# Integration of Climate Change Considerations in Statewide and Regional Transportation Planning

The DOT Center for Climate Change & Environmental Forecasting

Final Report July 2009

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# Integration of Climate Change Considerations in Statewide and Regional Transportation Planning Processes

Case Studies and Proceedings from Panels at the
Transportation Research Board and
Association of Metropolitan Planning Organization Conferences

July 2009

Prepared for the
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13. ABSTRACT (Maximum 200 words)
This report is part on on-going work for the US Department of Transportation's Center for Climate Change and Environmental Forecasting and the Federal Highway Administration to highlight innovative actions and initiatives undertaken by states and metropolitan planning organizations (MPOs) to incorporate climate change considerations as part of the transportation planning process. The report provides case studies and proceedings from two panels of state and regional experts. Although the report considers both reduction of greenhouse house gas emissions and adaptation of transportation facilities to climate change, it focuses on reductions to reflect the priority of the organizations' studied.

Climate change considerations can shape the selection of investments and strategies within state and metropolitan area transportation planning processes. The case studies and panel summaries focus on how participating states and MPOs are considering climate change in the following aspects of transportation planning: vision and long range planning; forecasts, data and performance measures; public involvement; collaboration with partners; and project selection.

The report provides analysis, observations, and lessons learned from the case studies and panels to assist peer states, regions and local areas interested in expanding how they incorporate climate change into transportation planning processes.

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The Volpe Center project team consisted of William M. Lyons, project manager, Ben Rasmussen, and Lydia Rainville. Diane Turchetta of the FHWA Office of Natural and Human Environment was the overall project manager for the FHWA and the CCCEF, and wrote the case study on the Conference of the New England Governors and Eastern Canadian Premiers (NEG/ECP). Mark Gaber of the FHWA Office of Natural and Human Environment wrote the New York Department of Transportation case study.

The project team recognizes the valuable insights provided by the CCCEF Core Team and by contacts for the case studies, including Kelly McGourty, Charles Howard, and Rocky Piro of the Puget Sound Regional Council; John Shea of the NEG/ECP; John Zamurs of the New York DOT; and the participants in the Transportation Research Board and Association of Metropolitan Planning Organizations experts panels.

The project team provided contacts with the opportunity to review and comment on drafts of this report. Please note that contacts and the CCCEF are not responsible for the accuracy of the report, which is solely the responsibility of the project team.

## EXECUTIVE SUMMARY

At the current rate of growth, transportation's share of human-produced greenhouse gas (GHG) emissions in the U.S. will increase from 28 percent currently to 36 percent by 2020. When Congress, environmental groups, and others look for solutions to climate change, transportation is often considered to be a major source of the problem. The U.S. Department of Transportation (USDOT) must be able to participate in and contribute to these discussions to ensure that policies balance the need for reductions with other transportation goals.[1]

This report, conducted for the USDOT's Center for Climate Change and Environmental Forecasting (CCCEF) and the Federal Highway Administration (FHWA), led by a project team from the USDOT's Volpe National Transportation Systems Center (Volpe Center), is part of ongoing work to highlight innovative actions and initiatives undertaken by states, metropolitan planning organizations (MPOs), and local areas to incorporate climate change considerations as part of the transportation planning process. These initiatives represent innovative attempts to use the planning process to manage and reduce GHG emissions from the transportation sector within corresponding states, metropolitan areas, and local jurisdictions.

This report provides case studies and summaries of presentations from two panels of State and regional experts. The cases studies evaluate innovative planning and policy making by an MPO -- the Puget Sound Regional Council (PSRC) in the Seattle metropolitan area; a State department of transportation (DOT) -- the New York State DOT (NYSDOT); and a regional and bi-national organization of states and Canadian provinces -- the Conference of New England Governors and Eastern Canadian Premiers (NEG/ECP).

As part of the research for this report, the CCCEF organized and facilitated two panels of experts. Panelists at the Transportation Research Board Conference on Land Use, Transportation Planning, and Air Quality included staff from the Puget Sound Regional Council, NYSDOT, NEG/ECP, and the Gulf Coast Study on the impacts of climate change and variability on transportation systems and infrastructure. Panelists at the Association of Metropolitan Planning Organizations Annual Conference included staff from the Boston Region MPO and Central Transportation Planning Staff, the National Capital Region Transportation Planning Board, the Washington, D.C. area MPO, and the PSRC.

This report discusses how the case study areas incorporate considerations of climate change, including emissions reduction strategies and impacts of climate change on transportation systems, in the transportation planning process through collaboration and partnerships with transportation and non-transportation agencies, policies, outreach, and technical methods and tools. The report also considers the extent to which climate change considerations, specifically involving GHG emission reductions, are becoming a factor in state, regional, and local transportation investments and other decisions. Although the report considers both reduction of GHG emissions and adaptation of transportation facilities to climate change, it focuses on reductions to reflect the priority of the organizations' studied. State and regional planning organizations currently appear to focus on one or the other aspect, but not both. In the future, increasing numbers of these agencies are likely to want to address both aspects.

[1] US DOT Center for Climate Change Strategic Plan: http://climate.dot.gov/documents/splan_2006.pdf

The report examines the prospects for continued progress in the ability of transportation planning agencies to successfully include climate change considerations in their ongoing planning, and identifies technical and institutional challenges to overcome. The report provides observations and lessons learned from the case study areas to assist peer states, regions, and localities interested in expanding how they incorporate climate change into transportation planning processes.

Climate change considerations can shape the selection of investments and strategies within a region's transportation planning process. The case studies and panel summaries focus on how participating states and MPOs are considering climate change in the following aspects of transportation planning: vision and long range planning; forecasts, data and performance measures; public involvement; collaboration with partners; and project selection.

Findings and observations in this report focus on:

- Opportunities to "amplify" results of statewide, metropolitan area, and local actions by anticipating future Federal policies, programs, and regulations
- Climate change policy and supportive regulations
- GHG reduction targets and climate action plans
- The value of a long term horizon for actions to meet GHG emission reduction goals
- Planning to adapt transportation facilities to climate change impacts
- Establishing links between land use and transportation
- The technical role for MPOs in planning to reduce GHG emissions
- The need for realism to establish support for statewide and metropolitan area actions to meet GHG reduction targets
- The importance of identifying "co-benefits," demonstrating that GHG emission reductions advance other important regional goals
- Education and outreach on choices to reduce transportation sector GHG emissions
- The importance of partners and champions in establishing support for GHG reduction strategies

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# 1. Overview and Summary Analysis

## INTRODUCTION

This report, conducted for the U.S. Department of Transportation's (USDOT's) Center for Climate Change and Environmental Forecasting (CCCEF) and the Federal Highway Administration (FHWA) by a project team from the USDOT's Volpe National Transportation Systems Center, is part of ongoing work to highlight actions and initiatives undertaken by states, Metropolitan Planning Organizations (MPOs), and local areas to incorporate climate change considerations as part of the transportation planning process.

At the current rate of growth, transportation's share of human-produced greenhouse gas (GHG) emissions in the U.S. will increase from 28 percent currently to 36 percent by 2020. When Congress, environmental groups, and others look for solutions to climate change, transportation is often considered to be a major source of the problem. USDOT must be able to participate in and contribute to these discussions to ensure that policies balance the need for reductions with other transportation goals.[2]

The complex nature of transportation and climate change issues poses challenges for state, regional, and local transportation decision-makers. State departments of transportation (DOTs), MPOs, counties, cities, and local transportation providers have primary responsibility for transportation planning and decision-making. Decisions range from working with elected officials to set policy to selecting major capital investments in roads, public transit, railways, ports, and airports to traffic management, tolls and pricing, and parking. State, metropolitan area, and local agencies make decisions that have a major impact on choices by residents and businesses to use one mode of travel rather than another, and to guide the land development that greatly determines travel patterns and distances.

In 1999, the U.S. Department of Transportation established the CCCEF to take a leadership role in addressing the growing policy issues associated with climate change and variability. Since its formation, the CCCEF, with a membership of eight operating administrations and the Office of the Secretary, has promoted comprehensive multimodal approaches to reduce greenhouse gases and prepare for the effects of climate change on the transportation system while advancing USDOT's core goals of safety, mobility, environmental stewardship, and security.

The USDOT formed the CCCEF to become the focal point within USDOT for information and technical expertise on transportation and climate change through strategic research, policy analysis, partnerships and outreach.

Stakeholders interviewed in the development of the current CCCEF Strategic Plan confirmed that there is a critical national role for the USDOT and the CCCEF to play on climate change and identified working with state, regional, and local agencies as a top priority. The Strategic Plan includes the following strategy as a top priority:

[2] US DOT Center for Climate Change "Strategic Plan," http://climate.dot.gov/documents/splan_2006.pdf

*State and Local Transportation Planning*: Focus on initiatives with State and local transportation planning agencies through outreach, capacity building, and other collaboration.

As part of this strategy, the CCCEF is conducting research to develop a better understanding of how climate change considerations can successfully be incorporated into statewide, regional, and local transportation planning efforts.

In the absence of current Federal regulations or related guidance to address climate change, states, metropolitan areas, and local governments are taking aggressive independent actions -- setting targets for reducing their GHG emissions, developing strategies to respond to the impacts of global warming and extreme weather, adopting policies to promote renewable energy, and developing climate action plans to reduce emissions. To date, 32 U.S. states and Puerto Rico have adopted climate action plans, six have plans in progress, and 46 states have completed GHG inventories.[3] At the local level, 911 U.S. mayors have signed the Conference of Mayors Climate Protection Agreement[4] committing to:

- Strive to meet or beat the Kyoto Protocol targets in their own communities, through actions ranging from anti-sprawl land-use policies to urban forest restoration projects to public information campaigns
- Urge their State governments, as well as the Federal government, to enact policies and programs to meet or exceed the GHG emission reduction target suggested for the United States in the Kyoto Protocol -- 7% reduction from 1990 levels by 2012
- Urge the U.S. Congress to pass bipartisan GHG reduction legislation, which would establish a national emission trading system

States such as California are initiating new policies and regulations to reduce GHG emissions through the transportation planning process. California Assembly Bill 32 (2006) requires the State to reduce (GHG) emissions to 1990 levels by 2020 through a broad range of local government, transportation, and other strategies[5]. Under California Senate Bill 375,[6] the California Air Resources Board will set regional targets for reducing GHG emissions. The cities, counties, and MPOs participating in development of regional plans are expected to link regional land use and transportation planning to reduce GHG emissions from vehicle trips. Each

[3]US EPA Climate Change Site, last updated August 2008 (February 9, 2009) http://www.epa.gov/climatechange/wycd/stateandlocalgov/state_planning.html#four

[4] U.S. Conference of Mayors Climate Protection Center (February 9, 2009) http://www.usmayors.org/climateprotection/agreement.htm

[5] California Air Resources Board, "Summary of AB 32 California's Climate Change Scoping Plan," http://www.green-technology.org/gcsummit/images/AB32_Toolkit-Dana_Papke.pdf

[6] California Senate Bill 375, September 30, 2008, http://www.leginfo.ca.gov/pub/07-08/bill/sen/sb_0351-0400/sb_375_bill_20080930_chaptered.pdf; summary by the California Department of Transportation, http://counties.org/images/users/1/SB%20375%20Caltrans%20Summary%20-%2010.21.08.pdf

metropolitan area will develop a “sustainable community strategy" in its regional transportation plans to meet the GHG reduction targets.

Other states are forming multi-state regional and inter-regional coalitions to reduce GHG emissions through emissions trading, clean energy development, and other programs. Regional efforts such as the Conference of New England Governors and Eastern Canadian Premiers (NEG/ECP), the Northeast Regional Greenhouse Gas Initiative (RGGI), and the West Coast Governors’ Global Warming Initiative are underway to address emissions. The activities of the NEG/ECP are reviewed in detail in a case study in this report.

These multistate, statewide, regional, and local initiatives represent a broad range of innovative transportation planning – the process for considering goals, setting priorities, assessing alternatives, determining trade-offs between climate change, energy, and a range of transportation goals, and reaching decisions on multi-modal transportation policies, investments, and strategies. Ultimately, these evolving efforts are beginning to have important impacts on how State DOTs, MPOs, and transportation agencies responsible for roadways, railroads, public transit, airports, ports, and nonmotorized transportation serve their jurisdictions.
For example, under the New York State Energy Plan, MPOs in the State are required to conduct a GHG energy analysis as part of the transportation planning process for “regionally significant” transportation projects and plans. The Houston area MPO is involved in regional planning to adapt the transportation network to prepare for the impacts of climate change, and in the Seattle metropolitan area, the MPO is considering GHG emissions in long range transportation and land use planning.

Although the number of State and local initiatives continues to grow, there has not been a systematic effort at the national level to survey, assess, and document innovations and successes, and provide information to assist states and MPOs who are interested in incorporating climate change considerations into transportation planning processes.

This report contributes to improving the national base of knowledge on how and why state, regional, and local organizations are integrating climate change within their transportation planning processes. The report builds on earlier research by the CCCEF on statewide and regional transportation[7]:

- “Greenhouse Gas Reduction Through State and Local Transportation Planning” (companion to this report)
- “Assessing State Long Range Transportation Planning Initiatives in the Northeast for Climate and Energy Benefits”
- “Integrating Transportation, Energy Efficiency, and GHG Reduction Policies: A Guidebook for State and Local Policy Makers”

This report focuses on the following areas:

- Inclusion of GHG reduction as a broad goal in long-range planning

[7] Available with other related research on the CCCEF web-site: http://climate.dot.gov/state-local/integration/index.html

- Consideration of climate change/weather impacts in long-range planning
- Consideration of GHG reduction in vision or scenario planning
- Analysis of GHG reduction through data collection, analysis, or modeling
- Coordination among states, cities, and counties in developing their GHG reduction plans and/or inventories
- Building consensus through public involvement and outreach to stakeholders

This report provides case studies and summaries of presentations from two panels of State and regional experts at a national research meeting of the Transportation Research Board (TRB) on Transportation, Land Use, and Air Quality, and the annual conference of the Association of Metropolitan Planning Organizations (AMPO).

## Case Studies

This report includes three cases studies by innovative planning and policy organizations: an MPO, a State DOT, and a regional and bi-national organization of states and Canadian provinces:

- *Puget Sound Regional Council* (Seattle metropolitan area MPO): long-range planning that considers the GHG emission implications of alternative transportation investments and land use strategies, working in partnership with Seattle, King County, and Washington DOT;
- *New York State DOT (NYSDOT)*: policies and programs to work with MPOs to measure the GHG emissions of major transportation projects;
- *Conference of New England Governors and Eastern Canadian Premiers (NEG/ECP)*: examines how a bi-national and super-regional approach can be used to develop multi-sectoral policies, targets, and actions to support State, regional, and local transportation planning to meet emissions reduction targets. The case study considers the range of approaches taken by selected States, provinces, or regions within the bi-national area.

## Expert Panels

As part of the research for this report, the CCCEF organized and sponsored two panels of experts to exchange information on innovative current practices, barriers encountered, and lessons learned:

- TRB Conference on Land Use, Transportation Planning, and Air Quality (Orlando, FL)
  - Puget Sound Regional Council (Seattle area MPO)
  - NYSDOT
  - NEG/ECP
  - Gulf Coast Study
- AMPO Annual Conference (Little Rock, Arkansas)
  - Boston Region MPO and Central Transportation Planning staff
  - National Capital Region Transportation Planning Board (TPB) (Washington, D.C., area MPO)
  - Puget Sound Regional Council

## Report Overview

This report discusses how the case study areas and those represented by panelists consider climate change, including emissions reductions strategies and impacts of extreme weather on transportation systems, in transportation planning through:

- Collaboration and partnerships with transportation and non-transportation agencies
- Policies
- Outreach
- Technical methods and tools

The report also considers the extent to which climate change considerations are becoming a factor in State, regional, and local transportation investments and other decisions that reduce GHG emissions. The report examines the prospects for the future, including technical or institutional challenges to overcome, and lessons learned to assist peer States, regions, and localities that are interested in considering climate change within their transportation planning processes.

Climate change considerations can shape the selection of investments and strategies resulting from a region's transportation planning process. Transportation planning can be viewed as a critical means to address what is variously described as the "three legs of the stool" for reducing GHG emissions: vehicle technology, vehicle fuels, and vehicle mile travel reduction. More recently, analysts and advocates have added a "fourth leg" to the stool: improved efficiency of the transportation system through technology, pricing, or other means. Transportation planning can play a critical role in addressing all of these elements – energy and vehicle efficiency, travel behavior changes, and system management – individually and in combination.

The case studies and panel summaries focus on how States and MPOs are considering climate change at key stages of their transportation planning process:

- Long Range Planning
  - GHG reduction as a broad goal in regional vision planning and the development of transportation and land use scenarios over time periods that range from 30 to 40 years
  - Long-range planning to prepare transportation systems for and adapt to the impacts of climate change and extreme weather
  - As part of the Federally-required long range transportation plans that all areas over 50,000 population must prepare, identifying goals, needs, investments, costs, and revenues over a 20-25 year period.
- Forecast, Data, and Performance Measures
  - Carbon dioxide ($CO_2$) reduction in vision or scenario planning
  - Analysis of reductions through data collection and modeling
- Public Involvement and Coordination
  - Coordination among States, cities/counties, and transportation authorities on GHG inventories and reduction plans and transportation plans
- Project Selection and Decision-Making
  - Investments and strategies that reduce $CO_2$
  - Along a spectrum of choice ranging from reviewing and screening proposed projects to using GHG emission reductions as a project selection criterion

As discussed in this report, integration of climate change considerations within the transportation planning process is rapidly evolving – the States and MPOs reviewed will continue to make rapid changes, and many of their peers will likely undertake similar planning initiatives.

## FINDINGS AND OBSERVATIONS

The following summary presents key observations based on the case studies and panel summaries in this report. Insights from the panels are based both on the presentations and the ensuing discussion with the audiences of researchers and senior planners from peer MPOs. As the transportation planning processes studied in this report evolve, they will continue to provide insights for peer States, regions, and cities that are considering following similar paths.

Table 1 presents a summary of approaches being undertaken by the agencies reviewed in the case studies and represented on the two panels. The entries in the table identify initiatives undertaken that the study team considered to be innovative and of significant potential interest to peer agencies considering how to incorporate climate change within their planning.

**Table 1: State and Regional Transportation Planning and Climate Change: Summary of Major Aspects of Transportation Planning Processes**

| | MPOs (Metropolitan Area) | | | State DOT | Multi-State or Province | |
|---|---|---|---|---|---|---|
| **Innovative Planning Application** | **Boston MPO** | **DC MPO** | **Seattle MPO** | **NYDOT** | **NEG/ ECP** | **Gulf Coast Impacts Study** |
| Policy development | | X | X | X | X | |
| GHG reduction targets | | | X | X | X | |
| Supportive regulations | | | X | X | | |
| Link to State/city/county GHG plan | X | | X | | A | A |
| Own GHG plan | | | X | | | |
| Vision plans - scenarios | | X | X | | | |
| Links to land use | | X | X | | | |
| Link to decisions and investments (criteria) | | | A | A | A | A |
| Role of co-benefits | | | X | X | | |
| Technical and use of models | | X | X | | | |
| Adaptation to impacts | X | | | | | X |
| Education and outreach | X | | X | | X | X |
| Partnerships | | | X | | X | |

X = In place or pending
A = Anticipated

**The role of targets to reduce GHG emissions within transportation planning process:**

- The transportation planning process can be adapted to focus on the feasibility of meeting $CO_2$ emission reduction targets through transportation and land use policies, investments, and other strategies.
- PSRC and TPB provide examples of how vision and scenario plans can be used to engage stakeholders and decision-makers by presenting a range of possible emissions reductions for a metropolitan area over a long time horizon and beginning to identify critical regional choices and trade-offs required to meet reduction targets.

- The MPOs reviewed are supported by formal State, regional, city, or county Climate Change plans with reduction targets, actions, and dates in place; are conducting early planning; or are developing policies that could support future plans and targets to reduce GHG emissions.
- The NEG/ECP member States and provinces have GHG or Climate Change plans in place with targets or are developing plans, supported by the voluntary targets set collaboratively by the governors and premiers for the U.S.-Canadian northeastern region.

**The need for realistic policy advocacy:**

- As suggested by panelists in discussion with peer MPOs at the AMPO session, there is an important role for MPOs to play nationally in the policy debate about what can realistically be accomplished through metropolitan area transportation planning and complementary land use planning, and more broadly at national, statewide, and local levels with city, county, and modal authority partners.

**Key initial stages: policy development and supportive regulations**:

- The examples reviewed in this report demonstrate the role regulations can play as key mechanisms for State, regional, and local agencies to translate political support and policies into concrete actions to reduce emissions or respond to climate change impacts.
- The NYSDOT case study describes an early application by a State of regulations and policies to implement the State Energy Plan, which requires MPOs to conduct a GHG energy analysis as part of its transportation planning process for plans and "regionally significant" projects.
- TPB conducted modeling to forecast GHG emissions from land use and transportation scenarios in response to policy direction from its Board, building on technical capabilities in place to meet existing conformity requirements of the Clean Air Act Amendments.

**Thinking long term: the role of vision planning and scenarios:**

- MPOs can use long-term planning horizons to examine how transportation and land use policies and actions might reduce GHG emissions. This can be over the 20-25 year horizon of long range plans, but also over the longer periods -- 30, 40, or even 50 years -- considered in regional vision and scenario plans.
- MPOs can employ "back-casting" techniques to examine aggressive GHG reduction targets and work backwards to identify the potential policies, investments, and strategies that would be required to meet those targets.
- As a key part of the planning process, MPOs can play an active role educating decision-makers and the public about realistic options, critical choices, and necessary trade-offs to meet aggressive goals.

**Linking transportation to land use:**

- The MPOs reviewed in this report approach GHG emissions reductions as involving coordinated transportation and land use planning.
- The PSRC planning process and vision plan are national models for how MPOs can attain GHG emission reduction targets with combined transportation and land use policies and programs.

- TPB provides a very helpful example of how an MPO can evaluate transportation and land use scenarios to indicate the range of $CO_2$ emission reductions possible over a long-term time horizon in a complex region (two States and the District of Columbia).

**Ultimate test: linking planning to decision-making:**

- Transportation planning provides a sound technical process for making decisions, including formulating policies, identifying investments, and developing strategies that can involve land use as well as transportation considerations.
- The areas summarized in this report are taking the early steps necessary to establish broad support for considering climate change in State and regional transportation planning processes. These steps include:
    - setting policies to reduce emissions (NY DOT, NEG/ECP, TPB, and PSRC)
    - developing GHG plans with targets or linking to plans by partner governments (PSRC)
    - developing new technical capabilities to forecast emissions from alternative transportation decisions (PSRC and the TPB)
- Rigorous GHG analysis conducted early in the decision-making process can be translated into criteria as part of the screening or selection of investments in metropolitan or statewide transportation improvement programs (TIPs and STIPs). These criteria will require rigorous technical analyses to credibly forecast GHG impacts of alternative decisions combined with broadly based political and institutional support to pursue GHG emission reductions alongside traditional transportation goals, such as mobility, congestion relief, or safety, and other broader goals, including energy conservation or public health.

**Need for realistic expectations:**

- The case studies provide early "reality checks" on the range of feasible reductions in $CO_2$ emissions that DOTs, MPOs and their planning partners might accomplish through policies, investments, and other strategies that they might shape.
- The MPOs in the NY DOT area identify possible limits of potential GHG emission reductions from major projects and the difficulty involved with estimating project-level emissions impacts.
- The scale of GHG reductions from MPO-initiated actions may be small relative to the reductions possible from Federal or State policies directed toward energy and vehicle technology, including fuel economy standards, renewable fuels, advanced vehicle designs, cap and trade regulations, or carbon pricing.
- As suggested at the AMPO peer exchange, as MPOs begin to examine the potential emissions reductions through regional planning and actions, initial limitations should not result in pessimism and inaction; MPOs should aggressively address energy and climate change issues with innovative planning, particularly over long time horizons.
- Experiences of State DOTs, MPOs, and local authorities using transportation planning to consider climate change could be very helpful for informing future Federal and State policies and regulations.

**GHG emission reductions can complement other regional goals (role of co-benefits):**

- GHG reduction activities are best pursued in combination with other regional goals, particularly air quality improvement, but also energy conservation, smart growth, open space preservation, congestion relief, and public health.

**Important technical role for MPOs:**

- MPOs that are already modeling criteria pollutants from transportation, as required by the Clean Air Act Amendments for conformity, are in a strong technical position for refining or developing models that also analyze $CO_2$ emissions.
- Enhanced models that account for factors such as speed, vehicle mix, weather, and fuel type are necessary to accurately analyze $CO_2$ emissions at regional, corridor, and project levels, as required for comprehensive transportation planning. PSRC is at the forefront of MPOs that are testing and refining some of these types of model improvements.
- Future Federal or State requirements for MPOs to perform related analysis of GHG emissions will require additional staff and improved technical capacity, especially for smaller MPOs.

**Impacts/adaptation versus mitigation/reductions**:

- Phase 1 of the CCEF study, "Impacts of Climate Change and Variability on Transportation Systems and Infrastructure Gulf Coast Study" assessed the vulnerabilities of regional transportation systems to potential changes in weather patterns and related impacts. Phase 2 will include resources for planners and engineers working at the State, regional, and local levels.
- MPOs such as the Boston Region MPO are approaching climate change by first raising public awareness of forecasted impacts, which may then build the future support necessary for regional transportation decisions to reduce emissions.
- To date, MPOs actively considering climate change appear to be focusing either on adaptation of transportation facilities to global climate change and extreme weather, or on identifying investments and strategies to reduce GHG emissions.
- As MPOs gain experience with climate change issues, it is likely that increasing numbers will be interested in pursuing both adaptation and reductions. A future challenge will be to balance pursuit of emissions reductions and preparation for impacts alongside other planning priorities since both may draw on the same limited resources.

**Anticipation of possible future policies, regulations, or programs:**

- Federal and State policies and initiatives and major trends related to climate change and energy will have profound impacts on the ability of State DOTs, MPOs, and local governments to reduce $CO_2$ emissions. Changes in these areas appear likely following the 2007 Supreme Court ruling that requires the EPA to determine whether $CO_2$ emissions endanger public health and welfare and the priority placed by the Administration and Congress on developing new climate change policies.
- MPOs should be prepared for the possibility that future Federal policy may entail regulatory actions requiring GHG reductions.
- Models and staff will need to be enhanced to meet future Federal and State policies and regulations.

- Currently, carbon monoxide, nitrogen oxides, and volatile organic compounds are included as criteria pollutants in air quality analysis; MPOs such as TPB and PSRC are exploring how they can expand this technical analysis to estimate GHG emissions.
- MPOs, State DOTs, and regions that are already addressing or at least accounting for GHG emissions, such as those evaluated in this paper, will be well-positioned to respond to any future regulations.
- State DOTs and MPOs interested in GHG emissions reductions should anticipate possible Federal and State policies, and develop local strategies that might *amplify* the results of these policies. For example, MPOs and States might anticipate shifts to alternative fuels by supporting investments in energy infrastructure. Similarly, increases in fuel prices, including from carbon pricing or cap and trade programs, might be anticipated with investments in alternative modes or land use policy to support compact development or improved jobs-housing balances. California's Senate Bill 375 will provide a laboratory for one comprehensive state-based regulatory approach to reduce GHG emissions through coordinated regional transportation and land use planning.

