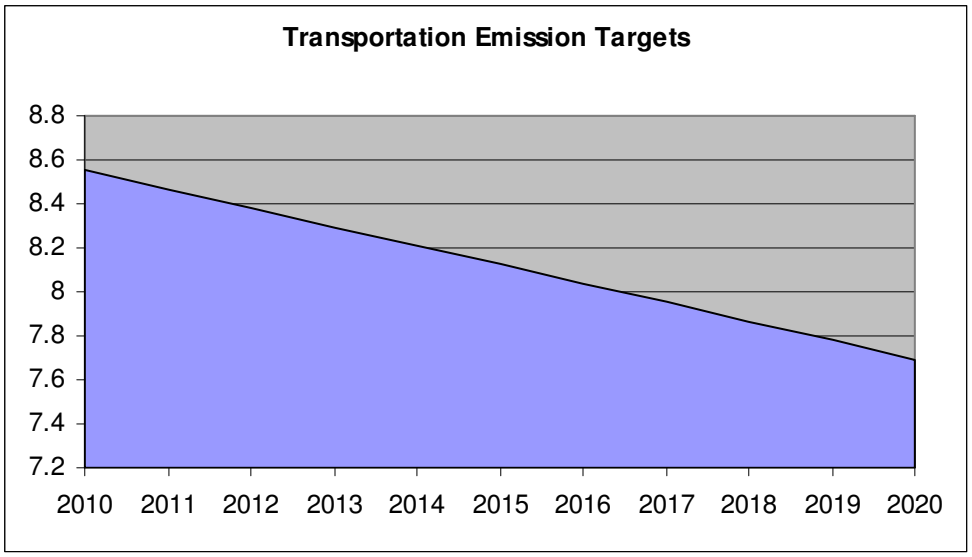

Transportation Emission Targets
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020

Table 2

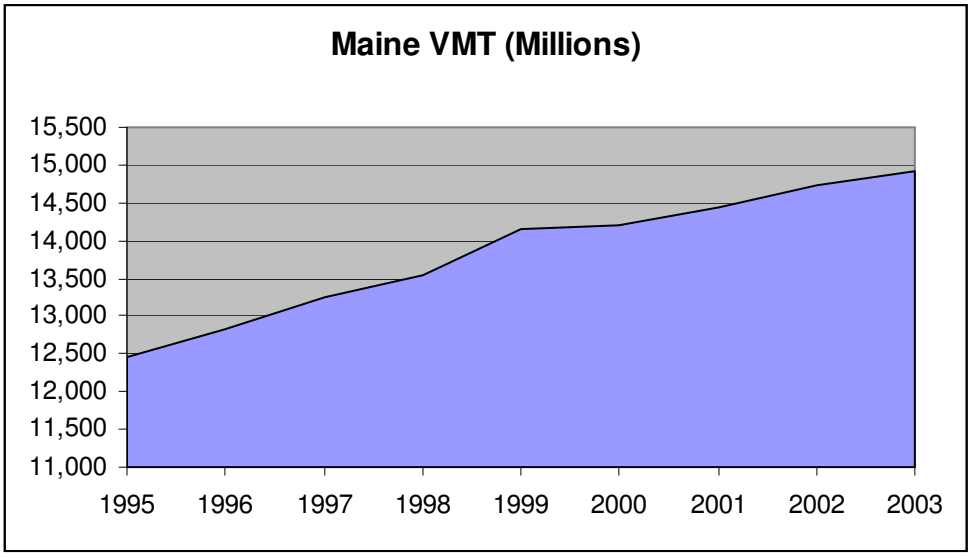
Transportation Actions	*Policy in Place to Produce Savings*
Tailpipe GHG Emission Standards	None at Present
Clean Diesel Technologies to Reduce Black Carbon	Clean School Bus Initiative for 266 School Buses
Set a Low-GHG Fuel Standard	None at Present
Pay as You Drive Insurance	Voluntary, Non-Quantitative Private Programs Exist
Slowing VMT Growth	Promotion of Vanpooling/ Carpooling, State Government Employee VMT Reduction Program
Low GHG Fuel for State Fleets	Trial Program Utilizing Bio-diesel at 1 Facility, Promotion of Procurement of Alternative Fuel Vehicles
Adopt Advanced Technology Component of LEVII Standards	Policy Currently not Adopted
Encourage Anti-Idling Measures	Pre-clearance Option in Preliminary Phase
GHG Feebates	Cleaner Cars Labeling Initiative
Maine Bio-diesel	Pilot Production Programs
Low-GHG Fuel Infrastructure	Pilot Project Portland Area COG

It appears that there may be a significant lag between the CAP start date and the policy implementation date. While the CAP does an excellent job of quantifying potential savings from policy changes, it is less clear how staggered implementation will affect Maine's ability to meet its reduction targets. The potential lag in policy implementation may make it difficult for Maine to meet its GHG reduction goals. Without more detailed data on the assumed policy start dates for policy implementation, it is difficult to quantify how far short Maine may fall from its desired goals.

Another significant problem for the CAP is the continued growth in VMT and its potential to derail emission savings. VMT is a prime component of the GHG equation. VMT has grown 26% from 1990 to 2003. The most updated actual VMT numbers from

1995 to 2003 show VMT increasing by 20% (Figure 5). Figures for projected growth in VMT range from 18.8% (Maine DOT) to 40% (US DOE) depending on model specification.

Figure 5



A spiraling increase in VMT can act to negate many of the smaller changes that may be made during the CAP implementation. Because of VMT's significance in the GHG equation, it is crucial to have a strong, detailed set of action items in place at the start of the CAP to flatten the VMT growth curve.

Maine's CAP acknowledges the importance of VMT in their action item 2, slowing the growth of VMT. Under this action, VMT growth is projected to slow by 2% in 2010 and by 6.5% by 2020. The problem, however, is that overall VMT growth under the Business-as-Usual projection could grow anywhere from 18.8% to 40%. While slowing this growth rate would be a good start, VMT increases alone will result in an overall increase in transportation-related GHG emissions despite the CAP actions.

