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This is the report I mentioned to you a few weeks ago, done by our internal Task Force, to educate our management. We are now circulating it within the Department for comment. We haven't decided what we'll do with it after that, but I wanted to make sure the WHCCTF knew of its existence.

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U.S. Department of  
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Office of the Secretary  
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# Memorandum

Subject: **INFORMATION:** Climate Change Task Force Report

Date: FEB 26 1999

From:   
Donald Trilling  
Director, DOT Climate Change Task Force

Reply to  
Attn. of:

To: Eugene A. Conti, Jr.  
Assistant Secretary for  
Transportation Policy

Attached is a report on the activities and findings of the DOT Global Climate Change Task Force. The Task Force was organized about a year ago, and we have been meeting bi weekly since April. All of the operating administrations are represented, and we have briefed the Policy Council twice. Our principal purpose has been to increase our internal awareness on the issue, and to begin to build expertise within the Department. As you will see from the report, we have succeeded in this to a considerable extent. Our knowledge and sophistication regarding global climate change has been greatly elevated, and we have worked closely with the State Department, the White House Climate Change Task Force and the President's Council on Sustainable Development.

The Department's efforts, however, do not measure up to the priority the President has placed on this issue. The State Department, DOE, EPA, Treasury, USDA, and CEA have all committed extensive full-time staff to Climate Change. DOT has not yet done so in spite of the fact that transportation now accounts for 26 percent of the nation's greenhouse gas (GHG) emissions, and they are increasing faster than those associated with any other sector. DOT must be able to authoritatively engage in the dialog among the agencies directing the governments's response to this phenomenon. Further, we must also be able to advise our constituency on what to expect at the Federal level, and what positive steps they can take to help.

As noted in the report, the Task Force believes it is important to more fully engage high ranking departmental political and career officials in the Administration efforts. It also recommends establishment of a ONE-DOT Center to continue the work now started. It would provide a standing capability to consider climate-related issues, and to respond to more broadly evolving environmental considerations. After reviewing organizational options and modal responses, the Deputy Secretary determined that this should be a *virtual center*, marshaling expertise across all modes and relying largely on periodic meetings and the electronic network to coordinate research and information. It would be managed by an

intermodal steering committee, with an OST lead. The center must, however, be able to count on dedicated staff time and funding for specialized work at Volpe and with other contract resources.

The consequences of not committing the Department to the organization and resources necessary to respond to this issue are formidable. For example, DOT has not participated in the interagency conceptualization and analysis of the global emissions trading program, a key pillar of the Administration's approach to lowering the cost of GHG reductions. This program will create *winners* and *losers* in transportation, depending upon its design. Further, many of our major programs have synergies and relationships to climate change including ITS, CAFÉ, Air Traffic Control, AID support, and the planning aspects of TEA-21. The Kyoto Protocol, which will set GHG reduction targets for the nation once ratified by the Senate, sets up special tracks for ICAO and IMO activities, which will directly impact our aviation and maritime efforts.

The Department could have a better say in the decisions impacting our transportation constituency by participating more forcefully and knowledgeably in the development of the Administration's evolving approach to this long term problem. To become better positioned to play such a role requires a commitment to the organization and resources necessary to respond to this issue in a systematic fashion. We look forward to an early opportunity to bring this need before the Department's senior management.

Attachment

**A Preliminary Consideration of General Climate Change Policy  
and Selected Strategies for Transportation in the United States**

**Summary Report of the DOT Global Climate Change Task Force**

*February, 1999*

U.S. Department of Transportation  
Global Climate Change Task Force

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## Selected Topical Acronyms, Abbreviations, Units

AIJ—Activities Implemented Jointly  
ATTB—Advanced Technology Transit Bus  
CAA—Clean Air Act  
CAFE—Corporate Average Fuel Economy  
CCAP—Climate Change Action Plan  
CDM—Clean Development Mechanism  
CEA—President's Council of Economic Advisors  
CH<sub>4</sub>—methane  
CMAQ—Congestion Mitigation and Air Quality  
CO<sub>2</sub>—carbon dioxide  
COP—Conference of the Parties  
DUETS—Demonstration of Universal Electric Transportation Subsystems  
EIA—Energy Information Administration  
EPAct—Energy Policy Act  
ET—Emissions Trading  
GHG—Greenhouse Gas  
HEV—hybrid electric vehicle  
HFCs—hydrofluorocarbons  
ICAO—International Civil Aviation Organization  
IMO—International Maritime Organization  
JI—Joint Implementation  
MPG—miles per gallon  
MT<sub>CE</sub>—metric tons of carbon-equivalent emissions  
MMT<sub>CE</sub>—million metric tons of carbon-equivalent emissions  
NAAQS—National Ambient Air Quality Standards  
N<sub>2</sub>O—nitrous oxide  
OHVT—DOE Office of Heavy Vehicle Technologies  
OTT—DOE Office of Transportation Technologies  
PCSD—President's Council on Sustainable Development  
PFCs—perfluorocarbons  
PNGV—Partnership for a New Generation of Vehicles  
SBI—Subsidiary Body on Implementation  
SBSTA—Subsidiary Body on Scientific and Technical Advice  
SF<sub>6</sub>—sulfur hexafluoride  
SOV—single occupancy vehicle  
UNFCCC—United Nations Framework Convention on Climate Change  
USCSP—United States Country Studies Program  
USII—United States Initiative on Joint Implementation  
VMT—vehicle miles traveled

*Note: Throughout the report, mass emissions of greenhouse gases are given in metric tons of carbon-equivalent emissions (MT<sub>CE</sub>), or millions of such tons (MMT<sub>CE</sub>).*

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## Executive Overview

The year 1998 has been pronounced as officially the hottest year ever recorded. Concerns about Global Climate Change are beginning to penetrate the public consciousness. The President and Vice President have made climate change an Administration priority. The Department of Transportation must be able to authoritatively engage in the dialog among the agencies directing the government's response to this phenomenon. We must also be able to advise our constituency on what to expect at the Federal level, and what positive steps they can take to help. Transportation emissions do, after all, account for **26 percent** of the problem, and are **increasing faster** than those associated with any other sector.

In the spring of 1998 DOT formed a staff-level Global Climate Change Task Force to begin considering developments in this area, and potential implications for transportation. The Task Force, consisting of representatives from each of the DOT administrations, has been a highly successful collaboration of staff, oriented toward attaining a better understanding of the issues relating to transportation-related greenhouse gas (GHG) emissions and beginning to build expertise within the Department. It has undertaken limited analysis of greenhouse gas reduction strategies and begun to identify those more or less effective. It has been briefed by a wide range of outside experts, has developed an extensive list of potential transportation-related measures, and has identified a number of important criteria (e.g., cost, effectiveness, timing) for evaluating such measures. It has worked closely with the White House Climate Change Task Force, and the President's Council on Sustainable Development. Its charter ended in January 1999.

This report provides a brief primer on the Nation's response to climate change issues, and summarizes the Task Force's accomplishments to date. More importantly, it is intended to communicate to top executives in the operating administrations and OST what is necessary to continue this work, which has become increasingly difficult as other statutory and programmatic responsibilities have demanded attention.

Based on Administration statements, and ongoing international negotiations through the United Nations Framework Convention on Climate Change (UNFCCC), three considerations warrant particularly close attention because of their impact on our transportation constituency:

1. The Administration's proposal calls for a shift from voluntary GHG reduction targets to binding obligations, assuming our negotiators succeed in getting a commitment to *meaningful participation* on the part of *developing* countries. Although the U.S. is currently responsible for nearly one quarter of global GHG emissions, emissions from developing countries may overtake those of developed countries before 2020. Once ratified by the Senate, the Kyoto Protocol puts into effect the U.S. obligation to meet our greenhouse gas targets, beginning with the first accounting period of 2008-2012. This obligation is to reduce our national emissions to a level seven percent below our 1990 emissions. Taking into account our continuing growth since then, our target amounts to a reduction of more than one-quarter below our economic growth trend line.

2. The Administration's proposal centers on meeting our national targets through a domestic and international emissions trading program which would, in effect, monetize emissions. The Protocol provides a basic framework for emissions trading, and groundrules are to be negotiated over the next two years. To date, DOT has not participated in the interagency conceptualization and analysis of a potential GHG emissions trading program. A review of recent economic analyses indicates that such a program would pass along outlays for GHG allowances (i.e., emission rights) in the form of higher fuel prices, particularly for high-carbon fuels like coal. Such a program would create *winners* and *losers* in transportation and other sectors, depending upon its design and on any compensating assistance. It is important that the Department attain a better understanding of how different approaches to emissions trading could impact its major stakeholders.
3. The Protocol calls for emissions from aviation and marine bunker fuels to be addressed separately through the International Civil Aviation Organization (ICAO) and International Maritime Organization (IMO), respectively.

The Task Force formed a small Analytical Team and selected ten transportation strategies for review. They are illustrative of the types of emissions countermeasures that have been aired in earlier national dialogs. They include some which, despite their GHG reduction potential, might fare poorly in the current political environment. For each strategy, key considerations have included: potential feasibility, geographic and temporal scope, costs, benefits, and negative impacts; expected compatibility with the Kyoto Protocol, DOT goals and programs, and broader sustainability goals; and potential equity issues. Partial progress to date in these areas reflects the fact that only limited resources have been available for this effort. For these strategies, key findings at this time include:

- *New Technologies to Achieve Higher Fuel Efficiency:* The development of very efficient advanced technologies, as exemplified by PNGV, offers limited reduction potential in the near term (e.g., 2008-2012), but great promise in the long term. Current research is targeted at cost, performance, and safety hurdles, which remain significant.
- *Tax Credits for Highly Fuel-Efficient Vehicles:* In order to accelerate deployment of new technology into the fleet, the President has proposed nearly \$900 million in tax credits during 2000-2004 for highly efficient vehicles. To be effective this may require changes in fuel economy regulations, and real GHG reductions will likely be modest through the first accounting period.
- *Accelerated Scrappage:* Incentives for the early retirement of passenger vehicles do not appear to be cost-effective from a GHG perspective alone, but could complement any such incentives that may be implemented in order to reduce criteria pollutant emissions.

- *Efficiency Standards:* A number of changes to fuel economy requirements could provide significant reductions and/or new forms of regulatory flexibility. Specific changes could include: (a) combining cars and light trucks; (b) allowing manufacturers to trade CAFE credits; (c) extending coverage to 10,000 lb. GVWR; and (d) negotiating some rate of increase in the numerical standard.
- *Alternative Fuels Research:* Transportation fuels from some renewable feedstocks, such as cellulosic ethanol, could have a significant impact. Current research is targeted at cost and infrastructure hurdles, which remain significant.
- *Fuel Volume and Carbon Taxes:* Transportation fuel taxes, whether based on volume or on carbon content, could achieve significant reductions, although potential impacts on the economy would have to be weighed carefully.
- *Changes in Travel Behavior:* There are many policies that could influence travel behavior, but their quantitative assessment is problematic at this time.
- *Emissions Trading (ET):* The Administration projects that a domestic and international emissions trading program would reduce the cost of meeting binding near-term targets to the equivalent of 4 to 6 cents per gallon of gasoline. However, some studies project considerably higher costs. For example, a study by DOE/EIA projects a 14 cent per gallon increase. Many administrative and other questions associated with emissions trading must still be addressed, both domestically and under the UNFCCC.
- *Joint Implementation (JI) and the Clean Development Mechanism (CDM):* These "flexibility mechanisms" play a key role in achieving the cost reductions projected by the Administration. The CDM would provide credits for reductions achieved through joint projects in developing countries, and would allow credits to be "banked" beginning in the year 2000. Groundrules for ET, JI, and the CDM are all the subject of ongoing international negotiations, and how the transportation community might participate in them is not yet clear.
- *Greenhouse Gas Objectives for States and Metropolitan Areas:* Transportation planning could be made more specifically responsive to climate change considerations by developing GHG objectives for States and metropolitan areas.

Additional research would be appropriate for all of these strategies, and more specific recommendations for such research are provided in the body of the report. There is an urgent need to better understand options for addressing transportation through early action and emissions trading, and the Volpe Center may organize a seminar on this subject within the next few months.

While efforts to date by the Task Force have been very important as a means to increase the Departmental understanding of climate change issues, those efforts have not been at a level consistent with effective engagement on the subject, and are not sustainable under current

resource provisions. The necessity of continuing this work is apparent from the broad range of policy questions for which we need to develop an internal dialog, so we can participate in the national debate. For example:

- How does a nation build the political will to cut down in its GHG emissions in an environment where a booming economy has brought us to unprecedented levels of activity, where buying a gallon of gas is cheaper than buying a gallon of bottled water, where SUVs and light trucks (subject to modest CAFE requirements) outnumber automobiles in new sales, and where multibillion dollar investments in fossil fuel technology have been and continue to be made?
- What are the trade-offs between reducing GHG emissions and reducing criteria pollutants?
- How can our transportation-related companies be earning credits for early action, or taking advantage of opportunities to engage in international projects under the Joint Implementation or Clean Development Mechanisms noted above?
- How will we be able to substitute cellulosic ethanol (when ready), which has outstanding GHG reduction benefits, for corn based ethanol, which has only modest benefits, but for which there are multi-million dollar investments in place?
- How will changes impact transportation financing through the Highway Trust Fund, as increasing fuel efficiency could cause revenues to decline and ever higher proportions of fuel are sold subject to the alternative fuels (e.g., gasohol) exemption?

The answers to these complex issues will not be found within the body of the report—our time and resources have only been sufficient to begin to identify and recognize these problems.

At the request of the Deputy Secretary, the Task Force developed a set of options on how to organize a standing capability to consider both near-term and long-term climate-related issues, and to respond to more broadly evolving environmental considerations. He has determined that a virtual center (i.e., a network of Departmental experts, who would remain in their program offices and rely largely on the internal electronic system to share and coordinate research and information) would be the most appropriate form. It would be managed by an intermodal steering committee, with an OST lead, reflecting a ONE DOT solution to a Department-wide problem. The pros and cons appear in Appendix A. To adequately advise our constituencies and to participate in interagency dialogues with the authority that credible staff and contract support brings, would initially require annual funding on the order of \$1 million. This would provide for the equivalent of three dedicated FTEs from the operating administrations and OST (\$350k), research funding of \$500k to provide for additional Volpe Center support, and about \$150k for studies by specialized Centers and consultants.

Based on its own work and its interactions with the Federal agencies that currently have a more prominent role on climate change issues, the Task Force makes the following major recommendations:

1. The Department must play a significantly more active role in ongoing domestic and international policy development, and should participate in negotiations related to climate change.
2. It should identify opportunities where there is synergy between our current programs and climate change concerns, recognizing that this could imply the consideration of some controversial changes in the direction and/or emphasis of some programs.
3. It must develop the tools and expertise required to determine the impact on our transportation constituency of emerging technologies, demographic and environmental trends and anticipated government regulations to support the Secretary in making strategic decisions and to pursue a range of policy and program analysis and review activities.
4. It should marshal its professional expertise and financial resources across all of the modes in order to ensure that climate change issues are addressed throughout the Department in a systematic way. This will likely necessitate the full engagement of high ranking career and political officials in each of the DOT administrations to raise the priority of climate-related efforts and promote greater participation in terms of research projects and dedicated staff time. It will also likely entail reordering research budget priorities for the FY 2001 budget cycle.

Immediate priorities include direct participation in ongoing preparations for the next major international negotiating meeting in late October, representation on the U.S. Delegation to that negotiation, participation in Administration dialogues with key industries, participation in the development of "early credit" criteria, and continued FAA and USCG participation in activities related to the above-mentioned ICAO and IMO processes. The modal professional staffs should closely examine relationships between climate change and some of their major programs and responsibilities, such as ITS, CAFE, Air Traffic Control, AID support, and the planning aspects of TEA-21, that may present unique climate-related opportunities. However, none of the above will be possible without the additional professional and financial resources addressed above and a virtual DOT Center to plan and coordinate these resources effectively.

DOT's Strategic Goals address climate change, and it is important that we elaborate on what are now only general references to GHG emissions. The ongoing UNFCCC negotiations being led by the State Department are the most far reaching of any international environmental agreement ever undertaken. Scientists indicate that the climate change phenomenon will be growing more serious in future decades, and in fact the second accounting period, beginning in 2013, will likely call for more stringent targets than the first. A visionary and vigilant Department of Transportation could have a better say in the decisions impacting our transportation constituency by participating more forcefully and knowledgeably in the development of the Administration's evolving approach to this long term problem. To become better positioned to play such a role requires committing the Department to the organization and resources necessary to respond to this issue in a systematic fashion.

## I. Introduction

Without the greenhouse effect, which keeps the Earth from being much cooler than would otherwise be the case, the planet would be uninhabitable for life as we know it. However, most climatologists agree that anthropogenic emissions (i.e., emissions that arise from human activities) of carbon dioxide and other greenhouse gases (GHGs) are already influencing the world's climate. Current and projected trends for GHG emissions have raised concerns regarding the potential risks associated with further human influences. Although uncertainties regarding specific risks to the U.S. are great, these could include an altered distribution of freshwater supplies, and a substantial loss of coastal land, especially along the southern Atlantic and Gulf Coasts.

Global climate patterns are influenced by the atmospheric concentration of many different gaseous and other species, including water vapor, carbon dioxide, other gases, and aerosols (e.g., sulfate particles). For purposes of this report, the term "greenhouse gases" includes those that would be controlled under the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC):

carbon dioxide (CO<sub>2</sub>)  
hydrofluorocarbons (HFCs)  
methane (CH<sub>4</sub>)

nitrous oxide (N<sub>2</sub>O)  
perfluorocarbons (PFCs)  
sulfur hexafluoride (SF<sub>6</sub>)

In considering potential strategies to reduce emissions of these GHGs, it is critical to recognize several key distinctions between (1) climate change and (2) air quality problems addressed by the Clean Air Act (CAA). The CAA limits emissions of hydrocarbons (HC) and nitrogen oxides (NO<sub>x</sub>), but not CH<sub>4</sub> and N<sub>2</sub>O, which do not contribute significantly to the formation of tropospheric ozone. More importantly, the CAA does not limit emissions of CO<sub>2</sub>, a combustion by-product that, unlike HC and NO<sub>x</sub>, cannot be reduced through emissions after-treatment.

GHGs are also typically much more stable in the atmosphere than CAA-controlled pollutants, with lifetimes measured in decades and centuries, not days. Point of origin, which is key to the formation and transport of tropospheric ozone, is therefore not relevant to climate change. A reduction in GHG emissions in one part of the world is equivalent to a reduction of the same magnitude on the other side of the world. On the other hand, individual gases vary widely in global warming potential (GWP), a measure of relative heat-trapping potential per unit of mass. For example, over a 100-year period, a pound of SF<sub>6</sub> is estimated to be about 24,000 times more "potent" than a pound of CO<sub>2</sub>. Finally, the potential to absorb atmospheric CO<sub>2</sub> through photosynthesis, and possibly even store CO<sub>2</sub> underground and deep in the ocean for long periods of time, could provide opportunities that have never been available under the CAA.

The U.S. is estimated to be responsible for about one quarter of the world's CO<sub>2</sub> emissions. However, emissions in developing countries have been growing quickly, and some estimates indicate that China's GHG emissions could overtake those of the U.S. around 2015.

According to EPA's 1998 *Inventory of U.S. Greenhouse Gas Emissions and Sinks*<sup>1</sup>, the transportation sector was responsible for 26 percent of U.S. GHG emissions in 1996.<sup>2</sup> More than 95 percent of GHG emissions from the transportation sector were in the form of CO<sub>2</sub>. As shown below in Figure 1, combustion of motor gasoline and distillate fuel oil (i.e., Diesel fuel) accounted for more than three quarters of total transportation-related CO<sub>2</sub> emissions.