**Role of education and outreach:**

- Education and outreach are important components in all of the case studies and panel presentations.
- The Boston Region MPO white paper represents a helpful example of an early effort by an MPO to raise the awareness of decision-makers, stakeholders, and the public of the connection between climate change and transportation, and to build support for future related planning and decisions.
- The TPB conducted modeling of scenarios to raise the technical understanding of decision-makers and stakeholders of the range of GHG reductions that are possible considering land use and transportation scenarios examined in the past vision plan.
- The NEG/ECP efforts are directed toward educating State and provincial-level leaders and stakeholders and building broad-based political support for future bi-national, multi-state, and multi-province policies, and related regional and local actions, to reduce GHG emissions.
- The Gulf Coast study will help raise the awareness of the States, cities, MPOs, modal operators, and other jurisdictions in the multi-state region on the vulnerability of the region's transportation networks and the pressing need to plan for collaborative adaptation. The study provides a valuable model for approaching transportation adaptation in a large vulnerable area with complex and over-lapping jurisdictional responsibilities.

**Importance of Partners and Champions**

- Partnerships are critical for successful GHG emission reduction strategies. Whether it is at the metropolitan, State, or multi-state level, partnerships help ensure "buy-in" and ownership of multi-jurisdictional and multimodal measures to realize significant GHG reductions.
- While partnerships are important, political or community champions, including elected officials, are essential to move measures from plans to implementation. With concurrence of other stakeholders, champions can move stalled or complex measures forward and can bring more partners into the process.

**Other Related Issues**

- Panelists and the discussants at the two workshops expressed interest in research and an exchange of information on the relationship between zoning and climate change impacts and national experiences integrating climate change into the environmental review process.

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# 2. Puget Sound Regional Council Case Study

# Integration of Climate Change Considerations into the Seattle Metropolitan Area Transportation Planning Process

**November 2008**

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## INTRODUCTION

This case study describes and evaluates how the Puget Sound Regional Council (PSRC), the Seattle area Metropolitan Planning Organization (MPO), incorporates climate change concerns in the metropolitan area transportation planning process. Climate change concerns include both reducing greenhouse gas (GHG) emissions and adapting to the impacts of climate change. PSRC has incorporated climate change concerns into their planning process in five innovative ways.

1. **Political Context:** PSRC integrated climate change concerns into its multi-county planning policies, which have legislative standing.
2. **Carbon Dioxide ($CO_2$) Criterion for Growth Alternatives**: PSRC used $CO_2$ emissions as one of its criteria used to select future growth alternatives.
3. **Forecasting $CO_2$ for Growth Alternatives:** Closely related to the preceding point, PSRC estimated how much $CO_2$ would be emitted under each growth alternative.
4. **Key Partnerships**: PSRC is partnering with several organizations and agencies to address climate change issues holistically at a regional level.
5. **Improved Technical Tools**: PSRC is involved in several initiatives to improve its model, and specifically its ability to accurately reflect $CO_2$ emissions in the region.

Climate change is a concern to PSRC and other agencies and organizations in the Puget Sound region for a number of reasons that will be explored in this report. Reasons include climate change's impact in the region, which will be significant, and in the State and local agencies in creating a planning environment that will support taking future actions to reduce GHG emissions.

To understand how PSRC is integrating climate change into its planning process, it is necessary to describe its planning process in the context of State, county, and local planning. Two examples help illustrate this point.

**First**, the State of Washington requires consistency between local, county, and multi-county planning policies in the Puget Sound region. This requirement means that organizations and entities that operate at these levels must coordinate their planning processes to be consistent across the region.

**Second**, the State of Washington requires that an environmental review be prepared for PSRC's long-range plan. This requirement has important implications for how PSRC has chosen to address climate change in its planning process.

This report begins by describing PSRC and the Puget Sound region and the policy context – including the examples above – affecting and surrounding PSRC. The next section describes how PSRC is integrating climate change into its planning process through its policies, criteria, analysis of alternatives, including selection of a preferred growth alternative. In addition to a summary of the transportation and environmental impacts of the growth alternatives, this section includes a discussion of the next steps for PSRC to further integrate climate change into its planning process. The last two sections describe how PSRC's partners together address climate

change issues and how PSRC is improving its model to better address and evaluate GHG emissions and climate change impacts.

The report concludes with a summary of "take away" lessons from this PSRC case study. These observations are provided to assist interested peer MPOs and their planning partners to benefits from PSRC's innovations and experiences as MPOs begin to integrate climate change considerations within their planning processes. *Selections in italics emphasize ways that climate change is being integrated into the larger, complex, and evolving transportation planning process.*

## OVERVIEW

PSRC is an association of cities, towns, counties, ports, and State agencies that serves as a forum for developing policies and making decisions about regional growth management, economic, and transportation issues in the four-county central Puget Sound region. PSRC is designated under Federal law as the MPO (which is required for receiving Federal transportation funds), and under State law as the Regional Transportation Planning Organization, for King, Kitsap, Pierce, and Snohomish Counties.

PSRC's members include the four counties and 71 of the region's 82 cities and towns. Other statutory members include the four port authorities of Bremerton, Everett, Seattle, and Tacoma; the Washington State Department of Transportation; and the Washington Transportation Commission. The Muckleshoot Indian Tribe and The Suquamish Tribe are also members. In addition, a memorandum of understanding with the region's six transit agencies outlines their participation in PSRC. Associate members include the Puyallup Tribe of Indians, the Tulalip Tribes, Island County, Thurston Regional Planning Council, and the Evans School of Public Affairs at the University of Washington.

PSRC is a comprehensive planning agency that supports the needs of local and State operating agencies with complementary planning and advocacy, and serves as a center for the collection, analysis and dissemination of information vital to citizens and governments in the region.

Between 1960 and 2005, the region's population grew from 1.5 million to nearly 3.5 million. Rapid growth occurred in the late 1960s, in the late 1970s and early 1980s, and in the late 1980s and early 1990s. Over half of the population growth during this period is accounted for by net migration into the region. Somewhat surprisingly, the region gained population each year during the economic downturn of the early 2000s, albeit at a slower rate than what was seen during the 1990s.

By 2030, the region is projected to grow by an additional 1.1 million people, add over 850,000 new jobs, and will need to accommodate close to 50 percent more travel, putting even more strain on the region's transportation system. Fifty percent of GHG emissions in the State come from the transportation sector.

The PSRC voluntarily elected to consider $CO_2$ emissions and the impacts of climate change as part of its regional planning process, which resulted in the formulation of VISION 2040, the region's long-range growth management, economic, and transportation strategy. As a key step in this process, PSRC's Growth Management Policy Board formulated multi-county planning policies (MPPs) based on factors identified in State law (Growth Management Act, Chapter 36.70A.210, RCW). The MPPs form the backbone of the VISION 2040 document. The MPPs must be integrated into the region's other planning documents as well, including Destination 2030, the region's long-range transportation plan (Figure 1)[8]. These policies also provide the framework for countywide planning policies (CPPs) and local comprehensive plans (Figure 2).

**Figure 1: Relationship between PSRC plans**


*Source: PSRC*

**Figure 2: Relationship between regional plans and policies**


*Source: PSRC*

## POLICY CONTEXT

### Multicounty Planning Policies

Under the Growth Management Act (see Box 1), MPPs provide a common region-wide framework for countywide and local planning in the central Puget Sound region. Central Puget Sound's current MPPs, which were adopted in April 2008, are listed in the VISION 2040, the region's current strategy for future growth and development. CPPs are developed by a collaborative body of county and municipal officials. They are adopted by the county legislative body (either a county council or county board of commissioners) and are then subject to a ratification process by the cities in the county.

[8] Figure 1 and other PSRC figures in this section are from http://psrc.org/projects/vision/index.htm

**Box 1: The Growth Management Act and Multi-County Planning Policies**

Washington state's planning legislation, the Growth Management Act, requires countywide planning policies – or for multi-county urban regions, multi-county planning policies – to provide a common policy framework for all local jurisdiction comprehensive planning within the county or multi-county region. The Growth Management Act was first adopted in 1990, and the requirement for countywide and multi-county policies was amended into the Act the following year. The Act identifies specific topics to be addressed in countywide and multi-county policies: urban growth areas, contiguous and orderly development, housing, capital facilities, transportation, economic development, and joint planning. As umbrella policies for local planning, there is an expectation that local comprehensive plans are consistent with the countywide and multi-county policies.

The four-county central Puget Sound region is currently the only multi-county urban region in Washington required to have multi-county policies in place, given the size of the region's population. Each of the counties in the PSRC region adopted their own first set of countywide policies between 1992 and 1994. Being newly established in 1992, PSRC adopted an initial set of multi-county policies in 1993, and then further updated them in 1995. Multi-county planning policies are adopted by PSRC's General Assembly, which is comprised of local elected officials from all of the counties and municipalities in the four-county region that hold membership in PSRC. The multi-county policies in VISION 2040 mark the first revisions to the multi-county policies since 1995.

There is important interplay between the provisions that end up in MPPs, CPPs, and local comprehensive plans. MPPs tend to be broader and, in addition to addressing the required topics spelled out in the law, also include other topics around which there is regional agreement, such as policies for the environment and public services. CPPs tend to offer more specific direction to local jurisdictions on how they should address certain issues. Sometimes issues that were first developed by a local jurisdiction in a comprehensive plan are viewed as having county or regional significance and find their way into CPPs or MPPs.[9] Even though there is interplay, once something has been established in MPPs, there is an expectation that that issue will be addressed in CPPs and local comprehensive plans. There are hearings board and court decisions that reinforce that relationship.

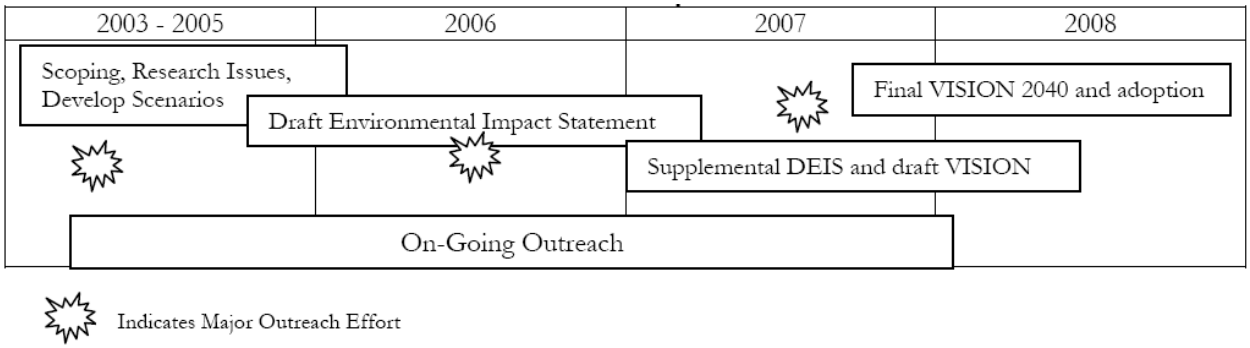
The unified structure established by the MPPs has both practical and substantive effects on city and county comprehensive plans. The MPPs provide a mechanism for achieving consistency among cities and counties on regional planning matters. They also guide a number of regional processes, including the review and certification of local comprehensive plans, the evaluation of transportation projects seeking regionally managed funding, and the development of criteria for PSRC programs and projects.

[9] Examples are policies for health and the built environment. King County first incorporated new policies addressing health and land use a couple of years ago. PSRC is now building on that individual jurisdiction work and bringing it into the regional policy arena, which will then establish it as part of the regional framework for all localities to address as they work on future amendments and updates to the their local comprehensive plans.

## VISION 2020 and VISION 2040

VISION 2040, approved in April 2008, is the current regional long-range growth management, economic, and transportation strategy for the four-county central Puget Sound region. It replaces VISION 2020, which was last revised in 1995. VISION 2020 was updated to provide a comprehensive regional approach to manage growth through the year 2040 (see timeline in Figure 3). In formulating VISION 2040, regional leaders were asked to build on VISION 2020's key priorities and be bolder, clearer, and more specific than VISION 2020. The new strategy accommodates the additional 1.7 million people and 1.2 million new jobs expected to be in the region by the year 2040.

**Figure 3: VISION 2040 Update Timeline**




*Source: PSRC, VISION 2040, 2008*

### *VISION 2020 and 2040 Environmental Impact Statements*

The VISION 2020 Update Draft Environmental Impact Statement (DEIS), released in May 2006, presents and discusses the potentially significant environmental impacts that may occur upon implementation of four growth management alternatives, which distribute forecasted growth into different types of areas throughout the region. The DEIS is a plan-level, or non-project, environmental impact statement, and its content is consistent with the requirements of the State Environmental Policy Act (SEPA) for non-project actions. The SEPA defines non-project actions as governmental actions involving decisions on policies, plans, or programs that contain standards controlling use or modifications of the environment or that will govern a series of connected actions.

Following the release of the DEIS, PSRC's Growth Management Policy Board used four tools to develop the Preferred Growth Alternative:

1. The findings in the DEIS
2. Input received during a public review and comment period
3. Staff analysis on a potential Preferred Growth Alternative, which included input from a technical advisory group made up of local jurisdiction staff
4. Application of the evaluation criteria for selecting a Preferred Growth Alternative that was published in the DEIS

Based on these four tools, the Policy Board made a recommendation to PSRC's Executive Board to release the Preferred Growth Alternative for full analysis in a Supplemental DEIS. The Executive Board took this action in March 2007.
The Supplemental DEIS, released in July 2007, presents an analysis of the environmental impacts of the VISION 2040 Preferred Growth Alternative, which is a hybrid of the alternatives presented in the DEIS. The analysis of the Preferred Growth Alternative considers the likely environmental consequences that may occur following the adoption of VISION 2040. Given the long range nature and regional scale of VISION 2040, the analysis is conducted at a regional scale that considers major geographic features, typical current environmental conditions, and broad geographies such as counties or classes of cities, rather than site-specific analysis. The analysis of this additional alternative supplements the information provided in the DEIS.

The Final Environmental Impact Statement (FEIS), released in April 2008, combines the information found in the Draft DEIS and Supplement DEIS. The information in both of these drafts has been updated in the FEIS based on comments submitted during the two public comment periods. The VISION 2040 FEIS analyzes the Preferred Growth Alternative as well as the four other conceptual growth alternatives for accommodating forecasted growth. For each element of the built and natural environment, the FEIS describes existing conditions, potential environmental impacts associated with each alternative, potential measures to mitigate the impacts of the growth, and potentially unavoidable adverse impacts.

### Destination 2030

Destination 2030 is a long-range plan for transportation in the central Puget Sound region, and also serves as the detailed transportation element of VISION 2020. The associated map displays the major transportation investments that the region has planned through year 2030. As the central Puget Sound region's comprehensive transportation action plan, Destination 2030 is intended to improve mobility, keep pace with growth, and support the region's economic and environmental health. Since adoption in 2001, the plan has won three national awards, including being named "America's Best Plan" by the American Planning Association.

Destination 2030 underwent a limited scope update for 2007, satisfying new requirements and setting the stage for a more extensive plan update to be completed by 2010. PSRC is currently in the process of updating Destination 2030 (Figure 4). The updated plan, termed Transportation 2040, will extend the plan horizon to 2040 and evaluate ways to keep the region moving and the economy prospering as the population grows. The plan will also consider protecting the region's environment, natural resources, and quality of life. The updated plan will continue to meet Federal transportation planning requirements and the State Growth Management Act, and will align with the Regional Economic Strategy and VISION 2040.

**Figure 4: Transportation 2040 Project Timeline**


*Source: PSRC*

## CLIMATE CHANGE IN THE PLANNING PROCESS

***Innovation #1:***

*PSRC integrated climate change concerns into its multicounty planning policies, which have legislative standing.*

This section describes how PSRC integrated climate change concerns into its planning process. PSRC achieved this end through a sequential and consistent process consisting of:

1. Development of *policies* that account for climate change
2. Creation of *criteria* based on these policies to evaluate the impacts of growth alternatives
3. Estimation of climate change *impacts* and the application of their criteria in the DEIS, Supplemental DEIS, and FEIS

The following section describes this process in more detail and includes an overview of how PSRC analyzed the alternatives and compared the results of the analysis in two specific areas: *impacts on the transportation system* and *impacts on the environment*.

### Policies

The PSRC developed MPPs regarding climate change as part of the VISION 2040 update process, with the MPPs listed under their parent category of goals.[10] In roughly chronological order, climate change started as an issue that a team of consultants identified in an environmental issue paper developed for PSRC's Growth Management Policy Board, was discussed and articulated by the Regional Staff Committee, and came into the draft VISION 2040 document as MPPs through the recommendations of Growth Management Policy Board members. This process is detailed below.

The PSRC's Growth Management Policy Board, which is comprised of elected officials from local jurisdictions with some interest group representation, has been the primary body overseeing the VISION 2040 update. In its initial scoping process in 2003 to 2004, the Policy Board received input on various issues to consider in the proposed update to the regional VISION. One of the key themes that came out of the scoping process was to provide a more integrated

[10] VISION 2040: people – prosperity – planet," page 33, April 24, 2008, http://psrc.org/projects/vision/pubs/vision2040/vision2040_021408.pdf

framework for addressing environmental issues in regional and local planning. It was proposed that a more integrated framework should expand the more limited treatment of the environment in the 1995 VISION 2020 regional plan – which focused primarily on open space and protection of resource lands – to address various facets of land, water, and air more comprehensively.

The Policy Board then identified 10 key topics from the scoping process for more detailed analysis – among those topic areas was "the environment." The PSRC let a small contract to a consultant team to develop an "Issue Paper on Environmental Planning," which was completed and endorsed by the Policy Board for public review in August 2005. Climate change was referenced in the section on air quality in the issue paper.

Also during 2004 and 2005, the Policy Board reviewed the existing MPPs from the 1995 VISION 2020 document, and identified which policies were still relevant, which should be revised, and where there were policy gaps. In reviewing the open space and resource lands policies, the Policy Board recommended that these environmental considerations provide an overarching framework for the provisions in the update. Preliminary guidance from the Policy Board also suggested that specific environmental policies should be more comprehensive in addressing a fuller range of environmental issues beyond open space.

The Regional Staff Committee, a high-level committee at PSRC, then worked with guidance from the Policy Board and the findings of the issue paper to craft draft policies for the Policy Board to consider. The Staff Committee includes planning directors, public works directors, and economic development directors from local jurisdictions in the four-county region as well as senior staff from two State agencies, plus the region's clean air agency. This committee worked with existing MPPs, the recommendations in the issue paper, and the guidance from the Policy Board to create a set of draft "Environment MPPs" that addressed five topic areas:

1. Environmental stewardship
2. Earth and habitat
3. Water quality
4. Air quality
5. *Climate change*

The committee spent some time discussing whether air quality and climate change should be one set of related policies, or separate subsections. Following the recommendation of the representative from the Puget Sound Clean Air Agency, *climate change was made its own stand-alone sub-section*.

The Regional Staff Committee's full set of policy recommendations was then transmitted back to the Growth Management Policy Board to consider in the fall 2006. The Policy Board worked through each section of draft policies and developed a final set of proposed revisions to the MPPs that was then transmitted to PSRC's Executive Board for review and action. For example, when the Policy Board reviewed the climate change policies, they added the policy provision that addresses the water-related implications of climate change. In March 2007, the Executive Board authorized the release of the draft MPPs for public review and comment. MPPs must be

followed in all subsequent planning processes. Climate change issues therefore will be addressed in Transportation 2040 in-line with the MPPs and actions listed in Vision 2040[11].

## Criteria

> ***Innovation #2:***
> *PSRC used $CO_2$ emissions as one of its criteria to select future growth alternatives.*

The evaluation criteria contain four overarching goals as well as a series of 40-plus measures that fall within nine topic categories. The Growth Management Policy Board identified the following four overarching goals that should be advanced by the preferred growth alternative:

1. Promote an overall high quality of life;
2. Create an efficient land use pattern for the provision of infrastructure, facilities, and services;
3. Protect the natural environment; and
4. Enhance human potential and social justice.

To compare the alternatives to the four goals listed above, the Board created nine topic categories and adopted a series of measures under each category. The topic categories are:

- Environmental quality (*which includes a measure on climate change*)
- Health
- Economic prosperity (based on meeting the objectives of the Regional Economic Strategy)
- Land use
- Transportation (based on meeting the objectives of Destination 2030)
- Social justice and human potential
- Maintaining rural character
- Protecting resource lands
- Efficiencies in the provision and use of infrastructure, public facilities, and services

In line with its MPPs, PSRC *included climate change as one of the eleven measures* under the environmental quality topic category. As described in the following section, it is *measured in the analysis of alternatives by estimating the $CO_2$* emissions generated by each alternative.

As published in the DEIS, the measures were anticipated to be evaluated on a scale of one to four, with four being the highest (or best) score and one being the lowest (or worst) score. Upon review, the Growth Management Policy Board suggested that this scoring component be removed. The rationale was that the measures were not weighted and therefore assigning scoring would make all measures "equal" to one another. Second, scoring implied a level of precision that some Board members did not believe was useful. Last, scoring might require statistical analysis, for example on quantitative measures that were essentially tied, which again implied an inappropriate level of precision.

[11] VISION 2040: people – prosperity – planet," page 33, April 24, 2008, http://psrc.org/projects/vision/pubs/vision2040/vision2040_021408.pdf

In response to Board members' concerns regarding scoring, the measures in the FEIS now rank only one alternative as having the best/highest relationship to the goal/measure. This alternative is identified using a check mark. Where the analysis shows a second alternative being essentially tied as best, a second check mark is shown. If the analysis finds an alternative being close to the best, but of slightly lesser magnitude, a smaller check mark is shown. Where the analysis shows all the alternatives being similar or no conclusive determination is made (i.e., where a tradeoff exists that cannot easily be resolved based on either environmental or policy analysis), check marks are shown for all four of the alternatives. This scoring system is displayed in Tables 1, 3, and 5.

**Table 1: Transportation Evaluation Criteria Results for the Four Alternatives**

| | VISION 2020 Update Alternatives | | | |
|---|---|---|---|---|
| | Growth Targets Ext. | Metropolitan Cities | Larger Cities | Smaller Cities |
| **5. Transportation** | | | | |
| 5A. Travel Distance | | ☑ | ☑ | |
| 5B. Travel Time | | ☑ | ☑ | |
| 5C. Daily Vehicle Miles Traveled | | | ☑ | |
| 5D. Daily Vehicle Hours Traveled | | | ☑ | |
| 5E. Daily Hours of Delay | | | ☑ | |
| 5F. Work Trip Mode Split | | ☑ | | |
| 5G. Household Access to Jobs - 10 Minute Walk (1/2 Mile) | | ☑ | | |
| 5H. Household Access to Jobs - 20 Minute Bike Ride (4 Miles) | | ☑ | | |
| 5I. Household Access to Jobs - 30 Minute Transit Ride | | ☑ | | |

*Source: PSRC, Evaluation Criteria for Selecting a Preferred Growth Alternative, 2006*

## Analysis of Alternatives

With the regional population and economic base projected to expand by 1.7 million residents and 1.2 million jobs between 2000 and 2040, there will be significant impacts to the regional transportation system, regardless of how the growth is distributed across the region. After approximately two years of outreach and public input, PSRC identified four alternatives to accommodate this growth for evaluation in the DEIS: Growth Targets Extended, Metropolitan Cities, Larger Cities, and Smaller Cities. The alternatives provide a range of future population and employment growth patterns based on regional geographies. Each alternative reflects a different set of choices for accommodating growth in cities, rural areas, and unincorporated urban areas on a regional scale. Table 2 shows how the alternatives compare with respect to population and employment growth. Generally speaking, the alternatives can be described as follows:

- **Growth Targets Extended Alternative** – The first alternative continues the growth patterns anticipated in current local land use plans out to the year 2040. Since these plans represent adopted public policy, this is the "no action" alternative. Cities and counties would continue to encourage growth to focus in urban centers, as well as some growth in unincorporated urban areas and rural areas. New jobs would locate in the large and medium size cities. New housing would locate inside cities as well as in the unincorporated urban and rural areas.

- **Metropolitan Cities Alternative** – This alternative has the most focused growth. Most of the growth would occur in the metropolitan or core suburban cities. This would mean considerable redevelopment, with new housing and jobs in centers near high capacity transit. Significantly less growth would occur in the region's rural and unincorporated urban areas.
- **Larger Cities Alternative** – This alternative assumes the bulk of the growth would occur in suburban cities that currently do not have designated regional growth centers. Considerable redevelopment would occur as town centers became major population and employment centers. Less growth would occur in the downtown areas of the region's largest cities, unincorporated urban areas, and rural areas.
- **Smaller Cities Alternative** – This alternative has the most dispersed growth pattern. The region's smaller suburban cities and unincorporated urban growth areas would accommodate a sizable amount of the population and employment growth, resulting in new commercial and residential development in currently undeveloped areas.