APPENDIX D:
MASSACHUSETTS STATE REPORT

TASK 2: PARTNER STATE INTERVIEWS AND GAP ANALYSIS—MASSACHUSETTS

I. Interview Process

The Task I report was distributed to Sonia Hamel, Deputy Director, and Office of Commonwealth Development. Sonia distributed it to Astrid Glynn, Director of the Office of Planning, Executive Office of Transportation; Kate Fighter, Office of Planning; Stephen Barrington, Deputy Director of the Office of Commonwealth Development; Steve Flabella, consultant; and Anne McMahan, Environmental Analyst, Central Transportation Planning Staff (CTPS). The "Interview Questions for State Partners" (Appendix A) were also distributed to this group. Due to the difficulty of arranging a common interview with all participants, the partner interview process was conducted in person with Sonia Hamel and on the phone with key state and MPO staff. Due to the status of plan development in Massachusetts (see below) most of the questions in the interview related directly to the draft plan itself, not the process for its development.

II. Status of Long Range Transportation Plan

The draft long range plan, entitled "*A Framework for Thinking—A Plan for Action*," was published on March 10, 2005 during the interview process. The plan was written entirely in-house at the Executive Office of Transportation (EOT) and the Massachusetts Highway Department (MHD), with review and oversight in the Office of Commonwealth Development (OCD). It is a staff-driven plan without involvement of consultants in the writing, and reflects the program direction of EOT and OCD which has responsibility for oversight of three cabinet agencies: Transportation, Environment and Housing and Development.

The *Framework for Thinking* (*Framework Plan*) is a unique document in the universe of state transportation plans in that, as part of a consolidation of state cabinet agencies whose common policy and program direction is coordinated through the OCD, it is as much an implementing document as it is a self-standing plan. As stated by Secretary of Transportation Daniel Grabauskas in the introduction, the *Framework Plan* is "premised on the already well-articulated policies of the Romney administration", including:

- Preserving and Improving our existing transportation system ("Fix it first"),
- Basing Decisions on an Objective, Transparent and inclusive Planning Process, and
- Identifying Needs and Seizing Opportunities.[1]

As a self-described "smart growth" state, the plan also states that, as matter of policy, EOT will "take the lead in funding locally-controlled planning studies designed to make sure that the communities of affected project areas are ready, willing and able to leverage smart growth before the Commonwealth commits to a proposed investment."[2] These statements of policy in the draft plan establish the *Framework Plan* as an implementation plan in support of broader sustainable development policies rather than a strategic planning document that establishes agency direction based on purely internal goals and objectives.

The outreach process for plan review is not finalized, although the *Framework Plan* asserts that this process will include:[3]

- Subject-specific focus groups;
- The establishment of a statewide advisory committee;[4]
- Thoughtful local outreach;
- Engagement of MPOs and local elected officials and Regional Planning Agencies (RPAs); and
- Involvement of the Commonwealth Coordinating Council

The fact that the public and MPO outreach process is initiated after publication of the draft plan creates difficulties in comparing the process to national best practice in planning processes for climate and energy outcomes. Therefore, this report will focus exclusively on policies, and tools and methods identified in the draft plan that demonstrate an intention to manage transportation plans, programs and projects for climate and energy outcomes.[5]

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[1] *Framework for Thinking (Framework Plan)*, p 3.4
[2] *Ibid*, p. iv
[3] *Ibid*, p. v
[4] In the interviews with OCD staff, participation of the Office of Environmental Affairs (OEA) on the advisory panel is assured, as is consideration of EOT responsibilities for transportation-related C02 and energy consumption, as stated in the Massachusetts Climate Action Plan.
[5] It should be noted that all four partner states are parties to a lawsuit in federal court seeking to force the USEPA to regulate greenhouse gases as a pollutant under the Clean Air Act. If successful this action will

III. Inter-agency Coordination in Long Range Transportation Plan Development for Climate and Energy Outcomes

Massachusetts does not routinely track transportation GHG or C02 emissions, either as a percentage of total state GHG emissions or in terms of absolute numbers (millions of metric tons). The Massachusetts Climate Protection Plan (CPP) simply states the broad goal of reducing total C02 emissions to 1990 level by 2010 and to 10% below 1990 level by 2020.[6] While it states that transportation represents 32% of total C02 emissions statewide,[7] there is no calculation of transportation C02 emissions for Massachusetts, either in total emissions (million metric tons of C02) or as a percentage of total statewide C02 emissions. The plan has no baseline for transportation emissions nor calculations of what reductions in transportation emissions are needed to meet the 2010 goal of returning to 1990 emission levels or the 2020 goal of 10% below 1990 levels. The CAP does estimate, however, that VMT rose about 13% statewide between 1990 and 1998 from a baseline of 45 billion VMT to 51 billion VMT.[8] It also estimates a total VMT increase of 33% between 1990 and 2020.[9] Using the 1990 baseline of 45 billion VMT, this would establish an estimate for 2020 VMT at 59.85 billion.

In the interviews, OCD acknowledged a lack of progress on emissions calculations. However, the focus in the CPP is not on counting what is undoubtedly a big number but instead on developing action plans to tackle the problem. While hard numbers on transportation GHG and C02 emissions are needed to track progress in the future, the lack of such emissions calculations (which can be extracted at any time from existing data sources) does not necessarily, in the view of OCD, demonstrate lack of intent to manage transportation for climate and energy outcomes. Instead, OCD focuses on efforts to identify and disclose the climate and energy consequences of *future* transportation investment decisions at the project and system management levels since that is where improvements on the margin can be made.

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have the affect of regulating tailpipe emissions of C02, leading to higher fuel economy and reduced fossil fuel consumption per vehicle mile traveled (VMT).

[6] *Massachusetts Climate Protection Plan (CPP),* Office of Commonwealth Development, May 2004, p. 8.

[7] *CPP*, p. 37.

[8] *CPP*, p. 37. The text says 41 million VMT but this is an error. The source of this data is apparently the FHWA publication, *Highway Statistics*, which itself is based on data from the Highway Performance Monitoring System (HPMS). VMT data is not a reliable basis for calculating total transportation GHG data because it is not a source for calculation of fuel consumption from non-highway sources.

