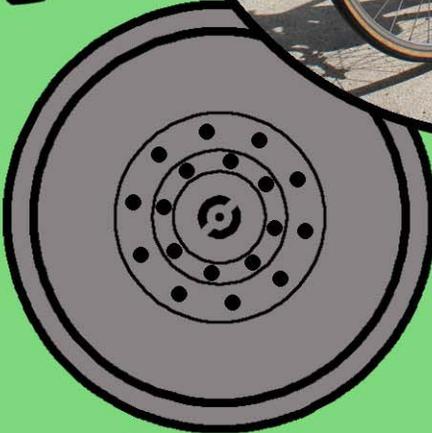
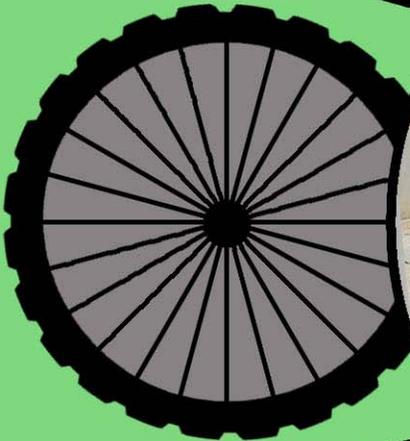
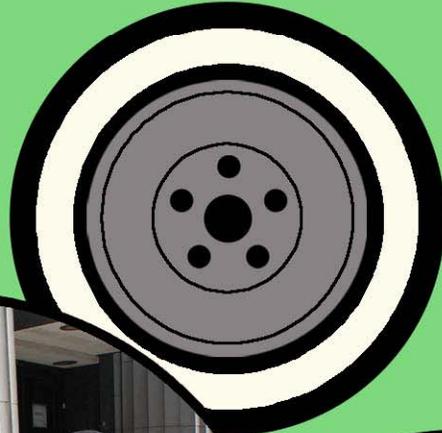


# REGIONAL ENVIRONMENTAL OVERVIEW

IV



## **IV. REGIONAL ENVIRONMENTAL OVERVIEW**

### **A. ENERGY**

#### **A.1 Resources and Consumption**

Massachusetts is one of the most densely populated states in the nation. However, per capita energy consumption is low, and the Massachusetts economy is one of the least energy-intensive in the nation. The transportation and residential sectors lead state energy consumption. Massachusetts has no fossil fuel reserves but does possess substantial renewable energy resources. The state's Atlantic coast in the east and the Berkshire Mountains in the west offer considerable wind power potential, as do some other locations in the Central area. Much of the State is covered in dense forest, offering potential fuel wood resources.

#### **A.2 Petroleum**

Petroleum products are shipped into Massachusetts by barge, primarily to the Boston Harbor. In addition, two small-capacity product pipelines run from ports in Connecticut and Rhode Island to Springfield. Massachusetts is one of a handful of States that require the statewide use of reformulated motor gasoline blended with ethanol. Along with much of the U.S. northeast, the state is vulnerable to distillate fuel oil shortages and price spikes during winter months due to high demand for home heating. Nearly two-fifths of Massachusetts households use fuel oil as their primary energy source for home heating. In January and February 2000, distillate fuel oil prices in the Northeast rose sharply when extreme winter weather increased demand unexpectedly and hindered the delivery of new supply, as frozen rivers and high winds slowed the docking and unloading of barges and tankers. In July 2000, in order to reduce the risk of future shortages, the President directed the U.S. Department of Energy to establish the Northeast Heating Oil Reserve. The Reserve gives Northeast consumers adequate supplies for about 10 days, the time required for ships to carry heating oil from the Gulf of Mexico to New York Harbor. The Reserve's storage terminals are located in Perth Amboy, New Jersey, and Groton and New Haven, Connecticut.

#### **A.3 Natural Gas**

Electric power generators and the residential sector are the leading consumers of natural gas in Massachusetts. More than two-fifths of Massachusetts households use natural gas as their primary energy source for home heating. The state's natural gas is supplied by pipeline from production areas in the U.S. Gulf Coast and Canada, from natural gas storage sites in the Appalachian Basin region, which includes parts of New York, Pennsylvania, and Ohio, and from other international sources, including Trinidad. The gas is supplied by pipelines entering the State from New York, Rhode Island, and New Hampshire. Like other New England states, Massachusetts has no natural gas storage sites and must rely on the Appalachian Basin storage capacity to supply peak demand in winter. Massachusetts also imports some of its natural gas from overseas via liquefied natural gas (LNG) import terminals near Boston. The onshore Everett facility and two offshore facilities are 3 of 10 existing LNG import terminals in the United States.