**Table 2: Regional Growth Alternatives Comparison: Share of Population and Employment Growth, By Regional Geography (2000 to 2040)**

| 2000-2040 Growth Allocations | | Metropolitan Cities | Core Suburban Cities | Larger Suburban Cities | Smaller Suburban Cities | Unincorp. UGA | Rural Areas | TOTAL |
|---|---|---|---|---|---|---|---|---|
| Growth Targets Extended Alternative | Population | 26% | 17% | 9% | 10% | 24% | 13% | 100% |
| | | 452,000 | 286,000 | 151,000 | 179,000 | 413,000 | 229,000 | 1,712,000 |
| | *Employment* | *45%* | *28%* | *7%* | *9%* | *8%* | *3%* | *100%* |
| | | *545,000* | *347,000* | *80,000* | *109,000* | *98,000* | *41,000* | *1,219,000* |
| Metropolitan Cities Alternative | Population | 40% | 25% | 15% | 10% | 5% | 5% | 100% |
| | | 685,000 | 428,000 | 257,000 | 171,000 | 86,000 | 86,000 | 1,712,000 |
| | *Employment* | *45%* | *30%* | *10%* | *5%* | *5%* | *5%* | *100%* |
| | | *549,000* | *366,000* | *122,000* | *61,000* | *61,000* | *61,000* | *1,219,000* |
| Larger Cities Alternative | Population | 20% | 30% | 30% | 5% | 10% | 5% | 100% |
| | | 342,000 | 514,000 | 514,000 | 86,000 | 171,000 | 86,000 | 1,712,000 |
| | *Employment* | *20%* | *30%* | *30%* | *5%* | *10%* | *5%* | *100%* |
| | | *244,000* | *366,000* | *366,000* | *61,000* | *122,000* | *61,000* | *1,219,000* |
| Smaller Cities Alternative | Population | 10% | 10% | 5% | 30% | 35% | 10% | 100% |
| | | 171,000 | 171,000 | 86,000 | 514,000 | 599,000 | 171,000 | 1,712,000 |
| | *Employment* | *10%* | *10%* | *5%* | *30%* | *35%* | *10%* | *100%* |
| | | *122,000* | *122,000* | *61,000* | *366,000* | *427,000* | *122,000* | *1,219,000* |

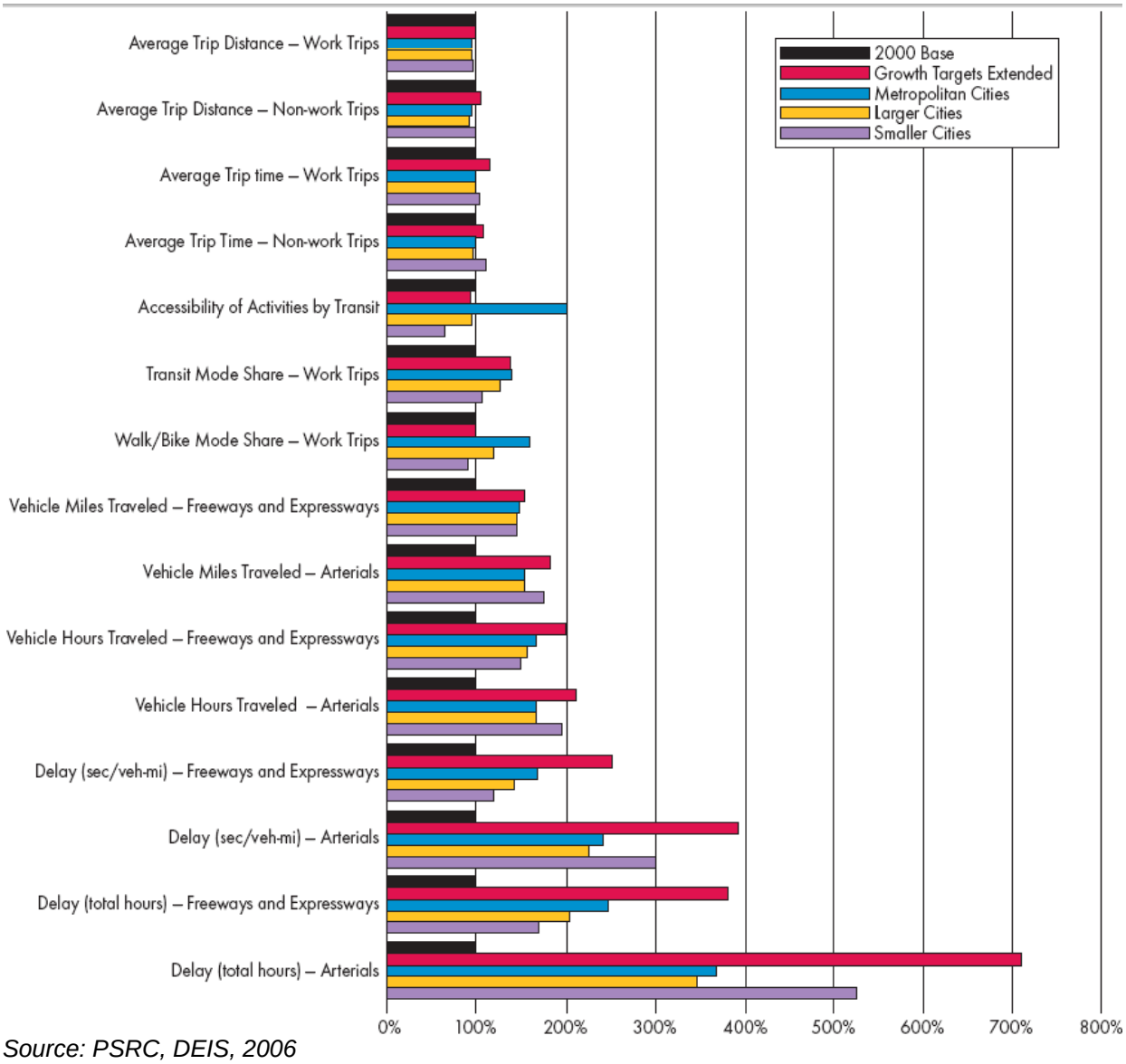
Notes: Totals may vary due to rounding. The percentages represent what was adopted by PSRC's Growth Management Policy Board adopted in September 2005. For each alternative, the shaded areas represent the geographies of focus. Please see the footnote on page 3 of the Executive Summary for more information on the total growth figures.

*Source: PSRC, DEIS, 2006*

### *Estimates of Transportation Impacts in the FEIS*

In the FEIS, PSRC modeled the impact of the various growth alternatives on the recommended transportation system in Destination 2030. The anticipated effects on this transportation system are summarized in Figure 5.

**Figure 5: Summary Comparison of All 2040 Alternatives and Base Year 2000: Regional Level Indicators[12]**




*Source: PSRC, DEIS, 2006*

Transportation evaluation criteria results are split between the Metropolitan Cities and Larger Cities alternatives in Table 3. On issues related to use of the system (miles and hours traveled, delay, travel times and distances), the Larger Cities alternative's slightly higher levels of dispersion among cities within the urban growth area create better performance. This is a function, in part, of moving more jobs to areas that currently have higher levels of population (e.g., meaning the impact comes from the existing large base of population in these areas, not just from new growth), creating more "centers of activity" to which trip destinations are attracted. On issues related to modes and access (mode split and household access by different

[12] Note: 100 percent means the indicator is the same as it would be for base year 2000. For example, Accessibility of Activities by Transit under the Metropolitan Cities Alternative is 200 percent. Therefore, the amount of accessibility for that alternative is double what it would be for base year 2000.

modes), the slightly higher level of focus within the urban growth area by the Metropolitan Cities alternative creates better performance. This is also, in part, a function of assigning future growth to areas that have higher levels of planned transit service and putting additional jobs and population in closer proximity. Many of these issues are tractable and will be more fully addressed with project and program specific mitigation analyzed as part of the update to Destination 2030 in 2007 to 2010.

**Table 3: Climate Change Criteria Evaluation of Alternatives**

| | | | | |
|---|---|---|---|---|
| Measure: | *1E. Climate Change* | | | |
| Unit: | Carbon Dioxide Emissions | | | |
| Rationale: | An emerging and consequential issue for our region's people, economy, natural systems, and infrastructure, climate change is affected by human activities. Rising temperatures will impact precipitation, alter forests and crop yields, affect species and the food chain, affect water levels and temperatures, and will affect the region's snow pack. | | | |
| Discussion: | In the Puget Sound region, 50 percent of the emissions are attributable to transportation sources. Other sources include industry, agriculture, and landfills. The alternatives that focus growth (such as the Metropolitan Cities and Larger Cities alternatives) and thereby decrease vehicle miles and hours traveled, and reduce estimated levels of delay, are anticipated to generate lower levels of greenhouse gases. These two alternatives are estimated to generate similar amounts of carbon dioxide in 2040, and both are therefore ranked as best. | | | |
| | Growth Targets Ext. | Metropolitan Cities | Larger Cities | Smaller Cities |
| Ranking: | | ☑ | ☑ | |

*Source: PSRC, Evaluation Criteria for Selecting a Preferred Growth Alternative, 2006*

### *Estimates of Environmental Quality Impacts and $CO_2$ Emissions in the DEIS*

As discussed above, SEPA requires that an EIS be performed for all non-project actions. SEPA, however, does not require that PSRC analyze $CO_2$ emissions as part of its EIS process. This was a decision made by PSRC Boards, with input from the various committees involved with the Vision update.

***Innovation #3:***

*PSRC chose to estimate how much $CO_2$ was emitted under each growth alternative*

As part of the analysis conducted for the DEIS, PSRC estimated $CO_2$ emissions alongside the emissions of the criteria pollutants generated under each growth management alternative for the year 2040 (Table 4). To calculate $CO_2$ emissions for each alternative, PSRC used the Environmental Protection Agency's (EPA) average vehicle emission factors, which are similar to MOBILE 6.2, to generate $CO_2$ emission estimates. These factors only base $CO_2$ emissions on vehicle miles traveled (VMT) and vehicle type and are not able to capture speed or characteristics of the area. These estimates, while helpful since they show how the alternatives compare, are therefore broad and not very detailed. This shortcoming is discussed in more detail in the Technical Issues section below.

**Table 4: Projected Pollutant Emissions in 2040 (tons/day)[1]**

| Pollutant | Emissions Budget[2] | Growth Targets Extended Alternative | Metropolitan Cities Alternative | Larger Cities Alternative | Smaller Cities Alternative |
|---|---|---|---|---|---|
| Carbon Monoxide | 2510.00 | 1231.13 | 1151.08 | 1147.59 | 1155.85 |
| Volatile Organic Compounds | 248.20 | 61.24 | 54.20 | 53.78 | 58.70 |
| Nitrogen Oxides | 263.01 | 45.13 | 41.06 | 40.87 | 44.68 |
| $PM_{10}$ | | | | | |
| Kent | 0.12 | .07 | .08 | .08 | .06 |
| Duwamish | 0.42 | .19 | .23 | .18 | .16 |
| Tacoma | 0.23 | .14 | .15 | .11 | .13 |
| $PM_{2.5}$ | N/A[3] | 2.09 | 1.91 | 1.91 | 2.08 |
| $CO_2$ | N/A[4] | 64,138 | 58,736 | 58,588 | 63,756 |

[1] Due to technological improvements assumed in forecast years in MOBILE6.2 (e.g., cleaner fuels and vehicles), emission factors in forecast years are lower than current emission rates.

[2] From the Central Puget Sound Region Maintenance Plans for the National Ambient Air Quality Standards, 2004.

[3] There is no emission budget for $PM_{2.5}$ because the Puget Sound region has never been designated nonattainment for $PM_{2.5}$.

[4] $CO_2$ is not one of the six criteria pollutants to which areas are designated attainment/nonattainment; therefore, there is no motor vehicle emissions budget for this pollutant.

*Source: PSRC, DEIS, 2006*

Encompassing the overarching goal to "Protect the natural environment," the focused growth alternatives (Metropolitan Cities and Larger Cities) demonstrate fewer environmental impacts region-wide (Table 5). These alternatives, which have the same amount of growth within the urban growth area (although the Larger Cities alternative shifts some growth from the metropolitan cities to the larger suburban cities) present two discrete policy options for accommodating future growth in a manner that lessens environmental impacts. As part of this analysis, staff determined that the *Metropolitan Cities and Larger Cities alternatives were tied as best for reducing $CO_2$ emissions* (Table 4).

**Table 5: Environmental Quality Evaluation Criteria Results for the Four Alternatives**

| | VISION 2020 Update Alternatives | | | |
|---|---|---|---|---|
| | Growth Targets Ext. | Metropolitan Cities | Larger Cities | Smaller Cities |
| **1. Environmental Quality** | | | | |
| 1A. Imperviousness | | ☑ | | |
| 1B. Wastewater Generation | ☑ | ☑ | ☑ | ☑ |
| 1C. Solid Waste Generation | ☑ | ☑ | ☑ | ☑ |
| 1D. Air Quality | | | ☑ | |
| 1E. Climate Change | | ☑ | ☑ | |
| 1F. Noise | ☑ | ☑ | ☑ | ☑ |
| 1G. Water Quality and Hydrology | | ☑ | ☑ | |
| 1H. Parks and Recreation | | | ☑ | |
| 1I. Visual Quality and Aesthetic Resources | | ☑ | ☑ | |
| 1J. Historic and Cultural Resources | | | ☑ | |
| 1K. Ecosystem Health | | ☑ | | |

*Source: PSRC, DEIS, 2006*

## Developing a Preferred Growth Alternative

Following the release of the DEIS, the Regional Council's Growth Management Policy Board led the process to develop VISION 2040, in coordination with other Regional Council boards and committees, between May 2006 and March 2007. During this time, the Board used four tools to develop the Preferred Growth Alternative:

1. The findings in the DEIS;
2. Input received during a public review and comment period;
3. Staff analysis on a potential Preferred Growth Alternative which included input from a technical advisory group made up of local jurisdiction staff; and
4. Application of the evaluation criteria for selecting a Preferred Growth Alternative that was published in the DEIS.

Based on the information developed through application of these four tools, the Board made a recommendation to the Regional Council's Executive Board to release the Preferred Growth Alternative for analysis in a Supplemental DEIS. The Executive Board took this action in March 2007 and the Supplemental DEIS was released on July 16, 2007. PSRC held a public comment period until September 7, 2007, which exceeded Washington's mandatory requirement of 30 days.

After the close of the public review and comment period for the Supplemental DEIS (marking the second formal public comment period for the VISION update), the Growth Management Policy Board, with assistance from the Transportation Policy Board and the Economic Development District Board, reviewed public comment and worked with staff and consultants to incorporate changes and publish a final revision of VISION 2040 and FEIS. The FEIS includes a discussion of all substantive comments received during the two public review periods for the Draft and Supplemental DEISs. The Regional Council's policy boards and committees reviewed and took final action to recommend approval to the Executive Board. The Executive Board, in turn, made its recommendation to the Regional Council's General Assembly. The General Assembly took final action and approved the updated VISION in April 2008. The Preferred Growth Alternative is included in April 2008's FEIS and is the Regional Growth Strategy in VISION 2040.

### *Definition of the Preferred Growth Alternative*

The Preferred Growth Alternative is similar to the other focused growth alternatives discussed in the DEIS (Metropolitan Cities and Larger Cities). Similar to the Growth Targets Extended and Metropolitan Cities alternatives, a significant share of the region's future growth would occur in the five major metropolitan cities and in the core cities. In this alternative, considerable redevelopment could occur in the region's metropolitan and core cities, with most new jobs reinforcing these areas as major regional employment centers. Job growth would be accompanied by a significant concentration of new residential growth in a variety of types and styles including new high-rise and mid-rise apartments, condominiums and townhouses built near job centers and in areas close to high capacity transit systems.

In the Preferred Growth Alternative, centers in larger cities would develop in and around traditional downtown main streets, town centers, neighborhood shopping areas, key transit stations, ferry terminals, park and ride facilities, and other transportation and service centers. The centers would provide local and regional services and amenities, and would likely experience substantial redevelopment and increased activity, becoming more significant regional job centers. Many new mid- and low-rise apartments, condominiums, and townhouses could also be built in these areas, although likely at lower intensities and at a reduced scale when compared to development in the larger regional growth centers in metropolitan and core cities.

At a smaller scale, locally-designated city and town centers would serve similar roles to larger city centers, providing services and housing that support communities at intensities appropriate to smaller municipalities. Growth in unincorporated urban growth areas would be prioritized in areas that are affiliated for annexation into incorporated jurisdictions. In the Preferred Growth Alternative, significantly less residential growth would occur in the region's rural areas than the trend suggested in current plans.

The Preferred Growth Alternative promotes the preservation of existing manufacturing and industrial centers. These are locations for intensive manufacturing, industrial, and related uses. Manufacturing industrial centers, along with more active regional growth centers and city centers, can help the region *achieve a closer balance between jobs and housing* within the counties and regional geographies, which can encourage people to live closer to their jobs and minimize long commutes.

### *Estimates of Transportation Impacts of the Preferred Growth Alternative*

The Preferred Growth Alternative falls in the middle of the range of the alternatives for the amount of vehicle miles traveled, delay, trip times, and levels of air pollution emissions at the regional level (Table 6). For the region's general population as well as its minority and low-income residents, the Preferred Growth Alternative is likely to have some of the best access among employment, services, and residences through transit. It also has the potential for more multifamily housing development, and an increased potential for providing more affordable housing units in areas with better transit service. The Preferred Growth Alternative could require less land than under current plans (Growth Targets Extended Alternative) to meet population and employment growth needs, resulting in lower levels of development and associated infrastructure in the region's undeveloped areas.

**Table 6: Summary Comparison of All 2040 Alternatives, the Preferred Growth Alternative, and the Base Year 2000: Regional Level Indicators[13]**

| Performance Measure | Base Year (2000) Alternative | Preferred Growth Alternative | Growth Targets Extended Alternative | Metropolitan Cities Alternative | Larger Cities Alternative | Smaller Cities Alternative |
|---|---|---|---|---|---|---|
| Accessibility** | | | | | | |
| Transit Access to Work | .70% | 1.07% | .69% | 1.52% | .70% | .48% |
| Transit Access to Non-work | .84% | 1.18% | .77% | 1.69% | .77% | .53% |
| Selected Mode Share - Work Trips | | | | | | |
| % Single-occupancy vehicle | 79.5% | 74.9% | 76.2% | 73.6% | 76.5% | 79.3% |
| % Transit | 8.4% | 11.3% | 11.6% | 11.7% | 10.5% | 8.9% |
| % Walk/Bike | 4.5% | 6.3% | 4.5% | 7.2% | 5.3% | 4.1% |
| Selected Mode Share- Non-work Trips | | | | | | |
| % Single-occupancy vehicle | 46.2% | 45.1% | 45.5% | 44.8% | 45.7% | 46.1% |
| % Transit | 2.1% | 2.9% | 2.5% | 3.1% | 2.6% | 2.1% |
| Average Trip Distance (miles) | | | | | | |
| Work Trips | 13.1 | 12.4 | 13.1 | 12.1 | 12.0 | 12.3 |
| Non-work Trips | 6.5 | 6.3 | 6.6 | 6.1 | 5.9 | 6.4 |
| Average Trip Time (minutes) | | | | | | |
| Work Trips | 25.4 | 26.5 | 29.1 | 25.4 | 25.4 | 26.2 |
| Non-work Trips | 14.5 | 14.8 | 15.5 | 14.3 | 14.2 | 15.7 |
| Vehicle Miles Traveled | | | | | | |
| Total vehicle miles traveled | 81,383,000 | 123,543,500 | 137,104,400 | 122,230,200 | 121,397,600 | 131,058,400 |
| Freeway vehicle miles traveled | 35,589,000 | 52,237,100 | 54,301,800 | 52,090,000 | 50,974,200 | 50,838,600 |
| Arterial vehicle miles traveled | 45,794,000 | 71,306,400 | 82,802,600 | 70,140,200 | 70,423,400 | 80,219,900 |
| Vehicle Hours Traveled | | | | | | |
| Total vehicle hours traveled | 2,426,000 | 4,109,000 | 5,025,900 | 4,026,900 | 3,950,700 | 4,378,200 |
| Freeway vehicle hours traveled | 766,000 | 1,271,900 | 1,522,800 | 1,274,700 | 1,189,200 | 1,132,300 |
| Arterial vehicle hours traveled | 1,660,000 | 2,837,100 | 3,503,100 | 2,752,200 | 2,761,500 | 3,245,900 |
| Delay (seconds/vehicle-mile) | | | | | | |
| Total Delay | 10.9 | 21.0 | 32.4 | 21.0 | 18.6 | 20.3 |
| Freeway Delay | 15.6 | 25.8 | 39.0 | 26.2 | 22.0 | 18.4 |
| Arterial Delay | 7.2 | 17.6 | 28.1 | 17.2 | 16.2 | 21.5 |
| Delay (total hours) | | | | | | |
| Total Delay | 245,300 | 721,900 | 1,235,300 | 713,900 | 628,400 | 739,600 |
| Freeway Delay | 154,100 | 373,900 | 588,700 | 378,500 | 311,500 | 260,200 |
| Arterial Delay | 91,200 | 348,000 | 646,600 | 335,400 | 317,000 | 479,400 |

Note: For the geographical area listed in the figure title, the mode share and average time data refer to "trips attracted to" the geographical area; the vehicle miles traveled and delay data refer to "roadways within" the geographical area; and the accessibility data refers to "people living within" the geographical area. See FEIS Appendices - Appendix I-E – Transportation Demand Model Output Data.

*Source: FEIS, PSRC, 2008*

[13] Note: For each geographic area, the mode share and average time data refer to "trips attracted to" the geographical area; the vehicle miles traveled and delay data refer to "roadways within" the geographical area; and the accessibility data refers to "people living within" the geographical area. See *Appendix 3C – Transportation Demand Model Output Data*.

** Accessibilities represent the percentage (xx% of 100%) of the region's employment that is accessible by the average household within the allotted time frame and mode (i.e., a 10-minute walk, 20-minute bicycle ride, or 30-minute transit ride) within the region.

Addressing aspects of the overarching goal to "Create an efficient land use pattern for the provision of infrastructure, facilities, and services," the Metropolitan Cities and Larger Cities alternatives, and to a lesser extent the Preferred Growth Alternative, demonstrate some of the best performance results (Table 7). While on most measures the Preferred Growth Alternative ranks in the middle of the range, overall it performed closer to the focused, rather than the dispersed, growth alternatives.

**Table 7: Transportation Evaluation Criteria Results for the Preferred Growth Alternative**

| | VISION 2020 Update Alternatives | | | | |
|---|---|---|---|---|---|
| | **Preferred Growth** | Growth Targets Ext. | Metropolitan Cities | Larger Cities | Smaller Cities |
| **5. Transportation** | | | | | |
| 5A. Travel Distance | ☑ | | ☑ | ☑ | |
| 5B. Travel Time | ☑ | | ☑ | ☑ | |
| 5C. Daily Vehicle Miles Traveled | ☑ | | ☑ | ☑ | |
| 5D. Daily Vehicle Hours Traveled | ☑ | | ☑ | ☑ | |
| 5E. Daily Hours of Delay | ☑ | | ☑ | ☑ | |
| 5F. Work Trip Mode Split | ☑ | | ☑ | | |
| 5G. Household Access to Jobs - 10 Minute Walk (1/2 Mile) | | | ☑ | | |
| 5H. Household Access to Jobs - 20 Minute Bike Ride (4 Miles) | | | ☑ | | |
| 5I. Household Access to Jobs - 30 Minute Transit Ride | ☑ | | ☑ | | |

*Source: PSRC, FEIS, 2008*

### *Estimates of Environmental Quality Impacts and $CO_2$ Emissions of the Preferred Growth Alternative*

For all environmental analysis topic areas, the Preferred Growth Alternative falls within the range of the four conceptual growth alternatives analyzed in the DEIS in terms of potential environmental effects (Table 8). Encompassing the overarching goal to "Protect the natural environment," the focused growth alternatives (Metropolitan Cities, Preferred Growth, and Larger Cities) demonstrate fewer environmental impacts region wide. These alternatives, which have the same amount of growth within the urban growth area (although the Larger Cities alternative shifts some growth from the metropolitan cities to the larger suburban cities and Preferred Growth shifts some of the larger city growth to outlying areas) present *discrete policy options for accommodating future growth in a manner that lessens environmental impacts*. Overall, these alternatives demonstrate fewer environmental impacts region-wide than more dispersed growth alternatives. By nearly all measures, the Preferred Growth Alternative performs better than current plans (Growth Targets Extended).

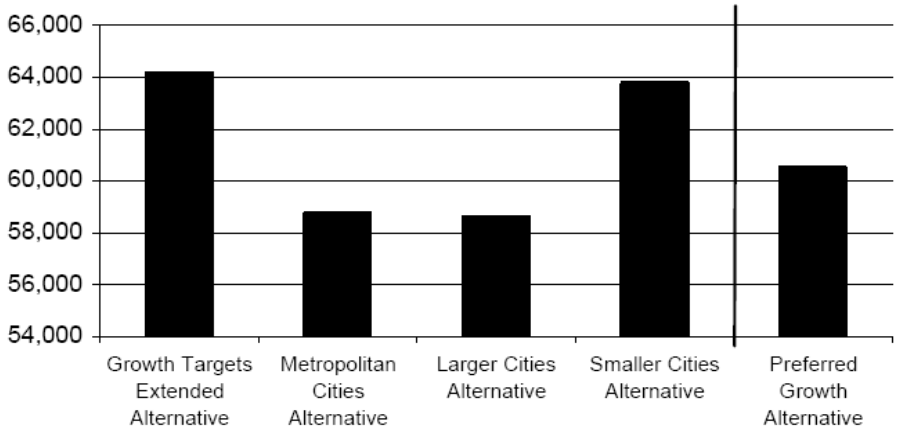
**Table 8: Environmental Quality Evaluation Criteria Results for the Preferred Growth Alternative**

| | VISION 2020 Update Alternatives | | | | |
|---|---|---|---|---|---|
| | **Preferred Growth** | Growth Targets Ext. | Metropolitan Cities | Larger Cities | Smaller Cities |
| **1. Environmental Quality** | | | | | |
| 1A. Imperviousness | ☑ | | | | |
| 1B. Wastewater Generation | ☑ | ☑ | ☑ | ☑ | ☑ |
| 1C. Solid Waste Generation | ☑ | ☑ | ☑ | ☑ | ☑ |
| 1D. Air Quality | ☑ | | | ☑ | |
| 1E. Climate Change | ☑ | | ☑ | ☑ | |
| 1F. Noise | ☑ | ☑ | ☑ | ☑ | ☑ |
| 1G. Water Quality and Hydrology | ☑ | | ☑ | ☑ | |
| 1H. Parks and Recreation | | | | ☑ | |
| 1I. Visual Quality and Aesthetic Resources | ☑ | | ☑ | ☑ | |
| 1J. Historic and Cultural Resources | | | | ☑ | |
| 1K. Ecosystem Health | ☑ | | ☑ | | |

*Source: PSRC, FEIS, 2008*

Figure 6 shows that *there are more $CO_2$ emissions estimated for the Preferred Growth Alternative than for the Metropolitan and Larger Cities Alternatives*. However, the emissions estimated for the Preferred Growth Alternative are less than the other two alternatives, and are closer to the more compact growth alternatives than to the more dispersed growth alternatives. Table 9 includes a comparison of how the alternatives compare based on the application of the climate change criteria.

**Figure 6: Projected CO2 Emissions in 2040 (tons/day)**



*Source: PSRC, FEIS, 2008*

Staff at PSRC observed that decisions on what alternative to select must carefully consider the need to protect and enhance the regional economy. Ultimately, there must be a balance that makes sense to decision-makers and ultimately, the general population. For example, the region would have significantly fewer GHG emissions without large, regional employers (most notably, the Boeing Corporation) that draw employees from around the area (resulting in more VMT in the region), ship products long distances, and produce emissions from their facilities, but then economic development and the region's quality of life would decline. However, PSRC's economic plans do account for new environmentally friendly businesses and the potential for growth in "green industries."