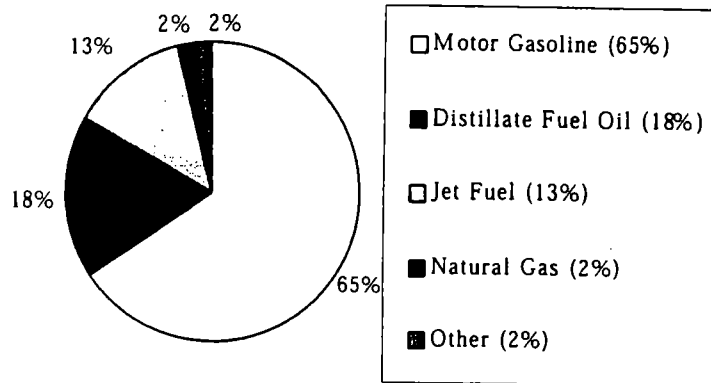


Figure 1. 1996 U.S. CO<sub>2</sub> Emissions from Combustion of Transportation Fuels.

The transportation sector is also one for which continued growth is typically projected in the foreseeable future, particularly on a global scale. In a recent study, DOE's Energy Information Administration projects that under business as usual conditions, "[domestic] carbon emissions from transportation are projected to grow at an average annual rate of 1.9 percent to 2010, compared to 1.4 percent for the commercial sector and 1.2 percent for both the residential and industrial sectors."<sup>3</sup>

As discussed in Section III, the U.S. and many other countries have ratified the *United Nations Framework Convention on Climate Change*, which adopts an international goal of stabilizing the atmospheric concentration of GHGs at levels which are not dangerous. The *Kyoto Protocol* to this Convention, which was negotiated in 1997 but has not yet been ratified by the U.S. Senate, would set binding GHG emission limits for the U.S. and other countries.

Based on the potential for such a shift to binding targets, and on the challenges revealed during past considerations of potential transportation sector measures (also discussed in Section III), the Department has organized a Task Force on Global Climate Change, which has been active

<sup>1</sup> U.S. EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–1996*, EPA 236-R-98-006, March 1998.

<sup>2</sup> Total estimated 1996 U.S. emissions were 1,788.0 MMT<sub>CE</sub>. Estimated CO<sub>2</sub> emissions from fossil fuel combustion in the "transportation end use sector" were 445.5 MMT<sub>CE</sub>—this included 12.4 MMT<sub>CE</sub> from agricultural machinery and construction equipment. Estimated CH<sub>4</sub>, N<sub>2</sub>O, and HFC emissions from "mobile sources" were 1.4 MMT<sub>CE</sub>, 16.5 MMT<sub>CE</sub>, and 3.6 MMT<sub>CE</sub>, respectively.

<sup>3</sup> U.S. DOE, *Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity*, SR/OIAF/98-03, October 1998.

throughout 1998. This group was charged with a number of activities, including the evaluation of current Administration proposals and the development of recommendations for DOT, which are documented in this report.

## II. Accomplishments, Practical Concerns, and Administrative Recommendations

DOT's formation in 1998 of a Global Climate Change Task Force responded to general concerns within DOT that neither (a) avenues for appropriate consideration of transportation interests in ongoing domestic and international climate change policy development, (b) recognized expertise within DOT applicable to such policy development, nor (c) dedicated DOT resources for addressing (a) and (b), were clearly available. This concern was—and still is—shared by all modes, and was considered to present an ideal opportunity for intermodal coordination and planning. The Task Force identified strategy identification and characterization as a high priority, and chartered a working-level “Analytical Team” to begin analysis in this area, starting with ten strategies viewed by a majority of participants as warranting immediate attention.

The specific charge to the Analytical Team was provided in May 1998 memorandum (Appendix A) from the Acting Assistant Secretary for Transportation Policy to the modal Administrators within DOT:

*“To help this effort, a small analytical team, composed of three or four individuals representing several modes, will be put in place for about 90 days. This team will establish our core expertise, evaluate current Administration proposals and strategies, and work with the task force to develop recommendations for DOT. We are also pursuing some limited contractual help for this effort.”*

This memorandum also notes that the “the task force will function through January 1999, to coincide with the submission of the Administration's FY 2000 budget.”

### *Accomplishments*

Toward the goal of building credible expertise in the analysis of global warming issues related to transportation, the Task Force has already achieved several significant successes.

Consistent with the “One DOT” concept, the Task Force has been successful in bringing together interested parties from most of the modes to jointly address transportation's contribution to greenhouse gas emissions. This group has devoted considerable time and effort in understanding the global warming phenomenon, how emissions from transportation may contribute to such warming, what strategies may mitigate them, and how effective those strategies are likely to be. This one-year effort did much to create a “team” atmosphere and create common understanding.

The Task Force was instrumental in achieving recognition of the need for a dedicated Center for the continued analysis of greenhouse gas emissions and sustainability. Originally recommended by the National Science and Technology Council's (NSTC's) Transportation and Sustainable Communities Team, the Center is viewed by the Task Force as one means of “institutionalizing” within the Department the study of global warming and greenhouse gas reduction. This step is absolutely critical. Although the Administration's Economic Analysis projects that the cost of meeting the target reductions of the Kyoto Protocol by the 2008-2012 time frame will be modest

(due largely to inexpensive reductions which may be available to the U.S. through international emissions trading), many outside analysts view the targets as extremely challenging. In any event, ultimately stabilizing GHG concentrations in the atmosphere will be a very long term effort, requiring decades if not a century or more. Recognizing this, the Task Force is developing options and possible next steps for continued study. The Task Force has also developed an initial bibliography of reading materials for Task Force and other DOT use via an informal clearinghouse in FHWA.

Many strategies have been suggested for the reduction of transportation-related GHG emissions—the number of such strategies is only limited by the creativity of the American people and those of other countries. Effective evaluation of such a huge number of strategies requires well-accepted criteria and a rigorous analytical framework. The Task Force has made useful progress in these areas. The Task Force has developed a list of the most promising strategies, and others of interest. The Task Force has also created a simplified analytical framework that can be used both for screening potential strategies and for more fully studying them. These criteria, shown in summary form below in Table 1, address the full gamut of considerations running from technical feasibility and likely impacts on greenhouse gases to political acceptability.

| Criteria                                           |
|----------------------------------------------------|
| Costs                                              |
| Benefits                                           |
| Negative Impacts                                   |
| Congruence With Kyoto Policies                     |
| Feasibility / Uncertainty                          |
| Equity (e.g., Win—Win, No Disproportionate Impact) |
| Geographic Scope (e.g., National)                  |
| Temporal Scope (e.g., Near-Term)                   |
| Synergy with DOT Goals and Programs                |
| Synergy with Broad Sustainability Goals            |

*Table 1. Task Force Strategy Evaluation Criteria*

Ideally, potential strategies can be consistently characterized in terms of these criteria, such that comparisons of strategies are a meaningful guide for decision making.

While limited to a selected subset that could be handled by the voluntary resources available, the preliminary analyses, summarized below in Section III, have already helped to form some initial thoughts on policy direction for the Task Force. Perhaps the most significant effort has highlighted the need to consider ways in which the transportation sector might participate in a domestic and international emissions trading program, either directly or in response to trading-related increases in transportation fuel prices. Preliminary consideration indicates that “upstream” trading, i.e., at the fuel producer or distributor levels, is likely to be more feasible than at the “downstream” levels of vehicle manufacturers, operators, or individual users.

The problem of global warming is long term and the need to address this will be continuing. The approach that the Task Force focused on was to learn from the policies already in place to address criteria pollutants and begin to determine what similarities exist. Preliminary analysis has also indicated that automobile scrappage programs as a greenhouse gas reduction strategy will have severe limitations due to the relatively modest expected difference between on-road and replacement vehicles. Finally, the Task Force has begun to identify means by which climate-related objectives could be introduced into State and local transportation planning.

These efforts require more intense and more prolonged scrutiny before they can truly guide us in terms of policy direction. However, the progress made to date has already been useful, laying the groundwork that will enable the Department to develop its own transportation strategies, across the modes, and to argue forcefully and authoritatively for them.

### *Practical Concerns*

While the Task Force has made considerable progress in terms of creating an approach for DOT on greenhouse gases, and the issue is clearly an important one for the Administration, practical concerns regarding level of effort must be addressed if the institutionalization of the capability to deal with global warming issues is to take place at DOT. The need for such a Task Force is clear. Policy is being developed within the Administration, but with little input from the transportation community so far. In truth, the Task Force is just reaching a level of understanding and technical sophistication where a significant contribution can be made. But still the question remains, who speaks for the transportation community, and will objectives for DOT's constituency be set without consideration of major and thoughtful inputs from DOT?

The endeavors of the Task Force have thus far been initiated and conducted by staff. They have been voluntary, and as the level of effort on greenhouse gases increased, these endeavors have come to compete with other program responsibilities. This situation will be very difficult to sustain without a clearer indication of the relative importance of global warming to other staff responsibilities. These practical concerns fall into three major categories:

#### 1. Competing Priorities on Staff Time

The major work of the DOT staff is largely to implement applicable legislation and to conduct research relevant to its primary mission. As this relates to the environment, the existing responsibilities are numerous, and global warming initiatives come on top of those responsibilities. As the level of effort has increased through the need to examine in detail how transportation might contribute to GHG reduction, staff are effectively faced with a choice to work on identified priorities of their offices or to work on GHG efforts of the Task Force. This is more difficult in times of downsizing as the number of discretionary and available staff hours grow increasingly scarce.

## 2. Budgetary Concerns

Although the Department is funded for a number of activities that could complement greenhouse gas reduction objectives, it has identified little, if any funding for more direct support of the Administration's climate change proposal. For example, although the proposed Climate Change Technology Initiative (CCTI) called for \$1,292 million in R&D funding for FY 1999, and included \$356 million for transportation (mainly PNGV), \$26 million for the analysis of policies and market incentives, and \$57 million for program direction, no DOT funding was included in the request. Proposed funding levels are summarized below in Table 2.

| Federal Agency | 1997 Actual | 1998 Actual | 1999 Proposed | 1998 to 1999 \$Change | 1999-2003 Total Increase |
|----------------|-------------|-------------|---------------|-----------------------|--------------------------|
| DOE            | 657         | 729         | 1,060         | +331                  | +1,899                   |
| EPA            | 86          | 90          | 205           | +115                  | +677                     |
| HUD            |             |             | 10            | +10                   | +10                      |
| Commerce       |             |             | 7             | +7                    | +38                      |
| USDA           |             |             | 10            | +10                   | +86                      |
| R&D total      | 743         | 819         | 1,292         | +473                  | +2,710                   |
| CCTI total     | 743         | 819         | 1,713         | +894                  | +6,345                   |

Table 2. Proposed Funding (\$million) for Climate Change Technology Initiative

The President's FY 2000 Budget estimates that actual FY 1999 CCTI funding will total \$1,021 million, and proposes \$1,751 million for the CCTI in FY 2000, including \$1,368 in R&D spending by the agencies identified in Table 2. This includes \$216 million in proposed funding for EPA's portion of the CCTI.

Combined with legislatively prescribed research directives, cuts in a number of DOT research budgets, and uncertainty regarding the release of some research funds, this has resulted in an extreme scarcity of discretionary DOT resources for such efforts.<sup>4</sup>

## 3. Uncertainty

Very little is certain within a policy context, and the debate surrounding global warming is less certain than most other issues. It is the view of the Task Force that no matter what political course is ultimately chosen by world leaders following the Kyoto protocol, the issue of increasing greenhouse gas emissions will remain an important one for generations to come. Yet the uncertainty associated with the immediate course of action does have ramifications regarding the level of effort that is appropriate in a world of limited resources.

<sup>4</sup> At FHWA, for example, the environmental research budget has been cut a minimum of 7.5 percent for FY 1999. In addition, \$200,000 per year has been directed to the University of Alabama for atmospheric studies of global warming, and DOT has been directed to establish a surface transportation environmental advisory board. This has left little discretionary resources which have been taken up by existing, multi-year research efforts. At FHWA, this is forcing a hard look at competing research priorities in each of its major program areas. As a result, only 50% of the environmental research budget—after the 7.5% reduction—is being released.

The major uncertainty affecting the future work of the Task Force lies within DOT reflecting the uncertainty of when and how the U.S. will (a) participate in the Kyoto Protocol and (b) adopt laws to reduce greenhouse gases. While top Administration officials and DOT executives are committed to the President's program, Senate ratification of the Kyoto Protocol remains uncertain, as does subsequent implementation. There are many on Capitol Hill who are not yet convinced that there is enough scientific and economic certainty regarding global climate change and GHG mitigation to support the adoption of binding limits on GHG emissions. Within this context, the Task Force does not appear to have a clear indication from its management, the political and top career officials at the respective administrations, of the relative importance of greenhouse efforts.

### *Administrative Recommendations*

The Task Force believes that this effort is important. It is important for DOT to continue to enhance its technical and policy capability to contribute to the Administration's global warming effort. The Task Force charter ended in January, with no commitment to continue beyond that point. If it is to continue, a clearer indication of the relative importance of its work will be needed so that an appropriate level of effort can be determined. Assuming that this is important enough to continue, the Task Force recommends:

#### 1. Establishment of Executive Leadership for the Task Force.

The Task Force has operated under the tacit approval of the Policy Council. Yet as a Council, no single champion has emerged to assist coordination of modal efforts. Further, the Task Force recognizes that S-2 has been involved in Intra-Administration efforts on global warming and the NSTC, among other efforts, and has expressed a high degree of interest in seeing this work move forward. Staff at all of the modes are interested in continuing their initiatives. What is missing is a clear mandate that establishes senior management priorities, and hands-on direction that bridges the gap between top level Administration officials and staff efforts. The level of leadership that is needed is high, probably at the P-1 or comparable level. This leadership is needed to set a strategic direction for the group, to more fully engage top officials at the respective DOT administrations, and to indicate to the Administration that DOT will be a major player in the country's global warming effort. Establishment of such leadership would also clearly indicate the relative importance of this effort. Once selected, the new Executive Leader of the Task Force could form a small group of SES-level representatives, possibly consisting of interested members of the Policy Council, to help set this strategic direction.

#### 2. Establishment of a *Center for Transportation Environmental Analysis and Forecasting*

Under the new executive direction, the Task Force should work out the details for the continuation and institutionalization of a virtual intermodal *Center for Transportation Environmental Analysis and Forecasting*. These details should include the delineation of working relationships between modal representatives and commitment/sharing of resources. Even though the staff and resources of the virtual center will be shared with other functions, it must still

be clear that specified levels of staff time are to be dedicated to this work. This is the only way to establish the capacity which will allow us to take our place in the interagency and/or public dialogues with the authority that credible staff and contract support brings.

### 3. Development of Short- and Long- Term Goals and Objectives

The long term need to address global warming through research is reasonably clear. What appears to be lacking at this time is a sense of urgency to the efforts of the Task Force. Goals and objectives, particularly in the short term are necessary to keep the group focused. If the long term is the sole focus, Task Force efforts will ultimately take a back seat to more pressing matters. These short term goals and objectives need to be tied to the Administration's efforts for maximum effect. Working with the new leadership and the SES subgroup, the Task Force should establish how its efforts directly support Administration efforts on global warming.

### 4. Resources

The key question for the institutionalization of global warming issues at DOT is how to get the resources necessary. Other agencies have major budgets in this regard, yet DOT has no dedicated funding. In the short term, this problem is likely to be intractable. However, plans need to be developed that will increase research funding levels for all DOT modes. This could start in the FY 2000 budget, but more realistically, it will be later before significant levels of funding can be dedicated to this effort. The Task Force suggests that outreach efforts to Congress be initiated to raise awareness on this need. We recognize that Congress may not look favorably on efforts to consider the implications of the Kyoto Protocol in advance of ratification. However, the Task Force believes that a clear rationale for research, as distinct from implementation, could be made, particularly since major transportation facilities (ports, airports, and roads) can be put at risk from sea level rises in some areas. In addition, the aviation and maritime industries are subject to the international marketplace, and ICAO has already asked for direct action in response to the Kyoto Protocol, suggesting that a failure by the U.S. to engage effectively could have economic consequences.

### III. Climate Change Policy Context

This section presents a very brief summary of key policy considerations relevant to options analysis within the current Administration. As such, it emphasizes positions articulated by the President and senior Administration officials. It addresses positions of the Congress, other countries, and nongovernmental interests—such as industry, labor, and environmental organizations—where those positions seem likely to weigh heavily upon policy development. The purpose of this section is to facilitate the prioritization of program analysis by first attempting to identify some key apparent policy boundaries.

#### UNFCCC

Although the U.S. can take unilateral steps to address climate change, the global nature of the causal relationship is such that the *United Nations Framework Convention on Climate Change* (UNFCCC) was negotiated in 1992 to establish a global response framework. The ultimate purpose of the Convention is to stabilize atmospheric GHG concentrations “at a level that would prevent dangerous anthropogenic interference with the climate system,” where the level of danger is related to ecosystem adaptation rates, food production, and sustainable economic development. The Convention also includes five principles for implementation, which are summarized<sup>5</sup> below:

1. Developed countries<sup>6</sup> should take the lead.
2. The Parties should give full consideration to the needs and special circumstances of developing countries and countries facing a disproportionate or abnormal burden.
3. The Parties should take cost-effective precautionary measures.
4. The Parties should promote sustainable development.
5. The Parties should promote an open<sup>7</sup> international economic system.

The Convention includes a wide range of commitments for activities such as emissions inventories, reporting, and cooperation on promoting sustainable development, technology transfer, adaptation, and scientific research. It establishes a procedural framework for a Secretariat, a Conference of the Parties (COP), a Subsidiary Body for Scientific and Technological Advice (SBSTA), and Subsidiary Body for Implementation (SBI).

The Convention’s most prominent feature is the nonbinding aim of returning to 1990 GHG emission levels by the year 2000 in developed countries. During the negotiations in Rio de

<sup>5</sup> The actual text of these principles is carefully worded, and contains important nuances not reflected in this summary.

<sup>6</sup> In the group of “Annex I” countries, the UNFCCC includes both developed countries and former Soviet Union countries undergoing the transition to a market economy.

<sup>7</sup> This principle promotes the objective of sustainable economic growth and development, particularly developing countries. Also, “measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.”

Janeiro that produced the Convention, the Bush Administration opposed binding targets, in part because of concerns that the U.S. was one of very few countries with a legal framework considered reasonably applicable to such targets. The U.S., one of 176 countries that have ratified the Convention, did so in 1992.

### *U.S. Climate Change Action Plan*

In October 1993, the Clinton Administration completed the first U.S. *Climate Change Action Plan* (CCAP). The CCAP identified activities designed to reduce U.S. GHG emissions to 1990 levels by the year 2000. The following four transportation measures included in the CCAP accounted for 8 of the 109 MMT<sub>CE</sub> in projected GHG reductions in the year 2000:

1. Reform federal tax subsidy for employer provided parking
2. Adopt a transportation system efficiency strategy
3. Promote greater use of telecommuting
4. Develop fuel economy labels for tires

Taken together, the first three measures were projected to achieve 6.6 MMT<sub>CE</sub>. A new labeling requirement for replacement tires was projected to achieve 1.5 MMT<sub>CE</sub>.

### *"Car Talk"*

The *Policy Dialogue Advisory Committee to Assist in the Development of Measures to Significantly Reduce Greenhouse Gas Emissions from Personal Motor Vehicles*—or "Car Talk" Committee—was convened by President Clinton in 1994 and 1995 to develop consensus on how to most cost-effectively reduce America's GHG emissions from passenger cars and light-duty trucks to 1990 levels by the years 2005, 2010, and 2025. Participants included key Federal agencies, States, environmental organizations, manufacturers, energy companies, and other interests such as insurance industry representatives. The Committee agreed on important analytical assumptions and methodologies, and considered a very wide range of policies, a few of which—such as funding for PNGV and promotion of cellulosic ethanol—gained fairly widespread favor. However, although a "majority report" was prepared by many of the nonindustrial Committee members, the full Committee never submitted a consensus set of recommendations to the President. By most accounts, the inability to reach consensus stemmed from the combined effects of manufacturer opposition to CAFE, energy sector opposition to gas tax increases, and environmental organization insistence on enforceable regulations as at least a backstop.