[9] An independent estimate of total Massachusetts transportation C02 emissions, using EIA data, other data sources and a USEPA calculator for translating fuel consumption into C02 emissions set Massachusetts 2000 transportation C02 emissions at 31.9 mmt out of a statewide total of 74.4 mmt. If accurate, transportation C02 represented about 42.9% of total C02 emissions statewide in 2000.

Outside of data development, inter-agency coordination on both the CPP and the long range transportation plan is well-developed. EOT participated in the development of the CPP and committed to a significant number of transportation finance action items in support. These items were, in most cases, included in the draft long range plan. However, except for the few items discussed below, no reference was made to their inclusion *for the explicit purpose of advancing climate and energy conservation outcomes*, or to the fact that these action items were in part fulfillment of commitments made in the CPP. These CPP action items include (page references are to where they are mentioned in *Framework Plan*):[10]

- Use Sustainable Development Principles to integrate transportation and land use (pp. 11-12, 115-122).
- Endorse CPP goals (pp.121, 136)
- Favor transit-oriented development around MBTA stations (pp.119-121).[11]
- Include energy use and GHG emissions as criteria in project selection (pp. 70-73, 121)
- Maintain and update transit services (pp. 11-13, 109-112)
- Increase parking at train stations (pp. 23, 31-32, 158, A-2)
- Improve the efficiency of transit vehicle movement (pp. 137-150)
- Develop new bicycle and pedestrian policies, programs and facilities (pp. 127-131, 135).
- Expand programs to promote efficient travel (pp. 121-122).
- Seek opportunities to reduce emissions at Logan Airport (p. 169).[12]
- Improve aircraft movement efficiency (p. 169).
- Evaluate the benefits of expanded rail and water opportunities (pp. 166-167).[13]

The CPP also outlined a series of clean fuels and clean vehicle action items, some of which require EOT support. These include (* indicates need for EOT support, page number indicates the pages in the *Framework Plan* where the CPP strategy is discussed):

- Provide incentives to purchase fuel efficient vehicles (pp.132-134, 136)
- Support HOV lane access for clean vehicles (pp. 35-36)
- Implement stronger vehicle emissions standards*[14]

[10] *CCP*, p. 11.
[11] Massachusetts Bay Transportation Authority, a division of EOT.
[12] Logan Airport is operated by the Massachusetts Port Authority, which was recently reorganized as a Division of EOT.
[13] *CPP*, p. 11.

- Promote the use of cleaner vehicles and fuels in public transit fleets (p. 121).*[15]
- Clean up the existing transit fleet with less polluting fuels (p. 133).*
- Promote the use of cleaner diesel equipment on state-funded construction projects.*
- Eliminate unnecessary idling of buses.*
- Use cleaner train engine technology to reduce diesel soot (p. 133).*
- Advocate for aircraft efficiency at a regional and national level.*

This comparison between the CPP and the *Framework Plan* indicates a strong intention to incorporate the commitments made in the CPP for transportation in the transportation plan. Explicit references to climate and energy outcomes in the *Framework Plan* include:

- Commitment to implement the requirements of the CPP (p. 136)
- Include climate protection as a criterion when making decisions on transportation projects (p. 73—for public transit capital projects, p. 121)
- Commitment to meet CPP goals (p. 121)

The process by which public transit capital projects are evaluated is more specifically described in *Program for Mass Transportation* (MBTA 2003, revised January 2004). This objective evaluation process included a Working Committee to establish 35 project criteria in seven different categories and to rank potential capital investments based on these criteria. One criterion under the Air Quality category as selected by the Working Committee is as follows:

> "Projected percentage reduction in C02 emissions on weekdays, region-wide"[16]

This is the only example where projected C02 emissions reductions are used as a transportation project selection criterion in any state LRTP (the *Program for Mass Transportation* C02 criterion is adopted in *Framework for Thinking*, p. 73). In addition to using C02 as a project selection criterion in public transit projects, OCD has undertaken an examination of potential methodologies for disclosure of GHG emissions and energy intensity of new transportation projects in transportation planning decisions.[17] Based on analysis to date of GHG emissions at the project level, these project-level evaluation criteria and disclosure initiatives, which are based on similar project-level disclosure

[14] Massachusetts Motor Vehicle Registration, a division of EOT, manages the I&M program
[15] EOT manages the major transit authority in Massachusetts—the MBTA.
[16] *Program for Mass Transportation Appendix,* p A-3.
[17] Carli Paine, *Greenhouse Gas Emissions and Energy Intensity Disclosure Policy in Transportation Planning: Methodology and Approach*, August, 2004, unpublished.

initiatives in New York State, appear to represent best practice in using GHG emissions reduction and energy savings as drivers of transportation decision-making

IV. Smart Growth, Land Use and Intentionality

In 2000, Executive Order 438 required state agencies to identify the environmental effects of project design, construction and operations, and to promote efficient and cost-effective environmentally sustainable practices to address project impacts. The EO established a State Sustainability Council. EOT, the Executive Office of Environmental Affairs (EOEA) and MHD participate on this Council.[18]

A specific intention to implement principles of sustainable practice, including smart growth, permeates the draft *Framework Plan*. The Introduction to the *Framework Plan* states that one purpose of the plan is to make sure that communities are "ready, willing and able to leverage smart growth before the Commonwealth commits to a proposed investment (in the community)."[19] An entire chapter in the *Framework Plan* is devoted to "Transportation and Sustainable Development"[20] and another on "Efficiency and Cost-Effectiveness."[21] Under the draft plan EOT expresses an intent to expedite projects that help create sustainable housing and employment opportunities such as transit-oriented neighborhoods, construction of mixed use development, and redevelopment of historic urban centers.[22] Of the ten "Sustainable Development Principles" outlined in the Transportation and Sustainability Chapter, at least four directly endorse smart growth including a commitment to "invest strategically in transportation infrastructure to support smart growth."[23]

The most specific smart growth initiative announced in the draft *Framework Plan* is the stated commitment by EOT Secretary Daniel Grabauskas in the introduction to require communities to demonstrate that they are "ready, willing and able" to leverage smart growth before EOT makes a transportation investment in the community. This new program—yet to be implemented—is more specifically explained in the final chapter of the *Framework Plan* under the subject heading "The Role of Transportation Decision-Making."[24] This section emphasizes the importance of corridor-level long range planning

[18] *Framework Plan*, p. B13
[19] *Ibid*, p. *iii.*
[20] *Ibid*, p 115-136.
[21] *Ibid* , p. 137-150
[22] *Ibid*, p. 141.
[23] *Ibid*, p. 117
[24] *Ibid*, pp. 281-283.

as a "critical component of statewide transportation planning."[25] It states that major infrastructure projects "can influence land use and transportation in multiple communities, necessitating pro-active planning and follow-through by local residents and officials from a wide area." These new, as yet unspecified, requirements demonstrating local commitments to sustainability, efficiency and smart growth as a condition of state transportation infrastructure investments are among the most aggressive state initiatives to link transportation investments to land use planning in any state long range plan.