**Table 9: Climate Change Criteria Evaluation of Preferred Growth Alternative**

| | | | | | |
|---|---|---|---|---|---|
| Measure: | *1E. Climate Change* | | | | |
| Unit: | Carbon Dioxide Emissions *(based on PSRC's MOBILE 6.2 Air Quality Model data)* | | | | |
| Rationale: | An emerging and consequential issue for our region's people, economy, natural systems, and infrastructure, climate change is affected by human activities. Rising temperatures will impact precipitation, alter forests and crop yields, affect species and the food chain, affect water levels and temperatures, and will affect the region's snow pack. The production of fewer carbon dioxide emissions is desirable. | | | | |
| Discussion: | In the Puget Sound region, 50 percent of the emissions are attributable to transportation sources. Other sources include industry, agriculture, and landfills. The alternatives that focus growth (such as the Metropolitan Cities, Preferred Growth, and Larger Cities alternatives) and thereby decrease vehicle miles and hours traveled, and reduce estimated levels of delay, are anticipated to generate lower levels of greenhouse gases. The preferred growth alternative ranked in the middle of the alternatives – yet closer to the focused growth alternatives – producing somewhat more emissions than the Metropolitan Cities and Larger Cities alternatives, but less than either the Growth Targets Extended or Smaller Cities alternatives. These alternatives are therefore ranked as best. | | | | |
| | Preferred Growth | Growth Targets Extended | Metropolitan Cities | Larger Cities | Smaller Cities |
| Ranking: | ☑ | | ☑ | ☑ | |

*Source: PSRC, FEIS, 2008*

## Next Steps

The Preferred Growth Alternative is intended to guide the region's cities and towns as they work within their counties to periodically update local population and employment growth targets adopted in CPPs, and to provide guidance as they amend their local comprehensive plans. The *Preferred Growth Alternative represents a unifying perspective* about the roles that different types of communities should play in accommodating growth as each county and its cities develop.

The MPPs are designed to implement the Preferred Growth Alternative. As the primary policy statements for implementing the regional growth strategy, the MPPs have been designed to support the concentration of growth within the region's designated urban growth area and to limit development in resource and rural areas. The MPPs provide an integrated framework for addressing land use, economic development, transportation, other infrastructure, and environmental planning. The MPPs and the Preferred Growth Alternative will guide countywide planning policies and local jurisdiction comprehensive plans, thereby helping to ensure that other planning documents are consistent with the Preferred Growth Alternative.

### *Transportation 2040*

As mentioned above, the model that PSRC ran for the VISION 2040 alternatives used the preferred/adopted transportation network from the original Destination 2030 plan from 2001. PSRC undertook limited scope updates to Destination 2030 in both 2004 and 2007, but PSRC will develop a new transportation network for 2010's update to Destination 2030, termed Transportation 2040. This network will build on the preferred growth alternative from VISION 2040. Figure 1 shows the relationship between VISION 2040 and Destination 2030.

While climate change was not mentioned in any of the previous Destination 2030 plans, *climate change will be addressed in Transportation 2040*. VISION 2040's MPPs, including those covering climate change, will be carried through in the update. Like other MPOs, PSRC will model how alternative transportation system scenarios compare to each other. Informed by how the model results compare between these scenarios, staff will make recommendations and the PSRC Executive Board will make its decision on the preferred alternative for Transportation 2040. This decision will subsequently guide funding decisions through the Transportation Improvement Program (TIP).

### *PSRC Climate Action Plan*

According to VISION 2040, PSRC and its member organizations will work with the Puget Sound Clean Air Agency, State agencies, and other environmental professionals to *prepare a Climate Action Plan* containing regional and local provisions. The plan should investigate ways to address climate change, reduce GHG emissions, and take specific mitigation steps to reduce air-borne carbons. The plan should also address establishing a regional climate change benchmark program. This Action Plan will be developed some time following the adoption of Vision 2040 in 2008.

### *Transportation Improvement Program*

Now that the policies in the Vision are adopted, the TIP may include climate change as one of the evaluation criteria to distribute Federal funds. Because the region is in maintenance status under the Clean Air Act Amendments, the evaluation criteria for air quality are heavily weighted. GHG emissions, specifically $CO_2$, could be incorporated into that category of criteria or it may be a stand-alone criterion.

Additionally, PSRC currently reports CMAQ-funded project emission estimates using TCM Tools, which is a sketch-planning model designed to report on the emissions of a wide range of transportation control measures (TCMs) to achieve emissions reductions. PSRC is considering adding $CO_2$ as one of the emission estimates as part of this process, but would need to do a significant amount of preparation work beforehand. For example, PSRC would need to develop a regional set of assumptions and methods for performing these estimates since there is not currently a precedent for this type of analysis. Because there is no standard for $CO_2$ emissions resulting from this process, PSRC's standard could differ from that of other MPOs if other MPOs adopt a similar process. Accordingly, adding $CO_2$ to this process would be a challenge, and is not a foregone conclusion.

## PARTNERS

As an MPO, PSRC already coordinates with Federal, state, local, and other regional agencies as part of its planning process, but on climate change issues, PSRC is fortunate to be working with *several organizations and agencies that are concerned beyond their statutory requirements about climate change* and its impact on the region. This level of concern among partners allows for coordination and communication on climate change issues and an allocation of tasks as well.

***Innovation #4:***

*PSRC is partnering with several organizations and agencies to holistically address climate change issues at a regional level*

PSRC created a *Climate Change/Air Quality Technical Working Group* in spring 2007. According to PSRC, the objectives of the working group are to discuss analysis needs and the status of existing modeling tools. In addition, the goals of the group are to:

1. Coordinate the activities occurring around the region related to transportation and climate change
2. Coordinate with State efforts on climate change, in particular climate change analyses
3. Work together towards utilizing a common set of talking points, analysis assumptions, and methodologies
4. Provide technical assistance to PSRC as it integrates climate change into its long-range planning

Members of this group include representatives from the Washington State Department of Ecology, the U.S. EPA, King County, Sound Transit, City of Seattle, Washington State DOT (WSDOT), and the Puget Sound Clean Air Agency.

### Role of Washington State

When work on VISION 2040 started, there were no specific guidelines or mandates from the State on climate change. Since PSRC began work on VISION 2040, the State has developed targets for GHG emissions and vehicle miles traveled, developed a comprehensive plan for meeting these targets, and has actively participated in the Western Climate Initiative. The legislation and process that established these targets are summarized below.

To date, Washington State has already taken action to cut emissions by 20% by 2050. These actions include:

- Reducing $CO_2$ emissions in newer cars and light trucks by more than 30% and in SUVs by 25%,
- Adopting renewable fuels standards for transportation by requiring 2% of fuel sold to be biodiesel or ethanol
- Instituting high-performance green building standards and energy-efficient building codes
- Passing a clean renewable energy initiative
- Implementing electric utility conservation programs

The Washington State Department of Ecology (DOE) and WSDOT provide valuable insight as members of PSRC's Climate Change/Air Quality Technical Working Group. These agencies have helped PSRC with technical questions as well as navigate through the state's progressive regulations.

### *Meeting Greenhouse Gas Emission and Vehicle Miles Traveled Targets*

In the period between February 2007 and June 2008, Washington's Governor and Legislature have passed four key pieces of legislation dealing with climate change. This legislation includes Executive Order 07-02, Senate Bill 6001, Engrossed Second Substitute House Bill (E2SHB) 2815, and Senate Bill 6580. While the first three pieces of legislation tie in directly with one another and are described below, SB 6580 is described separately in Box 2. All of this legislation has important implications for climate change mitigation planning, and transportation planning in general, in the Puget Sound region.

In February 2007, the Governor signed Executive Order 07-02, which established goals for reducing GHG emissions, increasing clean energy sector jobs, and reducing expenditures on imported fuel. Senate Bill 6001, effective July 2007, adopted the Executive Order into statute with the following GHG emission targets:[14]

- Reduce GHG emissions to 1990 levels by 2020
- Reduce GHG emissions to 25% below 1990 levels by 2035
- Reduce GHG emissions to 50% below 1990 levels by 2050

The executive order also directed the DOE and the Department of Community, Trade, and Economic Development (CTED) to lead stakeholders in a process that considers a full range of policies and strategies to achieve the emissions goals.

DOE and CTED created a *Climate Advisory Team* (CAT) and, as a sub-group of this team, formed a *Transportation Technical Working Group*. The CAT was charged with coming up with recommendations for achieving the goals in the Executive Order. The CAT is co-chaired by the Directors of the Washington State DOE and CTED and has over 30 members, several of which are from the Puget Sound region and work closely with PSRC. In line with the Executive Order, the CAT submitted their report, "Leading the Way on Climate Change: The Challenge of Our

[14] Executive Order 07-02: http://www.governor.wa.gov/execorders/eo_07-02.pdf

Time," in February 2008. This report has 12 recommendations and 31 strategies to reduce GHG emissions and increase clean energy jobs and in-state fuel supplies.

E2SHB 2815, passed by the legislature and made effective June 2008, *requires* the State to meet the GHG emission reduction goals set the previous year. This bill instructs the DOE to develop the state's part of the Western Climate Initiative's plan by December 2008 for reducing $CO_2$ emissions; gives the DOE the authority to require the largest producers of GHGs to report their emissions beginning in 2010, which is a key component of a cap and trade system; and creates an initiative for increasing the number of clean-energy jobs through job training.

Specific to the transportation sector, E2SHB 2815 also sets the following *targets for reduction of vehicle miles traveled*:

- Decrease the annual per capita vehicle miles traveled by eighteen percent by 2020;
- Decrease the annual per capita vehicle miles traveled by thirty percent by 2035; and
- Decrease the annual per capita vehicle miles traveled by fifty percent by 2050;

The CAT is intricately involved with the work laid out in E2SHB 2815 (Figure 7). This bill directed the CAT to continue its work and recommend "most promising actions to reduce emissions of greenhouse gases or otherwise respond to climate change." Building off its February 2008 report, the CAT presented its report "Leading the Way: Implementing Practical Solutions to the Climate Change Challenge," in November 2008.

Available at http://www.ecy.wa.gov/climatechange/2008CATdocs/ltw_app_v2.pdf, the report presents a suite of complementary polices the CAT identified as strategies that will further reduce GHG emissions. Implementing all of the policy recommendations from the CAT will generate jobs and could result in about 39 percent of the reductions necessary to meet the state's 2020 emissions reductions. If fully implemented, these policies will:

- Increase public transportation and ridesharing options, providing individuals with a variety of alternatives to single occupancy vehicles.
- Direct growth and development to compact, transit oriented areas, and away from rural and resource lands.
- Create jobs by expanding energy efficiency programs, strengthening building and energy codes, and increasing the use of combined heat and power.
- Reduce the amount of solid waste generated and disposed of through increased recycling and reuse programs, and improved product design.
- Protect Washington's working forests and agricultural lands.

A sub-group of the CAT, the Transportation Implementation Working Group (IWG), worked with the WSDOT to develop policy proposals specific to the transportation sector. As part of the larger CAT report, this group provided a report to the transportation committees of the legislature on the recommended tools to achieve the state's reduction in annual per capita VMT goals in November 2008. This report, entitled "Reducing Greenhouse Gas Emissions and Increasing Transportation Choices for the Future," is also available at http://www.ecy.wa.gov/climatechange/2008CATdocs/ltw_app_v2.pdf.

To reduce VMT, with the ultimate goal of reducing GHG emissions, the Transportation IWG recommended a package of strategies that fall into three broad categories of VMT reduction activities:

- *Transit, Ridesharing, and Commuter Choice Programs*, including recommendations to expand and enhance current programs to increase viable transportation options available to Washington residents to conduct the activities, trips, and travel needed and desired for daily life.
- *Compact and Transit Oriented Development and Bicycle and Pedestrian Accessibility* that supports the development of compact walking, bicycling, and public transportation-friendly communities and to increase the travel choices available.
- *Transportation Funding and Pricing Strategies* that identify and create potential pricing mechanisms to support and incentivize GHG and VMT reductions, and stress key considerations for revenue use to support transportation infrastructure maintenance and operations.

Informed by these reports, the DOE submitted its comprehensive plan to achieve the required emissions reductions to the Legislature on December 22, 2008. The first edition of that plan, available at www.ecy.wa.gov/climatechange/2008CompPlan.htm, focuses on the emissions reductions required by 2020. It presents a coordinated set of policies -- including incentives, regulations, and disincentives -- to meet the GHG emissions reductions adopted into law in 2008 as part of E2SHB 2815. According to the plan:

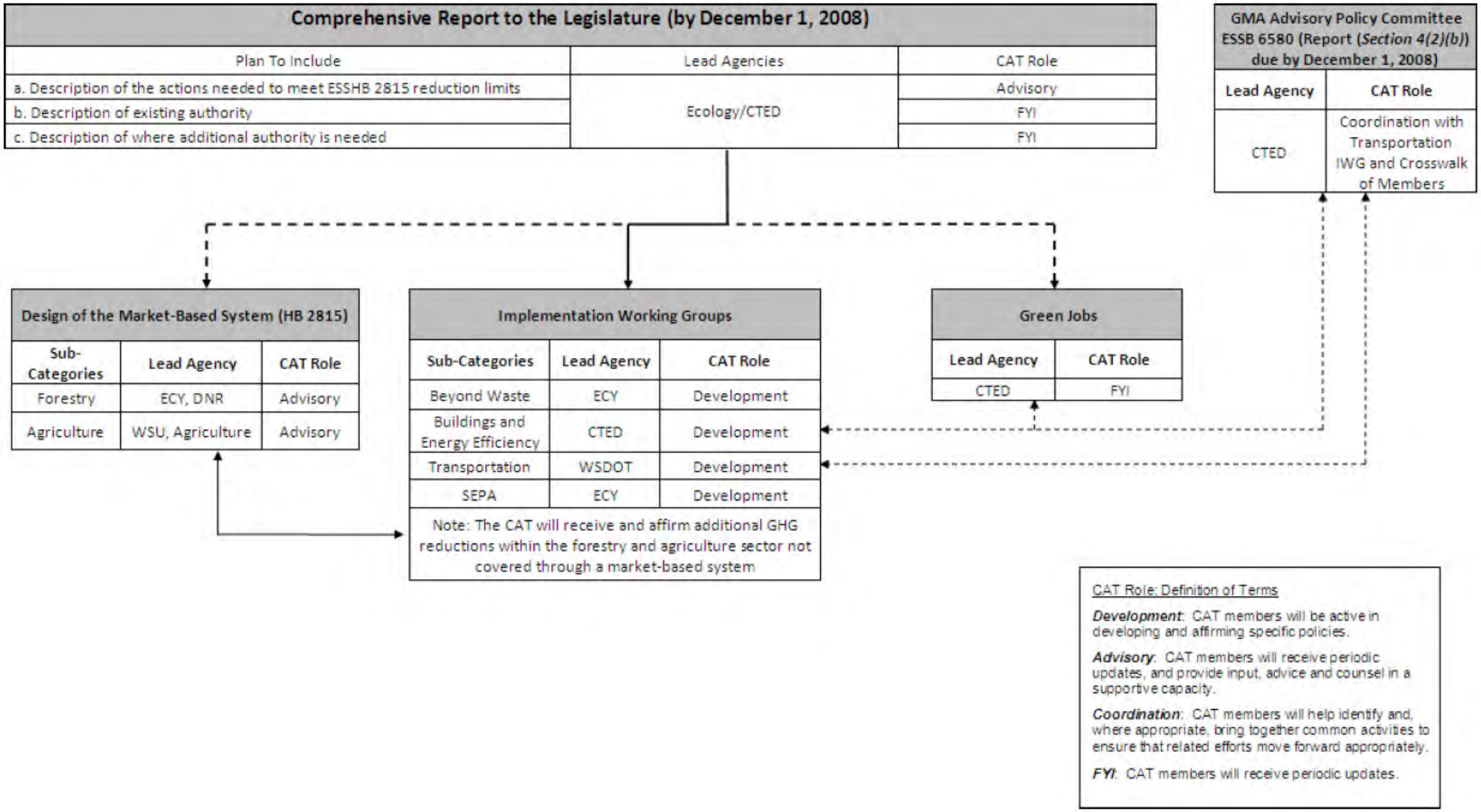
> The central policy of this plan is participation in the regional cap-and-trade program designed by the Western Climate Initiative (WCI). By capping GHG emissions, we will achieve the environmental certainty scientists say is critical if we are to slow the rate of climate change. The cap-and-trade program will provide emitting industries with flexibility on how they make the needed reductions. It will make clean energy sources more competitive with fossil fuel. It will also provide the regulatory certainty needed to support long-term investments in the green economy, investments that will move us toward the low-carbon future, creating jobs along the way.[15]

The plan is conceived as not being static: "To the contrary, it is vital that we be nimble, adaptive, and that we learn from the experiences of other jurisdictions. Further actions will be needed to meet our 2035 and 2050 emissions reductions. Many of the recommendations related to land use and transportation are longer-term strategies. Innovation will make things possible tomorrow that may seem out of reach today."[16]

While the DOE's authority to require the state's largest polluters to report their emissions would apply to at least 80 businesses and utilities, including refineries, pulp and paper mills, cement kilns, lumber mills, large manufacturers and food processors, it will also apply to motor vehicle fleets producing at least 2,500 tons of carbon dioxide, which equals about 250,000 gallons of fuel burned annually. That includes truck and delivery fleets, rental car companies, phone and cable companies, and government-agency fleets. How much these different entities will be allowed to pollute will be determined by the Western Climate Initiative.

[15] http://www.ecy.wa.gov/pubs/0801025.pdf
[16] http://www.ecy.wa.gov/pubs/0801025.pdf

**Figure 7: Relationship of 2008 Washington State Climate Activities**




*Source: DOE and DCTED, Memo to the 2008 CAT, 2008*

**Box 2: Overview of Senate Bill 6580 – Local Solutions to Climate Change**

Effective since June 2008, Senate Bill 6580 provides tools and technology for cities and counties to curtail GHG emissions through *smart land-use and transportation planning*. Senate Bill 6580 addresses mitigation of greenhouse gas emissions through land use and transportation planning processes under the Growth Management Act (GMA). This bill requires CTED to:

- Develop and provide counties and cities with a range of advisory climate change response methodologies, a computer modeling program, and estimates of GHG emissions reductions which must reflect regional and local variations of the county or city by December 1, 2009;
- *Work with WSDOT to reduce vehicle miles traveled;*
- Administer a local government global warming mitigation and adaptation program, which must conclude by June 30, 2010. Up to three counties and six cities are to be selected for the program through a competitive process; and
- Provide grants and technical assistance to aid the selected counties and cities in their efforts to anticipate, mitigate, and adapt to global warming and its associated problems.

Senate Bill 6580 also requires CTED to prepare two reports. One report must include descriptions of actions that counties and cities are taking to address climate change, among other items by December 2008, and the other must cover program findings and recommendations to the Governor and Legislature by January 2011. More specifically, these reports must:

- Describe current actions being taken by local governments to address climate change;
- Recommend amendments to GMA and other statutes (if needed) to help State and local governments address climate change issues through land use and transportation planning processes;
- Describe computer models and other analytic and assessment tools that could help local governments address climate change issues;
- Assess State and local resources needed to put the report's recommendations into practice and recommend funding; and
- Consider positive and negative impacts to affordable housing, employment, transportation costs, and economic development that result from addressing the impacts of climate change at the local level.

### *Western Climate Initiative*

Washington is a member of the Western Climate Initiative (WCI), which is a collaboration launched in February 2007 between the Governors of Arizona, California, New Mexico, Oregon and Washington to meet regional challenges raised by climate change. Since that time, Utah, Montana, and Canadian provinces British Columbia, Manitoba, Ontario, and Quebec have joined the effort and several additional states and provinces are observers. Together, the seven states

and four provinces represent over 70 percent of the Canadian economy and 20 percent of the U.S. economy.

In August 2007, the governments agreed to reduce their GHG emissions by 15 percent below 2005 levels by 2020. To achieve this goal, the partners committed to designing a carbon-trading system within a year. In September 2008, the WCI announced recommendations for the design of a regional market-based cap-and-trade program. When implemented, this program will cover nearly 90% of the region's emissions.

Unlike a similar multi-state program along the east coast (the Regional Greenhouse Gas Initiative), the program the members are considering is not limited to power plants. The WCI system includes:

- Electricity generation, including imported electricity
- Industrial and commercial fossil fuel combustion
- Industrial process emissions
- *Gas and diesel consumption for transportation*
- Residential fuel use

The timeline agreed to by the WCI member states and provinces is that each will begin reporting emissions in 2011 for emissions that occur in 2010. The first phase of the cap-and-trade program will begin on January 1, 2012, with a three-year compliance period. The second phase will begin in 2015, when the program is expanded to include transportation fuels and residential, commercial, and industrial fuels not otherwise covered in the first phase.

As part of this initiative or some future Federal or State policy or program, it is possible that $CO_2$ could be regulated as a criteria pollutant to limit GHG emissions from the transportation sector. If this occurs, PSRC will be in a strong institutional and technical position to respond since regions would need to be able to model $CO_2$ emissions and develop strategies to meet future $CO_2$ emissions targets.

According to DOE and CTED, much work remains on the details of the WCI cap-and-trade program. What has been recommended to date is the policy framework that outlines what must be the same across the participating jurisdictions to have a functional regional market. The framework also defines where each State or province may exercise its own discretion without distorting the carbon market. The areas of discretionary authority will be determined through legislative and administrative processes in Washington.[17]

### Proactive Partners: King County and the City of Seattle

The region had two of the most active national political champions for local action on climate change: King County Executive Ron Sims and Seattle Mayor Greg Nickels. Their jurisdictions have been active for many years in climate change issues. In addition to guiding climate change work at the county and municipal level, respectively, King County and Seattle have seats on the MPO Board as well as on various PSRC committees. *Their climate change work at county and*

[17] http://www.ecy.wa.gov/pubs/0801025.pdf

*municipal levels helped set the stage for the work PSRC is doing for the region.* According to PSRC staff, "Their actions create a good environment for doing our work." While King County's and Seattle's plans, policies, and actions are specific to what occurs within the purview of the county and city respectively, *PSRC can support these actions by providing support for some of their projects and placing actions within a regional context*.

### *King County*

King County is a leading county on climate change issues nationwide. In addition to having developed their own Climate and Energy Plans, policies, and actions to reduce emissions throughout the county, King County's Executive Ron Sims and his staff were involved in several national-level climate change initiatives and studies.

King County's goal is to reduce GHG emissions by 80% below current levels by 2050. The plan calls for cleaner cars and fewer cars as the solution for reducing automobile emissions, which account for more than half the GHG emissions in the region (Table 10). The King County Climate Plan and relevant Executive Order summaries include goals that are specific to the transportation sector[18].

**Table 10: Sources of GHG Emissions by Sector for the United States, Washington State, King County Region, and King County Operations**

| Sources of GHGs (%) | Electricity | Industrial | Transport | Other |
|---|---|---|---|---|
| United States | 39 | 18 | 32 | 10 |
| Washington State | 17 | 21 | 50 | 12 |
| King County | 10 | 10 | 60 | 20 |
| King County (Govt Ops) | 15 | 0 | 38 | 47 |

*Source: King County*

King County also operates the region's major transit agency, Metro Transit. Numerous goals and actions listed in King County's Climate Plan discuss increasing transit's mode share and reducing GHG emissions from its fleet. Under a proposal by King County Executive Ron Sims, King County became the first county and the first major bus transit agency in the nation to join the Chicago Climate Exchange in 2006. The Chicago Climate Exchange is North America's only voluntary, legally binding pilot program for reducing and trading GHG emissions, and is the most active carbon exchange in the nation. It requires members to reduce carbon emissions and allows trading of carbon credits. The Exchange contract obligates King County to reduce emissions by six percent from a baseline of its year 2000 emissions.

[18] King County Global Warming Initiative. http://www.kingcounty.gov/exec/globalwarming/transportation.aspx

**Box 3: Seattle's Transportation-Specific Climate Change Goals**

Reduce Seattle Dependence on Cars (reduce GHG by 170,000 tons by 2012)

- Action #1: Significantly Increase the Supply of Frequent, Reliable and Convenient Public Transportation
- Action #2: Significantly Expand Bicycling and Pedestrian Infrastructure
- Action #3: Lead a Regional Partnership to Develop and Implement a Road Pricing System
- Action #4: Implement a New Commercial Parking Tax
- Action #5: Expand Efforts to Create Compact, Green, Urban Neighborhoods

Increase Fuel Efficiency and Use of Biofuels (reduce GHG by 200,600 tons by 2012)

- Action #6: Improve the Average Fuel Efficiency of Seattle's Cars and Trucks
- Action #7: Substantially Increase the Use of Biofuels
- Action #8: Significantly Reduce Emissions from Diesel Trucks, Trains and Ships

*Seattle*

Seattle participates in and plays a leadership role in the U.S. Conference of Mayors Climate Protection Agreement, which commits cities to reduce GHG emissions to seven percent below 1990 levels by 2012, and calls for a Federal limit on emissions[19]. Seventeen Puget Sound area cities have signed on to the Agreement, including the four core cities in each county (Seattle, Tacoma, Everett, and Bremerton). Like King County, Seattle is also a participant in ICLEI's Cities for Climate Protection Campaign, which provides cities and counties with the tools and support necessary to inventory their GHG emissions, set targets to reduce these emissions, develop a Climate Action Plan, implement the actions, and monitor the results. Box 3 lists some of the *plan's transportation-specific climate change goals*.

Since motor vehicle emissions are the single largest source of GHG emissions pollution in Seattle, the City believes that it must do even more to provide *climate-friendly transportation choices* such as taking public transit, bicycling, and walking -- and to encourage greater use of those alternatives. The Climate Action Plan calls for significant improvements in infrastructure and incentives, including additional investments to make taking transit, biking, and walking easier, safer, and more convenient; a commercial parking tax; and a stronger push toward regional road-pricing strategies that have proven successful in other cities.

Seattle City Light, Seattle's publicly owned electric power utility, achieved its long-term goal to reduce net GHG emissions to zero in 2005, thereby becoming the first large electric utility in the country to effectively eliminate its contribution of GHG emissions into the environment. City Light attained this goal by working with other organizations, such as King County Metro and Washington State Ferries, to reduce emissions and thereby offset greenhouses gasses associated with the utility. According to their website, "In 2004 Seattle City Light helped reduce air pollution in the Puget Sound basin by working with the Washington State Ferries and Metro

[19] As of November 28, 2007, 740 Mayors had signed the U.S. Conference of Mayors Climate Protection Agreement http://www.mayors.org/USCM/home.asp and http://usmayors.org/climateprotection/ClimateChange.asp.

Transit to convert to biodiesel fuels, secured an agreement with the Port of Seattle to provide on-shore power to cruise ships so they would not have to run their diesel generators while in port, and gained recognition from the Nation Hydropower Association for outstanding stewardship of the Skagit River for the sixth year in a row."[20]

### The Seattle Climate Partnership

In February 2005, Mayor Nickels challenged Seattle to meet or exceed the global warming pollution reduction targets of the Kyoto Protocol; he appointed a Green Ribbon Commission on Climate Protection to develop recommendations for achieving that goal. One of the Commission's key recommendations was the formation of the Seattle Climate Partnership—a voluntary pact among Seattle-area employers to take action to reduce their own emissions and to work together to help meet the community-wide goal.

Twelve Seattle-area employers -- the Port of Seattle, Recreational Equipment Inc., the University of Washington, Starbucks Coffee Company, Urban Visions, Group Health, Lafarge Seattle, Shoreline Community College, Mithun, Garvey Schubert Barer, King County, and the City of Seattle -- came together to develop and grow the Partnership. These "founding partners" have drafted a Partnership Agreement that spells out the Partners' commitments. In addition, they are developing a suite of services for participating employers, including a robust technical assistance program, networking services, and a recognition program.