### *COP-1/Berlin Mandate*

The first Conference of the Parties (COP-1), held in 1995 in Berlin, adopted the "Berlin Mandate", which began a process aimed at strengthening developed country commitments by setting quantified targets for post-2000 emissions. The Mandate proposed that the process be guided by several principles, including: the "widest possible cooperation" by all countries within the context of "common but differentiated responsibilities"; inclusion of all GHGs; and inclusion

of GHG sinks. The Mandate indicated that the process would not add new commitments for developing countries.

### *Senate Resolution 98 (Byrd-Hagel Resolution)*

On July 21, 1997, the Senate passed *Senate Resolution 98* by a 95-0 margin. This Resolution indicated that the U.S. should not be a signatory to any agreement regarding the UNFCCC that would either (a) mandate new commitments for Annex I Parties in the absence of specific mandated commitments in the same compliance period for developing country Parties or (b) result in “serious harm” to the U.S. economy. The Resolution also called for any agreement requiring the advice and consent of the Senate to be accompanied by a “a detailed explanation of any legislation or regulatory actions that may be required” for implementation, as well as an analysis of “the detailed financial costs and other impacts on the economy of the United States.”

### *President’s Proposal*

*President Clinton’s Climate Change Proposal*, which was released in October 1997, outlines fundamental Administration goals for both international negotiations and domestic actions, and proposes a shift from nonbinding aims to binding targets. Specifically, it calls for binding targets to reach 1990 emissions levels by 2008-2012 and reductions below 1990 levels in the 5-year period that follows. The Proposal also articulates the President’s five climate change principles, which are as follows:

1. Policies should be guided by science.
2. Policies should rely on market-based, common-sense tools.
3. Win-win solutions should be sought.
4. Global participation is essential, and the U.S. will not adopt binding obligations without developing country participation.
5. Policies should be informed by regular (every 5 years) common-sense economic reviews.

The second and fourth of these principles warrant special attention. The second principle indicates that because the U.S. has already demonstrated that the costs of protecting the environment mitigation are substantially lower if the power of markets is harnessed to do so, the President’s plan (see below) emphasizes permit trading. The fourth principle insists that developing countries participate, but not that every developing country assume equal commitments on the same schedule. Indeed, the specific wording suggests that collectively “meaningful participation” by developing countries would be acceptable.

Reflecting these principles, the President's plan proceeds in three stages:

Stage 1: Priming the Pump Through R&D, Tax Incentives, Incentives for Early Action, Federal Leadership, and Industry Consultations.

Stage 2: Review and Evaluation

Stage 3: Meeting Binding Targets Through Domestic and International Emissions Trading Program

Although the nine elements<sup>8</sup> of Proposal's *Initial Action Plan* under Stage 1 are considered to make sense as good energy and environmental policy irrespective of any international agreement on binding GHG limits, Stage 3 articulates the President's intentions regarding how the U.S. will ultimately address compliance with any such Senate-ratified limits. Indeed, both Stage 1 and Stage 2 are described as preparations for Stage 3, in which the U.S. "would reduce emissions to 1990 levels by 2008-2012, and below 1990 levels in the 5-year period after that, through a market based domestic and international emissions trading system."

### *COP-3/Kyoto Protocol*

The third Conference of the Parties adopted the *Kyoto Protocol*, which has, as its central feature, a set of binding emissions targets for developed<sup>9</sup> nations. The specific limits vary from country to country, though those for key industrial powers of the EU, Japan, and the U.S. are similar—8% below 1990 levels for the EU, 7% for the U.S., and 6% for Japan. The Protocol allows countries with targets to meet those targets as blocs, forming "bubbles" or "umbrella groups." Consistent with the President's Proposal, the emissions targets are to be reached over a five year budget period, the first of which will be 2008-2012. The emissions targets include six major GHGs,<sup>10</sup> and may be offset through activities that absorb carbon, such as planting trees.

The Protocol allows emissions trading (ET) among nations with emissions targets, such that countries can purchase less expensive emissions permits from countries that have more than they need.<sup>11</sup> The Protocol also provides for "Joint Implementation" (JI), through which developed countries may get credit toward their GHG target through project-based emissions reductions in other developed countries, and establishes a "Clean Development Mechanism" (CDM), through which developed countries will be able to use credits from projects in developing countries. The Protocol allows CDM-based credits obtained during 2000-2007 to be "banked" and used toward compliance during 2008-2012. Private sector companies can participate in all three "flexibility mechanisms."

<sup>8</sup>These include: (1) \$5 Billion in Tax Cuts and Federal R&D; (2) Credit for Early Action; (3) Industry-by-Industry Consultations; (4) Encouraging the Use of Energy-Efficient Products; (5) Federal Procurement and Energy Use; (6) Electricity Restructuring; (7) Setting a Concentration Goal; (8) Bilateral Dialogues; and (9) Economics and Science Reviews.

<sup>9</sup> i.e., Annex I countries

<sup>10</sup> CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, and SF<sub>6</sub>

<sup>11</sup> The Protocol indicates that any such trading "shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments," but does not set a specific threshold.

Groundrules for the CDM—for example, project auditing and verification procedures—were to be defined during the November 1998 COP-4 in Buenos Aires, Argentina. Principles and groundrules for ET are also to be defined by the COP, but the Protocol does not identify a schedule.

Importantly for transportation, the Protocol also indicates that developed countries will address GHGs from aviation and marine (i.e., shipping) bunker fuels, working through the International Civil Aviation Organization<sup>12</sup> (ICAO) and the International Maritime Organization<sup>13</sup> (IMO), respectively.

On November 12, 1998, the U.S. became the 60<sup>th</sup> country to sign the Protocol.<sup>14</sup> The Protocol will become legally binding when at least 55 countries, including developed countries accounting for at least 55% of these countries' 1990 carbon dioxide emissions, have signed and then ratified. As of November 12, 1998, the developed country signatories account for 78.7% of the group's emissions. Three countries—Fiji, Trinidad and Tobago, and Tuvalu—have ratified the Protocol.

#### *Additional Administration Statements*

The President has said that he will not submit the Kyoto Protocol to the Senate without meaningful participation from key developing countries.<sup>15</sup> Although the U.S. signed the Protocol in November 1998, the Vice President's accompanying statement included the following: "Signing the Protocol, while an important step forward, imposes no obligations on the United States. The Protocol becomes binding only with the advice and consent of the U.S. Senate. As we have said before, we will not submit the Protocol for ratification without the meaningful participation of key developing countries in efforts to address climate change." In a statement at the Buenos Aires negotiations, Stuart Eizenstat, Under Secretary of State for Economic, Business and Agricultural Affairs, indicated that "for many developing countries, 'meaningful participation' could mean slowing the rate of emissions increase while their economies continue to grow."

In December 1998, Deputy Transportation Secretary Mortimer Downey participated in an Eno Foundation conference on transportation and climate change, noting that despite the absence of a "silver bullet" to reduce emissions, the transportation sector can expect to be asked to carry its "fair share" of the climate change burden. These remarks did not indicate the extent to which such

<sup>12</sup> Working with the SBSTA, ICAO's Committee on Aviation Environmental Protection (CAEP) has been deliberating potential approaches to emissions allocation, as well as potential means of limiting or reducing greenhouse gas emissions from international aviation. A 1996 ICAO *Council Resolution on Environmental Charges and Taxes* noted differences among member States on such levies, and strongly recommended that any such levies be in the form of charges applied first to mitigation, rather than taxes with other fiscal aims; and on other market-based options such as emissions trading.

<sup>13</sup> The IMO Marine Environment Protection Committee, at its 42<sup>nd</sup> session in November 1998, agreed to develop a policy document on greenhouse gas emissions from ships, which when completed, will be forwarded to the UNFCCC.

<sup>14</sup> As of February 2, 1999, there are 73 signatories to the Kyoto Protocol.

<sup>15</sup> The Administration has not yet specifically defined a threshold, but has indicated that while the CDM provides a down payment on such participation, it is seeking greater engagement.

burden sharing might be manifested in either direct regulatory responsibilities or indirect cost sharing, but did identify emissions trading provisions as an area requiring close attention.

### *Administration Economic Analysis*

In July 1998, the President's Council of Economic Advisors (CEA) released *The Kyoto Protocol and the President's Policies to Address Climate Change: Administration Economic Analysis*. The central assumption of this analysis is that the U.S. makes GHG reductions in an efficient manner employing the flexibility measures of emissions trading (both domestic and international), joint implementation, and the Clean Development Mechanism. The analysis "takes credit" for neither carbon sinks, the President's *Climate Change Technology Initiative*, nor voluntary industry actions in response to the Administration's industry consultations. The analysis estimates that GHG permit prices would be \$14-\$23 per ton,<sup>16, 17, 18</sup> and would increase gasoline prices by 3-4%, or 4-6¢/gallon (\$1992), relative to baseline projections for 2010. It also concludes that U.S. GDP would be \$1-\$5 billion (\$1992) less in 2010 than otherwise. Because the analysis characterizes these costs as "modest," it may be appropriate to interpret them as at least one indication<sup>19</sup> of the Administration's "willingness to pay."

A notable feature of this analysis is its determination that "reducing greenhouse gas emissions, in particular carbon dioxide emissions, would, in effect, modestly raise energy prices." The analysis further indicates that "tradable greenhouse gas permits would also cause some shift in the fuel mix, away from carbon-intensive fuels, like coals, and toward carbon-lean and carbon-free fuels, like natural gas, nuclear, and hydropower."

This has at least two important implications: First, it reflects a recognition within the Administration—and presumably some level of acceptance—that coal consumption would be reduced.<sup>20</sup> Second, it reflects at least a default assumption by the Administration that permit-holding requirements would apply to the energy sector. The efficiency of energy-consuming capital equipment is assumed to be driven by the resultant increases in energy prices, and the range of other policy drivers and market forces—not by "devolved" Kyoto Protocol commitments. Thus, for example, the Administration appears to have assumed that while refiners or other entities in the energy sector might be required to hold permits, neither automobile manufacturers, States, nor individuals would be required to do so.

<sup>16</sup> carbon-equivalent metric ton

<sup>17</sup> Marginal CO<sub>2</sub> abatement cost curves were derived from Battelle Laboratory's "Second Generation Model" (SGM).

<sup>18</sup> The analysis notes that ET and CDM are vital to reaching permit prices in this range. Based on CEA's analysis, domestic-only trading would result in a permit price of about \$200/ton.

<sup>19</sup> On the other hand, it is not clear whether this represents an upper or lower bound.

<sup>20</sup> It should be noted that the full text in Stage 3 of the President's Proposal expresses a commitment to provide "proper assistance" to workers dislocated by changes in energy usage.

## *EIA Economic Analysis*

Responding to a formal request by the House Committee on Science, with specific guidance regarding assumptions, the DOE Energy Information Administration released *Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity* in October 1998. For the scenario designed to come the closest in its assumptions to those made by CEA, EIA projected a carbon price<sup>21</sup> of \$67 per metric ton,<sup>22, 23, 24</sup> with an associated gasoline price increase of 14¢/gallon (\$1996), and a \$44-\$76 billion (\$1992) reduction in average annual GDP during 2008-2012.<sup>25</sup>

While the considerably higher permit price estimates and economic impacts are a prominent feature of this report, one area of methodological consistency warrants close attention. Although EIA notes that emissions can be reduced through reduced demand, energy efficiency, and fuel switching, it relies on one assumption similar to CEA regarding fundamental approach: "To reduce emissions, a carbon price is applied to the cost of energy. The carbon price is applied to each of the energy fuels relative to its carbon content at its point of consumption... In practice, these carbon prices could be imposed through a carbon emissions permit system."

### *COP-4/Buenos Aires*

The fourth Conference of the Parties, held November 1998 in Buenos Aires, focused on "loose ends" in the Kyoto Protocol, including the above-mentioned flexibility mechanisms, but deferred decisions for future Conferences. According to Michael Zammit Cutajar, the Convention's Executive Secretary, "we now have an action plan with political timetables... The crunch will come at the sixth session of the Conference of the Parties at the end of the year 2000."

<sup>21</sup> EIA indicates that in its analysis, carbon prices "represent the marginal cost of reducing carbon emissions, reflecting the price the United States would be willing to pay..." It further notes that these prices "do not necessarily represent the international market-clearing price of carbon permits or the price at which other countries would be willing to offer permits."

<sup>22</sup> Like CEA, EIA projected much higher permit prices for more restrictive scenarios, ranging to as high as \$348/ton for domestic-only trading.

<sup>23</sup> In her 10/6/98 testimony before the House Subcommittee on Energy and Power, Dr. Margo Thorming (American Council for Capital Formation) summarized a range of estimates of permit prices during 2008-2012. These ranged to as high as \$260 and \$300 per ton with and without international trading, respectively. Included among these were previous DOE estimates of \$40 and \$130 per ton with and without international trading, respectively.

<sup>24</sup> A September 1998 study by Ellerman *et. al.* (MIT), *Analysis of Post-Kyoto CO2 Emissions Trading Using Marginal Abatement Curves*, considers permit prices under various levels of geographic scope and monopolistic market behavior. Estimates include: \$24/ton under world trading, \$186/ton for a closed U.S. trading system, and \$127 for trading only among Annex B countries (those for which the Protocol establishes targets). Interestingly, for OECD-only trading, the study projects that permits would cost \$240/ton, and that the U.S. would export permits to Japan and the EEC.

<sup>25</sup> EIA assumes that domestic permits would be sold in a competitive auction run by the Federal Government, raising \$128 billion in this scenario. The range in GDP reduction reflects the difference between returning these funds via (1) a personal income tax rebate and (2) a social security tax rebate. EIA also includes an estimate of the total cost to the economy (\$77-\$109 billion for this scenario), taking into account estimated loss in potential long-term GDP, and expenditures on purchases of international permits.

Three countries took the opportunity during COP-4 to make major announcements: Argentina announced that it intends to voluntarily adopt a GHG target for 2008-2012, Kazakhstan expressed its intention to join the group of industrialized countries and accept a legally binding target, and the U.S. signed the Kyoto Protocol.

The next session of the Conference of the Parties (COP-5) will take place from October 25 to November 5, 1999 in Bonn, Germany. The COP's subsidiary bodies will meet in May or June of 1999 in Bonn to prepare for that session.

#### *S. 2617 (Chafee-Mack-Lieberman "Early Action" Bill)*

In October 1998, Senators Chafee, Mack, and Lieberman introduced to the Committee on Environment and Public Works S. 2617, the *Credit for Voluntary Early Action Act*, which would amend the Clean Air Act to authorize the President to enter into agreements to provide regulatory credit for voluntary early action to mitigate greenhouse gas emissions. The proposal, which has not yet been reintroduced, would provide credit for both domestic and international activities, as well as for sequestration of carbon. It would also authorize the President to promulgate enabling regulations and guidelines covering a number of issues, examples of which include coverage, measurement and verification, pooling, baselining, new sources, and exclusions (e.g., of small and diverse sources). Importantly, the bill contemplates a future domestic greenhouse gas regulatory statute, but would not bind the United States to adopt (or not to adopt) any particular form of such a statute.

Also in October 1998, the President's Council on Sustainable Development (PCSD) recommended a set of "Principles for Early Action" to the President. PCSD's letter to the President expresses strong support for an early action program that need not be tied to the Kyoto Protocol, and recommends an incentive-based program that encourages broad-based participation, learning, innovation, flexibility, and experimentation; grants formal credit for legitimate and verifiable measures to protect the climate; ensures accountability; is compatible with other climate protections strategies and environmental goals; and includes local, state, and federal government leadership.

#### *President's 1999 State of the Union Address*

In his January, 1999 *State of the Union Address*, the President announced several climate change initiatives for FY 2000: a new *Clean Air Partnership Fund*; a package of tax incentives and investments to foster increased energy efficiency and greater use of renewable energy sources; and increased funding for basic scientific research.

The *Clean Air Partnership Fund* would provide \$200 million in FY 2000 to support state, local and private efforts that achieve early reductions in both greenhouse gas emissions and ground-level air pollutants. It is intended to enable communities to achieve clean air goals sooner, and would be administered by the Environmental Protection Agency under existing authority.<sup>26</sup> The

<sup>26</sup> It should be noted that this authority currently does not extend to GHG reduction. This implies that criteria pollutant reduction would likely be the dominant basis for the allocation of these funds.

package of proposed tax incentives and R&D investments includes tax credits for consumers who purchase fuel-efficient cars, funding for the Partnership for a New Generation of Vehicles, and funding for renewable energy, including innovative technologies to convert crops into power and fuels. The President's proposed budget for basic scientific research includes a new research project, the *Carbon Cycle Initiative*, which will seek to deepen our understanding of carbon "sinks," such as forests and farmlands.

The President also announced that the Administration will work closely with industry and the Congress during the upcoming year on legislation to reward companies taking early, voluntary action to reduce their greenhouse gas emissions or increase carbon sequestration, and will continue its vigorous diplomatic efforts to fill in key details of the Kyoto Protocol in areas such as international emissions trading, as well as to encourage the meaningful participation of developing countries in efforts to address global warming.

### *Summary and Discussion*

Key features of the Administration's plan to address climate change include (1) a shift from a voluntary approach to one with binding commitments and (2) an apparently unwavering interest in using flexible market mechanisms to meet those goals at the lowest possible cost. The Administration also views global participation as essential, and indicates that it will not submit the Kyoto Protocol for ratification without "meaningful participation of key developing countries."

The President's Proposal calls for the U.S. to ultimately meet any commitments "through a market based domestic and international emissions trading system." Importantly, the Administration's Economic Analysis reflects an assumption that compliance will be managed through a requirement that energy sector interests—not equipment manufacturers/operators or States—hold permits to emit greenhouse gases. On the other hand, the President's recent preview of a new *Clean Air Partnership Fund* reflects an interest in State, local, and private activities which can reduce emissions of both criteria pollutants and greenhouse gases.

The Administration's Economic Analysis projects "modest" economic impacts, in contrast with analyses by DOE/EIA and a number of other researchers, and it must be recognized that the Byrd-Hagel Resolution demands not only developing country commitments, but also evidence that any new commitments by the U.S. can be met without serious harm to the domestic economy.

Even assuming ratification of the Kyoto Protocol, and implementation according to the President's Proposal and consistent with assumptions of the Administration's Economic Analysis, there remain a wide range of unanswered questions. Indeed, the intent of the first two stages of the President's Proposal is to prepare for this third stage by gaining the necessary experience.

Each of the nine elements of the President's Initial Action Plan—which are not addressed in detail in this discussion—will raise such questions, and some may be relevant to transportation. How should tax credits for efficient vehicles be designed, and what enabling regulations would be needed? Under what circumstances should "early credit" be awarded, and what steps are needed to avoid "double counting" of reductions? What regulatory hurdles that discourage energy

efficiency should be removed? What changes in Federal vehicle procurement would be appropriate? Some of these issues appear to be under consideration through government-industry consultations that were included in the Initial Action Plan, and through consideration of the Chafee-Mack-Lieberman "Early Action" Bill and related recommendation by the PCSD regarding principles for early action.