The issue in this research is whether these aggressive initiatives linking transportation to land use in the *Framework Plan* reflect a specific *intention* to implement EOT commitments under the *Climate Protection Plan*. The CPP itself lists as one "action item" for EOT in plan implementation "use sustainable development principles to integrate transportation and land use."[26] Standing alone, the *Framework Plan* initiatives to advance this objective appear to directly respond to the CPP. However, both the CCP and the *Framework Plan* are products of multiple agencies operating under the common management of the OCD and under the common obligation of implementing the E.O. 438. Therefore, it is impossible to conclude that the proposed adoption of integrated transportation and land use planning requirements in the *Framework Plan* are specifically intended to *primarily* advance climate and energy outcomes as stated in the CPP. The common sense answer, confirmed in the interviews, is that advancement of the CPP was one of several factors supporting adoption of measures in the *Framework Plan* that serve the long term sustainability objectives of the Commonwealth.

V. Performance Measurement and Gap Analysis

Performance Measurement**:** The *Framework for Thinking* is remarkable in both in the clarity of its eight-part statement of principles and policies to guide transportation planning and investment,[27] and in the number of specific action items for implementing these policies (130 action items). However, few specific performance metrics are outlined in the draft plan. Of the 130 action items, only eleven have specific performance measurements for which data can be collected and evaluated to determine if the action item has been implemented, and to what extent. Interestingly, the *Framework Plan* does include a specific commitment to "implement requirements of the Massachusetts Climate Protection Plan" (p.136) and discloses the precise targets of the plan (p. 121). In fact, the CPP target of meeting 1990 C02 emissions by 1990 and reducing emissions to 10% below 1990 levels by 2020 is one of the few measurable performance measurements included in the draft plan.

[25] *Ibid.* , p. 282.
[26] *CPP*, p. 11.
[27] *Framework Plan,* pp. 9-14.

It should be emphasized that this is a *draft* plan. The action plans contained in the *Framework Plan* to implement the principles may change, and thus performance measures may emerge as the action plan elements are finalized. Even in its draft form, however, the *Framework for Thinking—A Plan for Action* reflects a high level of specific intent to manage transportation in the Commonwealth for strategic support of climate and energy goals as stated in the *Massachusetts Climate Protection Plan*.

Gap Analysis**:** The primary process gap in comparison to best long range transportation planning practice is the failure to conduct any citizen or inter-agency outreach before drafting the *Framework for Thinking*. This document, as far as this study could determine, was generated totally in-house. However, it was produced within the context of the Commonwealth's Sustainable Development Principles (SDP), which were developed with significant public involvement. Also, the plan was overseen, edited and approved by the Office of Community Development (OCD), an office that represents and integrates the concerns of both the environmental and the housing/community development agencies in transportation decision-making, and which also produced the Climate Protection Plan. In the interviews, OCD staff expressed strong support for public input on the draft *Framework Plan* itself. While this is a unique methodology for integrating broader societal goals into the development of the long range plan, the benchmark for determining if this is a process gap in best planning practice will be the public feedback received on the draft *Framework Plan* during the public review process. Public acceptance or criticism of the public's assigned role in plan development is, in practice, the best determinant of best planning process.

On policy and technical support issues, the main gap in best practice is the failure to identify 1990 baselines for transportation-related GHG emissions, both in terms of absolute tons of GHG emissions and in terms of a percentage of total statewide GHG emissions. Absent such baseline data, it is impossible to track the growth of transportation-related GHG emissions, both between 1990 and the present, and between the present and 2020, when the CPP requires attainment of emissions at 10% below 1990 levels. Without such calculations in the plan itself, it is impossible to determine whether the laudatory "Action Items" in the plan are sufficient to accomplish the stated goal. The estimate in the plan that VMT will grow 33% between 1990 and 2020 underscores the importance of dramatic policy initiatives to avoid further net increases in transportation-related GHG emissions. The calculation made in this study that, given existing trends in statewide travel growth, the 33% increase in VMT is most likely to occur by 2012 further highlights the importance of dramatic action at the policy level to even hold the line on transportation-related GHG emissions.

VI. Conclusion

The Massachusetts draft long range plan, *Framework for Thinking-A Plan for Action*, is a unique document in its results-oriented approach to linking long range transportation planning to climate and energy outcomes. Public involvement in plan creation is waived in favor of public review of a proposed plan developed with the stated purpose of promoting broad public objectives of sustainable development. Transportation is not perceived as a goal in itself but as a mechanism for advancing broad community and state interests—environmental, social and economic. Climate and energy outcomes are included in these broad objectives, and the *Climate Protection Plan*, and its goals for GHG reductions, are specifically endorsed in the draft plan. All transportation investment commitments included in the CPP are reflected in the draft plan. Both EOT and OCD are undertaking efforts (in cooperation with MPOs) to identify and disclose C02 emission and energy intensity consequences of transportation investments at the project level. This is clearly best practice.

On the other hand, the lack of attention to measurement and tracking of transportation-related GHG and C02 emissions on a statewide level, or to compare such emissions to total GHG and C02 emissions across all sectors, makes it difficult to determine the level of effort needed within the transportation sector to meet Commonwealth goals under the CPP. Despite this lack of attention to statewide measurement and tracking, which OCD acknowledges and is seeking to address, the draft *Framework Plan* represents best practice in several areas of policy, planning and methods needed to correlate transportation practice with climate and energy outcomes through statewide long range planning.