### The Port of Seattle

While not directly working with PSRC on the planning activities described in this report, the Port of Seattle has been active in understanding and reducing its GHG emissions in addition to being a member of the partnership described above. In November 2006, the Port started its Climate Change Program and created a Climate Change Core Team composed of staff. As of June 2007, the Port's program is "benchmarking" initiatives related to climate undertaken by similar organizations, and has refined its objectives and expectations, improved transparency and communications, and participated in community and industry partnerships. The program has also begun *considering and implementing climate change related projects to reduce emissions to meet targets and to adapt to future impacts*.[21]

The program has also begun conducting emissions inventories. The program is conducting this inventory by looking at three scopes:

- Scope I – Owned (direct) emissions. Examples include Port vehicle fleets, facilities, waste, and materials.
- Scope II – Purchased (indirect) emissions. Examples include utilities and Port professional air travel.
- Scope III – Influenced (induced) emissions. Examples include employee commuting and tenants' emissions.

[20] http://www.seattle.gov/light/aboutus/. Accessed Jan. 3, 2008.
[21] http://www.portseattle.org/downloads/about/commission/SWS_20070605_6_Supp.pdf

As of June 2007, the airport and seaport inventories were underway (Scopes I and II) and the Puget Sound Maritime Emissions Inventory was complete (Scopes I and III).

The Port of Seattle, which manages Seattle-Tacoma (Sea-Tac) Airport, recently asked the Clean Airport Partnership to assess environmental achievements at the airport and identify practical opportunities that remain for maximizing environmental performance. According to the resulting report, Sea-Tac has one of the strongest environmental programs of any airport in the nation. Opportunities identified by the report include:

- Considering $CO_2$ benefits in the Port's prioritization of air quality improvement strategies, including $CO_2$ emissions
- Tracking progress as part of Sea-Tac's "Environmental Footprint"
- Examining transferability of European climate change offset programs to Sea-Tac[22]

Sea-Tac Airport purchases renewable energy credits for 25% of its electricity. The Sea-Tac website also provides a link for credits to be purchased to offset travel emissions.[23]

Next steps for the program include:

- Collecting Port Commission feedback on climate change policy options and direction
- Increasing communications
- Completing its emissions inventories, continuing its cost-benefit analysis of projects
- Prioritizing specific project ideas
- Implementing high-scoring projects, strengthening program management
- Continuing to support community and industry collaborative efforts
- Seeking Commission approval and support for the climate change program itself

### Sound Transit

Sound Transit was created by the State legislature to build a mass transit system that connects regional employment and population centers in King, Pierce, and Snohomish counties. Sound Transit operates 25 express buses; the Sounder commuter rail service between Everett, Seattle, and Tacoma; and the Tacoma Link light rail in Tacoma. Representatives from Sound Transit are on PSRC's Climate Change/Air Quality Technical Working Group. According to Sound Transit's website, Sound Transit has 22 electric hybrid buses in its fleet, an all-electric light rail system, and ultra-low-sulfur fuel used in the Sounder locomotive fleet.[24]

### Puget Sound Clean Air Agency

The Puget Sound Clean Air Agency is a special-purpose, regional agency chartered by State law in 1967 (RCW 70.94). The agency works in partnership with the U.S. EPA and the Washington State Department of Ecology. The agency's jurisdiction is the same as PSRC's: it covers King, Kitsap, Pierce and Snohomish Counties. The agency's staff of 70 includes air quality planners

[22] http://www.portseattle.org/downloads/community/environment/greenpowerpoint.pdf
[23] http://www.portseattle.org/seatac/
[24] http://www.soundtransit.org/x8.xml

and engineers, inspectors, meteorologists, and technicians who maintain air quality monitoring equipment.

The agency is governed by a Board of Directors, which is comprised of elected officials from each of the four counties in its jurisdiction, a representative from the largest city in each county, and one member representing the public-at-large. The agency also has an Advisory Council comprised of individuals representing large and small businesses, non-regulated business, education, transportation, health, tribes, fire officials, the environmental community, ports and the public-at-large.

In 2003 the Board of Directors directed the agency to convene *a stakeholder process to assist in developing a Climate Protection Program*. The Climate Protection Advisory Committee (CPAC) was formed, comprised of stakeholders from business, government including PSRC, and public interest organizations. In January 2005, the 25-member committee issued its recommendations and priorities for GHG emission reductions in our region.

One of the actions from VISION 2040 states:

> "The Puget Sound Regional Council and its member organizations will work with the Puget Sound Clean Air Agency, State agencies, and other environmental professionals to prepare an action plan containing regional and local provisions. The plan should investigate ways to: (a) address climate change in accordance with the Governor's 2007 Climate Change initiative and State legislation on greenhouse gas emissions reduction (RCW 80.80.020), (b) reduce greenhouse gas emissions, and, (c) take specific mitigation steps to address climate change impacts. The plan should also address establishing a regional climate change benchmark program. (short-term) (MPP-En-20 through 25). *Results and Products: Action plan for climate change, climate change benchmark program.*"

*PSRC will work with the Puget Sound Clean Air Agency on the action plan over the coming years*.

## TECHNICAL CONSIDERATIONS

> ***Innovation #5:***
>
> *PSRC is involved in several initiatives to improve its model, and specifically its ability to accurately reflect $CO_2$ emissions in the region*

The models that are currently used to evaluate $CO_2$ emissions are relatively unsophisticated. PSRC used EPA's average vehicle emission factors to estimate the region's current and projected $CO_2$ emissions for VISION 2040. While MOBILE 6.2 is useful in that it estimates $CO_2$ emissions (which is not a criteria pollutant), it does so only based on VMT and vehicle mix. This estimate therefore does not incorporate other important factors, such as speed and factors that may affect a person's choice to drive or take another form of transportation. Accordingly, PSRC is undertaking several *travel demand research projects* and model improvements and is partnering with the EPA to test and refine other models to enable them *to better estimate and project the region's $CO_2$ emissions*.

PSRC is *leading the nation in developing this technology* and realizes its importance as a "guinea pig" in this field. Having what may be the best transportation model for estimating $CO_2$ emissions in the nation not only benefits PSRC but also benefits all of the agencies with which PSRC works with. With such an accurate model, PSRC's partners (which include the City of Seattle, King County, and Washington State) all have a better and more accurate idea of what transportation's $CO_2$ emissions are in their jurisdictions, and will be better informed about the $CO_2$ impacts of alternative transportation decisions.

### Travel Demand Research and Model Improvements

Working with its Climate Change/Air Quality Technical Working Group, PSRC has identified a series of short-term travel demand forecasting model improvements that can provide the sensitivities and accuracy in the travel forecasting model outputs needed to evaluate the impact of transportation and land use alternatives on climate change. These travel demand model outcomes would be used directly in the emissions models to estimate effects on GHG emissions.

As a first step, PSRC identified six priority areas of model improvements:

- Undertaking a series of test changes to determine whether the changes improve the validation of traffic speeds and volumes. The test changes with the most promising outcomes will be implemented and the trip assignment model will be recalibrated to match observed speeds and volumes.

  The trip assignment model was updated to add 15 time periods (expanded from 5 time periods), adding a measure of reliability and improving the speed validation for freeways.

- Creating and integrating an activity generation model that can be used to test sensitivities on trip-making to congestion, tolling, trip chaining, density, accessibility, urban design, age, and life cycle variables. These variables can clearly affect whether to make a trip or not (including substitutions for working at home, shopping on the internet, etc.) and how many trips and stops are needed to meet daily requirements for activities. As part of this

work, PSRC will develop a plan for creating and implementing a comprehensive tour-based micro-simulation activity model.

The activity generation model was developed and tested; validation of the model continued through summer 2008. The design plan for the full activity-based model was delivered in draft form in June 2008 and the final was to be completed in August 2008.

- Segregating the mode choice model into different modes so that all transit modes are no longer treated equally in the model. PSRC will represent bus, rail, and ferry explicitly, including the representation of the time and cost associated with these modes. Segmenting the mode choice model into different modes will allow fares and other factors to be considered on a mode by mode basis, which will allow PSRC to consider differences in reliability and convenience by mode.

  *Update*: The work to develop new inputs for the mode choice model is complete and the coding and testing of the new mode choice model is in progress.

- Adding sensitivity in the model to represent walk and bike trips more accurately, including the development of pedestrian and bicycle environment factors. This will entail creating walkability factors, including measures of intersection density, retail floor area, and mixed land uses for each traffic analysis zone to improve the walk, bike, and transit modes in the mode choice model. PSRC is also proposing a method to better capture and estimate short trips, typically made by walking, within a traffic analysis zone.

  *Update*: The development of the urban form variables to represent walk and bike trips is complete; the inclusion of these in the models was to occur in fall 2008.

- Testing the sensitivity of the model to a range of parking costs from conservative to a realistic high end to better represent the cost of driving in the model. PSRC is also proposing to identify the potential reasonable range of potential future gas prices and then using these ranges to test the sensitivity of the model and predict the potential impacts on vehicle miles traveled and emissions.

- Reviewing existing micro-simulation modeling and existing literature on transportation operations in order to develop methods for best applying the region's travel demand models in the analysis of a range of operational approaches to improving the performance of transportation facilities.

Some of these tasks are temporary improvements that will improve how the model functions in the interim until more substantial changes to the model are made in coming years. Other changes are more permanent and will be relevant as PSRC's model evolves. The estimated cost of these six priority improvements is over $350,000, with expected completion times of between six weeks and six months.

## Current Methods for Analysis

The above improvements should be completed in time for the alternatives analysis and estimation of $CO_2$ emissions for *Destination 2040*. As is the case nationally for criteria pollutants, the analysis and estimates will be performed on the recommended transportation network and any alternative(s) and will not be estimated on a project-by-project basis. Smaller-grained estimates, i.e., for variations at the corridor or project level, are currently not viable due

to the amount of time necessary to run the model and the difficulty of accurately being able to pinpoint the causes and effects of individual variations in a regional context. Other models, discussed below, may be used for the update, but they may not be approved for use in time, especially for conformity purposes. The current MOBILE 6.2-based model is used for estimating emissions 20 to 30 years into the future but also for shorter-range conformity purposes, as is the case for the Transportation Improvement Program, which spans four years.

## Future Methods for Analysis

The EPA is developing a new model, termed MOVES, that has the potential to improve the estimation of $CO_2$ emissions. Until the official release of MOVES, which may be several years out, PSRC is working with the EPA and FHWA on options for improvements to the existing analysis capabilities for $CO_2$ emissions. PSRC worked with FHWA and EPA to secure a grant for modeling improvements, and to become the MPO pilot project for estimating GHG emissions for a transportation plan using a draft copy of MOVES. According to the EPA's website:

> "To keep pace with new analysis needs, modeling approaches, and data, the EPA's Office of Transportation and Air Quality is developing a modeling system termed the **MO**tor **V**ehicle **E**mission **S**imulator (MOVES). This new system will estimate emissions for on-road and non-road sources, cover a broad range of pollutants, and allow multiple scale analysis, from fine-scale analysis to national inventory estimation. When fully implemented, MOVES will serve as the replacement for MOBILE6 and NONROAD. The new system will not necessarily be a single piece of software, but instead will encompass the necessary tools, algorithms, underlying data and guidance necessary for use in all official analyses associated with regulatory development, compliance with statutory requirements, and national/regional inventory projections. This project was previously known as the New Generation Mobile Source Emissions Model (NGM)."[25]

## Challenges

Currently, there is a demand from some MPOs for models that better estimate $CO_2$ emissions. PSRC is working around the tools that they have as they try to find improved methods*; this takes flexibility and resourcefulness.* MOBILE 6.2 is adequate at the macro level, but it is critical to continue improving and refining models to be more accurate and to improve credibility if future policy and investment decisions are to be made based at least in part on $CO_2$ emission estimates.

[25] http://www.epa.gov/otaq/ngm.htm

## CONCLUSIONS

The following key observations are based on the analysis above regarding the progress PSRC is making with integration of climate change into the regional transportation planning process.

These observations are provided to assist interested peer MPOs and their planning partners to learn from PSRC's innovations and experiences as other areas begin initial efforts to integrate climate change considerations within their planning processes.

**Role of vision planning** – A vision document provides for high level consideration of, and establishes the connections between climate change goals (specifically, reducing GHG emissions), traditional transportation goals (such as improving accessibility and mobility), and other regional goals indirectly related to transportation (such as improving air quality, economic development, land use, equity, and energy). By overlaying these goals in vision planning, MPOs can begin to ensure that climate change will be considered in decision-making throughout the planning process.

**Supportive role of comprehensive planning at state, regional, and local levels –** Washington State's Growth Management Act and other policies provide a supportive legislative framework for regional and local governments to work together to manage growth and create land use strategies to encourage sustainability and reduce GHG emissions. Additionally, SEPA provided an opportunity for PSRC to estimate and compare $CO_2$ emissions between growth alternatives in its DEIS. Lacking this or a similar legislative foundation, it may be more difficult for other areas to replicate PSRC's approach to GHG reductions. However, PSRC's voluntary decision to examine $CO_2$ emissions as part of its DEIS is a testament to the ability of MPOs to create opportunities and avenues to begin analysis of this critical public policy in the absence of specific statutory requirements.

**An ongoing collaborative process** – It is critical to establish and continue a collaborative process that involves stakeholders and the public to develop the vision, create buy-in, and build support for the decisions reflected in the selected alternative. According to PSRC, the development of the Vision and alternative development and selection generated widespread interest and involvement in the region's future, and adding climate change considerations raised awareness and interest even further. Tackling a major public concern such as climate change in the MPO planning process raises the visibility and relevance of the overall MPO process regionally and brings additional supportive partners to the table.

**Role of political champions –** Mayor Nickels and former Executive Sims are national leaders on regional/urban climate change issues. While this may not directly lead to integration of climate change into the planning process in the way that statutes or regulations would, political champions establish critical momentum by opening doors for collaboration, bringing additional stakeholders to the table, and laying a critical political foundation the planning agencies can build upon.

**Active support of partners** – PSRC's efforts to bring climate change considerations into the region's transportation planning are enhanced by their success working with several organizations and agencies that are concerned beyond their statutory requirements about climate change and its impact on the region. This level of concern among partners allows for coordination and communication on climate change issues and accomplishment of technical planning tasks.

**A long-term time horizon** – The long-range planning timeline dovetails with many climate change goals, such as Washington's goals to reduce GHG emissions to 1990 levels by 2020, 25% below 1990 levels by 2035, and 50% below 1990 levels by 2050.[26] As an expansion of this initiative or some future Federal or State policy or program, it is possible that $CO_2$ could be regulated as a criteria pollutant to limit GHG emissions from the transportation sector. If this occurs, PSRC will be in a strong institutional and technical position to do the required planning work, including modeling $CO_2$ emissions and developing strategies to meet future $CO_2$ emissions targets. Many of the transportation and land use policies and strategies likely to have significant effects on GHG emissions are most realistically considered only over a long time horizon – twenty years or longer. It is also difficult to demonstrate significant impacts of shorter term transportation decisions and adjustments to the built environment.

**Importance of economic development** – From an economic perspective, MPOs need to demonstrate where there are opportunities to strengthen the economy while meeting climate change goals. Strategies that diminish regional economies will not be supported in a process that depends on broadly based collaboration and consensus. Estimating the benefits of and educating people about a regional green economy is one way for MPOs and their partners to make this case.

**Credible technical tools are critical** – Although PSRC has not yet completed its development of the models and related tools to accurately estimate $CO_2$ emissions, its efforts to date lend credibility to its modeling process and bring more interested parties to the table. Once PSRC has accomplished a more accurate estimation of $CO_2$ emissions, other MPOs can build from this process. PSRC's desire to lead the nation in this area demonstrates their commitment to climate change issues and establishes their leadership role not only regionally, but also nationally.

[26] Executive Order 07-02: http://www.governor.wa.gov/execorders/eo_07-02.pdf

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# 3. Transportation Planning and Climate Change: New York State

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## ABSTRACT

The transportation sector is responsible for roughly one third of US carbon dioxide emissions, making it a prime candidate for emission reductions. While no national policy to control greenhouse gases has yet been developed, many State and local governments have taken actions to reduce emissions. Twenty-eight states have adopted climate action plans, and 128 city and county governments are participating in an initiative to reduce emissions. While California has regulated tailpipe emissions of greenhouse gases, New York has enacted requirements on the transportation planning side.

The 2002 New York State Energy Plan required metropolitan planning organizations (MPOs) in the State to conduct a greenhouse gas energy analysis as part of the transportation planning process for regionally significant projects. This paper provides an overview of the transportation/climate change connection and its importance to New York, summarizes the requirements of the Energy Plan and examines the analyses conducted by three of the thirteen MPOs in New York. It synthesizes their findings, and assesses what effects the greenhouse gas analyses have had on the transportation planning decision-making process and the potential for achieving greenhouse gas reductions from such exercises.

Further, this paper compares the methods used by the MPOs to quantify greenhouse gas emissions and to conduct the analysis, and it recommends areas where further methodological development is needed or available for future planning documents.

With political and scientific attention increasing, the transportation sector may face some form of emission reduction targets in the future—whether mandatory or voluntary. Ultimately, this paper provides a case study on the potential for New York State's Energy Plan requirements to serve as model for gaining emission reductions through the transportation planning process.

## INTRODUCTION

### Climate Change and Transportation

In February 2007, the United Nations Environment Programme's (UNEP) Intergovernmental Panel on Climate Change (IPCC) released the summary findings of its fourth assessment report on the physical science basis of global climate change. The report strongly supports the scientific consensus that global climate change is a real and consequential phenomenon. Further, the IPCC authors have determined that "[m]ost of the observed increase in globally averaged temperatures since the mid-20$^{th}$ century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations" (IPCC, 2007). The authors define "very likely" to indicate a likelihood of greater than 90 percent—a change from the former designation of "likely", or greater than a 66 percent likelihood. The new report also ties the rising global average sea level and decreasing northern hemisphere snow cover to global climate change.

The anthropogenic contributions to global climate change result from emissions of greenhouse gases into the Earth's atmosphere. Simply stated, the greenhouse gases trap excess heat in the Earth's atmosphere, thus warming the planet. Carbon dioxide is the gas emitted in the largest quantity, but others, such as methane, nitrous oxide, and fluorinated gases, contribute to the warming (Environmental Protection Agency [EPA], Climate Change, 2007). These emissions are primarily produced by the burning of fossil fuels. The US Energy Information Agency (EIA) reported that, in 2005, the transportation sector accounted for thirty-three percent of US carbon dioxide emissions—the largest contributor of the end-use sectors. Additionally, since 1990, there has been an average annual growth of 1.5 percent in transportation sector carbon dioxide emissions (EIA, 2006).

The United States is responsible for twenty-five percent of global carbon dioxide emissions (EIA, 2004), which means that the US transportation sector is responsible for eight percent of global emissions. The US Department of Transportation's (DOT) Center for Climate Change and Environmental Forecasting acknowledged the transportation sector's contribution to greenhouse gas emissions in its 2006-2010 Strategic Plan. Importantly, the DOT also addressed the potential for impacts on the transportation sector as a result of climate change. "Transportation will also be affected by climate change, which has the potential to create significant weather irregularities, including sea level rise and more intense storms that could severely affect the safety and security of national transportation infrastructure" (DOT, 2006).

New York is one of several State governments that have been pioneering policies to reduce energy consumption and to integrate climate change considerations into decision-making processes. New York City is the largest US city, and its coastal location is threatened by the

potential for sea level rise, making this an important issue for the State and local governments to address.

## Climate Change Impacts in New York

New York City is one of the most significant centers of business in the world. As with other port cities, New York City's location near water makes it a natural site for trade and economic activity. The city has over 500 miles of coastline, of which transportation infrastructure covers a significant portion, including transit, tunnels, roadways, bridges, and other systems (Zimmerman, 2002). A significant portion of the city's transportation infrastructure is below or just slightly above sea level, which increases the threat of damage from flooding. According to Zimmerman (2002), the city has twenty-seven transit facilities; twenty-one surface transportation facilities, including roads, bridges, and tunnels; six marine facilities; and two airports; all that are ten feet or fewer above sea level. According to the IPCC (2007), global average sea level rose at an average rate of 1.8 millimeters per year from 1961 to 2003, but with a much higher rate of 3.1 millimeters per year from 1993 to 2003. The IPCC (2007) predicted a 0.18 to 0.59 meter (0.6 to 1.9 feet) rise in sea level from 1980 to 2099.

The threat of rising sea level to the city's transportation infrastructure is broad in its economic, health, and safety effects. Submerged infrastructure is obviously not useable, but it can also not withstand submerged conditions for long, as the material corrodes and the structures are impaired (Zimmerman, 1996). Transportation infrastructure is critical to public health and safety, serving as the conduits for emergency response vehicles. The flooding and storm damage that occurred after Hurricane Katrina in New Orleans in 2005 demonstrate the difficulties that emergency management officials face in reaching threatened populations when transportation infrastructure is compromised.

According to the IPCC (2007), of the twelve warmest years on record since 1850, eleven occurred between 1995 and 2006. Additionally, it reports that the best estimates for expected temperature increases over the course of the twenty-first century range from three to seven degrees Fahrenheit. One of the consequences of such an increase in temperature is increased stress on transportation infrastructure. According to Zimmerman (1996), bridges and other road surfaces withstand temperature ranges of 120 degrees Fahrenheit, from -20 degrees to 100 degrees Fahrenheit. While temperatures above 90 degrees Fahrenheit are not uncommon in the city during the summer months, temperatures above 100 degrees Fahrenheit are relatively rare (NOAA, 2006). As temperatures increase, however, impairment of the road facilities from heat stress could be a concern (Zimmerman, 2006).

Clearly New York City, and by extension, New York State, have a significant stake in taking steps to mitigate the threats posed by global climate change. Having been the center of the 9/11 attacks, the city is familiar with disasters. According to Dolfman and Wasser (2004), in their assessment for the Bureau of Labor Statistics, the 9/11 attacks resulted in over $2 billion in lost wages during the four month period following the disaster in Manhattan alone. Severe flooding and the loss of important transportation infrastructure could be expected to cause similarly significant economic, environmental, and human damage. Acknowledging the threat posed by

climate change, the State of New York developed its 2002 State Energy Plan with the goal of reducing greenhouse gas emissions.

## New York State Energy Plan

In 2002, the New York State Energy Research and Development Authority (NYSERDA) released its State Energy Plan, a wide-ranging set of policy goals aimed at providing the State with efficient, clean, affordable, and reliable energy resources. The plan details fifteen policy recommendations, including seven with environmental focuses. It places a large emphasis on renewable fuels research and use and increased energy efficiency. The Plan calls for increased efficiency in transportation through support for public transit, transportation management, intelligent transportation systems, and capital construction.

The recommendation that this Plan focuses on is to reduce the State's greenhouse gas emissions to five percent below 1990 levels by 2010 and to ten percent below 1990 levels by 2020. Specifically, the Plan calls for analyzing energy consumption of the transportation system as a part of the transportation planning process:

> Examining and analyzing the transportation system's energy consumption and air emissions when long-range plans and Transportation Improvement Programs are adopted would enhance this commitment. This examination could be on a build/no build basis and include public review. If a plan or a program increases air emissions or uses more energy than doing nothing at all, additional measures or modifications to the plan or program could be considered to minimize the increases as much as practicable. This review would be in addition to existing Federal and State requirements to address transportation conformity regulations in air quality non-attainment and maintenance areas (NYSERDA, p. 2-90, 2002).

While the Plan calls for the "build" scenarios to result in lower emission than the "no build" scenarios, it does not link this transportation planning requirement to the more ambitious goal of actually reducing greenhouse gas emissions below 1990 levels. Indeed, NYSERDA's 2005 State Energy Plan Annual report indicates that, through 2005, New York's greenhouse gas emissions actually increased by seven percent over 1990 levels. The State notes, however, that the actions it took to curtail emissions resulted in one-half of one percent fewer emissions than would have occurred without acting (NYSERDA, 2005).

The Plan identifies a large group of transportation planning strategies that can be included in transportation plans and Transportation Improvement Programs (TIPs) to reduce emissions. These strategies include enhanced bicycle and pedestrian programs, improved intelligent transportation systems (optimized traffic signals, incident response, corridor management), speed limit reduction, congestion pricing, transportation management planning for employers (providing telecommuting options, vanpooling, and flex time), and improved public transit.

The New York Department of Transportation carried out the directive in the Energy Plan by requiring MPOs to conduct a greenhouse gas energy analysis on their transportation plans.

## GREENHOUSE GAS ENERGY ANALYSIS

Any metropolitan region with over 50,000 people is required by Federal transportation planning regulations to have an MPO. There are thirteen MPOs in New York of varying sizes. In a report commissioned by the U.S. Department of Transportation in 2005, ICF Consulting interviewed staff from the State MPOs about the Energy Plan requirements. According to ICF (2005), many MPOs do not view the Energy Plan requirements as mandatory, instead seeing them as voluntary actions. Indeed, some MPOs, particularly the smaller regions, did not complete analyses. In the interviews, many MPOs expressed confusion as to why they were given such a visible role in the State assessment of energy consumption, given their perceived inability to control increases in energy use. Some MPOs are resisting the requirement, as they do not believe the analyses will be used in the decision-making process—indeed, the analyses were conducted after the plans were complete. Additionally, many MPOs were concerned with the increased workload required by conducting the analyses, stating that they required two to four person weeks on average to complete. For small MPOs, this can be a significant burden.

This paper assesses the greenhouse gas energy analyses conducted by three of the MPOs of different sizes: the New York Metropolitan Transportation Council (NYMTC) based in New York City, the Capital District Transportation Council (CDTC) based in Albany, and Ithaca-Tompkins County Transportation Council (ITCTC) based in Ithaca.

### New York City

NYMTC released its greenhouse gas energy analysis for its 2005-2030 transportation plan in November 2006. Table 1 presents data on NYMTC's past and future carbon dioxide emissions, gross regional product, carbon dioxide intensity, and energy intensity, as provided by ICF Consulting in a report for the US Department of Transportation.

**Table 1: NYMTC Carbon Dioxide Emissions and Energy Intensity**

| | 1990 | 2001 | 2010 | 2020 |
|---|---|---|---|---|
| **Gross Metropolitan Region Product (Million 2001 Dollars)** | $350,993 | $597,638 | $779,782 | $1,047,962 |
| **$CO_2$ Emissions ($MMTCO_2$)** | 44.0 | 47.0 | 53.8 | 59.6 |
| **$CO_2$ Intensity (MTCO2 per million 2001 Dollars)** | 125.3 | 78.7 | 68.9 | 56.9 |
| **Energy Use (Trillion BTU)** | 609.4 | 639.0 | 740.2 | 830.1 |
| **Energy Intensity (Thousand Btu per 2001 Dollars)** | 1.7 | 1.1 | 0.9 | 0.8 |

Source: ICF, 2005

While Table 1 demonstrates that NYMTC is reducing its greenhouse gas and energy use intensity, as measured against gross metropolitan regional product, it also shows that actual greenhouse gas emissions and energy use are increasing and are projected to increase through 2020. This indicates that NYMTC is not on track to meet the Energy Plan greenhouse gas reduction goals. To meet the Energy Policy goals, NYMTC's greenhouse gas emissions would need to be at or below 41.8 million metric tons in 2010, and at or below 39.6 million metric tons in 2020. This means that the NYMTC planning area is projected to emit 51 percent more emissions in 2020 than it would if the Energy Policy greenhouse gas goals were met.