Institutional issues associated with climate change stand in contrast to those associated with domestic urban air quality, in part because so many issues remain open. Under the Clean Air Act, States are responsible for plans to attain the ambient air quality standards which have been established by EPA. EPA plays a major role in mobile source and fuel regulation, but transportation planning must be consistent with air quality planning. Under the UNFCCC, national emissions targets are established through international negotiation, and subject to Senate advice and consent. However, it is not clear how any U.S. commitments under the UNFCCC might be devolved to the States, whereas devolution to energy sector interests is a much more common assumption. At the same time, clearly limiting official statements do not appear to have been made in this regard, and some linkage—perhaps nonbinding—between transportation planning and GHG planning may warrant consideration. The many ways in which national targets could be implemented will have important implications regarding the relative roles of different industries, levels of government, and agencies in addressing climate change.

There are also important questions about fuel economy regulations which, it should be noted, currently do not apply to vehicles accounting for about one third of transportation-related GHG, and are only available at the Federal level. Should they be a basis for U.S. compliance with GHG targets, or should they be utilized separately to anticipate and/or react to increases in fuel prices that result from energy sector expenditures on GHG permits?

As noted above, the Administration has projected that the "price signal" sent by permit-based emissions trading through 2012 will be 4-6¢/gallon. While some researchers have argued that the assumptions underlying these projections are overoptimistic, some other researchers have expressed concern this signal is too small to stimulate cost-effective efficiency gains, and would perpetuate wealth outflows to oil and permit exporters. As mentioned in the previous paragraph, efficiency standards could conceivably be used for at least some vehicles to respond to such concerns. In addition, other pricing policies have been suggested, such as fuel tax increases, congestion pricing, and pay-at-the-pump insurance. An important question could be to what extent such policies should be considered as complements to the emissions trading approach proposed by the Administration.

Finally, in addition to fundamental and specific questions related to early actions and eventual domestic and international emissions trading, similar questions may become important during deliberations by ICAO and IMO in response to the Kyoto Protocol. Because these are on a "separate track" specific to aviation and marine (i.e., shipping) emissions, and because the Department plays a direct representational role, they may be of particular interest.

#### IV. Transportation Strategies: Status of Phase I Analysis

As discussed in Section II, the Task Force has focused on ten strategies as a matter of immediate priority. These include:

- A. New Technologies to Achieve Higher Fuel Efficiency
- B. Tax Credits for Highly Fuel-Efficient Vehicles
- C. Accelerated Scrappage
- D. Efficiency Standards
- E. Alternative Fuels Research
- F. Fuel Volume and Carbon Taxes
- G. Changes in Travel Behavior
- H. Emissions Trading
- I. Joint Implementation and the Clean Development Mechanism
- J. Greenhouse Gas Objectives for States and Metropolitan Areas

Small working groups of one to three individuals explored each of these strategies and began assessing their expected performance relative to the criteria identified by the Task Force. The status of those efforts are summarized below for each strategy as follows:

- Summary—describes the strategy and reviews the state of knowledge
- Relevance to DOT—identifies expected level of interest/applicability to DOT
- Work Accomplished—summarizes status of efforts
- Recommendations—proposes policies for development and/or analysis, discusses resource requirements and necessary actions

##### *A. New Technologies to Achieve Higher Fuel Efficiency*

###### Summary

A 1997 report on energy technologies by 5 DOE laboratories concludes that transportation technologies have an enormous potential to reduce GHG emissions, but not for two decades or more.<sup>27</sup> Three general areas of research are considered here: light-duty vehicles, aeronautics, and other federally-supported technology development.

###### Partnership for a New Generation of Vehicles (PNGV)

The PNGV program, a decade-long collaboration between the federal government and the three major domestic automakers, was announced in 1993 by the Clinton Administration. The goals of the PNGV are to (1) advance manufacturing productivity, (2) rapidly deploy technologies that

<sup>27</sup> Interlaboratory Working Group on Energy-Efficient and Low-Carbon Technologies, *Scenarios of U.S. Carbon Reductions—Potential Impacts of Energy Technologies by 2010 and Beyond*, 1997, p. 5-54.

improve the efficiency of conventional vehicles, and (3) develop a class of vehicles that achieve up to a tripling in fuel economy. In 1997, the program went through "technology selection process," focusing on hybrid-electric vehicle (HEV)-drive, direct-injection engines, fuel cells, and lightweight materials. Manufacturers are to develop concept vehicles in 2000, and production prototypes in 2004. The PNGV agreement does not extend to commercialization, and most researchers project modest sales penetration beginning no sooner than 2006. Manufacturers have raised serious concerns regarding future emissions standards, the availability of cleaner fuels for diesel HEVs, and fuels from which hydrogen (for fuel cells) may be more easily extracted. The National Research Council has indicated that it does not believe HEVs will be cost-effective relative to lightweight vehicles with more efficient engines and mechanical drivetrains. PNGV's potential to independently reduce greenhouse gas emissions prior to 2013 is limited—probably to less than the equivalent of a 0.15% net reduction in light-duty vehicle energy demand. Further, because CAFE standards apply to the average fuel economy of each manufacturer's product line, the sale of high-MPG (e.g., 60-85 MPG) cars may not produce any net fuel economy gains, unless CAFE standards are adjusted accordingly.

### Aeronautics Research and Technology

The August 1995 National Science and Technology Council (NSTC) Report, *Goals for a National Partnership in Aeronautics Research and Technology*, concluded that "environmental issues are likely to impose the fundamental limitation on air transportation growth in the 21<sup>st</sup> century." Therefore, the NSTC proposed that a key national goal be to "ensure [the] long-term environmental compatibility of [the] aviation system." This goal was also considered important to the national economy because the aeronautics industry produces the largest trade surplus of any U.S. manufacturing industry, more than \$20 billion each year.

Although FAA has a substantial research program in areas where it has special responsibility (e.g., air traffic management), NASA has the legislative authority to maintain a leadership position for the U.S. in aeronautical science and technology. The FAA advises NASA in establishing programs for mitigating both noise and exhaust emissions that affect local air quality and climate. Most recently, the formal relationship is governed by an *Agreement Between Department of Transportation, Federal Aviation Administration and National Aeronautics and Space Administration Concerning a Partnership to Achieve Goals in Aviation and Commercial Space Transportation*, which was jointly signed by the agency administrators on October 9, 1998.

NASA programs regularly target improvements in fuel efficiency. These include improvements in both aircraft and engine systems technology for various classes of aircraft, but particularly for large commercial aircraft that use more than 80-percent of aviation fuel. At present, the NASA Advanced Subsonic Technology Program also has substantial goals to reduce emissions of nitrogen oxides (NO<sub>x</sub>) that produce ozone, a potent greenhouse gas in the upper atmosphere. Through this and other programs, NASA has established 10-year enabling technology goals for reducing CO<sub>2</sub> by 25 percent and NO<sub>x</sub> by 70 percent. However, the continued implementation of these programs is an issue being considered in the FY 2000 federal budget cycle. More firm plans for this possibly important effort will be known following Congressional action during the next year.

### Other Federally-Funded Technology Development

The DOE Office of Heavy Vehicle Technologies (OHVT) is charged with developing advanced technologies for all classes of trucks. Due to increasing demand for transport of goods and to continuing consumer demand for multipurpose vehicles (pickups, vans, and sport utility vehicles), trucks account for a growing portion of transportation petroleum use and greenhouse gas emissions. The goals of the OHVT program, to increase vehicle and engine efficiency and reduce emissions, have implications for reducing GHG emissions from trucks. OHVT's strategy focuses on the compression-ignition cycle (diesel) engine because of its inherent efficiency, reliability and durability. Program goals are to 1) develop technologies needed to support dieselization of Class 1-2 trucks, in order to achieve a 35% fuel efficiency improvement over equivalent gasoline-fueled trucks; 2) develop technologies for a low emissions Class 7-8 truck with a fuel efficiency of 10 mpg; and 3) develop high efficiency (55%) fuel flexible and dedicated gaseous diesel cycle engines.

Through the Advanced Bus Technology Program, FTA's Office of Technology facilitates research and development of advanced transit technologies and subsystems critical to achieving deployment, and eventual market introduction, of advanced vehicle technologies in the transit industry. There are several FTA programs with the objective of developing advanced high efficiency low criteria emission technologies for buses. While the primary goals of such programs is not to reduce GHG emissions, advances in these technologies, such as hybrid electric and fuel cell powered vehicles, achieve efficiency improvements and consequently lower GHG emissions.

In addition, the Advanced Technology-Transit Bus (ATTB) program aims to develop and deploy a lightweight, low-floor, low-emissions transit bus using proven advanced technologies developed in the aerospace industries, and the Demonstration of Universal Electric Transportation Subsystems (DUETS) program aims to design and develop advanced vehicle subsystems by adapting existing military and commercial technologies to the requirements of a hybrid electric system for a heavy-duty vehicle. FTA's fuel cell program also develops and demonstrates advanced low emissions technologies for transit applications. In conjunction with the U.S. Department of Energy, FTA developed a 30-foot fuel cell bus to demonstrate the viability of fuels cells as an effective power source for transit vehicles and is now demonstrating a commercially viable 40-foot phosphoric-acid fuel cell bus. A more advanced 100kW liquid-fueled, proton exchange membrane fuel cell designed for transit bus applications is currently under development. Over the past few years, FHWA has funded the evaluation of three hydrogen fuel cell buses in Chicago through the Congestion Mitigation and Air Quality (CMAQ) program.

Finally, MARAD is the Program Administrator for an Interagency Marine Fuel Cell Program. Partners include MARAD, RSPA, USCG, DOE, Navy, and NOAA. Two 2500 kW marine fuel cell plant design contracts were awarded via the Navy and are underway. One 500 kW fuel cell plant may be fabricated in future years. Ship/Fuel Cell plant interface studies are underway by Coast Guard and the Maritime Administration. Coast Guard also has awarded a worldwide Marine Fuel Cell Market Analysis contract. A possible shipboard fuel cell testing platform has been identified. The potential benefits of marine fuel cell power plants are myriad from ship

design, operations, manning and maintenance standpoints. As fuel cells do not require combustion, these benefits also include negligible CO, SO<sub>2</sub>, NO<sub>x</sub>, and particulate matter emissions. The projected high operating efficiency of fuel cells will also reduce CO<sub>2</sub> output.

#### Relevance to DOT

DOT should be interested in technology development, in general, because it is generally regarded as holding great promise as a means to reduce GHG emissions, and therefore must be taken into account during the consideration of policy options. Emissions benefits of these technologies are typically quantifiable, although economic implications may be more uncertain. The above-mentioned "5-Labs" report concludes that significant reductions would require meaningful public policy initiatives to advance new technologies—in particular a twofold to tenfold increase in research funding.

DOT should be interested in the PNGV because it is an active partner, conducting research to explore the safety implications of new vehicle designs. Although its potential to reduce near-term GHG emissions is limited, the PNGV enjoys broad political support, and may achieve technical progress with important longer-term implications.

The Department should be interested in the extent to which existing internal technical programs that, in addition to their primary goals, have some beneficial effect on GHG emissions. This information could be useful in developing DOT's general role within the Administration on climate change issues.

#### Work Accomplished

The Task Force was briefed by Department of Commerce staff on the status of PNGV, and by DOE staff on a broader range of technology and fuels research. In addition, Volpe Center staff have drafted a study of the infrastructure implications of next-generation vehicles, have reviewed the PNGV program as a general example of partnering between industry and the Federal government, and have explored its potential relevance to climate change.

#### Recommendations

The Task Force should take steps to ensure that its deliberations are informed by both public and non-public PNGV-related indications regarding the status of key technologies. The Task Force should also consider undertaking a more detailed assessment of "Goal 2" technologies and their potential relevance to CAFE and climate change, and an update of market penetration assumptions developed to support the "Car Talk" negotiations. More generally, the Task Force should develop and maintain a more complete and current understanding of technologies and technology development programs with important GHG implications, across all transportation modes.

## B. Tax Credits for Highly Fuel-Efficient Vehicles

### Summary

The President included a tax credit proposal for efficient vehicles in his FY 2000 budget request.<sup>28</sup> The proposal calls for credits ranging from \$1,000 to \$4,000 per vehicle, depending upon the increase in fuel economy relative to comparable in-class vehicles. These credits, summarized below in Table 3, would apply to purchases between 2003 and 2006.

| Credit  | Efficiency Increase | Eligible Purchase Dates |
|---------|---------------------|-------------------------|
| \$1,000 | 1/3                 | 1/1/03-12/31/04         |
| \$2,000 | 2/3                 | 1/1/03-12/31/06         |
| \$3,000 | 100%                | 1/1/04-12/31/06         |
| \$4,000 | 200%                | 1/1/04-12/31/06         |

Table 3. Proposed Tax Credits for Fuel Efficient Vehicles

This proposal expands a similar proposal made in the President's FY 1999 budget request by adding incentives for vehicles achieving less than a doubling of fuel efficiency. Analysis of the FY 1999 proposal by EPA's Office of Mobile Sources and the Department of Treasury projected a program cost of \$660 million during 1999-2003. The FY 1999 budget request estimated that aggregate sales of 2X and 3X vehicles during 1999-2003 would be on the order of 200,000 vehicles. As implied above, such voluntary sales of 2X and 3X vehicles would likely not yield net GHG benefits without either corresponding increases in CAFE standards or "off-CAFE" regulation of participating vehicles. Even with such policies, the aggregate GHG benefit through 2012 of sales during 1999-2003 would likely be modest (assuming benefits of at most 2/3 tonne<sub>CE</sub>/year each, aggregate benefits on the order of 2 MMT<sub>CE</sub> are plausible). Longer-term impacts of the incentives were viewed as speculative by Treasury, and were not estimated.

The tax credits proposed in the FY 2000 Budget are projected to cost about \$900 million during 2000-2004. This includes a much smaller decrease in tax receipts due to the proposed extension of the electric vehicle tax credit (up to \$4,000 per vehicle). Further details, for example regarding projected aggregate sales, are not publicly available as of February 24, 1999.

### Relevance to DOT

DOT should be interested in tax credits for efficient vehicles because changes to CAFE regulations could be required in order for this strategy to be effective. Through 2012, this strategy does not appear likely to yield significant GHG benefits. In the longer term, there may be greater potential to generate significant benefits by "seeding" a market for high-efficiency vehicles, but this appears too uncertain for meaningful analysis.

<sup>28</sup> The FY 1999 predecessor of this proposal is reviewed in *Global Climate Change: The Energy Tax Incentives In the President's FY1999 Budget* (Congressional Research Service Report #98-193E, March, 1998)

## Work Accomplished

Volpe Center staff have reviewed the Administration's proposed tax credits for 2X-3X vehicles, have identified potential regulatory issues, and have performed simple calculations regarding potential GHG benefits.

## Recommendations

After confirming continued Administration interest in this strategy, the Task Force should conduct a more thorough analysis of potential regulatory changes that would be required to implement tax credits for highly efficient vehicles, as well as potential emissions reductions. It should work closely with Treasury and EPA staff in doing so, and in reviewing any estimates of budgetary implications. Extension of this strategy to other vehicle types should be considered as a lower-priority analytical activity, in parallel with consideration of efficiency standards for such vehicles.

### *C. Accelerated Scrappage*

#### Summary

This preliminary report discusses the potential greenhouse gas emissions reduction potential of vehicle scrappage programs based on several literature reviews and case study examples. Based on the literature review and case study examples, the potential reductions of carbon dioxide emissions via vehicle scrappage is quite limited at generally less than 1 million metric tons of carbon equivalent (MMT<sub>CE</sub>). The range of carbon reductions was found to increase if hybrid electric vehicles were used as replacement vehicles (1.68 MMT<sub>CE</sub> reductions), as long as those HEVs were excluded from the manufacturer's CAFE. The type of replacement vehicle used had a significant impact on how much carbon emissions would be produced or mitigated.

#### Relevance to DOT

DOT should be interested in accelerated scrappage because of the potential implications for the composition of the overall in-use fleet, and because of the relationships between scrappage-related GHG benefits and CAFE.

#### Status

FHWA staff have made an extensive review of the literature regarding vehicle scrappage, have developed estimates of potential GHG reductions available through this strategy, and have completed a stand-alone report documenting findings.

#### Recommendations

Any vehicle scrappage programs directed at GHG reduction should consider potential leakage effects of U.S. export vehicles traded to other countries. Further research efforts are recommended for the following areas: 1) early market incentives for new fleet technologies;

2) cost effectiveness of scrappage programs (indirect and direct); 3) implications of multiple vehicle households based on 1995 NPTS; 4) effects of enhanced and hybrid I/M programs on scrappage programs; and 5) leakage effects of U.S. passenger vehicles exported to the world market. Based on Phase I study findings, DOT should not focus on national scrappage programs as a major CO<sub>2</sub> mitigation strategy.

#### *D. Efficiency Standards*

##### *Summary*

U.S. CAFE standards currently apply separately to new passenger cars (27.5 MPG) and light trucks (20.7 MPG) up to 8,500 pounds GVWR. Congress and NHTSA establish standards, and EPA administers fuel economy testing. Based on available research, modification of the CAFE program could yield significant GHG benefits to be counted toward any U.S. commitments under the UNFCCC, although such benefits would likely be expensive relative to the \$14-\$23/ton CEA estimate of the permit price under an international emissions trading regime. Alternatively, any CAFE changes could be excluded from any U.S. compliance plan, and utilized separately to address the economic impact of the market price of GHG permits under a broad-based domestic and international emissions trading regime. Either way, there are at least four changes that could be considered as elements of a "CAFE Reform" legislative proposal, which the Administration could include in a broader legislative agenda for climate change: First, a combined standard for cars and light trucks could be adopted. Second, manufacturers could be allowed to trade CAFE credits. Third, coverage of light trucks could be extended up to 10,000 pounds GVWR. Fourth, legislation could establish either a rate of increase in CAFE stringency or an updated process for identifying such a rate through subsequent regulation. Future analysis could focus on the market implications of new program flexibility (e.g., first two elements), and the potential to achieve near-term fuel economy gains through "Goal 2" PNGV technologies.

Efficiency standards for larger vehicles are plausible, but would require new statutory authority and probably new test equipment and procedures. Although EPA enforces emissions standards for heavy vehicles, these standards are based on engine dynamometer testing. This testing could form the basis for engine efficiency standards, but not standards for overall vehicle efficiency, which require chassis dynamometer testing.<sup>29</sup>

##### *Relevance to DOT*

DOT should be interested in efficiency standards because it has a major role in their administration, and because they have a direct relationship to carbon dioxide emissions. Changes in current CAFE standards could significantly reduce future GHG emissions. Depending upon

<sup>29</sup> EPA conducts such testing during the course of certifying that new automobiles and light trucks comply with criteria pollutant emissions standards (i.e., NMHC, CO, and NO<sub>x</sub>). EPA is currently considering more stringent standards under the "Tier II" provisions of the Clean Air Act. The California Air Resources Board (CARB) has recently made considerable changes to its more stringent Low Emission Vehicle (LEV) program, requiring that diesel vehicles meet "gasoline-equivalent" emissions standards, and that light trucks meet automobile emissions standards. Historically, there have been engineering tradeoffs between NO<sub>x</sub> control and fuel efficiency.

stringency, leadtime, and structural regulatory changes, those reductions could be reasonably cost-effective. Even if CAFE standards are not counted toward U.S. compliance with any binding GHG targets, they could still play an important role in mitigating the economic impact of expenditures on imported GHG permits. Of course, rulemaking related to CAFE has been legislatively restricted in recent years.

#### Work Accomplished

Volpe Center staff have reviewed recent analyses and proposals relevant to efficiency standards, and have explored the potential role of such standards in the climate change arena.

#### Recommendations

The Task Force should quickly draft a proposal and supporting analysis that could, for example, be included in a broader climate change or other legislative proposal. The proposal could be specific, as discussed above, or could more generally initiate a process that leads toward such statutory and regulatory changes. In addition, the Task Force should initiate a study of the implications (e.g., energy, emissions, employment, economic competitiveness, and fleetwide safety) of such changes. Exploratory research regarding potential efficiency standards for heavier vehicles could be of interest, but should be treated as a lower priority at this time.