APPENDIX E:
NEW JERSEY STATE REPORT

TASK 2: PARTNER STATE INTERVIEWS AND GAP ANALYSIS—NEW JERSEY

I. Interview Process

The Task I report was distributed to Neil Longfield, Statewide Strategies Section Chief, who oversees Long Range Plan Development in NJDOT; he distributed it to both relevant NJDOT offices and the Climate and Air Quality Staff in NJDEP. The "Interview Questions for State Partners" (Appendix A) were also distributed to this group. A joint NJDOT/NJDEP interview was scheduled with BBG partner David Burwell for January 26, 2005 at NJDOT offices. In attendance, besides Mr. Longfield and Mr. Burwell, were:

- Robert Miller, Director, Bureau of Systems Development and Analysis, NJDOT
- Judith Parrish, Section Chief, Air Quality Planning, BSD&A, NJDOT
- Martin Rosen, Chief, Division of Science, Research and Technology, NJDEP
- Michael Aucott, Environmental Indicators Scientist, SRT, NJDEP
- William Mates, Division of Sustainable Communities and Innovative Technologies, NJDEP
- Adrianne Calle, NJDEP

Mr. Longfield chaired the meeting and led a group discussion based on the interview questions. Notes of the meeting were prepared and circulated by Mr. Burwell. Edits were coordinated by Mr. Longfield for NJDOT and Mr. Rosen for NJDEP. Additional material on the 2030 LRTP was provided by NJDOT.

II. Status of Long Range Transportation Plan

The current NJ Jersey Long Range Transportation Plan, *Transportation Choices 2025,* was issued in March 2001, including seven individual *Urban Transportation Supplement Plans* which addressed strategic direction and specific transportation issues in each of New Jersey's seven urban centers.[1] *Transportation Choices 2025* was developed by a consulting team lead by DMJM + Harris consultants with a variety of sub-consultants. The plan was managed by the Bureau of Statewide Planning at New Jersey DOT in

[1] The urban centers with supplemental plans included Camden, Jersey City, Atlantic City, Patterson, Elizabeth, Newark and Trenton. The 2030 Scope of Work includes New Brunswick as well.

conjunction with New Jersey Transit. No advisory committees were created but a significant public outreach initiative was undertaken, including an on-going website, www.njchoices.com. This plan is called a "Living Plan" due to the concept that it and future plans are part of an on-going statewide planning process in which the LRTP is constantly evolving as the state's transportation planning process evolves over time. As one plan is being completed the scoping process for the next plan begins and the necessary consulting assistance is retained. Meanwhile, feedback provided through the website and other means helps to inform the key area of focus in the next plan. NJDOT's next plan, *Transportation Choices 2030,* is underway with a first draft due for completion in March 2006. DMJM + Harris remains the lead consultant on the 2030 plan development although the sub-consultant team has changed.

NJDOT has established a *Transportation Choices 2030* Study Advisory Committee (SAC) to guide the development of the new plan. Membership includes all transportation agencies (NJDOT, NJ Transit, NJ Turnpike Authority, all the MPOs and the Office of Smart Growth (OSG) in the Department of Community Affairs). However, it does not include the Department of Environmental Protection (DEP) which has lead authority on greenhouse gas reduction policy, nor does it include the Bureau of Public Utilities (BPU) which has lead authority on energy efficiency policy. The new scope also directs the consultant to develop a list of "critical issues" to be addressed in the 2030 plan. As a result of the initial meeting and discussion with NJDOT regarding the absence of a focus on climate and energy conservation issues in the current LRTP, these two areas were added to the list of critical issues being examined in the Department's next plan, *Transportation Choices 2030*.[2] In a new development, the new work plan directs that modeling processor tools be developed to allow the monitoring of performance indicators for the seven long range goals.[3] The existing plan has no mechanism for performance monitoring.

III. Inter-agency Coordination in Long Range Transportation Plan Development for Climate and Energy Outcomes

Total GHG emissions in New Jersey in 1990 were calculated at 135 million metric tons (MMT). The goal of the Climate Action Plan (CAP), adopted in 1999, is to reduce GHG

[2] The pre-identified critical issues in the Scope of Work include: congestion, coordination of transportation and land use planning, smart growth, context sensitive design and environmental justice. However, since the consultant is charged with identifying critical issues as part of the work plan, there is an opportunity for climate and energy issues to be so identified. See Modification #1, Task 16, Redeployment of Phase 1 Funds, dated 2/16/05.

[3] New Jersey 2030 Long Range Transportation Plan, Phase III Contract Modification #3, Task 25, dated 2/16/05.

emissions to 3.5% below 1990 levels by 2005 or 130.275 MMT. However by 2001, the latest year in which data is available, total statewide GHG emissions were calculated at 150 MMT. Achievement of the 2005 goal appears unattainable.

Transportation sources presently represent about 30% of total GHG emissions in New Jersey. However, there is no present coordination between NJDOT, NJDEP and NJBPU on climate and energy issues. NJDOT was not involved in the development of the Climate Action Plan in 1999 (officially the NJ Sustainability Greenhouse Gas Action Plan). Conversely, NJDEP and NJBPU played no official role, nor served on any inter-agency committee, leading to the development of *Transportation Choices 2025*. [4] The CAP did include three transportation strategies for reduced greenhouse gas emissions:

- Improved transit services (Energy Conservation)
- Implementation of an Inspection and Maintenance ("I&M") Program (Energy Conservation).
- Alternative Fueled Vehicles (AFV) program (Innovative Technology Strategy).

Together, these three transportation strategies in the CAP were projected to decrease GHG from the Business-as-Usual projection of 46.2 MMT (million metric tons) by 2005 to 44 MMT, for a total transportation GHG emissions reduction of 2.2 MMT. Total GHG emissions reductions from all sources under the CAP were projected to be 20.4 MMT by 2005. Therefore, transportation sources were projected to contribute about 10.8% of total planned GHG emission reductions by 2005.