Table 2 summarizes the greenhouse gas emissions from direct energy consumption of the "build" versus the "no-build" scenarios.

**Table 2: NYMTC Daily Greenhouse Gas Emissions from Direct Energy (2005-2030 Regional Transportation Plan)**

| | Build | | No-Build | | Build Compared to No-Build | |
|---|---|---|---|---|---|---|
| **Year** | **VMT** | **Direct Greenhouse Gas Energy (tons)** | **VMT** | **Direct Greenhouse Gas Energy (tons)** | **Difference in VMT** | **Difference in Direct Energy** |
| **2002 Base Yr.** | | | 182,193,403 | 97,408 | | |
| **2007** | 185,989,846 | 101,091 | 187,766,434 | 102,051 | 1,776,588 | 960 |
| **2010** | 188,061,642 | 103,204 | 189,790,440 | 103,984 | 1,728,798 | 780 |
| **2020** | 196,918,361 | 106,794 | 200,053,115 | 108,643 | 3,134,754 | 1,849 |
| **2025** | 201,785,908 | 108,928 | 205,046,401 | 110,959 | 3,260,493 | 2,031 |
| **2028** | 204,499,647 | 110,723 | 208,335,055 | 113,104 | 3,835,408 | 2,381 |
| **2030** | 205,672,794 | 111,374 | 209,480,633 | 113,840 | 3,807,839 | 2,466 |

Source: NYMTC, 2006

While the Energy Plan calls for actual reductions in greenhouse gas emissions, its section on transportation only indicates that the plans and TIPs should show less emissions under the build than under the no-build scenarios. NYMTC's 2005-2030 Regional Transportation Plan meets this goal in each analysis year, with 2,466 fewer tons of daily greenhouse gas emissions projected for 2030 under the build scenario than under the no-build scenario. It is important to note, however, that the analysis indicates that there will be an increase of 13,966 tons of greenhouse gas emissions per day, or roughly 5,100,000 tons per year, from the 2002 base year in 2030 if the Plan is enacted. This represents a 14 percent increase in emissions over 2002 levels. Furthermore, NYMTC did not compare emission levels to those caused by transportation sources in 1990. Without that information, it is impossible to determine the increase that will happen relative to the 1990 levels, the year that the Energy Plan uses for its greenhouse gas reduction goals.

NYMTC concludes its greenhouse gas analysis by stating that "NYMTC's TIP and Plan are consistent with the 2002 State Energy Plan, and the forecasted reduction in future energy consumption for years 2010, 2020, and 2030 illustrate the regional focus and commitment to reducing greenhouse gas emissions" (2006, p. 9). This statement is true if viewed as a comparison of the implementation of the plan versus a no-build scenario, but it is not true for the Energy Plan's overall goal of actually reducing greenhouse gas emissions.

## Albany

CDTC released its *New Visions 2025 Plan* for public comment in June 2004. It included the greenhouse gas analysis required under the Energy Plan. Table 3 presents data on CDTC's past and future carbon dioxide emissions, gross regional product, carbon dioxide intensity, and energy intensity, as provided by ICF Consulting in a report for the US Department of Transportation.

**Table 3: CDTC Carbon Dioxide Emissions and Energy Intensity**

| | 1990 | 2001 | 2010 | 2020 |
|---|---|---|---|---|
| **Gross Metropolitan Region Product (Million 2001 Dollars)** | $19,375 | $31,330 | $40,878 | $54,937 |
| **$CO_2$ Emissions ($MMTCO_2$)** | 4.2 | 4.7 | 5.5 | 6.0 |
| **$CO_2$ Intensity (MTCO2 per million 2001 Dollars)** | 215.0 | 150.0 | 133.4 | 109.7 |
| **Energy Use (Trillion BTU)** | 58.9 | 66.6 | 77.3 | 85.4 |
| **Energy Intensity (Thousand BTU per 2001 Dollars)** | 3.0 | 2.1 | 1.9 | 1.6 |

Source: ICF, 2005

Like NYMTC, Table 3 indicates that CDTC has reduced and is projected to continue reducing its greenhouse gas intensity. However, actual greenhouse gas emissions are projected to continue rising, counter to the goals of the Energy Plan. To meet the Energy Plan goals, CDTC's greenhouse gas emissions would need to be at or below 4 million metric tons in 2010, and at or below 3.8 million metric tons in 2020. This means that CDTC is projected to emit 58 percent more emissions in 2020 than it would if the Energy Plan greenhouse gas goals were met.

Table 4 summarizes the greenhouse gas emissions from direct energy consumption of the "build" versus the "no-build" scenarios.

**Table 4: CDTC's Yearly Greenhouse Gas Emissions (New Visions 2025 Transportation Plan)**

| | Build | | No-Build | | Build Compared to No-Build | |
|---|---|---|---|---|---|---|
| **Year** | **Daily VMT** | **Carbon Emitted per Year (tons)** | **Daily VMT** | **Carbon Emitted per Year (tons)** | **Difference in Daily VMT** | **Difference Carbon Emitted (tons)** |
| **1990** | | | 17,740,000 | | | |
| **1996** | | | 20,470,000 | | | |
| **2003** | | | 23,498,000 | 800,912 | | |
| **2008** | 23,167,000 | 788,290 | 24,774,000 | 846,046 | 1,607,000 | 57,756 |
| **2015** | 23,780,000 | 786,122 | 26,526,000 | 888,323 | 2,746,000 | 102,201 |
| **2021** | 24,942,000 | 815,998 | 27,756,000 | 927,828 | 2,814,000 | 111,830 |
| **2025** | 25,651,000 | 825,983 | 28,539,000 | 938,944 | 2,888,000 | 112,961 |

Source: CDTC, 2004

Like NYMTC, CDTC meets the Energy Plan goal of reducing greenhouse gas emissions with the implemented build scenario relative to the no-build scenario. But CDTC also indicates that actual greenhouse gas emissions will rise 37,693 tons per year from 2008 to 2025—a 5 percent increase. Like NYMTC's analysis, the CDTC analysis does not present greenhouse gas emissions for 1990, so a comparison to the Energy Plan targets is not possible from the information provided in the CDTC transportation plan.

## Ithaca-Tompkins County

ITCTC released its 2025 Long Range Transportation Plan in December 2004, and it included a greenhouse gas analysis. ITCTC is one of the smallest MPOs in New York. Table 5 presents data on ITCTC's past and future carbon dioxide emissions, gross regional product, carbon dioxide intensity, and energy intensity, as provided by ICF Consulting in a report for the US Department of Transportation.

**Table 5: ITCTC Carbon Dioxide Emissions and Energy Intensity**

| | 1990 | 2001 | 2010 | 2020 |
|---|---|---|---|---|
| **Gross Metropolitan Region Product (Million 2001 Dollars)** | $1,934 | $3,045 | $3,973 | $5,339 |
| **$CO_2$ Emissions ($MMTCO_2$)** | 0.4 | 0.4 | 0.5 | 0.5 |
| **$CO_2$ Intensity (MTCO2 per million 2001 Dollars)** | 213.4 | 139.6 | 123.7 | 101.0 |
| **Energy Use (Trillion BTU)** | 5.8 | 6.0 | 7.0 | 7.6 |
| **Energy Intensity (Thousand BTU per 2001 Dollars)** | 3.0 | 2.0 | 1.8 | 1.4 |

Source: ICF, 2005

ITCTC, like the other MPOs, shows a reduction in energy intensity through 2020, but it also fails to meet the Energy Plan goals of a reduction in greenhouse gas emissions relative to 1990 levels. While it shows no increase from 2010 to 2020, this can partially be explained by the small size of the MPO. To meet the Energy Plan goals, the ITCTC planning area would need to be emitting at or below 0.38 million metric tons of greenhouse gases in 2010 and at or below 0.36 million metric tons in 2020. Thus, in 2020, ITCTC area is projected to emit 39 percent more greenhouse gas emissions than it would if it met the Energy Plan goals.

Table 6 summarizes the greenhouse gas emissions from direct energy consumption of the "build" versus the "no-build" scenarios. Unlike NYMTC and CDTC, ITCTC only conducted its analysis for 2004 and 2025.

**Table 6: ITCTC Yearly Greenhouse Gas Emissions**

| Year | Build | No-Build | Build Compared to No-Build |
|---|---|---|---|
| | **$CO_2$ Emitted (Metric Tons)** | **$CO_2$ Emitted (Metric Tons)** | **$CO_2$ Emitted (Metric Tons)** |
| **2004** | | 115 | |
| **2025** | 131 | 133 | 2 |

Source: ITCTC, 2004

ITCTC, like the other two MPOs assessed, shows a reduction in greenhouse gas emissions for its build compared to its no-build scenario. Likewise, it shows a total increase in greenhouse gas emissions from current levels to 2025 levels, in this case 16 metric tons, or a 14 percent increase. It too does not provide information on 1990 levels.

## Comparison of Three MPOs

The trends of all three MPOs assessed in this paper are the same. All of their analyses indicate that implementing their long range transportation plans will result in fewer greenhouse gas emissions than would occur without the projects in the plans. However, all three envision greenhouse gas emissions from the transportation sectors increasing over current, and therefore,

1990, levels. It is interesting to note that, although it is responsible for the largest share of the state's emissions, the New York City metropolitan region is significantly less energy intensive than either the Albany or the Ithaca-Tompkins County regions.

In interviews with New York MPOs, ICF Consulting found that "most MPOs see few circumstances in which these energy/$CO_2$ assessments could influence decisions in a significant way" (2005, p. 16). Two of the MPOs assessed in this paper, CDTC and ITCTC, included their analyses in their long range plan, while NYMTC conducted its analysis after the plan was released. Thus NYMTC did not use its analysis as part of the decision-making process of which projects to include in the plan. For future planning cycles, MPOs could better incorporate climate change considerations by using the information gained in these first-round analyses as a part of the decision-making process.

### Quantitative Needs

Carbon dioxide, the primary greenhouse gas, is generally emitted in a manner directly proportional to fuel consumption. As such, the calculation of greenhouse gas emissions from the implementation of transportation plans requires determining the amount of fuel consumed by the vehicles that will use the roadways contained in the plan. While conceptually simple, it is more complex in practice and requires a model that can make adjustments based on fuel type and vehicle mix, among other factors. If these data are not available for an MPO for its facilities, then the calculation becomes more difficult (ICF, 2006). This difficulty is demonstrated by the calculations conducted by the three MPOs assessed in this paper—Ithaca-Tompkins County, the smallest MPO studied, provided the least detailed quantitative assessment of the greenhouse gas emissions expected from its transportation plan. Further, assessing the greenhouse gas emissions on a regional scale will not assist transportation decision-makers in project selection if they wish to choose projects that will result in fewer greenhouse gas emissions. Project-level emissions data, while less reliable than regional data, are nonetheless needed if MPOs are to select projects based on their expected greenhouse gas contributions.

While there are several off-the-shelf models currently available for use in quantifying greenhouse gas emission from transportation projects, the EPA is in the process of developing its Motor Vehicle Emission Simulator (MOVES) model. The MOVES model will be much more robust than current models and will be more sensitive to the factors, such as vehicle mix and fuel type, that affect greenhouse gas emissions. The official version of the model is tentatively scheduled for release within the next year (EPA, MOVES, 2007).

## CONCLUSION

The New York Energy Plan is the only state plan in the country that requires MPOs to assess the greenhouse gas emissions that will result for the implementation of their long range transportation plans. As such, it has served as a pilot for how climate change considerations can be included in the transportation planning process. While the greenhouse gas analyses that were conducted show that emissions will continue to rise, and the reduction goals will not be met (at least within the transportation sector), they also show that the build scenarios result in fewer

emissions than the no-build scenarios. The analyses could be better utilized in future rounds of plan updates if the information gained from this first round is used to inform the decision-making process to select a mix of projects that most minimizes greenhouse gas emissions. Overall, the analysis requirements represent an important step in bringing climate change considerations into the transportation planning process.

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# 4. New England Governors and Eastern Canadian Premiers Case Study

## Transportation Solutions to Reducing Greenhouse Gas Emissions

**February 2009**

**Diane Turchetta**

**U.S. Department of Transportation**
**Federal Highway Administration**

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Governor Douglas (Vermont) pointed out that "*Our energy choices have a clear impact on the environmental legacy we leave our children. The positions we have defined reflect the importance of increased regional cooperation in the fight against climate change and atmospheric pollution, while ensuring energy security and economic development. The productive discussions over the past two days have allowed a frank assessment of the measures that we could, and should, implement.*"

Premier Charest (Quebec), in turn, stated that "*Prosperity and environmental protection must no longer be mutually exclusive. Given the extent of the situation, the time has come to replace isolated actions with the implementation of joint solutions in the energy and transportation fields. I am proud to see that Québec's environmental positions, backed up by a firm plan to combat climate change, have been favourably received by our neighbours and partners. Together, we agree that we must do more for the future of the planet.*"

**NEG/ECP Ministerial Forum for Regional Energy and Environmental Solutions, Québec City, February 11-12, 2007**

## INTRODUCTION

This case study outlines and analyzes the process undertaken by the Conference of New England Governors and Eastern Canadian Premiers (NEG/ECP) to develop transportation-related options and strategies to reduce greenhouse gas (GHG) emissions from a multi-jurisdictional and multi-national perspective. The report begins by describing the origins and goals of the NEG/ECP Climate Change Action Plan. The next section outlines the policy approach and process undertaken by the NEG/ECP to develop solutions and strategies to reduce transportation-related GHG emissions in the region.

The report then identifies specific actions identified by the NEG/ECP that could potentially have both direct and indirect impacts on the transportation planning process. The final section describes efforts taken by NEG/ECP members to address climate change issues. This section provides information on efforts taken by the Northeastern states and the Eastern Canadian Provinces to reduce GHG emissions with a particular focus on transportation-related programs and strategies.

The report concludes with a summary of key elements that made the NEG/ECP process a success, which could be utilized by other areas, particularly multi-state regions, which are beginning to consider options to reduce GHG emissions from the transportation sector.

## OVERVIEW

NEG/ECP is an organization of the six New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont) governors and five Eastern Canadian (New Brunswick, Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and Quebec) premiers.

The NEG/ECP first met in 1973. This informal regional alliance, though, has existed since colonial days, with the region sharing extensive trade, economic, energy, environmental, and cultural ties. The NEG/ECP is not an incorporated entity. It consists of two secretariats (the NEGC in Boston and the ECP in Halifax) and enters into voluntary agreements (not legally binding treaties or mandates) between the states and provinces.

In July 2001, the NEG/ECP adopted the "Climate Change Action Plan"[27], the first multi-jurisdictional / multi-national initiative of its type. The Plan originated at the Halifax, Nova Scotia, meeting of the NEG/ECP in July 2000, when the regions' governors and premiers asked their respective environmental and energy agencies to draft a plan for reducing the northeast's emissions of greenhouse gases (GHGs) and adapting to the impacts of a changing climate.

[27] "Climate Action Plan, 2001." http://www.negc.org/documents/NEG-ECP%20CCAP.PDF

The Plan identifies three major targets for GHG emissions in the region:

- **Short-Term Goal** – Reduce regional GHG emissions to 1990 emissions by 2010.
- **Mid-Term Goal** – Reduce regional GHG emissions by at least 10% below 1990 emissions by 2020, and establish an iterative five-year process, commencing in 2005, to adjust the goals if necessary and set future emissions reduction goals.
- **Long-Term Goal –** Reduce regional GHG emissions sufficiently to eliminate any dangerous threat to the climate; current science suggests this will require reductions of 75–85% below current levels.

These targets are to be achieved on a regional basis with states and provinces contributing to the overall reduction in aggregate but not necessarily in equal measure by each jurisdiction.

The Plan elaborates on nine areas of action to achieve the reduction targets, adapt to the impacts of a changing climate, and foster regional cooperation:

1. The Establishment of a Regional Standardized GHG Emissions Inventory
2. The Establishment of a Plan for Reducing GHG Emissions and Conserving Energy
3. The Promotion of Public Awareness
4. State and Provincial Governments to Lead by Example
5. The Reduction of Greenhouse Gases from the Electricity Sector
6. The Reduction of the Total Energy Demand through Conservation
7. The Reduction and/or Adaptation of Negative Social, Economic, and Environmental Impacts of Climate Change
8. *A Decrease in the Transportation Sector's Growth in GHG Emissions* (emphasis added)
9. The Creation of a Regional Emissions Registry and the Exploration of a Trading Mechanism

According to the NEG/ECP, transportation produces greater than a third of the GHG emissions in New England and Eastern Canada and is growing more rapidly than any other sector. GHG emissions from transportation combustion in the NEG/ECP region rose from 109 $MMTCO_2E$ (million metric tons of $CO_2$ equivalent) in 1990 to 124 $MMTCO_2E$ in 2000, an increase of almost 14 percent. More than half of transportation-related GHG emissions come from light-duty motor vehicles. The next largest source is heavy-duty trucks, and the remainder of emissions comes from locomotive, marine, and other transportation sources.

## POLICY CONTEXT

### Approach

The NEG/ECP determined that in order to reduce emissions in the sector, it would be necessary to bring together environmental and transportation officials, municipal decision-makers, climate change stakeholders, environmental scientists, businesses, and other interested parties to discuss the development and implementation of transportation-related strategies and options to reduce emissions.

In December 2006, the NEG/ECP organized a forum in Portland, Maine on "Transportation Solutions to Climate Change." The purpose of the meeting was to develop a series of recommendations on potential transportation initiatives which could be pursued in the NEG/ECP region to reduce transportation-related GHG emissions. The December forum consisted of a series of presentations and case studies from NEG/ECP representatives, and other invited speakers on alternative and clean fuels, transportation technology and logistics, transportation investment solutions, and methods to reduce vehicle miles traveled. Preliminary recommendations were presented at the Ministerial Forum on Energy and Environment, which was held in February 2007 in Quebec City, and final recommendations were presented at the 31st Conference of the NEG/ECP held in Prince Edward Island in June 2007.[28]

Seven transportation action items were adopted at the June 2007 conference including:

1. Development of environmentally friendly biofuels that reduce $CO_2$ and other emissions using local feedstocks and technology
2. Promotion of fuel efficiency in all modes of transportation through incentives for efficient technologies on the market, research and development initiatives for new and emerging technologies, partnerships with the private sector, and public awareness programs
3. Expansion of alternative transportation and commuter services and facilities
4. Alignment of infrastructure funding with energy and climate goals by encouraging energy-efficient development in municipalities and regional entities
5. Use of life-cycle GHG and carbon emissions analyses to set indicators for policy and project planning, when appropriate
6. Collaboration with the private sector to seek new opportunities to enhance regional interconnectivity and efficiency of freight networks in the region
7. Governors and Premiers will seek to adopt clean car programs including the $CO_2$ and air quality standards, such as California standards, throughout entire region

In addition, the Governors and Premiers agreed to appoint a regional standing task force of environmental and transportation officials to pursue the implementation of the action items, or any other transportation initiatives to reduce emissions, and to set a regional goal for GHG

[28] "Report to the 32nd Conference of New England Governors and Eastern Canadian Premiers," September 16, 2008.
http://www.cap-pma.ca/images/pdf/eng/2008%20NEGECP%20Documents/Ctee%20Reports/2008%20TAQAP%20Annual%20Report%20E.pdf

reductions from the transportation sector. The concept of this committee began with the governors and premiers' resolution adopted in Rhode Island in 2006 mandating that the NEG/ECP convene a ministerial forum on energy and the environment and report back with measures to address issues of sustainable and secure energy development. The committee that developed recommendations for the February 2007 forum suggested that transportation and environment officials collaborate on the development of an action plan to reduce emissions associated with the transportation sector in keeping with objectives set out in the NEG/ECP Climate Change Action Plan.

The Energy and Environment Resolution (31-1) adopted in June 2007 directed the new Transportation and Air Quality Steering Committee (TAQC) to produce a regional Transportation and Air Quality Action Plan. The TAQC first met in Quebec City October 29-30, 2007 and continues to meet periodically to develop transportation policy and action recommendations for the NEG/ECP. The following describes discussion items from the initial meeting.

## Review of Regional Transportation Initiatives

In order to avoid any duplication of effort, the TAQC reviewed transportation initiatives already underway in the region including:

*I-95 Corridor Coalition Initiative* – The coalition is an alliance of transportation agencies and related organizations from the State of Maine to the State of Florida, with affiliate members in Canada. The briefing book included a copy of a recently completed Northeast Rail Operations Study that identifies trends which will impact the ability of the region's railroads to accommodate additional passengers and freight.

*Northeast CanAm Connections Study* – Under the leadership of the State of Maine, the northeast states and provinces collaborated on a study to examine the adequacy of East-West transportation connections as far east as the port of Halifax and as far west as the Toronto and Buffalo markets. The study assesses whether the transportation infrastructure is sufficient to take advantage of economic opportunities within the region.

*Coalition of Northeast Governors* – An association of northeast governors (NEGC governors plus New York and New Jersey) who submitted recommendations to Congress regarding the reauthorization of TEA-21, the Federal legislation authorizing transportation programs and expenditures for multi-year periods.

*Atlantic Gateway* – A Canadian Federal funding program that supports the development of infrastructure and policies that assist the Atlantic Provinces in taking advantage of increased container traffic via the Suez Canal.

*Ontario-Québec Corridor* – Under the same gateway/corridor program, Ontario and Québec have agreed to develop a strategic, integrated, and globally competitive transportation system that facilitates the movement of international commerce.

## Overview of Jurisdictional Initiatives

Each State and province was asked to report on current and planned activities that may contribute to the development of a transportation air quality action plan.

Following a roundtable discussion of State and provincial initiatives, the participants listed all initiatives they felt would make a worthwhile contribution to GHG emission reductions. Participants noted that collaborative activities may have greater impact, but local programs contribute to the overall reduction of GHG emissions as well. Participants developed a list of 39 issues and initiatives. The list also included a relative weighting of votes in support of each initiative. The top four issues/initiatives included regional rail connectivity (inter-modalism); 0.7 cent fuel carbon levy; transportation and land use best practices; and the adoption of low emissions standards (CAL-LEV).

Several observations were noted relative to the list of proposals:

- The Canadian Federal government has imposed a 5% biofuel requirement (2010) and a 2% biodiesel requirement (2012); however, the standards are averaged nationally and may not invoke increased biofuels sales in Atlantic Canada.
- Québec has invested in two cellulosic test plants with anticipated production of six million litres by 2010.
- Connectivity and intermodalism initiatives need to be broadly defined to include both passenger and freight issues.
- Life-cycle analysis may be an extremely complex issue to coordinate regionally – Québec and Massachusetts have begun some early assessments and will share their approaches with the committee.
- The Northeast States for Coordinated Air Use Management low carbon fuel study and some initial assessments by Federal departments may provide a basis to address life-cycle analysis.
- The committee needs to determine whether the objective of the full cost of transportation options initiative is to change behavior or to raise revenues.

## Development of a Transportation and Air Quality Action Plan

The NEG/ECP organized five sub-committees to develop action plans and proposals for consideration at the meeting held in January 2008 in Portland, Maine. The action plan sub-committees include:

1. Biofuels
2. Pricing – reflecting the cost of carbon
3. Regional Rail Connectivity and Intermodalism
4. Transportation and Land-Use
5. Low Emission Vehicle Standards

All sub-committees acknowledged that current technology will not achieve the 2050 80% reduction target; instead, they were to assess the potential of current technology and consider

measures that support and encourage development of more effective technology to fill the gap. The sub-committees initially focused on what activities could be undertaken to address 2020 reduction targets. Each sub-committee undertook a resource and literature search in their area and developed a framework for action that was reviewed during the January 2008 meeting. Ideally, proposals under consideration were to include some form or metrics and start/stop dates.

The work of the sub-committees formed the basis for the principal categories in the action plan, which follows the format of the other three NEG/ECP action plans. The sub-committees developed goals for the respective action categories, as well as proposed actions that can be pursued to achieve those goals.

In addition to literature searches, the committee discussed the issue of involving outside resources in the action plan process. Several Federal (US and Canada) agencies were noted as valuable partners in the area of reducing vehicle emissions. It was agreed that other government and non-government entities need to be involved in pursuing TAQC activities. The involvement of outside agencies was determined on an ad hoc basis dependent on need. Committee members were consulted for advice on potential government and non-government partners.

The NEG/ECP determined that private sector stakeholders are another valuable resource and called for a management strategy to validate the TAQC Action Plan. One suggestion was to convene a ministerial forum on transportation and air quality similar to the one held in Québec City.

The NEG/ECP passed Resolution 32-1 in September 2008, accepting the Transportation and Air Quality Action Plan, and directing environment and transportation officials to coordinate resources and strategies to implement recommendations of the action plan while recognizing the need for flexibility for the jurisdictions. The Resolution directs the TAQC to coordinate discussions with multi-modal freight and passenger system operators and public-private stakeholders by improving modal coordination and to monitor program development in other countries and jurisdictions that "generate price signals to fuel consumers and operate market-based mechanisms such as the exchange of carbon credits or other efficient mechanism to fund transportation investment focused on reducing VMT and GHG emissions."

The Transportation and Air Quality Action Plan is a concise document that provides a framework for collaborative actions that will reduce emissions from the transportation sector.[29] The plan explains why actions are required and includes goals and 34 recommendations organized in categories for each of the seven action items:

1. Transportation and Air Quality Committee
2. Transportation Planning
3. Land Use
4. Low/No-Carbon Fuels
5. Pricing and Incentive Mechanisms

[29] NEG/ECP. Transportation and Air Quality Action Plan, September 2008. http://www.cap-cpma.ca/images/pdf/eng/2008%20NEGECP%20Documents/Ctee%20Reports/2008%20TAQAP%20Annual%20Report%20E.pdf

6. Clean Car Programs
7. Regional Freight Policy

The plan incorporates the specific actions and targets established for the transportation sector in the NEG/ECP Climate Change Action Plan 2001, as well as the actions agreed to at the February 2007 Ministerial Forum on Energy and the Environment.

TAQC working groups are developing recommendations to present to the NEG/ECP on the following topics:

- Pricing and Incentive Mechanisms
- Freight Policy
- Land Use
- Transportation Planning
- Low Emission Vehicles
- Low Carbon Fuels

## LINKAGE TO THE TRANSPORTATION PLANNING PROCESS

There has been growing interest regarding the linkages between the transportation planning process and climate change issues. This growing focus encompasses both the significant role that the transportation sector contributes to global GHG emissions and the vulnerability of the nation's transportation infrastructure to the effects of climate change. Since MPOs and State DOTs play a vital role in determining long-range transportation investments and strategies for time periods of 20 years or more, and these investment decisions have major impacts on jurisdictions' transportation-related GHG emissions, the process by which these decisions are made will undoubtedly come under much scrutiny from individuals, groups, and organizations working to reduce GHG emissions from the transportation sector.