#### *E. Alternative Fuels Research*

##### Summary

This strategy focuses on supporting the development of alternative fuel technologies that reduce GHG emissions for both light- and heavy-duty vehicles. The use of alternative fuels with low full fuel-cycle GHG emissions offers an opportunity to complement any reduction in GHG emissions that is achieved through changes in vehicle efficiency and/or transportation demand. Alternative fuel development and deployment strategies, for the most part, focus on replacement of traditional transportation fuels. Much of the impetus for use of alternative fuels has been to reduce criteria emissions in order to meet NAAQS, or to ensure energy security through reduced dependence on imported petroleum. To that end, Federal and state alternative fuel programs (both research and deployment programs) have been focused on fuels and technologies that advance these goals. While the issue of GHG impacts from alternative fuel initiatives has been examined, it has not been a primary goal to date.

Increased use of alternative fuels could substantially reduce GHG emissions or, in some cases, have a negative impact. Alternative fuels derived from fossil energy sources have limited potential to reduce greenhouse gas emissions. However, on a full fuel cycle basis, alternative fuels derived from renewable energy sources have the potential to substantially reduce greenhouse gas

emissions. A 1996 report by DOE's Office of Policy and International Affairs reaches the following conclusions regarding transportation fuels:<sup>30, 31</sup>

*"Indeed, the only alternative fuels with decisive CO<sub>2</sub> emission advantages are hydrogen derived from solar energy and alcohols and methane derived from biomass. As a result, the Department of Energy has focused its renewable transportation fuels research on the production of ethanol or methanol produced from lignocellulose (woody biomass)."*

Several barriers must be overcome for widespread use of such fuels including resistance to new vehicle technologies, vehicle and fuel costs, fuel production and distribution, and concerns about safety, toxicity and vehicle performance. Moreover there is a renewed interest in gas-to-liquid fuels derived from coal, natural gas or biomass, where lifecycle GHG emissions depend upon processing advances.

This strategy will examine various alternative fuel technologies, the barriers to significant market introduction and/or penetration and their potential to achieve GHG emissions reductions on a life-cycle basis. The linkages between alternative fuel R&D programs and programs aimed at deploying these technologies into the fleet could also be examined.

#### Relevance to DOT

DOT should be interested in alternative fuels research because it has a role under TEA-21 in promoting the use of such fuels and developing some compatible vehicle technologies and because of their overall relevance GHG mitigation. In addition, transportation funding is influenced by the differential taxation of certain fuels (e.g., ethanol). Finally, DOT is responsible for any regulations that may be required to ensure the safety of vehicular fuel systems and the infrastructure used to distribute fuels (e.g., pipelines, hazardous materials transportation).

#### Work Accomplished

FTA staff have assembled a collection of alternative fuel technology reference materials, and have drafted a briefing paper on the alternative fuels vehicle technologies, with an emphasis on bus applications.

<sup>30</sup> U.S. DOE, *Policies and Measures for Reducing Energy Related Greenhouse Gas Emissions—Lessons from Recent Literature*, July 1996, p. 5-35.

<sup>31</sup> A recent study by Argonne National Laboratory, *Fuel-Cycle Energy and Greenhouse Gas Emissions Effects of Fuel Ethanol* (January, 1999), estimates that, based on updated data regarding the productivity of U.S. corn farming, even corn-based ethanol might offer considerable (but still much less than cellulosic ethanol) fuel-cycle GHG reduction.

## Recommendations

Goals of mitigating GHG emissions must be balanced with goals to ensure energy security and reduce criteria pollutant emissions in order to determine what research or incentive/mandate programs to support. An understanding of the limitations of certain technologies will enable resources to be spent on the most promising technologies. Federal programs, such as EPA's fleet mandates or CMAQ will impact how and which alternative fuels are introduced into the market. Cost-effective alternative fuel sources and infrastructure will be necessary for conversion to clean fuel technologies. CMAQ funds can already be used for this purpose, but a National policy needs to be brought to light in order for consistency and transparency.

The Task Force should conduct a more comprehensive literature search on alternative fuel technologies, and develop a synthesis study of alternative fuel options for GHG mitigation. Based on this study, and coordinating closely with DOT, the Task Force should determine the potential for GHG reduction achievable through market penetration of various alternative fuels technologies into the light- and heavy-duty markets.

### *F. Fuel Volume and Carbon Taxes*

#### Summary

This strategy addresses both volume- and carbon-based national fuel tax increases, and considers social costs and benefits. Increasing the Federal "gas tax" would effectively raise the real price of motor fuels in the United States. If indexed for general price inflation, it would raise the long-run price of motor fuels. Short-run effects include less fuel consumption and reduced vehicle miles traveled (VMT) per capita as a result of shifting commute patterns (e.g., alternative modes, trip chaining, and/or foregone trips). Long-run effects (assuming the tax is indexed for inflation) includes a shift towards more fuel-efficient vehicles, and more efficient land use decisions. Of course, the magnitude of the effects depends upon the magnitude of the real price change and its duration.

Studies examined by the Analytical Team have found short-term price elasticities ranging from  $-0.05$  to  $-0.5$ , with many falling in the  $-0.2$  to  $-0.3$  range. For example, a price elasticity of  $-0.5$  indicates that a 10 percent increase in the real price of gasoline (about 10 cents at today's prices) would reduce consumption by approximately 5 percent. Long-run price elasticity of demand estimates range from  $-0.2$  to  $-1.0$ , generally speaking.

One alternative to increasing the Federal motor fuels tax is to implement a nationwide carbon tax, which would be applied at the point of production for fossil fuels (e.g., coal, natural gas, and petroleum) and would be based on the carbon content of each fuel type. Other impacts, in addition to less fuel consumption per capita, would be fewer carbon emissions per capita in the short-run, and a shift away from carbon-based fuels and into a range of alternative fuel sources in the long-run.

In addition, it should be recognized that emissions trading based on the energy sector, discussed below and in Section III, could have important similarities to a carbon tax. In particular, such a trading system is expected to increase the price of high-carbon fuels. However, for a given GHG budget, that price increase could be considerably smaller under a trading regime, where relatively inexpensive supplies of allowances may be available in other countries and/or sectors.

#### Relevance to DOT

Interest in raising the Federal motor fuels tax or implementing a nationwide carbon tax would presumably be high because of its ability to yield sizable reductions in per capita carbon emissions. Lower carbon emissions per capita would occur as a result of lower fuel consumption per capita, as well as a shift to more fuel efficient vehicles or alternative fuels. Other benefits from implementing these strategies would be that effects would occur relatively quickly because of their nationwide coverage (thereby meeting the temporal objectives established by the DOT Task Force) and because the infrastructure for collecting and enforcing Federal motor fuel taxes is well established. Additionally, both strategies would help to fulfill broad DOT goals.

Implementing these strategies would appear very difficult in today's political climate though, and objections have been raised to motor fuel volume and carbon taxes on the grounds that they are inequitable. Looking at motor fuel volume taxes, those in lower income groups spend a larger percentage of their annual household income on gasoline and motor oil than do households in higher-income brackets. Additionally, fuel consumption patterns differ significantly by state and between urban and rural locations. Those in rural areas, with few transportation alternatives, would bear a higher burden of a motor fuels tax increase than those in urban areas, and those large, rural Western states might pay more than those in urbanized Northeastern states.

#### Work Accomplished

FHWA staff have developed a basic strategy description and initial reference list.

#### Recommendations

The first step should involve a synthesis study which incorporates the findings of those papers and studies included in the reference list, plus additional research studies obtained from completing a more comprehensive search. Upon assembling a synthesis paper, the DOT Task Force would presumably determine whether the information assembled is specific enough to develop a policy recommendation. One element which may need further analysis beyond the synthesis paper is a fairly specific analysis of the carbon reduction impacts from implementation of these two strategies. If so, the Task Force might consider undertaking a new, direct comparative analysis of a specific increase in the motor fuels tax versus implementation of a nationwide carbon tax. Such a study could be performed at relatively low cost (e.g., less than \$50,000 presumably) using an "off-the-shelf" dynamic input-output model, which has the ability to examine the income, output, and employment impacts by industry and region of the country. Of course, this model would have to be coupled with a traffic simulation model which has a "reasonable" capability to measure the carbon emission impacts from the two tax strategies proposed above.

## *G. Changes in Travel Behavior*

### *Summary*

Accomplishing significant changes in travel behavior (and by extension, freight movement behavior) could require an integrated range of policy options, aimed at maximizing individual and firm choice while presenting sufficient information to allow consumers to make environmentally intelligent choices. Possible techniques include: collecting and disseminating comparative cost information on individual and firm transportation decisions, by mode and by travel distance; fostering community design that reduces auto dependence and VMT; supporting efforts (possibly with tax breaks) to institute "green audits" and "green marketing" comparable to the program in Sweden; or undertaking a nationwide "health campaign" to encourage individuals to walk and bicycle for certain short-distance trips that would otherwise be made by SOV. These techniques take a long time to implement, but their effects have the potential to reduce individual or firm VMT without increasing emissions in other ways. Their importance is underscored by the fact that walking is the second most used mode among Americans over sixty-five years of age, who will represent one sixth of the population by 2020.

### *Relevance to DOT*

DOT should be interested in changes in travel behavior because some of its primary stakeholders (e.g., State transportation agencies) could play a major role in developing and implementing programs and incentives in this area, and because such changes, when significant, can have important implications for other DOT Strategic Goals.

### *Work Accomplished*

The breadth of this subject and the uncertainty of research funding availability led to postponement of work in this area.

### *Recommendations*

First steps in researching these techniques would involve demonstrating those considered most likely to achieve significant benefits, as identified in a current literature search. This is an area of significant academic and professional activity in recent years.

## *H. Emissions Trading*

### *Summary*

The U.S. position in Kyoto and Buenos Aires discussions has focused on market-based mechanisms for achieving greenhouse gas reductions. One such mechanism is a domestic and international emissions permit trading system. There is significant potential to both price emission reductions and to implement a rational reduction scheme in the transportation sector via emission trading. This requires the establishment of a trading scheme in which it is ultimately clear which

entities are required to hold emissions permits, how and in what quantity those permits will be made available, and what domestic and international rules govern the accumulation, use, and trade of such permits. As discussed in Section II, the working assumption within the current Administration appears to be that permit-holding requirements would reside in the energy sector (e.g., refineries). The Administration's Economic Analysis projects that this approach would increase gasoline prices by 4-6 cents per gallon. However, other options for the transportation sector are plausible. With enabling efficiency certification requirements and GHG projection methodologies, vehicle manufacturers could conceivably be required to hold permits covering the future emissions of new vehicles. Transportation companies and/or individuals could conceivably face such requirements, as could States.

The President's proposed *Initial Climate Change Actions* also seek credit for early action: "To provide an immediate incentive for near-term actions to cut emissions, the Administration is committed to ensuring that firms which act early are rewarded appropriately. We will work with companies to build a program that appropriately rewards those who take prompt and early actions before the beginning of the mandatory emissions budget period in Stage 3." This will require the development of a baseline to facilitate the creation of "early" emission credits. As discussed in Section II, such issues are considered in recent recommendations by the President's Council on Sustainable Development (PCSD), and the pending Chafee-Mack-Lieberman "Early Action" Bill could result in significant near-term interest in this aspect of emissions trading. Indeed, at least one company, British Petroleum, has already announced plans to experiment with emissions trading between its own facilities in different countries.

In addition, as discussed in Section II, groundrules for "flexibility mechanisms" under the Kyoto Protocol—including emissions trading—are to be defined by the Conference of the Parties, likely before 2001.

#### Relevance to DOT

DOT should be interested in emissions trading because the President has proposed "meeting binding targets through [a] domestic and international emissions trading program," because the Administration's Economic Analysis appears to assume that the transportation sector participates in such a program through a requirement that permits be held by fuel providers, and because there would be *winners* and *losers* among transportation stakeholders under any emissions trading scenario.

#### Work Accomplished

The Task Force has been briefed on emissions trading issues by a number of outside experts, including EPA, Resources for the Future, and the Center for Clean Air Policy.

#### Recommendations

In June of 1998, Volpe Center staff organized a seminar on transportation and emissions trading, with planned participation of the Department of State, energy companies, vehicle manufacturers,

transportation companies, States, trading exchanges, and other stakeholders. The seminar was to have addressed many of the considerations identified above. In response to concerns regarding pending language in the FY 1999 EPA appropriations bill, the seminar was postponed indefinitely. If related concerns have subsided to the point that appropriate assurances can be given to invitees, it may be appropriate to reschedule the seminar and refocus it toward credit for early action.

In addition, the Federal Transit Administration has received a proposal to compare upstream and downstream approaches to emission credits trading. The goal of this effort is to identify the option with the likeliest beneficial cost/benefit ratio, if implemented within U.S. borders. The proposal assumes that an effective trading system would have to be proven domestically before it could be implemented in cross-border transactions. The next step would be to fund this project (FTA as thus far committed one-half of the cost in its policy research plan for FY 1999) with the goal of estimating potential costs per ton of carbon emission avoided for an upstream approach versus a downstream approach. This could be completed by November or December of 1999.

The Task Force should pursue further analysis in this area, either through the above proposal and/or other mechanisms. However, if DOT is to become an active participant in ongoing policy development and negotiation in this area, it cannot wait for such analysis. Rather, it will have to become directly involved, almost immediately, in ongoing intra-Administration efforts and international meetings under the UNFCCC.

### *I. Joint Implementation and Clean Development Mechanisms*

#### *Summary*

The Kyoto Protocol provides for the use of flexible mechanisms for Annex I and non-Annex I countries in order to achieve a worldwide average reduction of greenhouse gas emissions of 5.1% by the 2008-2012 timeframe. Joint implementation (JI) efforts, already underway since the UN Framework Convention on Climate Change was ratified on May 4, 1992, provide for voluntary efforts by participating nations to fund projects geared toward greenhouse gas emission reductions and allows the sponsoring country emission credits for this purpose. Clean development mechanisms (CDM) would allow developed Annex I countries the opportunity to sponsor projects in developing countries (non-Annex I) for purposes of achieving greenhouse gas emissions reductions. For example, the Federation Internationale de l'Automobile (FIA) recently funded an enhanced forestry project in Chiapas, Mexico, demonstrating the ability to offset all emissions associated with running the Formula One race for approximately \$10 per ton (i.e., less than 3 cents/gallon).

Notably, the Kyoto Protocol would allow CDM-based credits to be "banked" beginning in the year 2000. The transportation sector has an opportunity to reduce emissions either through joint implementation and clean development mechanisms via the Kyoto Protocol upon its formal Congressional ratification. As is discussed in Section II, groundrules for the CDM—for example, project auditing and verification procedures—were to be defined during the November 1998 COP-4 in Buenos Aires, Argentina, but will likely be under continued development between now and the year 2000. Many observers note that even if such procedures are established and funds

for CDM projects become more plentiful, successful and significant utilization of this mechanism will be dependent upon the degree to which potential host Nations recognize its importance for climate change and broader sustainability goals.

### Relevance to DOT

DOT should be interested in JI and the CDM because these strategies, particularly the latter, may offer the potential for significant reduction in the cost of meeting binding requirements under the pending Kyoto Protocol. According to a 1996 report by DOT's Australian counterpart, "planting trees is the only measure that can (eventually) absorb all of the carbon dioxide emissions... produced by the transport sector from 1996 to 2015."<sup>32</sup> While considerable forestry-based credits may be available in the U.S., the CDM is the only mechanism under the Kyoto Protocol that provides access to potentially attractive forestry-based and other credits in developing countries.

### Work Accomplished

In 1996, Volpe Center staff arranged a meeting between DOT, DOE, EPA, and State to discuss emissions trading and JI, and gave a presentation on potential transportation sector opportunities at a workshop in Jakarta on Activities Implemented Jointly (AIJ). The purpose of the workshop, which was sponsored jointly by the U.S., Australia, and Indonesia, was to explore opportunities for AIJ in southeast Asia. FHWA and Volpe Center Staff have since reviewed the Kyoto Protocol, draft Administration position papers on JI and CDM, and projects that have been sponsored to date through the U.S. Initiative on Joint Implementation.

### Recommendations

The Task Force should pursue further research and analysis regarding potential transport sector opportunities (both as "buyer" and "seller") under JI and CDM, addressing issues such as project types and strategies, and greenhouse reduction estimation techniques. Based on the potential for "banking" of CDM-based credits beginning in the year 2000 under the Kyoto Protocol, and the planned development beforehand of CDM-related administrative requirements, the Task Force should pursue direct and immediate DOT involvement in related Administration policy development and international negotiation. The Task Force should also develop and implement a strategy to approach potential private sector project sponsors, such as refineries, to ensure that the transportation sector can benefit appropriately from JI- and CDM-based cost savings.

### *J. Greenhouse Gas Objectives for States and Metropolitan Areas*

#### Summary

This strategy utilizes state, regional, or metropolitan area objectives to reduce GHG emissions. Objectives would be set to achieve reductions from state or local baseline emissions levels to contribute to international and national GHG reduction goals. This approach differs from other

<sup>32</sup> Australia BCTE, *Transport and Greenhouse: Costs and Options for Reducing Emissions*, Report 94, 1996.

strategies with clearer costs and benefits by providing a broad policy structure through which other initiatives would be locally deployed. Under this broad policy framework, local governments would have flexibility to identify cost-effective transportation investments and initiatives that best satisfy local GHG objectives, including emissions trading, scrappage, travel behavior strategies, integrated land use policies, or gas or carbon taxes.

A GHG objectives strategy could support devolution as encouraged by TEA-21, which encourages comprehensive technical transportation planning and a broadly participatory process to produce financially realistic plans and programs. In non-attainment areas, plans and programs must meet air quality targets. "Mainstreaming" planning for GHG reduction within state and metropolitan transportation and environmental planning processes would contribute to a more realistic understanding of the major contribution transportation makes to climate change, and encourage a more integrated approach to local transportation decision-making. The strategy would move decision-making to governments able to plan and design projects according to local conditions and sentiments, and would further implementation of TEA-21.

#### Relevance to DOT

DOT should be interested in greenhouse gas targets for States and metropolitan areas because of its role in implementing TEA-21, and its relationship to State and local transportation decision makers. State or local objectives could be set to produce whatever reduction is sought, and local governments would select locally appropriate strategies to meet objectives, consistent with national principles of devolution exemplified by TEA-21. This approach would move decision-making for GHG reductions into the mainstream of State and metropolitan transportation planning, supporting successful implementation of TEA-21.

#### Work Accomplished

Volpe Center, FHWA, FRA and FTA staff completed a strategy description and analysis and presented it to the Task Force for discussion and comment.

#### Recommendations

The Task Force may wish to expand the paper into a complete policy level or white paper for discussion within DOT and with nonfederal stakeholders. Topics might include local incentives and links to other climate change strategies, including emissions trading. Further analysis of quantification and institutional issues related to this strategy may also be appropriate.

## V. Conclusion

Most climate scientists agree that anthropogenic greenhouse gas (GHG) emissions are already having a discernable effect on the Earth's climate. The U.S. is currently responsible for about one quarter of those emissions, and combustion of fuel for transportation purposes accounts for 26 percent of the U.S. inventory of GHG emissions. In the U.S., emissions are growing faster in the transportation sector than in any other sector.

The President has proposed a broad strategy for addressing climate change, and the Administration is in the midst of international negotiations and domestic discussions to pursue that strategy. If ratified, the Kyoto Protocol to the U.N. Framework Convention on Climate Change would limit average annual U.S. GHG emissions during 2008-2012 to 93% of their 1990 levels. However, the Protocol would also provide for flexible market-based approaches to meeting those targets, and the Administration's strategy envisions meeting binding targets through a domestic and international emissions trading program.