Although NJDOT did not play a role in CAP development, it did play a role in CAP implementation. Each of the three transportation strategies listed above as CAP strategies are referenced in *Transportation Choices 2025*, but no reference to climate or energy outcomes is mentioned as a reason for their inclusion. Only one (use of alternative fuels) is listed as a performance indicator for any of the seven LRTP goals.[5] The only mention of climate benefits of any NJDOT action in the plan was the climate benefits of the NJDOT tree replanting program.

In the interview session, the following reasons were given for the lack of coordination between NJDOT, and NJDEP on climate and energy issues:

[4] Two members of NJDEP staff are listed in the plan acknowledgements, but their role is not identified. No mention of NJBPU is made in the acknowledgements.
[5] The goal is "Improve the Quality of Life for Users of the Transportation System and Those Affected by its Use." The specific performance outputs are (1) percentage of NJDOT and NJ Transit fleet using alternative fuels, and (2) number of private vehicles using alternative fuels. *Transportation Choices 2025*, p. 120.

- The 1999 CAP was a "no regrets" plan, meaning it was voluntary and was not intended to be implemented as the cost of any other agency objective. This reduced cross-agency incentives to implement the plan.

- In 2002, NJDEP decided to go beyond voluntary efforts to control C02 emissions by developing a mandatory, regional "cap-and-trade" program called the Regional Greenhouse Gas Initiative ("RGGI"). This program deals only with stationary sources of GHG emissions. Voluntary measures were not tracked. Since NJDOT was focused only on mobile sources, it was not involved in RGGI. In addition, since voluntary efforts were no longer tracked, it had no incentive to implement the transportation measures in the CAP specifically for climate outcomes.

- C02 is not a criteria pollutant under the Clean Air Act and NJDOT does not have sufficient resources to measure and reduce emissions that are not criteria pollutants.

- While USEPA did issue one regulation that affected transportation use under the 1990 Clean Air Act, the Employer Trip Reduction (ETR) rule, that rule was later rescinded. Since New Jersey law says that the New Jersey Clean Air Plan can be "no stricter" than the federal requirement, the state ETR rule was also rescinded and trip reduction was no longer a goal at NJDOT.

- The bifurcated nature of transportation, energy and climate planning in New Jersey, with NJDOT the lead on transportation, NJDEP the lead on climate and air quality, and NJBPU the lead on energy issues (including the RGGI initiative), makes coordination very difficult.

Despite these difficulties, New Jersey did establish and implement an I&M program. NJDOT did have an alternative fuels committee but it no longer meets, although NJDOT does have an AFV acquisition program. Transit is an increasing priority at NJDOT and NJ Transit, but climate and energy benefits are not driving that increased priority. In fact, they are not mentioned as a benefit of improved transit services at all.

It should be noted that, although integrating transportation with land use planning is not identified as a climate or energy strategy in the CAP, and climate and energy benefits of such integrated planning are not identified as goals of the LRTP, improved transportation and land use planning is a goal of the plan (Goal #7: "Use Transportation to Shape Desired Development Planning Consistent with the *State Development and Redevelopment Plan (SDRP)*). Support of the SDRP, or "Smart Growth" plan is an

explicit goal of the LRTP with performance metrics being number and cost of transportation projects in NJ urban centers and urban complexes, and number and cost of transportation projects within other centers designated by the State Planning Commission. These metrics, which have specific climate and energy benefits, have the effect of guiding transportation investments to these smart growth areas. This is a best practice in integrated transportation and land use planning with significant climate and energy conservation benefits. However, there is no demonstrated intention, either in the LRTP or the CAP, to achieve these outcomes through such integrated planning.

IV. Performance Measurement and Gap Analysis

Performance Measurement**:** *Transportation Choices 2025* has an entire Chapter dedicated to performance indicators (the factors measured) and performance outputs (data collected to measure the factors) for each of its seven plan goals (see Chapter XII: Identifying Progress). However, NJDOT does not actually measure performance against these seven goals, nor does it routinely collect the data needed to measure such performance. In the interview, NJDOT indicated that performance measurement was tried but proved too expensive and remained unconnected to decision-making. The approach adopted is that the LRTP is a "policy plan" in that it is a statement of agency policy, but not a "performance plan" in that it is not intended to dictate particular outcomes.

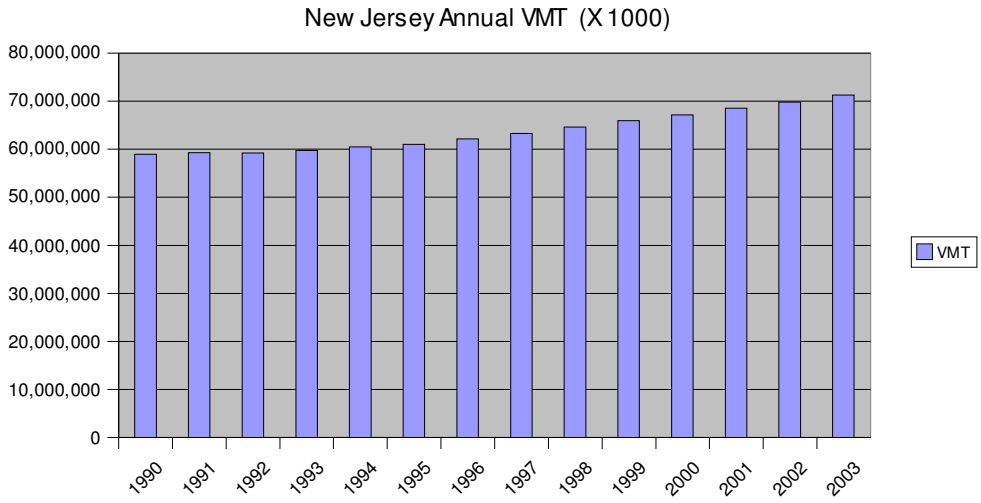
This approach is a significant variance from best practice. Several states focus on C02 measurement even in the absence of a specific transportation policy to reduce transportation-related C02 emissions. For example, Massachusetts and Connecticut measure C02 emissions from transit and freight respectively even in the absence of a specific C02 goal in the transportation plan. In New York, the state energy office is directing MPOs to measure C02 emissions resulting from transportation plan implementation. In California, C02 reduction is a specific goal of the state transportation plan and measurement of transportation C02 emissions is precisely measured. It should be noted, however, that NJDOT does appear to be developing tools and methods for including performance measurement in the 2030 LRTP.