Two of the seven transportation action items adopted at the June 2007 conference could have both direct and indirect impacts on the transportation planning process. The development of land-use strategies to reduce vehicle miles traveled (VMT) and promote mixed use areas and the creation of a link between GHG emissions as a result of transportation policies and projects will require new and innovative approaches by transportation planners.

### Alignment of Infrastructure Funding with Energy and Climate Goals in Development

The NEG/ECP identified the following three mechanisms to achieve this action:

- Redevelop city, small town, and village areas, including brownfields, already served by basic infrastructure. Consider these areas and new compact, mixed-use growth centers before supporting new wastewater, transportation, and other state-supported facilities in the undeveloped countryside.
- Encourage compact, mixed use development, such as transit oriented design, by working with towns and cities to revise their planning and zoning requirements to encourage traditional village centers that rely less on automobiles access and encourage pedestrian, bike, and transit travel options.
- Provide technical assistance and other resources to municipalities to assist in the preparation of municipal level energy and climate change action plans. These plans set municipal carbon reduction targets and include strategies such as the use of alternative fuels in municipal fleets, local and neighborhood sponsored car share and rideshare programs, and park and ride facilities.

### Use of Life-Cycle GHG and Carbon Emission Analysis for Policy and Project Planning

Although the NEG/ECP did not list detailed mechanisms to achieve this action, it was noted that a lifecycle analysis to estimate resulting GHG emissions is necessary not only from the transportation mode, but also fuel production, fuel distribution, manufacturing, and other processes. The TAQC will determine if transportation measures have adequate lifecycle estimates associated with them. If not, then suggested sources will be recommended.

## NORTHEASTERN STATES AND ECP ACTIONS TO ADDRESS GHG EMISSIONS

The NEG/ECP Climate Change Action Plan specifies nine actions that its member states and provinces should undertake to achieve the emission reduction goals outlined in the Plan. The nine actions include:

**Action Item 1** – Establishment of a Regional Standardized GHG Emissions Inventory
*Goal*: Each jurisdiction should establish a standardized inventory beginning with 1999 GHG emissions levels, reported every three years.

**Action Item 2** – Establishment of a Plan for Reducing GHG Emissions and Conserving Energy
*Goal*: Each jurisdiction should create a plan articulating measures for achieving GHG reductions in view of the regional short and midterm targets.

**Action Item 3** – Promotion of Public Awareness
*Goal*: By 2005, make the public aware of the problems and impact of climate change and what actions they can take at home and at work to reduce the release of GHGs. The public should also be made cognizant of adaptive measures they can accomplish.

**Action Item 4** – Need for State and Provincial Governments to Lead by Example
*Goal*: Reduce end-use emissions of GHGs through improved energy efficiency and lower carbon fuels within the public sector by 25 percent by 2012, as measured from an established baseline.

**Action Item 5 –** Reduction of GHGs from the Electricity Sector
*Goal*: Reduce the amount of $CO_2$ emitted per MWh of electricity use within the region by 20% of current emission rate by 2025.

**Action Item 6** – Reduction of the Total Energy Demand through Conservation
*Goal*: By 2025, increase the amount of energy saved through conservation programs (as measured in tons of GHG emissions) within the region by 20 percent using programs designed to encourage residential, commercial, and industrial energy conservation.

**Action Item 7 –** Reduction and/or Adaptation of Negative Social, Economic, and Environmental Impact of Climate Change
*Goal*: Broaden the understanding of forecast effects on climate and plan the adaptation to these changes, where possible. In addition, seek climate adaptation options that do not increase GHG emissions further.

**Action Item 8** – *Reduction in the Transportation Sector's Growth in GHG Emissions*
*Goal: Slow the growth rate of transportation emissions in the near future, better understand the impact of transportation programs and projects on total emissions, and seek ways to reduce these emissions. Work with Federal officials to improve the energy efficiency of vehicles for sale to the public* (emphasis added).

**Action Item 9** – Creation of a Regional Emissions Registry and Exploration of a Trading Mechanism
*Goal*: To create a uniform, coordinated basis for emissions banking and trading.

In addition to the action items listed above, the NEG/ECP also passed the following resolutions:

**Resolution 277 (August 2002)**
Encourage and promote climate change proposals focused on LED traffic lights; partnerships with regional colleges and universities for emissions reduction programs; purchase of high-efficiency and low-emission office equipment; and use of clean, energy efficient vehicles in State and provincial fleets.

**Resolution 287 (September 2003)**
Evaluate "smart growth" approaches to land use and development and seek recommendations for implementation. Continue to develop the administration, tracking, and reporting framework for a voluntary regional GHG registry. Work to develop voluntary partnerships with cities, towns, and businesses to increase the efficacy of NEG/ECP's climate change work.

The following section provides information on the specific strategies, programs, and actions developed by the NEG/ECP member states and provinces in response to the nine action items in the Climate Change Action Plan.

## Connecticut

On February 15, 2005, the Governor's Steering Committee on Climate Change, made up of leaders from key State agencies including the Department of Environmental Protection, Public Utility Commission, Transportation, Administrative Services, the Office of Policy and Management, and The Connecticut Clean Energy Fund, led a collaborative effort that developed the Connecticut Climate Change Action Plan 2005. The plan will help Connecticut reduce greenhouse gas emissions to 1990 levels by 2010 and 10% below that by 2020. The policy recommendations in the Transportation and Land Use section of the plan included the following actions:

- Adopt California LEV II Standards
- Establish a GHG feebate program
- Provide vehicle fleet incentives and support State vehicle initiatives
- Amend LEV II regulations to include GHG tailpipe standards
- Design a public education initiative to raise awareness of low GHG emitting vehicles
- Develop a comprehensive hydrogen infrastructure research and demonstration program
- Implement a package of transit improvements and land-use policies and incentives to achieve a 3 percent reduction in VMT below the 2020 baseline
- Embark upon a multi-state freight initiative
- Reduce black carbon by establishing a Connecticut clean diesel program

More information on the Connecticut Climate Change Action Plan can be found at:
http://www.ct.gov/dep/cwp/view.asp?a=2684&q=322070

## Maine

A 2003 Maine law (PL 237) required the Department of Environmental Protection (DEP) to develop and submit a Climate Action Plan for Maine. The goals of the Plan are to reduce GHG emissions to1990 levels by 2010, 10% below those levels in 2020, and by a sufficient amount to avert the threat of global warming over the longer term, which could be as much as 75%. The Plan was delivered to the Maine legislature in December of 2004. Fifty-four recommended actions/options were identified to meet the target outlined in the Plan – the transportation and land use options included:

- The adoption of California GHG tailpipe standards for passenger vehicles
- Development of a Clean Diesel Technologies Program to reduce black carbon
- Requirement of a State low-GHG fuel standard
- Implementation of a Pay-As-You-Drive Insurance Program
- Development of policy packages to slow the growth in VMT
- Implementation of low-GHG fuel use for State fleets
- Adoption of CA LEV II Standards
- Encourage adoption of heavy-duty engine idle-reduction measures for freight movement
- Development of a GHG feebate program
- Expand infrastructure for low-GHG fuel options

More information on Maine's Climate Change Action Plan can be found at:
http://www.maine.gov/dep/air/greenhouse/

## Massachusetts

The Massachusetts Climate Protection Plan was finalized in 2004. The Plan outlines the following three emission reduction targets:

- Short-Term – Reduce GHG emissions to 1990 levels by the year 2010.
- Medium-Term – Reduce GHG emissions 10% below 1990 levels by the year 2020.
- Long-Term – Reduce GHG emissions sufficiently to eliminate any dangerous threat to the climate; current science suggests this will require reductions as much as 75-85% below current levels.

The plan focuses on a range of strategies to reduce GHG emissions including the following actions in the transportation sector:

- Use Sustainable Development Principles to integrate transportation and land use
- Favor transit-oriented development around MBTA stations
- *Include energy use and GHG emissions data as criteria in transportation decisions* (emphasis added)
- Maintain and update public transit services
- Increase parking at train stations to encourage use of public transit
- Improve the efficiency of transit vehicle movement
- Develop new bicycle and pedestrian policies, programs, and facilities

- Expand programs to promote efficient travel
- Seek opportunities to reduce emissions at Logan Airport
- Improve aircraft movement efficiency
- Evaluate the benefits of expanded rail and water opportunities
- Provide incentives to purchase fuel-efficient vehicles
- Support HOV lane access for clean vehicles
- Implement stronger vehicle emissions standards
- Promote the use of cleaner vehicles and fuels in public transit fleets
- Clean up the existing transit fleet with less polluting fuels
- Continue to promote the use of cleaner diesel equipment on state-funded construction projects
- Eliminate unnecessary idling of buses
- Use cleaner train engine technology to reduce diesel soot
- Advocate for aircraft efficiency at a regional and national level

Significant to the transportation planning process is the inclusion of the action to "include energy use and GHG emissions data as criteria in transportation decisions." In April 2007, Massachusetts required a quantification of GHG emissions for projects subject to a Massachusetts Environmental Policy Act (MEPA) review and State projects which have an associated Environmental Impact Report (EIR).

More information on the Massachusetts Climate Protection Plan can be found at: http://www.mass.gov/dep/air/climate/

### New Hampshire

On December 7, 2007, the Governor of New Hampshire signed an Executive Order establishing a Climate Change Task Force. The Task Force is charged with carrying out the following tasks:

- Recommend quantified goals for reductions of NH greenhouse gas given the inventory of NH greenhouse gas emissions and emission projections;
- Recommend specific regulatory, voluntary and policy actions, based on Stakeholder input, that the State should consider to achieve its greenhouse gas reduction goals;
- Hold at least 1 public hearing on the proposed Plan and appropriately consider all stakeholder comments; and,
- Submit a Climate Change Action Plan and recommendations to the Governor by September 1, 2008.

A press release on the Executive Order can be found at: http://www.nh.gov/governor/news/2007/120607.html

### Rhode Island

In July of 2002, Phase I of the Rhode Island GHG Action Plan was completed. The Plan includes 52 options to reduce GHG emissions in the State. Eleven of these options were targeted towards the transportation sector in the following categories:

- **High Priority Consensus:**
  - Local Fuel Economy Improvements (Feebate) Initiative
  - Transit Oriented Development and Enhancing Transit Options and Operations Initiative
  - Bicycle and Pedestrian Infrastructures Initiative
  - Commuting Efficiency Program
  - Commuting Trip Reduction Initiative
  - Government Owned and Private Fleet-Vehicle Efficiency
- **Lower Priority Consensus:**
  - Fleet Fuel GHG Content Mandate
- **Non-Consensus:**
  - Increase Gasoline Tax
- **Consensus Regional/National Options:**
  - Increase CAFE Standards
- **Consensus Priority Study Options:**
  - VMT-Based Insurance Premium Structures
  - Transportation Infrastructure Planning
    - Commuter rail/light rail and its potential electrification
    - Advanced bus rapid transit
    - Barging
    - Carbon impacts of shifting transportation resources from new lane miles to preserving, enhancing, and better integrating the State's transportation infrastructure

More information on the Rhode Island GHG Action Plan can be found at: http://righg.raabassociates.org/

### Vermont

In December 2005, the Governor of Vermont established a Commission on Climate Change. In October 2007, the Commission approved a set of strategies to address climate change in the State. Thirty-eight strategies were recommended to address climate change in Vermont. The strategies recommended in the transportation sector included:

- Compact and Transit-Oriented Development Bundle
- Alternatives to Single-Occupancy Vehicles
- Vehicle Emissions Reductions Incentives
- Pay-As-You-Drive Insurance
- Alternative Fuels and Infrastructure
- Regional Intermodal Transportation System – Freight and Passenger
- Commuter Choice/Commute Benefits
- Plug-In Hybrids
- Fuel Tax Funding Mechanism

More information on the Vermont's efforts to address climate change can be found at: http://www.anr.state.vt.us/air/Planning/htm/ClimateChange.htm

### Canada/Eastern Canadian Premiers

On September 28, 2006, the Commissioner of the Environment and Sustainable Development released her 2006 Report on Climate Change. The Report described that even though the Federal government had announced billions of dollars in funding since 1992 toward meeting commitments to address GHG emissions, as of 2004, Canada's GHG emissions were 26.6% above 1990 levels. The Commissioner urged Canada's New Government to come up with a credible, realistic, and clear plan that should address the long-neglected need to help Canadians cope with the consequences of climate change and to commit to specific actions with timeframes for completing them. The 2006 Report of the Commissioner of the Environment and Sustainable Development is available on the Office of the Auditor General of Canada web site at: http://www.oag-bvg.gc.ca/internet/English/osh_20061005_e_23460.html

The cornerstone of Canada's new approach is legislation tabled in Parliament on October 19, 2006. Canada's Clean Air Act takes a comprehensive approach to the problem of worsening air quality and GHG emissions. Standards on air pollution and GHG emissions will provide certainty to industry to allow the greatest use of technology to make the investments needed to reduce both. The Act represents a significant shift from a voluntary to a regulatory approach.

Specific to the transportation sector, Canada's Report on Demonstrable Progress Under the Kyoto Protocol Demonstration of Progress to 2005 states that:

> "In the medium term, there is a need for regulatory action on GHG emissions from the transport sector. Emissions from cars and trucks account for about 75 percent of Canada's total transportation GHG emissions, and passenger travel accounts for about half of that. Under Canada's Clean Air Act, the Government will issue regulations in order to limit GHG emissions from cars and trucks as soon as a voluntary Memorandum of Understanding with the auto sector expires in 2010.
>
> Once a Memorandum of Understanding that has been negotiated with the Railway Association of Canada expires, in 2011, GHG emissions from the rail sector will also be subject to regulation.
>
> The Government has already announced a number of initiatives that reduce emissions in the transportation sector. Initiatives included significant new investments in public transit infrastructure and a tax credit for public transit users, as well as a commitment to require 5% average renewable content in transportation fuels by 2010."[30]

[30] Canada's Report on Demonstrable Progress under the Kyoto Protocol Demonstration of Progress to 2005, Pages 2-3. http://unfccc.int/resource/docs/dpr/can1e.pdf

Specific measures mentioned include:

- Encouraging citizens and transportation service providers to use energy efficient vehicles or equipment;
- Increasing the availability and market acceptance of alternative fuels;
- Transportation system efficiency improvements; and
- Reduction in transportation demand.[31]

Just as local governments and MPOs in the US are taking actions to reduce GHG emissions in the transportation sector, Provinces and Territories are doing the same in Canada. Numerous Provinces have implemented varied educational campaigns to reduce unnecessary vehicle idling, encourage the purchase of energy-efficient vehicles, construct HOV lanes on provincial highways, and provide incentives for the use of ethanol.

Canada's transportation trends are similar to those in the US – rising passenger-kilometres traveled, growth in freight movement, and increasing energy use in off-road vehicles. In an effort to reduce GHG emissions from the freight sector, the Canadian government signed a Memorandum of Understanding with the US EPA in September 2005 to work jointly with North American freight and shipping industries to take voluntary actions to save fuel and reduce GHG emissions. The agreement brings together Canada's FleetSmart program and EPA's SmartWay Transport Partnership program in an effort to cooperate and share information on research and the development of projects to reach stated goals.

[31] *Ibid*, pages 2-3.

## CONCLUSIONS

The goal of the process described in this document was the development of a NEG/ECP action plan to reduce GHG emissions from the transportation sector. Throughout this process, the following key elements were important factors in the progress that NEG/ECP made in their effort to address GHG emissions from the transportation sector.

**Role of Political Champions:** The six New England Governors and five Eastern Canadian Premiers provided the necessary political leadership and momentum to address climate change issues in the region. The collaborative efforts and the successes of the NEG/ECP to date are due to the political foundation and support of the governors and premiers. Without political champions, the outcomes of well-intended efforts and plans often prove to be unsuccessful due to the lack of political support.

**Partners and Stakeholder Involvement:** The development of a Transportation and Air Quality Action Plan by the NEG/ECP was a significant multi-jurisdictional and multi-national undertaking, which required a great deal of cooperation and coordination. Several Federal (US and Canada) agencies were identified as valuable partners and were included in the development of the action plan. There was also recognition that other government and non-government entities and private sector stakeholders needed to be involved and consulted with for advice.

**Regional/Bi-National Approach:** In the absence of national or Federal regulations to reduce GHG emissions in the US, a coordinated and comprehensive regional approach is needed in order to make significant reductions in GHG emissions. In the case of the NEG/ECP effort to reduce transportation-related GHG emissions, there is not only an emphasis on a regional approach, but also on a bi-national one. In both the short-term and the long-term, this approach will help to reduce emissions more efficiently and effectively.

**Commitment and Leadership:** The commitment to reduce GHG emissions in the region began in 2001 with the development of the NEG/ECP Climate Change Action Plan, which established emission targets. The recognition that a strategy needed to be developed to address climate change in the region was the first step in securing a commitment from US states and Canadian provinces to take action on the issue. With inevitable action on climate change anticipated in the U.S., the NEG/ECP is well-positioned to meet possible future regulations set forth at the Federal level because of its early action, sustainable leadership over the years, and commitments to reducing dependence on energy imports in the region and environmental protection.

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# 5. Transportation Research Board; Transportation, Land Use, and Air Quality Conference

## Summary of Peer Exchange

Orlando, Florida

July 9-11, 2007

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## INTRODUCTION

The Transportation Research Board (TRB) 2007 Transportation Land Use, Planning, and Air Quality Conference (Orlando, FL, July 9-11) focused on the latest developments in transportation and land use modeling and planning to improve air quality. The conference included a focus on climate change considerations.

The conference included a session on "Transportation Planning and Climate Change" organized by the U.S. Department of Transportation's Center for Climate Change and Environmental Forecasting (CCCEF).[32] Two members of the CCCEF core team, Diane Turchetta (FHWA) and William M. Lyons (USDOT/Volpe Center), facilitated and participated in the panel. The core team represents the different organizations within US DOT that manage the CCCEF. The panel included presentations on transportation planning to reduce the emissions of greenhouse gases (GHG) as well on the potential impacts of climate change and variability for transportation long-range planning and investment. Panelists included representatives from the FHWA Office of Environment, who presented the New York State case study; the Puget Sound Regional Council (Seattle-area Metropolitan Planning Organization); the New England Governors and Eastern Canadian Premiers Conference; and a speaker presenting on the Gulf Coast Climate Impacts study.

The panelists represented organizations at different stages of incorporating climate change considerations into statewide and metropolitan area transportation planning activities. All are involved in innovative activities related to incorporation of climate change considerations within their planning processes. Panelists participated in a facilitated discussion with the audience of practitioners, which provided additional insights for the CCCEF research.

This report summarizes the presentations as part of the consolidated report on climate change and transportation planning, and concludes with key points. This summary is provided as a resource on best practices for a national audience of interested peers.

[32] http://www.rita.dot.gov/ordt/climate_change/

## SUMMARY 1: NEW YORK STATE CASE STUDY[33]

**Presenter: Mark Gaber, Federal Highway Administration**
http://www.fhwa.dot.gov/environment/
https://www.nysdot.gov/portal/page/portal/divisions/engineering/environmental-analysis/air-quality

The Air Quality/Asbestos/Energy Section of the New York State Department of Transportation (NYSDOT) prepares policies, procedures and technical guidance that allow the Department to identify and assess potential air quality effects of its activities. This work includes Clean Air Act issues, air conformity analysis, air quality analysis procedures and energy impact analyses.

- The state's 54,500 square miles encompass 62 counties, 62 cities, and 1,485 villages and towns
- Statewide population is over 19 million, with over 8 million in New York City

The United States emits 25 percent of global $CO_2$ emissions; however, no national policy has been developed to reduce emissions, according to the presenter. In the U.S., actions are primarily being initiated at state, local, and regional levels: 28 states have adopted climate action plans, and 128 city and county governments currently participate in emissions reduction initiatives, at the time of the presentation. Among this group of states, New York recently enacted innovative requirements for transportation planning to consider climate change.

New York City is the largest U.S. city and an international financial and economic center. The city's coastal location and location of major transportation facilities near sea level leave its transportation infrastructure vulnerable to the potential for sea-level rise from increased climate and weather variability. New York City, and therefore New York State, has an interest in taking action to mitigate the threats posed by climate change. For this reason, New York developed its 2002 State Energy Plan, which places particular emphasis on renewable fuels and increased energy efficiency. The plan is largely to be carried out through support for public transit, transportation demand management, intelligent transportation systems (ITS), and capital construction, with the goal of reducing GHG emissions. The plan provides fifteen policy recommendations to attain these goals.

As one of the policy recommendations, the State Energy Plan lays out a statewide goal of reducing GHG emissions to 5 percent below 1990 levels by 2010, and 10 percent below 1990 levels by 2020. Within this effort, the plan calls for analyzing energy consumption of the transportation system as a part of the transportation planning process. The plan also identified strategies that can be included in transportation plans and Transportation Improvement Programs (TIP) to reduce emissions, such as improved ITS, bicycle and pedestrian programs, transportation demand management, and improved public transit. The plan requires analysis of the transportation system's energy consumption and air emissions, specifically including GHG emissions, when long-range plans and TIPs are adopted. Analysis can performed on a build versus no build basis.

[33] The presentation is based on a complete case study presented in this consolidated report.

NYSDOT carried out this statewide directive by becoming the first (and only) State requiring MPOs to conduct GHG and energy analysis on their transportation plans, according to the author. Based on an interview conducted for the case study, the State encountered a number of difficulties getting MPOs to fulfill this directive. To succeed at a similar policy, another State could consider the following issues encountered in New York when developing its own policy.

- MPOs do not view the Energy Plan requirements as mandatory.
- Confusion about MPOs role in energy consumption assessment given their perceived inability to affect emissions reductions.
- MPOs expressed doubt as to whether analyses will be considered in the decision-making process.
- Increased workload, particularly burdensome for small MPOs

During the presentation Mr. Gaber highlighted GHG and energy analysis conducted by three MPOs of different sizes:

- New York Metropolitan Transportation Council (NYMTC) based in New York City metropolitan area;
- The Capital District Transportation Council (CDTC) based in the Albany metropolitan area;
- The Ithaca-Tompkins County Transportation Council (ITCTC) based in the Ithaca metropolitan area.

All three MPOs exhibited a similar pattern. Each organization's analyses indicate that implementation of its long-range transportation plan would result in fewer GHG emissions than if the projects envisioned in the plans were not realized, meeting the build versus no-build goal; yet, all three projected GHG emissions from the transportation sector continuing to increase over current levels, failing to achieve the Energy Plan reduction goals.

Based on interviews with New York MPOs, a consultant's study found that MPOs do not see these GHG and energy assessments as significantly influencing the decision-making process. In fact, NYMTC conducted its analysis after the long-range plan was released, and therefore could not integrate the analysis into the decision-making process of selecting the projects to be included in the plan.

Because, $CO_2$ emissions are generally emitted in a manner directly proportional to fuel consumption, the calculation of GHG emissions from the implementation of transportation plans requires calculating the forecasted fuel consumption by the vehicles on roadways contained in the plan. This requires a model that can be adjusted based on fuel type and vehicle mix. Regional GHG emissions projections cannot assist transportation decision-makers in project-level selection; project-level emissions data, even if less reliable, are needed for this level of selection. Current commercial off-the-shelf models that are available for quantifying GHG emissions from transportation projects are limited, and the EPA is addressing this need by developing its Motor Vehicle Emission Simulator (MOVES) model, which will be more sensitive to vehicle mix and fuel type factors.

## Key Points

- Energy Plan requirements can serve as a model for gaining reductions through transportation planning process. Requirements for analysis of GHG emissions are an instrumental step in bringing climate change considerations into transportation planning process by providing GHG information to inform the decision-making process.
- Project-level emissions data is a current challenge but will important if emissions are to be considered as part of project selection.
- To succeed at enacting a similar policy, issues such as measures for noncompliance, the role of the energy consumption and $CO_2$ analyses in the decision-making process, and the increased burden, especially on small MPOs, should be addressed when creating policy frameworks.

## SUMMARY 2: PUGET SOUND REGIONAL COUNCIL

**Presenter: Kelly McGourty**
http://www.psrc.org/

See AMPO presentation by PSRC and PRSC case study.

## SUMMARY 3: NEW ENGLAND GOVERNORS & EASTERN CANADIAN PREMIERS CONFERENCE

**Presenter: Gregory Nadeau, Deputy Commissioner for Policy, Planning, and Communications, MaineDOT**
http://www.negc.org/premiers.html.
http://www.maine.gov/mdot/index.php

The Conference of New England Governors and Eastern Canadian Premiers (NEG/ECP) is comprised of the leadership of six U.S. states and five Canadian provinces. At their annual conferences, the NEG/ECP discusses issues of common interest and concern, and enacts policy resolutions that call for actions by the State and provincial governments, as well as by the two national governments. During the year, the Conference convenes meetings of State and provincial officials, organizes roundtables and workshops, and prepares reports and studies of important regional issues.

The NEG/ECP has a history of collaboration on regional issues, with a focus on issues that do not recognize borders, particularly environmental issues. Over the past two years, energy and GHG emissions have become a particular focus. In June 2007, at the 31st annual Conference, held in Prince Edwards Island, Canada, members received reports of two previous events, a Ministerial Forum on Energy and Environment as well as a preparatory forum on Transportation Solutions to Climate change. At the conference, the governors and premiers adopted the recommendations of the Ministerial Forum, which included the creation of a standing Committee on Transportation and Air Quality charged with the implementation of specific actions included in the forum recommendations.

The Committee is made up of transportation and environment officials from the eleven jurisdictions, and is responsible for reducing air emissions and setting regional goals for GHG reductions from the transportation sector. It is also tasked with the development of a Regional Transportation Action Plan and a report for the 2008 NEG/ECP conference. Action steps include:

1) Development of environmentally friendly biofuels-- Policy options such as the California proposed Low Carbon Fuel Standard, which sets a 10 percent GHG reduction target for fuel producers by 2020.
2) Promotion of fuel efficiency in all modes of transportation -- investigating ways such as “feebates” to provide incentives to the public to purchase more fuel efficient vehicles, and utilizing fuel efficient and GHG friendly vehicles in public transportation fleets.
3) Expansion of alternative transportation and commuter services -- exploring regional transit system opportunities, and addressing funding issues and opportunities
4) Alignment of infrastructure funding with energy and climate goals by encouraging energy-efficient development in municipalities and regional entities -- developing and promoting programs that prioritize funds for jurisdictions that employ “smart growth” strategies, and providing incentives for transit-oriented development
5) Use of life-cycle GHG and $CO_2$ emission analyses to set indicators for policy and project planning, and when appropriate, determining whether or not transportation measures have

adequate lifecycle analyses associated with them, and researching consistent sources, if necessary.

6) Collaboration with the private sector to seek new opportunities to enhance regional interconnectivity and efficiency of regional freight networks—engaging the private sector jointly assess opportunities to assess improvements in freight movement efficiency, which is also an opportunity to reduce GHG emissions and improve regional competitiveness.
7) Adopt clean car programs including $CO_2$ and air quality standards such as California standards to NH and Eastern Canadian provinces.