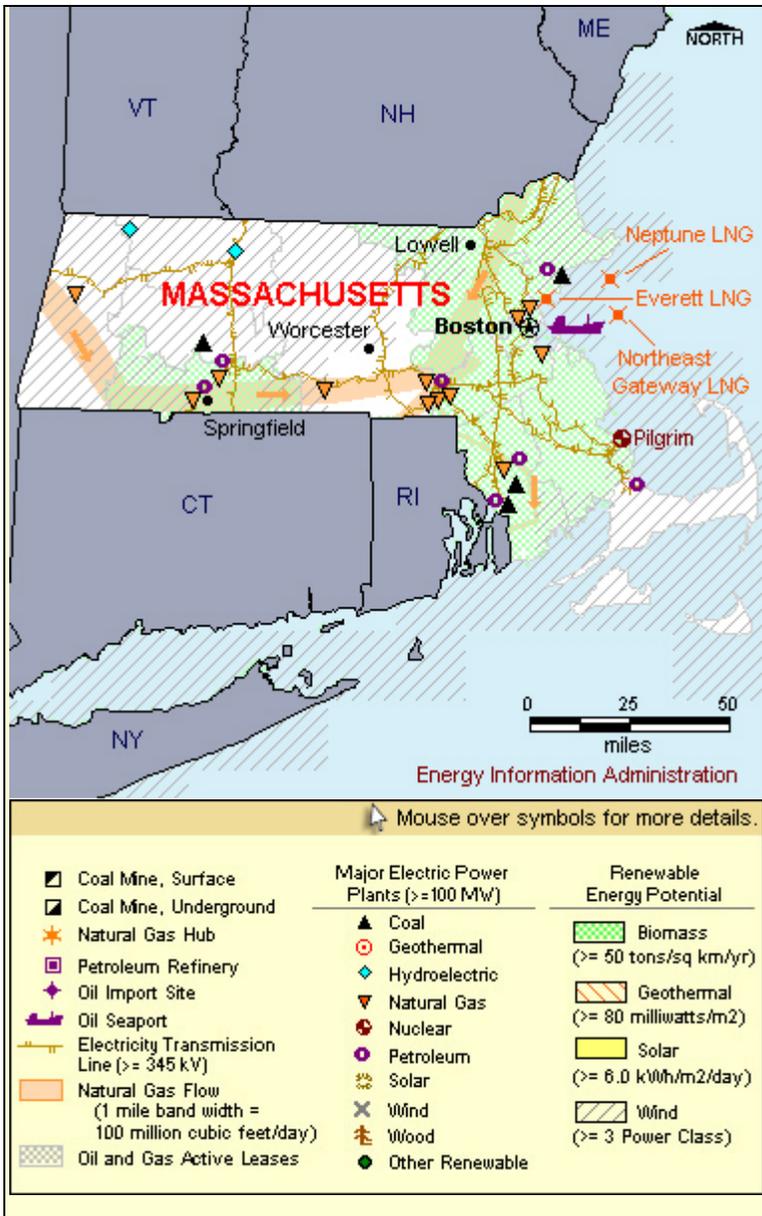
#### **A.4 Coal, Electricity, and Renewables**

Before the mid-1990s, petroleum-fired power plants led electricity production in Massachusetts. However, this source has declined steadily since 1991, as State power producers have reduced use of petroleum in favor of cleaner-burning natural gas. As in other New England states, this switch has been driven by the benefits of the lower emission levels of natural gas compared with other fossil fuels and the ease of siting new natural gas-fired power plants. Today, natural gas-fired power plants are the state's leading power producers, accounting for over half of net generation. Coal, transported largely from Colorado and West Virginia, is the State's second leading generation fuel, typically accounting for about one-fourth of net electricity production. The Pilgrim nuclear power plant located in Plymouth on Cape Cod Bay also contributes to the Massachusetts grid.

Residential electricity use is lower in Massachusetts than the national average, in part because demand for air-conditioning is minimal during the mild summer months, and because few households use electricity as their primary energy source for home heating.