VMT Management**:** Lack of attention to performance measurement has contributed to significant shortfalls in transportation goals for the CAP. VMT, when factored together with average fuel consumption and CO_2 emissions per unit of fuel consumed, translates directly into overall CO_2 emissions in the transportation sector (New Jersey CAP 1999, p. 23). The CAP translates this formula into a template of possible strategies to decrease GHG emissions. It states that "[r]eductions in GHG emissions can be achieved through strategies that either increase the efficiency of fossil fuel consumption (C), reduce the amount of VMT (V), or substitute alternative means to power cars or trucks (G)" (p. 23).

These three transportation GHG emission reduction strategies are embedded in the CAP's proposed transportation framework.

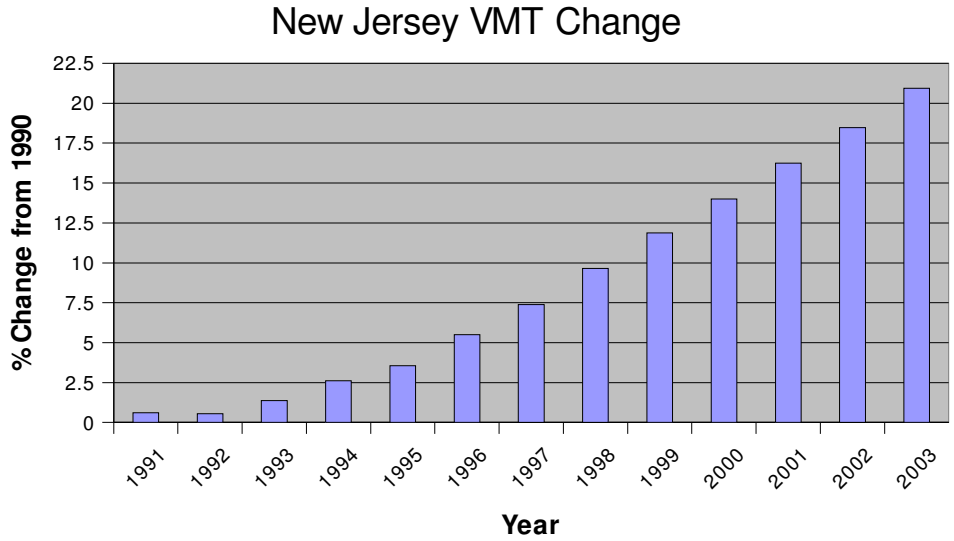
In New Jersey, VMT growth continues to outstrip other gains made in the transportation sector. From 1990 to 2003, VMT grew from 58,922,680 to 71,262,000 (X 1000). Figure 1 shows the VMT growth in New Jersey.

Figure 1



While the annual growth never exceeded 2%, the cumulative change in VMT over time represents a significant increase. Table 2 shows that the percentage change in VMT from 1990 to 2003 was 20.94%. Absent a huge improvement in fuel efficiency, this level of VMT growth makes attainment of transportation GHG emissions targets impossible. According to the CAP, transportation-related GHG emissions (including marine and heavy trucks) were projected to grow from 1990 levels of 43.4 MMT to a 2005 Business-as-Usual level of 46.2 MMT. Even with the strategies proposed in the CAP, projected transportation emissions in 2005 were 44 MMT. This still represents an overall increase in transportation-related GHG emissions from 1990 levels based on the Plan.

Figure 2

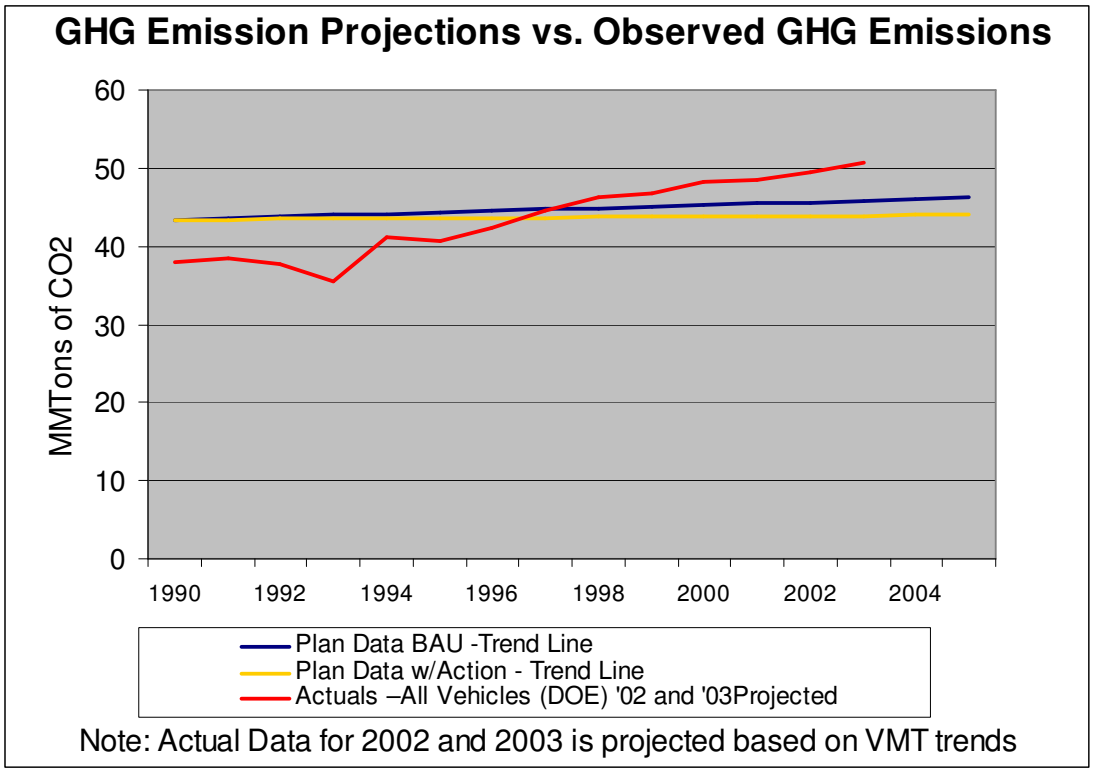


However, the most recent GHG emissions data from 2001 shows that NJDOT is struggling to achieve even this modest CAP goal. In 2001, actual GHG emissions from the transportation sector were already 48.4 MMT, significantly higher than the CAP plan 2001 projection for transportation emissions of 43.8 MMT and even 5% higher than the 2005 Business-as-Usual projection of 46.2 MMT.