It is not clear at this time how such targets would impact the transportation sector. It is also not clear how the transportation sector would participate in a broad-based emissions trading program, although management through providers of transportation fuels appears to be a plausible approach. There is a very wide range of strategies relevant to the transportation sector that could be considered as either alternatives or important complements to such an approach.

The Task Force has reviewed ten such strategies, and has found that while several specific substantive recommendations can be made at this time, further study is warranted for every strategy except accelerated vehicle retirement, which offers limited promise as a GHG strategy.

The Task Force's efforts have greatly expanded the Department's internal knowledge base in the general area of climate change and strategies for reducing GHG emissions, but have been very constrained by competing demands on staff time, budgetary constraints, and broad uncertainty regarding climate change policy and its importance to the Department.

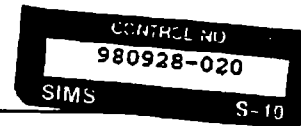
The Task Force observes that an international and domestic response to the climate change problem continues to evolve, and senses that this response will inevitably involve the transportation sector in some manner. The Task Force recommends that the Department play a significantly more active role in ongoing domestic and international policy development. This will require expertise, commitment across all modes, and resources. The Task Force recommends that the Department establish a virtual DOT Center—a network of DOT experts who remain in their offices and are connected electronically—to plan, coordinate, implement, and share research and information that are needed to support DOT's involvement in this issue. The Task Force estimates that a credible effort would require initial annual funding on the order of \$1 million.

## **Appendices**

Appendix A. Memoranda<sup>33</sup> Regarding Global Climate Change Task Force

U.S. Department of  
Transportation  
Office of the Secretary  
of Transportation

## Memorandum



Subject: **INFORMATION:** Center for Transportation  
Environmental Analysis and Forecasting (CTEAF)

Date: September 28, 1998

From: Joseph Canny *Joe Canny*  
Deputy Assistant Secretary for  
Transportation Policy

Reply to: DTrilling  
Attn. of: x64220

To: The Deputy Secretary

Following up on the recommendation of the NSTC Transportation and Sustainable Communities Team, the Climate Change Task Force prepared a paper on organizational options for a Center to deal with Sustainability issues. A complete consensus was never achieved but most of the modes, seeing their program dollars at risk, opted for a *Virtual Center*, as opposed to a *Stand-alone Center*. Their comments are summarized in Attachment 1. This memo is in response to your request for an independent recommendation by P. The earlier memos (also attached) define most of the concepts used, so only the fundamental points will be repeated here.

#### Background

- Need - There is a need to establish a base of analytical expertise for projecting the long range impacts of the interplay between transportation and the environment, to respond to national issues in this regard, and to assure we have an authoritative say in the destiny of our transportation constituency in Administration deliberations. A center would provide a DOT focal point for modal efforts on such issues.
- Opportunity - We have a good precedent in the responses from the modes. Most would support a new center, and they would have supported a stand-alone center, if they hadn't feared encroachment of their program dollars. Most agreed it should be managed by an intermodal steering committee, with an OST lead, and be a prototype for a ONE DOT response to an intermodal issue.
- Funding Needs - The Center, depending on the functions assigned to it, could be funded up to \$1 million annually. In addition to the Center itself, there are also requests for funding support for the May 1999 PCSD town meeting in Detroit (\$300,000 maximum), and the U.S. Conference of Mayors/National Association of Counties Joint Center for Sustainable Communities (\$300,000 maximum)

Considered here is a proposal to organize a Center for Transportation Environmental Analysis and Forecasting (CTEAF). The Center would serve as the DOT focal point for

<sup>33</sup> Presented in reverse chronological order

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analyzing environmental trends related to transportation, and be charged with coordinating among the modes the research and policies related to these trends, as well as tying them to the DOT Strategic Plan. With the Operating Administrations, the Center would establish a base of analytical expertise for projecting and evaluating strategies for dealing with these long range trends. It would provide support as the Department participates in interagency dialogues on Climate Change and Sustainability. It would also coordinate and share research information for program managers, the Department's partners and stakeholders, and the public. It would demonstrate the ONE DOT concept through a multimodal approach to transportation environmental research and planning. The work of the center would be guided by the DOT Policy Council or a programmatic Steering Committee reporting to P.

The following contrasts two organizational options:

Virtual Center - For the most part, the resources of the Center would be made up of a network of Departmental experts, who would remain in their program offices and rely largely on the internal electronic network to share and coordinate research and information.

#### Pros

- . Can be started quickly at low cost.
- . Provides a focal point for these kinds of activities, which could be pointed to as DOT's solution to these kinds of problems.
- . This form of organization is in use successfully in programs such as the Travel Model Improvement Program and TCSP.
- . Although coordinating efforts would be more difficult, could work if aggressively managed by OST.
- . No self contained target for OMB or Congressional budget-cutters.

#### Cons

- . Less visibility for dealing with PCSD, CEQ, Department of State, and other Administration interests.
- . Would have to draw on the willingness of the modes to provide the necessary staff resources on a continuing basis.

- 3 -

- . The experience of the Climate Change Task Force's small Analytical team indicates how difficult it is to get products when the analyst has a host of other projects tugging at him/her.
- . The building of the kind of multi-modal analytical expertise needed would be at a much slower pace, and subject to other conflicting priorities.
- . Diffuse responsibilities make it more difficult to obtain financial support for key research and analytical projects.

Stand-alone Center - Charter a "free standing" autonomous center operated as a separate DOT office with a dedicated staff to perform research, coordination and outreach efforts cited above. It would be budgeted for up to \$1 million, for core personnel, research, and contract support

|                                                        |         |
|--------------------------------------------------------|---------|
| 3 core staff plus administrative expenses:             | \$350K; |
| 3 person years of expert consulting and direct support | \$510K; |
| other contracting                                      | \$140K. |

A network with program offices, as in the virtual model, would be closely linked to the Center.

The funding source is a key concern. The work of the Center could qualify for funding under the TCSP program, but there will be much demand for TCSP funds. Drawing on it exclusively would narrow the range of issues to the surface modes, and it should be augmented by contributions from other Operating Administrations.

#### Pros

- . Creating a Center is the most effective way to build the core analytical expertise needed to manage these issues.
- . Provides continuity and commitment of time and resources.
- . Clear visibility within and outside DOT.
- . Would allow us to take our place in the interagency dialogues with the authority that credible staff and contract support brings — especially critical to vetting decisions affecting our transportation constituency. For example, estimated costs to constituents of climate change scenarios have been dominated by model-building, and we are unable to add to the debate.

- 4 -

- . Many ongoing efforts in this area are not now effectively coordinated.

Cons

- . A stand-alone center is an easy target.
- . Higher cost due to a larger staff requirement
- . Funding would have to come from all the modes, in order to make the Center truly multimodal.

Recommendation - We believe that a virtual center could not respond to all the needs for this activity in a timely manner. We therefore recommend that the stand-alone model of the Center be chartered and funded at the \$1 million level.

Attachments

**Attachment 1**

**Summary of Comments Received (Some not received officially)**

**Support a Center**

**Yes:** Coast Guard, FAA, NHTSA (limited virtual), FHWA (virtual), FTA, RSPA, FRA, S-30 (virtual, with emphasis on social equity), C, M

**Form of the Center**

Coast Guard - Stand alone, only after funding obtained, and carefully proscribed

FAA - Virtual

FHWA - Virtual

FTA - Stand alone, virtual as back-up

NHTSA - Virtual only, with 1-3 support staff from Volpe

RSPA - Combined stand alone and virtual (as in the recommendation)

FRA - Combined stand alone and virtual (as in the recommendation)

S-30 - Virtual

C - Combined stand alone and virtual (as in the recommendation)

M - Combined stand alone and virtual (as in the recommendation)

**Where it Should be Located**

Coast Guard - P or FHWA. Policy Council providing oversight

FAA - FHWA

FHWA - Virtual in program offices

FTA - First alternative FTA. Second alternative OST

NHTSA - Virtual in program offices. Executive Steering Committee providing oversight

RSPA - In P or in a mode with dotted line reporting to P

FRA - Not indicated

S-30 - Virtual in program offices

C - Defer to S-2

M - As recommended in memo

**Willingness to Contribute Money of Staff**

Coast Guard - Willing to continue 2 technical assistants on ad hoc basis. Funding should come out of OST or FHWA FY00 budget.

FAA - Willing to consider if we go beyond a virtual center

FHWA - None offered.

FTA - No funds offered; one FTA staff would be committed

NHTSA - Unable to provide funding

RSPA - Already supporting \$100 k in studies. That's all for now

FRA - No funding. Willing to provide staff experts to assist Center staff

S-30 - Unable

C - Unable

M - None



U.S. Department of  
Transportation  
Office of the Secretary  
of Transportation

# Memorandum

CONTROL NO.

980813-012

SIMS

S-10

Subject: INFORMATION: Center for Transportation  
and Sustainable Communities

Date: August 13, 1998

From: Joseph Canny *Joe Canny*  
Deputy Assistant Secretary for  
Transportation Policy

Reply to: DTrilling  
Attn of: X64220

To: The Deputy Secretary

As you know, following up on the recommendation of the NSTC Transportation and Sustainable Communities Team, the Climate Change Task Force has been preparing a paper on a proposed Center to deal with Sustainability issues.

You requested the reaction of the operating administrations to the proposal before the FY 2000 Budget was made final. Attachment 1 is the options paper as it was sent to the operating administrations. In the letter of transmittal, I asked for comments on where the center should be located organizationally, and their willingness to contribute funding to support it. A summary of the comments received is at Attachment 2, but some of these are advanced drafts of what is coming through the system formally.

In summary, most responses favored the Virtual Center option, as opposed to a Stand Alone one. In light of the present stringent budget considerations, no mode indicated a willingness to support the Center financially, although some were willing to commit one full time staff.

Attachments



U.S. Department of  
Transportation  
Office of the Secretary  
of Transportation

# Memorandum

Subject Center for Transportation and Sustainable  
Communities

Date July 31, 1998

From Joseph F. Canny *JFC*  
Deputy Assistant Secretary  
for Transportation Policy

Ready to D. Trilling  
Act on x64813

To  
Modal Administrators  
Secretarial Officers

You will recall from the Senior Staff meeting of June 29th and the presentation by Todd Stern, that the White House has given Global Climate Change a top priority. In support of our climate change and overall sustainability work, two DOT working groups have proposed that the Department organize a Center for Transportation and Sustainable Communities. This Center would provide a focal point for climate change and sustainability issues and become a source of expertise for analysis, policy development and technical assistance for our constituencies. It would also demonstrate the ONE DOT concept.

The Deputy Secretary has requested a paper outlining organizational options for such a Center. The attached paper was developed by the internal DOT Climate Change Task Force for his consideration. A contact list of Task Force members is attached.

I would appreciate your concurrence or comments by cob August 5, 1998. I realize this is a very short response time, but the Deputy Secretary has indicated his interest in considering this Center before the FY 2000 budget is made final. Would you please include in your comments where you feel the center should be located organizationally, and your willingness to contribute funding to support it. If there are any questions, please contact Don Trilling at x-64220.

Attachments



U.S. Department of  
Transportation  
Office of the Secretary  
of Transportation

**DRAFT**

# Memorandum

Subject: **Action:** Recommendation to Create a DOT Center  
on Transportation and Sustainable Communities

Date:

From: Joseph F. Canny  
Deputy Assistant Secretary for Transportation Policy

Reply to  
Action of:

To: The Deputy Secretary

In its *Transportation and Sustainable Communities Initiative: National Investment Plan*, the National Science and Technology Council's (NSTC) Transportation and Sustainable Communities Team recommended the creation of a DOT Center for Transportation and Sustainable Communities. During follow-up discussions on the Team's report you asked for an options paper to discuss the purpose and possible scenarios for implementing this recommendation. The newly established DOT Climate Change Task Force, which includes representatives from all of the modes, has prepared options and a recommendation for your consideration.

**Background:** The recommendation from the NSTC team to establish a focal point in the Department on sustainability (including climate change) stemmed from recognition of its importance to the Administration as well as to communities and industries throughout the country. In recent years, there has been a growing public awareness that transportation can directly promote or deter sustainable development through the effects of transportation systems and land development patterns, such as air and water pollution, widespread highway congestion, inefficient land consumption and eco-system degradation.

It is incumbent on the Department to take an active role in fostering transportation strategies and initiatives that reduce greenhouse gases and promote sustainability. DOT must develop the tools and expertise required to conduct the requisite analysis for directing and supporting these initiatives, and to work closely in the development of transportation strategies proposed by such agencies as DOE and EPA. It must develop its own proposals, working across the modes so that strategic decisions can be made to focus activities on the most promising of them.

**Goal:** The goal of the Center is to ensure that our decisions foster sustainable transportation and communities. This means that transportation decisions must balance and optimize short and long term goals for social equity, economic growth and environmental quality. It means that land, energy and resources used to meet transportation demands today do not preclude options for future generations to meet their needs.

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**Objectives:** In furtherance of this goal, the Center will provide leadership and fulfill the following roles:

1. **Focal point:** Serve as the DOT focal point for modal efforts on climate change and sustainability issues, research, and policies for the DOT agencies and offices.
2. **Liaison:** Establish effective working relationships, coordination, and initiatives with other Federal, State, and local agencies and stakeholders on sustainability. The Center would provide information to program managers as well as partners and stakeholders through a central repository of research, tools, best practices, and initiatives in sustainable development.
3. **Policy Development:** Coordinate among the modes policy development activities and scenarios for the transportation sector to help meet goals for climate change and assure that transportation programs support sustainability.
4. **Analytic Expertise:** Build a base of analytic expertise on sustainability within the Department to effectively support modal programs. This would include developing a range of scenarios and strategies to reduce greenhouse gas emissions from the transportation sector, and developing sustainable transportation indicators.
5. **Research:** Conduct, coordinate and synthesize research on the interplay between transportation and land use; and on transportation and sustainability, including climate change. The Center would coordinate and share research among the modes, and identify opportunities for existing research efforts to include a sustainability component.
6. **Outreach:** Develop and coordinate outreach information and educational tools for DOT, other Federal agencies, the Department's partners and stakeholders, and the public. Assist individual modal outreach efforts as applicable. The Center could sponsor interdisciplinary training and regional interagency forums to promote sustainability in transportation, at the local, state, regional and Federal levels.
7. **ONE DOT:** Foster and demonstrate the ONE DOT concept through a multi-modal approach to transportation research, planning, and project implementation.

**Alternative Organizational Structures:** The Climate Change Task Force explored a range of options to best achieve the Center's objectives. Additional details and the pros and cons are summarized in Appendix A. The options include:

1. A "virtual" model where a network of Departmental experts would remain in their program offices and rely largely on technology to share and coordinate research and information;

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2. A "free standing" autonomous office staffed and operated as a separate DOT office with a dedicated core of staff to perform research, coordination and outreach efforts;
3. An office located and staffed at the Volpe Center; and
4. A center operated by a consultant, university, or similar group under contract to the Department.

**Recommendation:** The Task Force recommends a combination of Options 1 and 2, an autonomous Center, but closely linked to DOT program offices. A small core of dedicated staff would create the necessary focus to conduct and coordinate strategic research, analysis, and policy development needed by the Department. The network of program experts located in the program offices would build expertise and ensure that climate change and sustainability are addressed throughout the Department in a systematic way.

#### **Management of the Center:**

- **Director and Center Staff:** The 3 to 5 member staff would include a Director and be housed in a separate office in Washington headquarters. In addition, the core staff would be supported by Federal technical experts at Volpe.
- **Associate Staff:** Designated Departmental experts would remain in their program offices but would function as adjunct staff to the Center. The Analytic Team established under the Climate Change Task Force could provide a quick start to building technical expertise throughout the Department and may be likely candidates for Center or Associate staff.
- **Executive Steering Committee:** The Center would be overseen by an Executive Steering Committee comprised of representatives from the modes and program offices. The Committee would work with the Director to establish strategic direction, priorities and resources for the Center. This will ensure the Center remains focused on serving the programmatic and policy needs of the DOT offices on sustainability and climate change. Alternatively, the Policy Council might serve in the steering committee function.
- **Coordination within DOT:** The Center Director would report formally to the Secretary's designee (e.g., the Assistant Secretary for Transportation Policy). With the Executive Steering Committee, the Director would work closely with the DOT Policy Council, BTS, RSPA's new Advanced Vehicle Technologies Program, and special issue groups such as the NSTC Transportation and Sustainable Communities Team and the DOT Climate Change Task Force, to coordinate the Center's agenda and priorities. The Director of the Center would also participate on the DOT R&T Coordinating Council.

- 4 -

**Funding and Resources:**

- **FY1999:** The Center could start in FY1999 at the \$1 million level with funds pooled from program offices for research, outreach and contract support. (See Note 1)

|                                                         |        |
|---------------------------------------------------------|--------|
| Core staff (3), plus administrative expenses and travel | \$350K |
| Volpe Analytic Support (3 person years @ \$170/yr)      | \$510K |
| Other contract support.                                 | \$140K |

The resident experts in the program offices supporting the work of the Center are not included in this estimate. Their Administrative support (e.g., travel, training, etc.) would be provided by participating agencies.

- **FY2000-01:** The Center would be fully operational at \$1.5 million level. (See Note 1)

|                                                         |        |
|---------------------------------------------------------|--------|
| Core staff (5), plus administrative expenses and travel | \$585K |
| Volpe Support (4 person years @ \$170/yr)               | \$680K |
| Other contract research support.                        | \$235K |

- **FY2002 and Beyond:** The Center would prepare a strategic plan and budget request for the years beyond FY2001 after the center has been operational for a year. This would allow reassessment of the agenda, organization and management of the Center as its service continues.

The allocation of the funding from the various operating administrations to support this effort has yet to be determined. We recommend that you consider with the modes the need for this Center when putting together the FY2000 budget.