## Key Points

- The NEGC/ECP presents a very valuable example of regional approach to setting policies on reducing greenhouse gas emissions through transportation decisions. NEGC/ECP is particularly noteworthy because it is not only multistate, but also bi-national.
- Regional policies, including a shared commitment to reach regional GHG emission targets, with endorsement of top political leadership, set a helpful voluntary direction for the participating states. The states are then provided with flexibility to develop their own GHG plans and programs to meet the shared commitments.
- The NEGC/ECP approach fosters joint planning and programs on regional transportation concerns, such as more efficient freight networks, with implications for GHG emissions.
- The implementation of the NEGC/ECP programs in the individual states and provinces will provide a range of useful approaches to accomplishing reductions both within their jurisdictions and across the region.

## SUMMARY 4: GULF COAST

### Impacts of Climate Change for Transportation Planning and Investment

**Presenter: John Suhrbier, Cambridge Systematics, Inc.**
http://climate.dot.gov/areas.html#gulf

The U.S. DOT and the U.S. Geological Survey are collaborating to investigate the potential impacts of climate change and variability on transportation systems and infrastructure along the Gulf Coast extending from Mobile, Alabama to Galveston, Texas. While integration of climate change considerations into the planning process normally manifests itself as efforts to reduce GHG emissions, Mr. Suhrbier discussed the importance of studying and adapting to the transportation impacts. As the effects of climate change increase over-time infrastructure will have to evolve to handle new conditions. Future effects should be addressed in current planning efforts, as transportation infrastructure is a long-term investment. Unfortunately, the impact on transportation systems is an underdeveloped area of research, and the effects will vary based on the transportation assets and vulnerabilities of each geographic region.

Evaluating and adapting to these effects can and should be done within the framework of the existing transportation planning process, during which transportation investment decisions are made. Climate change considerations must enter into the equation if they are to be reflected in these decisions. To determine how MPOs and State DOTs are addressing climate change and how it might be addressed in the future, the approach was:

1) Reviewing existing organizational vision and mission statements, long-range transportation plans, and transportation improvement programs (TIP).
2) Interviewing four State DOTs, and six MPOs of varied size, within the study area.
3) Reviewing other relevant documents such as those related to recovery planning and reconstruction following Hurricane Katrina.

**Figure 1**

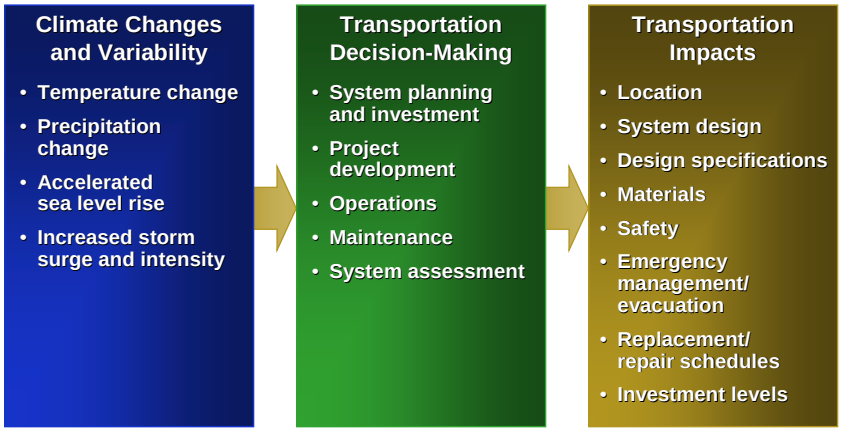


Figure 1 follows the flow from direct climate effects resulting from increased temperatures and climate variability, to transportation decision-making, to transportation impacts. The USGS analysis determined that in the Gulf Coast region the average annual temperature of the study

area is estimated to increase between two and eight degrees Fahrenheit, and extreme precipitation events, particularly severe thunderstorms may become more likely. These and other changes would affect all aspects (maintenance, operations, and construction) and modes of transportation in the region. Within the region, 72 port facilities, three airports, and 50 percent of the pipeline network are vulnerable to a relative sea level rise of four feet.

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) contains new environmental considerations for transportation planning. Section 6001 defines eight planning factors that should guide the planning process and the development of projects, strategies, and services. While climate change is not explicitly included, six of the eight factors reflect considerations that are directly related to climate change, which include: system preservation; protecting, enhancing, and mitigating impacts on the environment; system management and operation; access and mobility; safety; and economic vitality. The legislation also contains provisions that transportation plans should discuss potential environmental mitigation activities; include consultation with agencies responsible for land use management, natural resources, environmental protection, and conservation; and consider resource agency databases (where applicable).

Interviews conducted with MPOs and State DOTs in the region revealed one barrier to effective action: many transportation planning officials lack a detailed understanding of climate change and variability issues. Several interviewees expressed hesitation due to current uncertainty, and some do not see it as a priority concern given shortages in available funding. Mid-sized and smaller MPOs are also limited by a small staff.

One critical aspect of planning is the time-horizon -- how and when should DOTs and MPOs start to respond, and what are the costs of deferring a response? On the planning side, long-range transportation plans span a 20 to 30 year period, while Statewide Transportation Improvement Plans (STIPs), and TIPs last four years. Many structures last 50 to 100 years and, in addition, climate change impacts could be abrupt.

Mr. Suhrbier concluded his presentation with suggestions for planners and decision makers consistent with these new trends in the planning process. These suggestions include:

- Consider climate change in the visioning process – extend beyond 20 years.
- Add climate change to the development and analysis of future scenarios.
- Include climate scientists in the consultation process.
- Consider climate change impacts in the evaluation of alternative improvements -- strengthening or moving facilities, providing connectivity for evacuation and emergency response.
- Consider contingency planning for the possibility of climate change impacts.

## Key Points

- Additional research should be undertaken to study the impact of climate change on transportation systems, particularly at a regional level, since the transportation assets and vulnerabilities of each region vary.

- Full consideration of climate change impacts is limited by the traditional timeframe of transportation planning. The time-period of traditional MPO transportation planning activities such as the 20- to 30-year long range transportation plan does not extend as far as the 50- to 100-year period of projected climate change impacts.
- Transportation planners should monitor changes in land use patterns resulting from climate change within a region on both a sub-area and regional basis, and incorporate these changes into the long-range transportation and investment process.
- Climate-related changes can be introduced into the long-range transportation planning and investment process at a number of steps, under considerations such as environmental quality, economic development, mobility, and safety.
- Collaboration will become increasingly important for transportation agencies to address and respond to climate change issues. This may include consultation with climate scientists and agencies responsible for land use management and natural resources.

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# 6. Transportation Planning and Climate Change Session; Annual Conference of the Association of Metropolitan Planning Organizations

## Summary of Peer Exchange

Little Rock, Arkansas

October 3, 2007

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## INTRODUCTION

The Transportation Planning and Climate Change session at the annual Association of Metropolitan Planning Organizations (AMPO) conference was organized by two members of the CCCEF core team, Diane Turchetta (FHWA) and William M. Lyons (USDOT/Volpe Center). The session was designed to assist the CCCEF with its research on innovative efforts to consider climate change within statewide and metropolitan area planning processes. The sessions focused on recent activities by Metropolitan Planning Organizations (MPOs) in the Seattle, Washington, D.C., and Boston metropolitan areas.

Mr. Lyons presented an overview of the CCCEF project and then he and Ms. Turchetta facilitated a panel with presentations by representatives of the Puget Sound Regional Council (PSRC, the Seattle-area MPO); the National Capital Region Transportation Planning Board (TPB) at the Washington, D.C.-area MPO, and the Boston Region MPO. Panelists also participated in a discussion with the audience, which provided additional insights for the CCCEF research.

The panelists represented organizations at different stages of incorporating climate change considerations into metropolitan area transportation planning activities. All are involved in innovative activities related to incorporation of climate change considerations within their planning processes. Panelists participated in a facilitated discussion with the audience of MPO directors and planners, which provided additional insights for the CCCEF research.

This report summarizes the presentations as part of a consolidated report on climate change and transportation planning that will be provided as a resource on best practices for a national audience of interested peers.

This summary provides key points from the presentation, which are presented in Appendix B, and concludes with key points.

## SUMMARY 1: METROPOLITAN WASHINGTON COUNCIL OF GOVERNMENTS

**Presenter: Ronald Kirby, Director of Transportation Planning**
http://mwcog.org

"COG is a regional organization of Washington area local governments. COG is composed of 21 local governments, plus area members of the Maryland and Virginia legislatures, the U.S. Senate, and the U.S. House of Representatives."

- COG provides a focus for action and develops sound regional responses to such issues as the environment, population growth, public safety, and transportation.
- Membership Population: 4,272,392 (from 2000 Census)
- Land Area: 3,020 square miles
- The Metropolitan Washington area emitted 65.6 million metric tons of $CO_2$ in 2005: approximately one-third of those emissions were produced by the transportation sector.

In November 2008, The Metropolitan Washington Council of Governments (MWCOG) Board of Directors "voluntarily adopted stringent goals for reducing the region's greenhouse gas emissions. COG's decision, one of the few in the country to affect a multi-state region, proposes to return to 2005 levels of regional greenhouse gas emissions by 2012. The mid-range goal is for a reduction of 20 percent below the 2005 levels by 2020, and the long-term goal is for a reduction of 80 percent below the 2005 levels by 2050."[34] The MWCOG approved the *National Capital Region Climate Report*, which includes significant greenhouse gas reduction goals for the region and 78 recommendations to help area leaders and citizens meet the targets, including working with the TPB to explore options to reduce vehicle miles travelled, including financial incentives such as pay-as-you-travel insurance and congestion pricing, shifting short trips to transit on nonmotorized travel, transit-oriented development and concentration of future growth in regional activity centers.[35]

MWCOG has established climate change as a leading priority for the organization and appointed a Climate Change Steering Committee to guide climate change planning efforts. MWCOG emphasized that inclusion of climate change is not a change in direction, and that emissions reduction strategies support other ongoing work: climate change can be readily integrated into other planning activities including visioning and travel demand management.

MWCOG believes it is important for climate change actions to be based on an understanding of the problem, particularly at regional and local levels. To this end, the MPO staff prepared initial forecasts of recent and projected changes in $CO_2$ emissions from mobile emissions sources (Table 1). Experience with similar forecasting techniques for population, land use, and air quality emissions using EPA's Mobile 6.2 emissions model enabled the MPO staff to apply much of the technical work previously completed for ongoing transportation planning and air quality conformity.

[34] MWCOG Press Release, November 12, 2008. http://www.mwcog.org/news/press/detail.asp?NEWS_ID=332
[35] National Capital Region Climate Change Report, November 12, 2008. http://www.mwcog.org/uploads/pub-documents/zldXXg20081203113034.pdf

**Table 1: 2002-2030 Changes in Households, Employment, VMT, NOx, VOC, and $CO_2$ for the 8-hour Ozone Non-Attainment Area**

| | 2002 | 2030 | % Change |
|---|---|---|---|
| Households | 1,742,117 | 2,463,893 | 41% |
| Employment | 2,893,646 | 4,162,621 | 44% |
| Annual VMT (000,000's) | 39,212 | 53,726 | 37% |
| NOx (tons/day) | 259.232 | 34.899 | -87% |
| VOC (tons/day) | 101.117 | 39.41 | -61% |
| CO2 (tons/year) | 23,273,168 | 34,450,922 | 48% |

While VOC and NOx emissions are declining significantly regionally -- largely due to cleaner vehicles and fuels -- $CO_2$ mobile source emissions are projected to grow steadily, based on forecasted growth in vehicle miles traveled, with a predicted 48 percent increase in mobile $CO_2$ emissions in 2030.

To gain a better empirical understanding of the effects of specific emissions reduction strategies or policies, the MPO staff quantified the impact of California Low Emission Vehicles II (CAL LEV II), California's more stringent vehicle emissions standards, and the National Highway Traffic Safety Administration's (NHTSA) Corporate Average Fuel Economy Standards (CAFE) -- hypothetically increased to a more stringent 35 miles per gallon by 2020 -- against the 48 percent baseline increase. Under CAL LEV II emission growth would be limited to 22 percent; under more stringent CAFE standards, emission growth would be limited to 16 percent.

In contrast, additional $CO_2$ reductions achievable through reductions in vehicle miles of travel (VMT) by travel demand reduction and land use and transportation strategies, as included in scenarios examined in recent MPO planning studies, were (conservatively) estimated at only one to two percent.

Mr. Kirby emphasized the importance of a two part approach -- reducing emissions per vehicle mile and reducing vehicle miles of travel. Both strategies need to be promoted at the national, state, and local levels.

## Key Points

- When possible, incorporate climate change considerations into existing models and tools to build an ongoing ability to evaluate strategies. Identify opportunities to build on and apply ongoing technical work related to land use, transportation, and air quality analysis.
- Travel forecasts for the Washington metropolitan area indicated that land use and transportation strategies currently under consideration could reduce CO2 emissions growth by only one to two percent. To achieve further CO2 reductions, efforts to reduce VMT need to be combined with actions to reduce CO2 emissions per vehicle mile.
- Policy advocacy by individual MPOs and AMPO policy should highlight the difference between reductions that can reasonably be achieved by MPOs and their partner

authorities, compared to the potentially more significant GHG reductions of national policies such as CAFE.

## SUMMARY 2: PUGET SOUND REGIONAL COUNCIL[36]

**Presenter: Charlie Howard, Transportation Planning Director**
http://www.psrc.org/

The Puget Sound Regional Council is an association of cities, towns, counties, ports, and State agencies and is governed by a General Assembly and Executive Board. Executive Board members are appointed by their General Assembly constituents to represent the member governments. The full Regional Council General Assembly includes all council and commission members from member jurisdictions.

- 6,290 square mile region encompasses four counties—King, Kitsap, Pierce, and Snohomish—and includes approximately 55% of the state's population, or approximately 3,582,900 people
- Region contains 82 cities and towns. Major cities include Seattle, Tacoma, Bellevue, Everett, and Bremerton

Nationally, transportation accounts for approximately one-third of GHG emissions; however, this figure rises to approximately 45 percent in Washington State, largely due to less reliance on coal-fired power plants. Addressing transportation-related sources of GHG is therefore particularly important in the region. Mr. Howard emphasized the importance of stakeholder and public participation throughout the process of incorporating climate change into PSRC work. Stakeholders involved on boards, committees, and technical working groups include state, regional and local government agencies as well as business, tribal, and environmental organizations, and citizens. When addressing climate change, PSRC is in a relatively unique position of working in an environment particularly supportive of climate change efforts with strong state, regional, county, and city policies and programs that support actions related to climate change planning and decisions, including:

- State and county legislation establishing statewide GHG emissions reduction goals.
- Washington Clean Car Standards: adoption of California emissions standards beginning with 2009 model year.
- Seattle's Climate Action Plan pledges $37 million over the next two years for climate protection actions, with GHG reduction targets.
- King County Action Plan: goal to reduce emissions by 80% below current levels by 2050.

Building on this solid foundation, PSRC has Board direction to address climate change in its planning activities, and is incorporating climate change considerations throughout its planning process. VISION 2040, the update of the MPO's VISION 2020, the region's coordinated long-range regional growth, transportation, and economic strategy, includes an expanded environmental section that addresses climate change, a $CO_2$ analysis in the environmental impact statement (EIS) and growth alternatives as well as policies for reducing emissions (reduced energy consumption, increased conservation and alternative energy sources) and a regional

[36] This consolidated report includes a separate case study on PSRC.

action plan to investigate ways to reduce greenhouse gas emissions and prepare for climate change impacts.

The Policy Board directed that climate change be incorporated into the upcoming update of Destination 2030 -- the MPO's 30-year long-range metropolitan transportation plan. The Board also directed that a climate change technical working group be established, and that GHG analysis be performed for the EIS/strategy alternatives.

PSRC has not yet focused on impacts of global warming on the region, but intend to do so once the policy basis is established. During the presentation, Mr. Howard identified the importance of potential tradeoff analyses in the planning process between climate change and the MPO's other goals and policies.

Mr. Howard also discussed the technical issues related to incorporating climate change considerations in the planning process. The current transportation model, based on MOBILE 6.2, yields simplistic analyses based only on VMT. For future analyses, PSRC hopes to have the ability to analyze for speed variations, changes in vehicle/fuel mix, corridor/sub-area analyses, and an analysis of transportation and land use strategies. As a step in this direction, PSRC and its regional partners are working with the EPA to utilize features of their new MOVES model that are currently unavailable.

### Key Points

- A supportive political and policy environment with strong regional and local initiatives and Board direction facilitates incorporation of climate change issues into the planning process.
- Collaboration with air quality consultation partners and member agencies is fundamental to beginning to address the technical requirements of incorporating climate change into models.
- It is very helpful to first complete a land use/transportation vision, with a climate change component, before reflecting climate change considerations in the regional long range transportation plan.
- When incorporating climate change considerations into the planning process, there will be inevitable tradeoffs between GHG reductions and other outcomes related to additional goals pursued by MPOs. The planning process must be able to conduct this type of analysis.

## SUMMARY 3: BOSTON REGION MPO[37]

**Presenter: Anne McGahan, Chief Planner**
http://www.bostonmpo.org/bostonmpo/index.htm

The Boston Region MPO Board is composed of representatives from seven agencies, seven municipalities, and a public advisory committee that collectively carry out the Federally mandated transportation planning process for the region. The MPO's unified work program is carried out by the Central Transportation Planning Staff (CTPS) which is composed of professional transportation planners and support staff

- 1,400 square mile region is composed of 101 municipalities including and surrounding the City of Boston
- Regional population estimated at nearly 3 million

In Massachusetts, transportation sources are responsible for more carbon dioxide emissions than any other source. Climate change will likely have significant impacts on the climate and weather patterns in Boston, as well as on the regional infrastructure and economy. To address this, the Boston Region MPO recently began exploring issues pertaining to climate change and GHG emissions reduction. Like the Puget Sound Regional Council, the Boston MPO is working in an environment of a high level of State and local support for GHG initiatives including a City of Boston executive order, which sets an emissions reduction goal of reducing annual GHG emissions seven percent below 1990 levels by 2021 as well as the Massachusetts Climate Protection Plan, which lays out a number of policies, programs, and goals for reducing GHG emissions in the Commonwealth of Massachusetts. Massachusetts is also a member of the multi-state Regional Greenhouse Gas Initiative and participates in the New England Governors/ Eastern Canadian Premiers Climate Change Action Plan (see TRB peer exchange summary and case study).

The Boston Region MPO's voting membership includes local operating authorities, which is not typically the case with other MPOs. One of these members is the Massachusetts Bay Transportation Authority, (MBTA), which provides regional public transportation service. The MBTA's 2003 long-range capital planning document, the Program for Mass Transportation (PMT) contains information for each project's projected percentage reduction in $CO_2$ emissions on weekdays region wide as well as the ratio between the capital cost of the project and the anticipated reduction in GHG emissions on weekdays region wide. The 2008 PMT will consider how the MBTA's emissions reduction goals fit into State and other $CO_2$ emissions reduction goals.

In summer 2007, MPO staff prepared a White Paper to develop a policy context for climate change and its local impacts, provide a summary of existing programs and projects that result in GHG emissions reductions, and lay out "next steps" for future emissions reductions. Citing work from the Union of Concerned Scientists, the paper provides a strong focus on regional impacts of climate change under high and low emissions scenarios, which serves to attract attention of decision-makers and stakeholders to the issue. Both high and low emissions

scenarios forecast significant impacts on air quality, sea level rise and flooding, and extreme temperatures. For example, under the lower-emissions scenario, sea level is expected to rise from four to 21 inches, and under the higher-emissions scenario, this figure increases to 33 inches. In turn, these impacts will likely affect the transportation system through extreme climate events such as significant flooding, which can inflict significant economic costs due to infrastructure damage and interruptions in the operation of transportation systems.

Currently, the MPO and its partners reduce GHG emissions by:

1) Funding projects that provide transportation options other than single occupancy vehicles (SOV) such as transit, bicycling, walking, and carpooling.
2) Funding projects that improve air quality and reduce VMT and roadway congestion, such as upgrading weight-restricted bridges to minimize detours of truck traffic.
3) Funding the use of alternative fuels.

Because transportation is a significant source of $CO_2$ emissions in Massachusetts, the Boston MPO and its partners believe it is important to continue and expand current initiatives that reduce $CO_2$ emissions while also taking additional actions that are within the purview of the MPO and partner organizations and agencies. The white paper discusses considerations and trade-offs that must be faced for $CO_2$ reduction activities to have a significant effect. Due to resource constraints, a shift in investments towards alternative modes such as transit may reduce highway project funding, and therefore result in reduced motorist mobility.

The white paper identifies three goals necessary for reducing the transportation sector's $CO_2$ emissions. To address these goals, MPO staff developed a list of short-, mid-, and long-term actions that the MPO could take, either on its own or with partners. The following framework (Table 2) provides examples of the numerous actions presented in the white paper, categorized by regional goals.

**Table 2**

| Goal | Possible MPO Actions or Interest/Partnership Opportunities |
|---|---|
| **A More Efficient Transportation System** | *Short-term* - Model $CO_2$ emissions with the region's transportation model<br>*Short-term* - Enhance transportation planning and decision-making criteria by adding $CO_2$ emissions as criteria in transportation decisions<br>*Mid- to long-term* - Favor transit investments near commercial or residential development |
| **More fuel-efficient and cleaner vehicles** | *Short- to long-term* - Continue to fund transit vehicle retrofits purchases of cleaner motor vehicles and train engines in public transit fleets<br>*Short- to long-term* - Upgrade bridges to lift weight restrictions for freight and accelerate the double stacked bridge program |
| **Investments that support land uses that reduce VMT** | *Short- to long-term* - Support the sustainable redevelopment of urban areas that enables residents to live near their work or live near transit<br>*Short- to long-term* - Continue to support compact development and discourage sprawl |

## Summary

- Both high and low emissions scenarios project significant impacts on air quality, sea level rise and flooding, and extreme temperatures. MPOs should consider the effects of these impacts throughout the planning process. Highlighting these impacts serves to attract attention of decision-makers and other stakeholders.
- Incorporation of climate change into the planning process should not be limited to traditional MPO long range and land use plans. Transportation operating authorities, including public transit, should consider their own potential GHG reductions and determine how they fit into the larger regional and State GHG reduction efforts.
- It is important to continue and expand current initiatives that reduce $CO_2$ emissions while also taking additional actions that are within the purview of the MPO and its partner organizations and agencies.

## OBSERVATIONS AND HIGHLIGHTS OF DISCUSSION

The following summary presents key points from the presentations and following discussion with the panelists and audience of MPO staff managers and planners, and others.

### Need for Realism

- MPOs (Boards, staff, partners, and the public) must be realistic about their ability to reduce GHG emissions significantly through the transportation and land use policies and actions that they typically can influence directly or indirectly. For example, the MPO in the Washington metropolitan area projected that at most it could reduce travel demand and GHG emissions by one to two percent across the range of transportation and land use scenarios under consideration in its current long range planning.
- Although other MPOs are able to project more optimistic estimates of GHG reductions from MPO planning and programming, the scale has been limited.
- The scale of GHG reductions from MPO initiated actions is relatively small relative to the much larger reductions available from Federal or State policies related to energy and vehicle technology and alternatives.
- There is a great deal of difference in climate change issues in areas nationwide. In contrast to the areas represented by panelists, some members of the audience observed that there has been little interest in climate change in their areas.
- As MPOs begin to examine the potential emissions reduction through regional planning and actions, initial limitations should not result in pessimism and inaction.
- Rigorous assessment of the potential reductions identified by leading MPOs, represented on the panel, is critical to inform the policy debate about transportation and GHG reductions.
- Discussants made a strong case for MPOs individually and together to confront the dual challenges of energy and GHG reductions aggressively.
  - "This is not business as usual – it's the challenge of our generation."
  - "Change is coming and we need to be ready."

### Importance of Policy Advocacy

- It is critical for MPOs to engage actively in realistic policy debate about what they can do through metropolitan area wide planning, but also more broadly – nationally and at the statewide level – and locally, with city and modal authority partners.
- Panelists and the audience emphasized the need for MPOs, both individually and through AMPO, to encourage decision-makers to change current policies. For example, policies such as CAFE and CAL LEV II standards reduce emissions by significantly more than MPOs can by their planning and direct and indirect actions alone. Nationwide, the transportation sector should look to these sources first, before turning to regional transportation planning and actions for reductions. Responding to this view,
  - The MPO in the Washington metropolitan area wrote to Congress regarding the benefits of CAFE legislation in reducing CO2 emissions.
  - PSR, adopts a legislative agenda, and recommended that other MPOs should also work with State legislatures on similar measures.

**Think Long Term**

- MPOs should set long term planning horizons in examining how transportation and land use policies and actions might reduce GHG emissions. This can be over the 20-25 year horizon of long range plans, but also over longer periods, 30, 40, or even 50 years considered in regional vision plans.
- MPOs should employ "back-casting" techniques, to examine aggressive GHG reduction targets and work backwards to identify the potential policies, investments, and strategies that would be required to meet those targets.
- As part of the planning process, MPOs should play a role educating decision-makers and the public about realistic options to meet aggressive goals.

**GHG Emissions Reductions Should Complement Other Regional Goals**

- GHG reduction activities are best pursued in combination with other regional goals, particularly air quality improvement, but also energy conservation, smart growth, congestion relief, and public health.
- Actions to reduce GHG emissions can also support transportation demand management and land use strategies.

**Important Technical Role for MPOs**

- MPOs that are already modeling automobile emissions (NOX and VOC) will be in a strong technical position for developing models that analyze $CO_2$ emissions.
- To overcome limits of current models, PSRC and its regional partners are working with FHWA and EPA to determine what can be done to utilize features of the new MOVES model, and also to improve the linkage between emissions and travel demand models. Progress will be useful for peer MPOs and other organizations hoping to perform similar analyses.

**Impacts/Adaptation versus Mitigation/Reductions**

- To date, MPOs actively considering climate change appear to be focusing either on adaptation of transportation facilities to global climate change and extreme weather, or to identifying investments and strategies to reduce GHG emissions. As MPOs gain experience with climate change issues, it is likely that increasing numbers will be interested in pursuing both adaptation and reductions. A future challenge will be to balance pursuit of emissions reductions and preparation for impacts alongside other planning priorities.

**Anticipation of Possible Future Regulation**

- MPOs should be prepared for the possibility that future Federal administrations may take regulatory actions to require GHG reductions, particularly after the Supreme Court ruling that the EPA can now regulate $CO_2$ emissions.
- Currently, CO, NOX, VOC are included as criteria pollutants in air quality analysis; some MPOs are exploring how they might conduct the technical analysis to add $CO_2$ to this list. The Boston MPO staff recently recommended this to its Board.

**Other Related Issues**

- Interest in information on the relationship between zoning and climate change impacts.
- National experiences of MPOs and partners integrating climate change into EIS process.
- MPOs use of information on GHG impacts of idling ships.