Figure 3 shows the projected GHG emissions from both the CAP and Business-as-Usual models plotted with the actual GHG emissions as estimated by NJDEP.[6] Two important points are worth noting here: (1) the DOE actual GHG numbers are lower for the base year 1990 than the CAP numbers, and (2) growth in VMT appears to be driving GHG emissions much higher than the CAP contemplated. However, since NJDOT does not measure VMT growth against CAP goals, this major shortfall goes unnoticed and unconsidered in transportation decision-making.

[6] NJDEP uses Department of Energy estimates of fuel use for New Jersey and converts these estimates into GHG emissions (personal communication with Michael Aucott).

Figure 3



Three conclusions may be drawn from this evaluation: (1) the lack of a policy to set and measure transportation GHG emissions targets in the LRTP has hampered the effectiveness of the CAP; (2) of the three key transportation strategies listed in the CAP (inspection/maintenance, alternative fuel vehicles, and improvements in transit), only the inspection/maintenance program has been implemented and (3) New Jersey is not meeting its GHG emission reduction goals.

Actual GHG emissions from transportation were 10% higher in 2001 (the last available year for actual GHG emission figures) than the desired target emissions for 2005. Moreover estimated transportation GHG emissions based on actual VMT figures from 2002 and 2003 shows that GHG emissions continued to rise in these years as well. Projected GHG emission figures for 2002 were 49.5 MMT.[7] The projected figure for 2003 rose again to 50.6 MMT. This unanticipated growth in transportation-related GHG

[7] These estimates are based on actual VMT figures from NJDOT and data on average GHG emissions per vehicle mile traveled for the years 1996 through 2001.

emissions essentially negates all the other gains projected by the CAP, which aimed to decrease GHG emissions from all sectors by 20.4 MMT by 2005. However, the growth in transportation-related GHG emissions alone is projected to exceed Business-as-Usual by 25.09 MMT[8]. This effectively wipes out the other possible gains contemplated by the CAP.

Transportation GHG emissions Calculations**:** A final conclusion that can be drawn from this analysis is that calculations of transportation-related GHG emissions are far from exact. There appear to be several gaps in the process. First, savings projected by the CAP have not been tied to possible data sources to monitor implementation progress. In the transportation area, no data is collected (or, if collected, not analyzed) to measure the amount of GHG emission reductions secured through implementation of the three transportation strategies—I&M, transit improvements and alternative fueled vehicles. Thus, there is no way to determine if these strategies are meeting their collective performance target of reducing GHG emissions by 2.2 MMT by 2005.

Second, the process for calculating VMT is also far from exact. This is not a New Jersey-specific issue. VMT nationwide is generally tracked through the Highway Performance Monitoring System (HPMS). However, HPMS data is not updated yearly. Instead, states extrapolate data from previous counts and only verify counts every three years. VMT calculations are therefore a rolling average, not a specific measurement. This makes it difficult to determine if policy measures to manage VMT growth are working. While some states attempt to verify VMT calculations by cross-checking VMT estimates with sales of motor fuels provides by USDOE, this is not done in New Jersey.

Finally, there is no attempt to calculate the GHG emissions generated by construction and operation of the transportation system itself, including construction materials, construction and operations, or from alternative fuel technologies.

Other GHG Emission-reduction Initiatives**:** While implementation of the transportation emission reduction strategies in the CAP appears spotty, NJDOT does support other non-CAP strategies with potentially significant GHG emission-reduction potential. These include:

- A Transportation Demand Management (TDM) program funded under CMAQ to reduce commuter-related VMT.

[8] Increases in transportation-related GHG emissions for 1999-2001 are based on actual data. Increases for 2002-2003 were estimated as described above. Due to the lack of any actual data for 2004-2005, GHG emissions were assumed to be constant from 2004 to 2005.

- A program to replace all existing traffic signals with light-emitting diodes (LED), resulting in significant savings in electricity costs and thus GHG-emissions from power sources needed to operate the transportation system.
- A state law, called "Fix it first" that focuses capital infrastructure investment on system preservation and management, thus reducing the induced travel demand generated from a focus on building new capacity.
- A new project development process, called New Jersey Future in Transportation ("NJFIT") that attempts to coordinate project planning and design with local land use planning to provide more transportation choices and manage travel demand.
- A Transit Villages Program that provides grants and services to 15 designated urban centers in New Jersey that meet specific criteria for accommodating and encouraging transit use.

These initiatives may well be the source of significant benefits for climate and energy outcomes if specifically managed to achieve such benefits. However, to date, there appears to be no specific intention to manage these initiatives for these outcomes. Instead the incentive for, and intention of, these programs is primarily to save money, reduce congestion or preserve system capacity.

V. Conclusion

Transportation policy and management appears disconnected from climate and energy policy in New Jersey. The long range planning process, both as reflected in the existing 2025 plan and the scope of work for the 2035 plan, does little to address this issue. This is primarily due to state environmental policy that focuses its GHG-reduction policy on stationary sources ("RGGI"), as well as the voluntary approach taken in development of the CAP in 1999.

NJDOT appears to be in the process of implementing several programs with the potential to advance climate and energy conservation goals. However, these programs are not managed or marketed with that intention. Opportunities for inter-agency collaboration for mutual advantage exist in meeting primary agency goals, such as demand management (NJDOT), air quality and GHG-reduction (NJDEP) and energy conservation (NJBPU) are significant. However, processes are not yet in place to advance such a collaboration. A specific intention within NJDOT to manage the transportation system for climate and energy outcomes could provide the incentive for achieving significant gains in this area.