**Attachment**

Note 1: These staff levels would be required for a number of activities. There would be extensive interaction with outside constituencies under the liaison and outreach efforts cited above. In addition, the continuing analytical work will be substantial. First must be the acquisition of the analytical tools needed to evaluate strategies for the reduction of greenhouse gases, and to test our proposals and assumptions. Some of these will be straightforward adaptations of existing models developed by DOT and other agencies (but they will nevertheless take extensive staff time); others will consist of building new tools. Second will be the conduct of the analyses of the various strategies that will be proposed (the staff has identified over 50 such strategies). Third is the development of scenarios, such as was done by TRB in their report *Toward a Sustainable Future*, and it is expected that these analyses would be done at least in the same level of depth as was done in that report, but many more would be conducted and refined.

| Center Option              | Staff                                                                                                                                                                                             | Leadership                                                                                                                                                                 | Resources                                                                                                                                                                          | DOT Visibility                                                                                                      | Pros                                                                                                                                                                                          | Cons                                                                                                                                                                                                    |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Virtual                    | <ul style="list-style-type: none"> <li>• 10+ reps from DOT offices linked through technology</li> <li>• Exec. Steering Committee (ESC) comprised of reps. from all DOT program offices</li> </ul> | <ul style="list-style-type: none"> <li>• Chair-person position would rotate among exec. committee members</li> </ul>                                                       | <ul style="list-style-type: none"> <li>• Modal support for their staff participant.</li> <li>• Chairperson's Agency to provide staff for coordination and facilitation.</li> </ul> | <ul style="list-style-type: none"> <li>• Reps. remain in their individual offices</li> </ul>                        | <ol style="list-style-type: none"> <li>1. Rapid start</li> <li>2. Low Cost</li> <li>3. Establish and maintain analytic expertise within program offices</li> </ol>                            | <ol style="list-style-type: none"> <li>1. Less visibility outside DOT and potentially within Agencies.</li> <li>2. Potential time conflict for staff members with their other Agency duties.</li> </ol> |
| Free-Standing              | <ul style="list-style-type: none"> <li>• 3-5 FTE housed at DOT office</li> <li>• 1-4 Volpe support staff</li> <li>• Contract out add'l support</li> </ul>                                         | <ul style="list-style-type: none"> <li>• Executive director would report to OST and ESC</li> </ul>                                                                         | <ul style="list-style-type: none"> <li>• Modal contributions with eventual Budget Line Item</li> <li>• Office space, administrative, and technical resources needed</li> </ul>     | <ul style="list-style-type: none"> <li>• Clearly distinguished as a separate DOT organization</li> </ul>            | <ol style="list-style-type: none"> <li>1. Dedicated staff</li> <li>2. Provides continuity and commitment of time and resources</li> <li>3. Clear visibility within and outside DOT</li> </ol> | <ol style="list-style-type: none"> <li>1. Larger staff requirement</li> <li>2. Cost</li> <li>3. May diminish capacity development in the program offices</li> </ol>                                     |
| DOT Center housed at Volpe | <ul style="list-style-type: none"> <li>• Volpe provides primary staff</li> <li>• DOT hdqtrs. supplement staff through details or electronic communication</li> </ul>                              | <ul style="list-style-type: none"> <li>• ESC plays larger mgmt., guidance, and oversight role</li> <li>• Volpe provides executive agents to coordinate with ESC</li> </ul> | <ul style="list-style-type: none"> <li>• Modal contributions</li> <li>• Volpe serves as a quasi-contractor</li> </ul>                                                              | <ul style="list-style-type: none"> <li>• Potentially less visible since housed at Volpe in Cambridge, MA</li> </ul> | <ol style="list-style-type: none"> <li>1. Taps current research capacity and cross-modal expertise at Volpe</li> </ol>                                                                        | <ol style="list-style-type: none"> <li>1. Doesn't build multi-modal expertise</li> <li>2. More difficult to coordinate, less visible within and outside of DOT</li> </ol>                               |
| Center Under Contract      | <ul style="list-style-type: none"> <li>• Function contracted out</li> <li>• DOT to develop and coordinate</li> </ul>                                                                              | <ul style="list-style-type: none"> <li>• Leadership, oversight, guidance, and mgmt. provided by ESC and DOT staff</li> </ul>                                               | <ul style="list-style-type: none"> <li>• Contract support required</li> </ul>                                                                                                      | <ul style="list-style-type: none"> <li>• Little visibility within Agencies, DOT or stakeholders</li> </ul>          | <ol style="list-style-type: none"> <li>1. Contractor already has expertise &amp; skills</li> <li>2. Easier to change as Center's focus changes</li> </ol>                                     | <ol style="list-style-type: none"> <li>1. Does not develop DOT capacity</li> <li>2. Less ownership and accountability by program offices</li> <li>3. Difficult to maintain funding</li> </ol>           |

## GLOBAL CLIMATE CHANGE TASK FORCE CONTACTS

| NAME              | ORGANIZATION | ROUTING SYMBOL |
|-------------------|--------------|----------------|
| PETER RICHARDSON  | USCG         | G-MSE-3        |
| KEN MALMBERG      | USCG         | G-SEC          |
| JIM LITTLETON     | FAA          | AEE-120        |
| SUSAN PETTY       | FHWA         | HEP-20         |
| MIKE SAVONIS      | FHWA         | HEP-40         |
| STEVE GRIMM       | FRA          | RRP-24         |
| HENRIETTA SPINNER | NHTSA        | NPS-32         |
| PAUL MARX         | FTA          | TBP-10         |
| DANNY GORE        | MARAD        | MAR-725        |
| FENTON CAREY      | RSPA         | DRA-1          |
| WILLIAM LYONS     | RSPA         | VOLPE          |
| JOHN KISER        | OST          | X-43           |
| MIKE BATES        | OST          | C-10           |
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**Attachment 2- Final**

**Summary of Comments Received (Some not received officially)**

**Support a Center**

**Yes:** Coast Guard, FAA, NHTSA (limited virtual), FHWA (virtual), FTA, RSPA, FRA, S-30 (virtual, with emphasis on social equity), C, M

**Form of the Center**

Coast Guard - Stand alone, only after funding obtained, and carefully proscribed  
FAA - Virtual  
FHWA - Virtual  
FTA - Stand alone, virtual as back-up  
NHTSA - Virtual only, with 1-3 support staff from Volpe  
RSPA - Combined stand alone and virtual (as in the recommendation)  
FRA - Combined stand alone and virtual (as in the recommendation)  
S-30 - Virtual  
C - Combined stand alone and virtual (as in the recommendation)  
M - Combined stand alone and virtual (as in the recommendation)

**Where it Should be Located**

Coast Guard - P or FHWA. Policy Council providing oversight  
FAA - FHWA  
FHWA - Virtual in program offices  
FTA - First alternative FTA. Second alternative OST  
NHTSA - Virtual in program offices. Executive Steering Committee providing oversight  
RSPA - In P or in a mode with dotted line reporting to P  
FRA - Not indicated  
S-30 - Virtual in program offices  
C - Defer to S-2  
M - As recommended in memo

**Willingness to Contribute Money of Staff**

Coast Guard - Willing to continue 2 technical assistants on ad hoc basis. Funding should come out of OST or FHWA FY00 budget.  
FAA - Willing to consider if we go beyond a virtual center  
FHWA - None offered.

FTA - No funds offered; one FTA staff would be committed  
NHTSA - Unable to provide funding  
RSPA - Already supporting \$100 k in studies. That's all for now  
FRA - No funding. Willing to provide staff experts to assist Center staff  
S-30 - Unable  
C - Unable  
M - None



U.S. Department of  
Transportation  
Office of the Secretary  
of Transportation

# Memorandum

Subject: Global Climate Change Task Force

Date: May 14, 1998

From: John N. Lieber *John N. Lieber*  
Acting Assistant Secretary for  
Transportation Policy

Reply to  
Attn. of:

To: Modal Administrators

## Summary

The Department has been organizing a task force on Global Climate Change and sustainable development. It is to be made up of key DOT program representatives, and will provide a focal point for the effective participation of the Department in this area. It will be supported by a core analytical team to establish initial plans and strategies for this work. This memo requests your organization's participation on the task force.

## Background

As you know, global climate change is a major issue for the Administration. At the Kyoto conference in December, the developed countries proposed binding limits on greenhouse gas emissions. The U.S. committed to achieving a 7 percent reduction below its 1990 levels by the 2008-2012 time frame -- which translates to a 41 percent reduction below the levels projected under current trends. The U.S. continues to lead efforts to achieve meaningful participation by developing countries so the Kyoto Protocol can be submitted to Congress for ratification.

In the meantime, work is accelerating on this critical issue. The President has proposed a three-stage strategy beginning with voluntary partnerships and \$6.3 billion in R&D investment and tax incentives, to be followed by several years of review and evaluation, and then meeting the binding targets set for the 2008-2012 time frame through a number of initiatives and a domestic and international emissions trading system. DOT's constituency will play a major role in meeting these targets, since the transportation sector accounts for one third of the Nation's carbon dioxide emissions. Thus, it is increasingly important that DOT take a proactive role and participate in developing sustainable transportation strategies and initiatives that compliment and extend the ongoing work on advanced technologies, fuels and vehicles.

- 2 -

Global climate change is a key factor in the broader issue of sustainable transportation. Sustainability means that resources are used in a way that does not preclude options for future generations. Land use patterns, biodiversity, habitat, vehicles, and infrastructure are also transportation sustainability issues. A sustainable transportation system provides mobility and access in a manner that balances the long and short term goals for environmental quality, economic growth, and social equity. Global climate change and sustainability are cross cutting issues for the modes of transportation and provide an opportunity and context for a multi modal and balanced approach to access and mobility. Working together on this issue will also support our *One DOT* concept.

#### Task Force

For the past two months, we have had a group working on global climate change, including most of the operating administrations. Now we are proposing to formalize this group and to establish an analytical team to advance our collective effort in this area. The group will share and pool technical expertise and will be charged with creating an action plan, which includes:

- Drafting and coordinating DOT-wide policies and strategies for global climate change and sustainable transportation;
- Drafting alternative scenarios of transportation initiatives to meet global climate change and sustainable transportation goals;
- Identifying the means to provide and share analytical and technical expertise to support evaluation and measurement of scenarios and related modal initiatives;
- Identifying communication and technical assistance strategies to provide an information resource for the Department and our partners and stakeholders;
- Coordinating and sharing proposals from our operating administrations for the FY 2000 budget and performance plans to ensure a cohesive, strategic focus for DOT's initiatives;
- Longer term recommendations for continuing this strategic coordination within the Department; and
- Other high priority initiatives identified by the group.

- 3 -

To help this effort, a small analytical team, composed of three or four individuals representing several modes, will be put in place for about 90 days. This team will establish our core expertise, evaluate current Administration proposals and strategies, and work with the task force to develop recommendations and strategies for DOT. We are also pursuing some limited contractual help for this effort.

The task force will be sponsored by this Office. They will provide briefings and coordination with the Policy Council, modal administrations, OMB and others as appropriate. The task force will function through January 1999, to coincide with the submission of the Administration's FY 2000 budget.

Initial briefings to provide background on global climate change and on DOE and EPA programs are under way. Attached are the names of those who have been attending informally. We ask that you designate an appropriate individual to represent your agency. We understand that some of you may want to designate more than one representative if there are diverse program elements that need to be represented. We would also welcome any nominee for detail to the core analytical team. The task force is initially meeting on the first and third Tuesday of each month during this start-up phase, so please let us know your designees as soon as possible.

Conclusion - We believe the task force will be an excellent forum to support a cohesive, strategic direction to the Department's initiatives in this area. The Secretary has stated that he wants the Department to be a major participant in the President's Climate Change Initiative. Many of the other agencies involved have substantial teams engaged in it. The task force and core support team structure will provide a framework whereby the operating administrations can begin to develop the expertise of their staff in this emerging area, and assure the Department's leadership role in global climate change and sustainable transportation.

— We look forward to working with you on this important issue. For your information, we have also attached background material on global climate change and the Kyoto Protocol. If you need additional information, please contact Don Trilling of my staff at 366-4220.

Attachments

cc: Secretarial Officers

## Appendix B. Partnership for a New Generation of Vehicles (PNGV)

### A. Description

The Partnership for a New Generation of Vehicles is a ten-year collaboration between the federal government and the US auto industry focused on improvement of the fuel-efficiency of passenger cars, with the specific intent of yielding automobiles with very low emissions and dramatically decreased energy usage without adverse impact on current levels of safety and cost. The Partnership was announced in September 1993 by President Clinton and Vice President Gore, who described the program's technological challenges as "comparable to or greater than the Apollo project." It is explicitly seen as a new model for government-industry interactions, replacing adversarial and confrontational relationships with joint efforts to achieve technological advances that preclude the need for regulatory actions.

### Participants

Core participants in the PNGV are eight federal agencies and the "Big Three" US automobile companies, but many other organizations are involved. The federal partners are:

- Department of Commerce (DOC)
  - National Institute of Science and Technology
  - Advanced Technology Program
- Department of Defense (DoD)
  - Defense Advanced Research Projects Agency
  - US Army Tank Automotive Research, Development and Engineering Center
- Department of Energy (DOE)
  - Office of Advanced Transportation Technologies
  - National Laboratories<sup>34</sup>
- Department of Transportation (DOT)
  - National Highway Traffic Safety Administration
- Environmental Protection Agency (EPA)
  - National Vehicle and Fuel Emissions Laboratory
- National Aeronautics and Space Administration (NASA)
  - Ames Research Center
  - Jet Propulsion Laboratory
  - Marshall Space Flight Center
  - Lewis Research Center
- National Science Foundation (NSF)

The focal point for industry participation is the United States Council for Automotive Research (USCAR), an organization formed by Chrysler Corporation, Ford Motor Company and General Motors Corporation to strengthen the technology base of the domestic auto industry through

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<sup>34</sup> Argonne National Laboratory, Brookhaven National Laboratory, Idaho National Engineering & Environmental Laboratory, Lawrence Berkeley Laboratory, Lawrence Livermore Laboratory, Los Alamos National Laboratory, National Renewable Energy Laboratory, Oak Ridge National Laboratory, Pacific Northwest National Laboratory, Sandia National Laboratories.

cooperative precompetitive research. USCAR was formed in 1992 to help coordinate administrative and information services for existing and future Big Three research consortia devoted to tackling shared technological and environmental concerns.

In addition, all of the partners have drawn upon more than 400 other entities for ideas and performance of the research, including small businesses, major automotive suppliers, universities, and individual inventors. This effort has included use of many mechanisms, including contracts, subcontracts, Cooperative Research and Development Agreements, Small Business Innovation Research grants, and various shared research arrangements.

#### Scale/Funding

In the context of transportation R&D, PNGV represents a major initiative, running at several hundred millions of dollars per year. As the program moves from research toward development of prototypes, the primary burden will fall on the industry.

#### Policy Objectives

The most visible and specific objective of the PNGV enterprise is to have a "concept vehicle," followed by a "production prototype," available early in the next decade. The research is targeted on a fuel efficiency improvement that providing a three-fold advance—to 80 miles per gallon—for a mid-sized family sedan without any compromise in performance, size or utility, fully compliant with current safety and emissions standards, and imposing no increase in life-cycle cost. Concurrently, the program also seeks to develop advanced design and manufacturing techniques to get new products to market more quickly, and to provide technologies that can lead to near-term improvements in vehicle fuel efficiency, safety and emissions. More broadly, key policy objectives are national energy security, reduction of harmful emissions and gases that can contribute to global warming, and a more vigorous and competitive automotive industry.

#### Time Frame

The basic schedule for PNGV calls for a concept vehicle to be ready by 2000, with a production prototype available by 2004. In January 1997 the program reached a key interim milestone: selection of four key system areas or technologies most promising for achievement of PNGV goals:

- Hybrid-Electric Vehicle Drive
- Direct-Injection Engines
- Fuel Cells
- Lightweight Materials

Continuing efforts will focus on these topics. In addition, all three auto manufacturers have already unveiled advanced concepts suggesting real progress.

## *B. Key Factors*

### Partnership Technology Areas

The very aggressive goal of the PNGV necessitates addressing every element of the vehicle. The program has subdivided the various projects into seven subsystems:

- Internal Combustion Reciprocating Engines
- Continuous Combustion Engines
- Fuel Cells
- Electrochemical Energy Storage
- Flywheels
- Power Electronics and Electrical Systems
- Materials

### Partnership Structure, Roles and Management

From the outset, the government role has been seen by all parties as arising from the broad responsibility to undertake long-term, high-risk basic research in support of national priorities. In this case, the public interest in improvement of fuel efficiency is seen to be great, though not yet reflected in the market demand that would justify private-sector firms making the necessary investment. Government efforts thus emphasize the research component of PNGV.

The industry, on the other hand, will carry out the product development and commercialization phase. In addition, USCAR and PNGV provide framework for cooperation among the US automobile manufacturers on pre-competitive technical issues, thus enabling them to compete more effectively in the global marketplace.

PNGV policy is coordinated by an overall steering group consisting of government and industry subgroups of senior-level officials. The government group includes, in addition to the participating agencies, representatives from the Office of the Vice President, the Office of Science and Technology Policy, the Office of Management and Budget, and the National Economic Council. Shorter-term coordination and management is in the hands of subject-specific technical teams of government and industry representatives. The lead government policy role and secretariat functions are the responsibility of the Department of Commerce. The Department of Energy plays a technical leadership role, based on receiving the majority of federal PNGV funding, having a variety of related R&D programs, being responsible for ten National Laboratories with relevant facilities and capabilities.

Overall, this process has proven satisfactory, although coordination of the several federal agencies, each with different underlying missions, independent budgets and PNGV roles, has proven to be challenging.

The PNGV is reviewed annually by a distinguished standing committee of the National Research Council to assess the overall balance and adequacy of the program and other relevant matters.

## Motivation of Partners

The motivation for the PNGV collaboration differed substantially between the government and industry participants, but their differing goals are complimentary and not inherently in conflict. The primary Federal objective is to mitigate adverse impacts of the nation's high level of petroleum consumption: vulnerability to oil price shocks and reduced availability and reduction of emission of greenhouse gases and air pollutants. Additionally, there was a concern that the absence of market demand for high-fuel-efficiency vehicles would ultimately cause US manufacturers to fall behind in the world market, damaging the national economy and reducing employment in the auto industry. More generally, PNGV was also influenced by a perceived need for leadership in advancing civilian industry as the Cold War defense marketplace withered. Intertwined with these concerns was the desire to provide an alternative to seeking greater fuel efficiency through more-stringent regulations than already exist—a course which would be contentious and possibly unsuccessful, or through increased taxes, which was seen as not a viable approach.

For the industry, the reduction of the cost of compliance with mileage and emission standards, accompanied by the desire to provide technological advances as an alternative to a regulatory solution, was a primary motivation. The industry also found it highly appropriate that the government support R&D to achieve advances in vehicle technology and manufacturing directed at the public good in areas where market demand is lacking.

## Resource Considerations

Government funding for PNGV is spread over multiple agencies, often involving a redefinition, expansion or redirection of existing programs. The program also draws on results of related programs in the various agencies. At present, the core PNGV budget is embodied explicitly in the R&D programs of DOE, EPA, DOT, DOC and NSF. Since inception of the Partnership, federal funding has ranged roughly from \$200 M to a little over \$300 M. No estimates are available for industry expenditures, which are a small part of corporate R&D expenses, but the original agreement was intended to embody equal investment by the government and the industry over the ten-year technology development and validation phase of the program.

USCAR has also expressed the view that a more consistent set of cost-share guidelines is needed, based on the position of projects on the spectrum running from fundamental, high-risk research to product design and development.

## Legal Considerations

Achievement of cooperation among the industry partners was not a trivial undertaking. Technical collaboration among automobile firms has generally been rare, for competitive reasons as well as antitrust considerations. However, strong foreign competition in the 1970's and 1980's, and passage of the 1984 Cooperative Research Act, motivated a wide range of precompetitive research collaborations involving industrial competitors. Compliance with government regulations also required the development of innovative automotive components. Technical

collaboration became attractive where (1) technology leads to no customer differentiation, (2) the R & D is directed at a societal good, and (3) the supply base is important to R & D success. In the latter case, collaboration encourages component suppliers to innovate, and leads to acceptance of standards that benefit all parties. USCAR was formed to facilitate this type of research, and provided a structure which greatly facilitated development of the PNGV collaboration.

Similarly, it would be a difficult and politically sensitive undertaking for the federal government to have sought to work individually with one or more of the major auto manufacturers. Thus, the existence of USCAR was a key element in the government's ability to work with the industry to establish the PNGV.

USCAR has expressed concerns with respect to the process by which specific projects are defined in the federal budget as part of the PNGV, and the means by which industry partners gain access to project research data for those and related activities.

As the industry becomes increasingly international (epitomized by the new linkage between Chrysler Corporation and Daimler Benz), additional questions can be expected to arise in the development of policies for collaborations with industry, and who can participate.

### *C. Evolution*

To a large degree, the partnership has so far followed approximately the path initially described. The tone of descriptive materials now emphasizes global warming more than energy security, but the goals and schedule are unchanged. The Department of the Interior was originally a modest participant, primarily in connection with recyclability and availability of materials; it is no longer listed as a participant. Unlike the early years, DoD and NASA are also no longer listed as receiving any of the core PNGV budget, although they are pursuing complimentary R&D. The importance of fuel characteristics in determining emission performance has generated related efforts to develop links and coordination with the petroleum industry. Each automobile manufacturer now plans to produce its own concept vehicle and prototype, rather than a joint PNGV vehicle. But overall, the program has changed little in approach, scale, or objective.

### *D. Greenhouse Gas Reductions Prior to 2013*

Notwithstanding significant longer-term opportunities, PNGV's potential to independently reduce greenhouse gas emissions prior to 2013 is limited. The program does not include targets for market penetration, and most researchers project modest penetration beginning no sooner than 2006. Further, because CAFE standards apply to the average fuel economy of each manufacturer's product line, the sale of high-MPG (e.g., 60-85 MPG) cars may not produce net fuel economy gains.<sup>35</sup>

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<sup>35</sup> For example, a manufacturer that sells 100,000 65 MPG vehicles in 2007 would be able to sell an additional 700,000 20 MPG vehicles and still attain a 27.5 MPG average.

Even estimates that assume no such product line adjustments project modest benefits through 2012. Based on two scenarios for the introduction of 81 MPG automobiles and 63 MPG light trucks, a 1997 study by Argonne National Laboratory projects a 0.00-0.15% net reduction in light duty vehicle energy demand during 2008-2012.<sup>36</sup> In its FY 1999 Congressional Budget Request, DOE projected that activities supported by its Office of Advanced Automotive Technologies (including PNGV and other R&D) would provide a 3.6 MMT reduction in carbon emissions in 2010, and a 19 MMT reduction in 2020.

### *E. Conclusions*

The longevity and accomplishments of the Partnership for a New Generation of Vehicles reflects the basic compatibility and complementarity of the motivations of the various partners, as well as the balanced programmatic structure they established. The objectives and roles were clearly defined, and the program built on an existing pattern of R&D investment.

PNGV clearly created a stronger awareness and interest with respect to vehicle technology R&D, and as spurred innovative thinking within and external to that program. It has also had beneficial impacts in increasing coordination and communication among government and industry. "Success stories" describing specific individual technologies or component improvements attributed to the Partnership abound. At the same time, success is by no means assured. While there is considerable optimism about achieving the fuel efficiency goal, uncertainties remain as to meeting the cost objective, which will determine whether such cars come to market. In its fourth review of the program, the NRC reached the following conclusion: "Despite the projected improvement in fuel economy of an HEV with a CIDI engine over a nonhybrid vehicle, the committee believes the difference is probably not enough to offset the higher cost of the HEV."<sup>37</sup> NRC findings for specific technologies are summarized in Appendix B.

Critics have argued that PNGV, with a relatively short-term and risk-averse focus, has undervalued technological approaches that are longer-term in nature but will be required in order to make dramatic improvements. Advances by foreign manufacturers (some presumably supported to a degree by their governments) may ultimately provide sufficient market motivation for the industry to take full responsibility for automotive innovation, which has historically been a private-sector function.

Since PNGV is a program largely developed out of existing R&D activities, and continues in the context of related non-PNGV research, it is not clear to what degree it is responsible for the ongoing substantial advance in fuel-efficiency and other automotive technologies. However, the program clearly offers a strong focus for the efforts of many parties, and has stimulated a high degree of coordination and collaborative decisions concerning identification of the most promising

<sup>36</sup> Argonne National Laboratory, *Assessment of PNGV Fuels Infrastructure*, ANL/ESD/TM-140, January 1997.

<sup>37</sup> Based on cost expectations (e.g., for power electronics and electrochemical energy storage), and on fuel economy estimates from PNGV systems analysis, which indicate that fuel economy can be approximately doubled in a vehicle that utilizes a CIDI (i.e., Diesel) engine, and advanced mechanical transmission, and a "PNGV-class" lightweight body, chassis, and interior.

paths to follow. Major technological advances have been achieved. Five years after initiation of the PNGV, government and industry partners remain publicly supportive and enthusiastic.

In summary, the Partnership for a New Generation of Vehicles is arguably one of the best current examples in transportation of a true large-scale partnership among public- and private-sector entities. PNGV includes wide participation in government, industry and academia, significant investments by all partners, a joint steering group, objective technical oversight, clear delineation of roles, and explicit schedules and goals. It provides a clear model of a public-private partnership that works.

## Appendix C: Fourth National Research Council Peer Review of the PNGV Program-- Summary of Key Findings for Specific Technologies

*Four-Stroke Compression Ignition Direct Injection (CIDI) Engines:* Potential cost increment of \$800-\$1,200 for turbocharger and intercooler, in addition to unknown cost of high-pressure electronic fuel injection system, seen as major hurdles to attainment of \$30/kW cost target. Feasibility of achieving emissions targets seen as uncertain without major changes in Diesel fuel quality, or widespread availability of a clean alternative to Diesel fuel.

*Gas Turbines:* Seen as well beyond PNGV time frame.

*Stirling Engines:* Cost, manufacturing hurdles, and durability not well understood at this time.

*Fuel Cells:* Proton Exchange Membrane (PEM) fuel cells seen as promising technology requiring major advances or breakthroughs. Not clear at this time whether or how cost goal of \$50/kW can be achieved. In systems with fuel processing, stacked efficiencies may not be sufficient to reach PNGV goals. Viewed as "a very high risk endeavor."

*Lithium Ion Batteries:* Performance is on target, but failure modes and safety still a concern. \$150/kWh cost goal seen as "extremely difficult".

*Nickel Metal Hydride Batteries:* Meeting the PNGV goal of \$150/kWh "seems quite unlikely."

*Flywheels:* "The committee believes that the relatively large cost penalty for the [small or 'low energy storage'] flywheel system will be difficult to offset by reductions elsewhere in the vehicle system."

*Ultracapacitors:* "The committee agrees with the PNGV assessment that breakthroughs will be necessary to increase the specific energy of ultracapacitors significantly and to lower the costs before they can be considered as primary HEV storage devices."

*Power Electronics:* "The committee has not seen any evidence that the cost target of \$7/kW for electronic power modules can be achieved in any of the [USCAR member hybrid] designs."

*More Efficient Steel Design:* An approach developed by AISI has the potential to reduce the mass of the body-in-white (BIW) by 20% (120 lb.), and to reduce the BIW cost by \$154. The PNGV materials team found that using a stainless steel space frame might yield a weight savings of 22%, at a cost penalty of \$200. Either approach only achieves about half the weight reduction projected to be required for a Goal 3 vehicle. The intensive use of steel "is not feasible for meeting the Goal 3 weight reduction targets unless there is a major breakthrough in power train efficiency."

*Aluminum and Magnesium:* “The challenge is to develop new processing methods so that an aluminum-intensive vehicle can be made as inexpensively as a steel vehicle. Based on a price for aluminum of \$1.60/lb, the cost penalty of an aluminum BIW is estimated at \$400.”

*Fiber-Reinforced Plastic:* High cost and lack of suitable high-volume manufacturing process still seen as a major barrier for graphite fiber reinforced plastics (GrFRPs). “Currently, the cost penalty of a GrFRP BIW is higher than a steel BIW, and there is no feasible high-volume manufacturing process for thin sections.” More extensive use of glass fiber reinforced plastic composites (FRPs) seen as potential source of more modest (e.g., 25-35%) weight reductions in nonstressed structures (e.g., hoods), but disadvantaged by low manufacturing throughput.

**Appendix D. Tax Credits for Fuel-Efficient Vehicles: Exerpts from June 4, 1998 Statement (#RR-2492) by John Karl Scholz, Treasury Deputy Assistant Secretary before the Senate Committee on Energy and Natural Resources**

“Cars and light trucks (including minivans, sport utilities, and pickups) currently account for 20 percent of greenhouse gas emissions. Tax credits for highly fuel efficient vehicles will help to move vehicles that are ultra efficient from the laboratory to the highway. Thus this credit complements the research Partnership for a New Generation of Vehicles (PNGV program) that will develop a production prototype of a family car with three times the fuel economy of today's comparable car (about 80 miles per gallon) by 2003-2004.

Two tax credits would be provided:

- A \$4,000 credit for a vehicle with triple the base fuel economy for its class. This credit would be available for purchases of qualifying vehicles beginning January 1, 2003. The credit amount would be phased down to \$3,000 in 2007, \$2,000 in 2008, and \$1,000 in 2009, and would be phased out in 2010.
- A \$3,000 credit for a vehicle with twice the base fuel economy for its class. The \$3,000 credit would be available for purchases of qualifying vehicles beginning January 1, 2000. The credit amount would be phased down to \$2,000 in 2004, \$1,000 in 2005, and would be phased out in 2006.

These credits would be available for all qualifying vehicles, including cars, minivans, sport utility vehicles, pickup trucks, and electric vehicles. The revenue cost of this incentive is estimated to be \$0.7 billion for FY 1999 - 2003.

Again, we have set a very high threshold for obtaining these credits. Eligible vehicles must be two or three times as efficient as today's comparable vehicles. Tripling a car's fuel economy reduces its emissions of carbon dioxide by 67 percent; doubling a car's fuel economy reduces its emissions of carbon dioxide by 50 percent.

...

The impact of the incentives in this package on greenhouse gases will likely increase significantly in the years beyond the ten-year budget window, and those distant effects, by their very nature, are the most difficult to predict. That is why the Administration has chosen not to make speculative estimates about the potential benefits.”

## Appendix E. Fuel Economy Standards for Light Vehicles

In 1974, the average new automobile sold in the U.S. achieved about 14 MPG—about the same as the average new light truck at the time. In 1985, CAFE standards for automobiles and light trucks were 27.5 MPG and 19.5 MPG, respectively. Today, the standards are 27.5 and 20.7, and actual average new vehicle fuel economy is close to the applicable standards. U.S. passenger car fuel economy is now much closer to that in other OECD countries than in 1974. However, trucks and similar vehicles represent a much greater share of light vehicle sales than at that time.

Although some industry and other analysts question the causal relationship between historical CAFE standards and actual fuel economy improvements, and although the real-world impact of those and potential future improvements could be partially offset by a related slowdown in new vehicle purchases and/or the “rebound” effect, there is little doubt that changes in CAFE could significantly reduce future GHG emissions from light vehicles.<sup>38</sup> What is much less clear, and much more heavily debated, is whether, how, and to what extent average fuel economy should be increased—even in theory—taking into account a wide range of factors such as petroleum prices, fuel savings, safety, consumer preference, and manufacturing employment. Many options for standards and “ramp-up” schedules have been studied and proposed since 1990, ranging to as high as about 50 MPG for automobiles by as soon as 2005.

Although CAFE changes could play an important role in an overall climate change strategy for transportation, a number of preliminary questions may be relevant to this consideration:

- What basic purpose(s) might such changes play? For example, in an overall strategy that relies on fuel-based tradable GHG permits as a compliance mechanism, CAFE might not play a direct role in a greenhouse gas strategy, but might rather be utilized (or not) to anticipate and/or respond to future increases in the price of those permits. In such a strategy, CAFE would serve a primarily economic purpose.
- What changes might be appropriate for consideration? Options could include:
  - combining cars and light trucks<sup>39</sup>
  - allowing manufacturers to trade CAFE credits
  - extending coverage to 10,000 lb. GVWR
  - negotiating some rate of increase in the numerical standard
- Are any such changes to CAFE likely to be considered as part of a broader legislative initiative, such as ratification of the Kyoto Protocol?

<sup>38</sup> The “Majority Report” by many members of the *Policy Dialogue Advisory Committee to Recommend Options for Reducing Greenhouse Gas Emissions from Personal Motor Vehicles*, for example, predicted that by raising fuel economy standards 6%/year starting in 1998, the U.S. could reduce GHG emissions by 35 MMT in 2005, and 117 MMT in 2015. Of course, most analysts would consider this to be a very rapid rate of increase.

<sup>39</sup> For example, a single standard could be increased over time from a baseline of about 24-25 MPG (or manufacturer-specific baselines). This would presumably facilitate the reintroduction of larger automobiles (e.g., station wagons) that have difficulty meeting the 27.5 MPG standard but compare favorably to most SUVs, and create an incentive to increase the automobile market share.

## Appendix F. Greenhouse Gas Objectives for States and Metropolitan Areas

### *Concept*

This paper describes how a broad policy might be developed utilizing state, regional, or metropolitan area objectives to reduce emissions of greenhouse gases (GHG). This conceptual approach differs from other strategies analyzed by the Analysis Team of the US Department of Transportation's Climate Change Task Force. Typically, costs and benefits can clearly identified for many of the other strategies. In contrast, the strategy developed in this paper involves a flexible policy framework under which a broad range of other strategies might be locally deployed. Examples of other strategies considered by the Analysis Team include: transportation emissions trading, vehicle scrappage programs, policies shifting travel behavior, and gasoline or carbon taxes. Local GHG objectives would be set to achieve reductions from state or local baseline emissions levels to contribute to national and international GHG reduction objectives. The policy might be deployed in different variations that could produce modest to high GHG reductions.

A useful but limited analogy is the application of targets for states and metropolitan areas to reduce criteria pollutants under the Clean Air Act Amendments of 1990 (CAAA) and the National Ambient Air Quality Standards (NAAQS). As with the CAAA, clear and measurable objectives would be set for political jurisdictions. The GHG objectives strategy would not necessarily have to follow the same regulatory or proscriptive approach to accountability taken by the CAAA and might consider other incentives for meeting objectives.

A GHG objectives policy could be developed to support devolution as encouraged by ISTEA and now TEA-21. TEA-21 encourages comprehensive technical transportation planning and broadly participatory and collaborative processes with the goal of producing financially realistic plans and programs. A local GHG objective has the advantage of moving decision making to governmental organizations that are better able to plan and design projects according to local conditions and sentiments.

Local governmental organizations would need to have the flexibility to identify cost-effective transportation investments and initiatives that best satisfy their local GHG objectives. A GHG objectives strategy would depend upon local ability to exercise the flexibility provisions of TEA-21 for expending Federal transportation funds, and might benefit from provisions for increased flexibility. Flexibility would allow agencies to invest transportation funds to produce a locally meaningful balance between economic efficiency and cost effective GHG reductions. Increased flexibility might make all transportation modes and initiatives eligible, including demand reduction techniques.

Local GHG objectives would move decision-making for GHG reductions into the mainstream of state and metropolitan transportation planning, furthering implementation of TEA-21. Investments and strategies to achieve local GHG objectives would be selected as the locally preferred means, in the process improving the likelihood of public and political acceptance. "Mainstreaming" GHG reduction planning within existing state and metropolitan transportation

planning processes is logical considering the major contribution transportation makes to climate change, and the importance of an integrated approach to transportation.

1. *GHG Objectives* -- GHG objectives could be set by state, region, or metropolitan area for emissions from specific sectors, such as transportation, or for overall GHG emissions. GHG objectives could be set by using existing metropolitan planning organization boundaries, Bureau of the Census metropolitan area definitions, or air quality management districts. A state-based system that could be allocated to metropolitan area organizations has the advantage of covering areas not included in any existing planning district such as rural areas that have significant GHG emissions from agricultural operations.
2. *Basic Components* -- the basic components of local GHG objectives policy are:
  - Measurable objectives.
  - Incentives for gradual progress.
  - Flexible, locally determined means to meet local GHG objectives.
  - Measurable policy initiatives and projects
3. *Optional Approaches* -- GHG Objectives could be applied using options based on variation of several key factors, including:
  - Specified intergovernmental roles and responsibilities.
  - Compliance and accountability.
  - Technical means of defining baselines and monitoring progress.
  - Incentives for progress.

A policy level paper for this strategy would include development of alternative options based on specification of these and other variables. The paper would analyze the advantages and disadvantages of each approach, including the range of costs and benefits in terms of reduced GHG.

4. *Spectrum of Options* -- variations of this strategy can usefully be considered along a spectrum, with placement determined by approach to functions in topic 3.

Prescriptive approach -- one approach that might produce the greatest decreases in GHG might be the most prescriptive, with the following characteristics:

- A strong Federal regulatory role (similar to the CAAA).
- Clear state and local responsibilities.
- Models to simulate likely results.
- Monitoring of progress.
- Strict accountability, possibly similar to air quality conformity determinations of state implementation plans, 20-year transportation plans, and Transportation Improvement Plans (TIPs).
- Enforceable sanctions.

*Voluntary Approach* -- for contrast, a less regulatory option might combine a voluntary approach built on the foundation of the state and metropolitan planning requirements of TEA-21. Although the TEA-21 planning process supports accomplishment of and enforcement of the NAAQS, it also requires local areas to develop a sound technical and participatory process and encourages areas to consider and balance a broad range of complex local transportation goals, including accessibility for disadvantaged groups, freight movement, safety, and environmental improvement. Unlike the NAAQS, these goals are not defined as measurable national and local targets. The expectation is that local areas will consider these factors throughout their planning processes, and if these are locally important, incorporate them with performance measures within the twenty-year long-range plan and TIP. TEA-21 encourages inter-agency collaboration and public involvement to broaden the scope of concerns dealt with in the planning process. GHG reductions might similarly be incorporated into the statewide and metropolitan transportation planning processes.

Characteristics of a voluntary approach might include:

- Federal government encourages GHG objectives through guidance, outreach, and training.
- GHG objectives are encouraged as part of state and metropolitan transportation planning
- Local areas determine objectives and schedules. (An even more flexible approach would encourage "consideration" of GHG objectives along the lines of the state and metropolitan area planning factors in TEA-21).
- Emphasis on public and political support for GHG reductions.
- Federal incentives for progress, e.g., incentive grants for specified projects or relief from regulations (e.g., more flexible transportation funds).

5. *Important Issues* -- analysis in a policy level paper would consider the following issues:

#### *Technical*

This strategy would require currently available data on GHG emissions, sector activity, and population. If a GHG objectives policy were to integrate multiple activities such as agriculture and transportation, then data would be needed for the local proportion of national activity represented by each particular sector.

- What research would be required into the availability of fuel consumption by type and sector for states and subdivision of states to examine the feasibility of regional implementation?
- How adequate are currently available data for determining state and local baselines (e.g., for energy use, emissions, and vehicle miles traveled)? What additional or improved data would be required and at what cost?
- How would local objectives be set (e.g., gross emissions, emissions trends, emissions per capita, or fuel consumption)?

- How adequate are energy, transportation, or land use models for forecasting future emissions?
- How would progress toward objectives be monitored? How reliable are these tools?
- How accurately can the costs and emissions reductions be estimated for a range of investments, policies or strategies employed to achieve GHG objectives?

### *Institutional*

- Would this strategy concentrate on the transportation sector only, or would it be multi-sector? Do any aspects of the CAAA provide a useful model?
- Administrative roles and responsibilities would need to be clear and straightforward. How could an effective program be developed without creating complex and costly administrative costs and burdens?
- What if any relationship would there be to the CAAA? For example, regional or state objectives could be implemented through the conformity procedures either as a new requirement by statutory amendment of the CAAA or as a separate requirement using the organizations employed in air quality conformity planning or other entities.
- How would state and local stakeholders approach this policy? In particular, how would state transportation and energy agencies, regional air quality agencies, MPOs, and transit operators that might participate approach this strategy? How could it be presented as an attractive alternative?

### *Public and political acceptance*

A prescriptive approach might produce significant reductions, but how significant would public and political resistance be?

- A voluntary approach, which might produce modest reductions, would rely on local public and political support. How strong would this be, and in how many communities? Have any communities had experience with similar approaches, and with what results?
- How could this strategy be incorporated within current or future public outreach, education and training programs that promote balanced approaches to transportation, economic development, community preservation, and the environment?

*Integration with other climate change policies*

How would a GHG objectives policy complement and support other climate change policies?

For example:

- Could incentive payments for meeting objectives be funded through gas or carbon taxes, or congestion pricing?
- Could a GHG objectives strategy allow for participation in national or international trading programs?
- GHG objectives could be combined with a universal trading regime if one is implemented. Within an open ended trading system, states or regional entities could be allowed to trade emissions reductions attributable to public investments thereby encouraging better public decisions that would reduce the cost of GHG emissions reductions. This flexibility would be significant for transportation-based GHG objectives. It would allow for a highly successful project or strategy in one locale to receive government funding allocated to other areas, regions, or industries, or other compensation. This would greatly expand the incentives to make GHG reductions when considered alongside other transportation goals, for example, to enhance mobility or encourage economic development.