Although renewable energy makes only a small contribution to net electricity generation, Massachusetts has several hydroelectric facilities and is one of the Nation's major producers of electricity from landfill gas and municipal solid waste. In July 2008, Massachusetts adopted a renewable portfolio standard requiring renewable energy to account for 15 percent of total electricity generation by 2020 and 25 percent by 2030. Regulations covering the leasing, siting, permitting, and building of wind turbines and other renewable energy sources in Federal waters could allow a proposed 420-megawatt wind power project, to be built in Nantucket Sound, to become the nation's first offshore wind farm. However, the high-profile project faces significant opposition from area landowners. In May 2009, the U.S. Department of Energy awarded Massachusetts \$25 million in funding to accelerate development of the State's Wind Technology Testing Center that will test commercial-sized wind turbine blades to help reduce cost, improve technical advancements, and speed deployment of the next generation of wind turbine blades into the marketplace. This center will be the first commercial large-blade test facility in the United States able to test blades longer than 50 meters.

The state has also put into place the Green Communities Act, a comprehensive reform of the state's energy marketplace. It promotes a dramatic expansion in energy efficiency, supports the development of renewable energy resources, creates a new greener state building code, removes barriers to renewable energy installations, stimulates technology innovation, and helps consumers reduce electric bills. It also created the Green Communities Program, providing all cities and towns with energy efficiency and renewable energy opportunities.



### Massachusetts Quick Facts

- With the start-up of a second offshore liquefied natural gas (LNG) import facility in March 2010, Massachusetts now has three LNG import terminals that serve markets in the Northeast. The third terminal is an onshore facility located in Everett.
- Massachusetts is one of the few States that require the statewide use of reformulated motor gasoline blended with ethanol.
- Massachusetts is a leading source of electricity generated from landfill gas and municipal solid waste.
- Massachusetts is the only New England State that relies significantly on coal-fired power plants, with coal accounting for one-fourth of electricity generation.
- A proposed 420-megawatt wind power project in Nantucket Sound could become the Nation's first offshore wind farm.
- Massachusetts received \$25 million in 2009 from the U.S. Department of Energy for the development of the Nation's first large commercial-scale Wind Technology Testing Center, which will be able to test blades longer than 50 meters.

## **B. AIR QUALITY**

### **B.1 Overall Status**

Ozone is the only pollutant for which Massachusetts monitors indicate violations of a National Ambient Air Quality Status. Massachusetts is in attainment for the other criteria pollutants, including carbon monoxide, lead, nitrogen dioxide, sulfur dioxide, and particulate matter (including PM10 and PM2.5).

In 1997, the Environmental Protection Agency (EPA) promulgated a new 8-hour ozone standard that was designed to be more representative of exposure over time, rather than just a maximum concentration. The 8-hour standard was revised in 2008 to 0.075 parts per million (ppm). In March 2009, Massachusetts recommended to the EPA that the entire state be designated as nonattainment with the 2008 standard. The 2008 standard was challenged in Court and remanded to EPA. In January 2010, EPA proposed to revise the primary 8-hour ozone standard to a level with the range of 0.060 to 0.070 ppm and proposed a distinct cumulative, seasonal secondary standard with the range of 7-15 ppm-hours. Although today's eight-hour EPA standard for ozone took effect only in 1997, MassDEP has used this stricter limit to ascertain and tabulate the number of times that observed levels exceed standards, dating back ten years earlier, to provide a consistent basis for comparison over time.

While measured concentrations of ozone are still too high in Massachusetts, they nevertheless confirm that we're breathing cleaner air now than we did years ago, thanks in large measure to tougher government regulation and voluntary steps by industry aimed at reducing pollution from vehicles, power plants, factories and consumer products.

### **B.2 Greenhouse Gases**

Greenhouse gases occur widely in the atmosphere in Massachusetts as well as over the nation and the globe. They are now considered to be detrimental to overall air quality due to their long-term effects, as opposed to the more direct effects of the pollutants discussed above. There is broad scientific consensus that our climate is likely changing both regionally and globally. While not universally accepted, there is growing concern that this may largely be due to the combustion of fossil fuels and other human activities that increase atmospheric concentrations of greenhouse gases, generally considered to include the following:

- Carbon dioxide (CO<sub>2</sub>)
- Methane (CH<sub>4</sub>)
- Nitrous oxide (N<sub>2</sub>O)
- Other heat-trapping gases

## **C. CLIMATE CHANGE**

### **C.1 Overview**

Greenhouse gases as noted above form a "blanket" of pollution that traps heat in the atmosphere that may cause climate instability characterized by severe weather events such as storms,

droughts, floods, heat waves and rising sea levels. Climate change is a worldwide concern because if it continues, there will be significant impacts on people, natural resources and economic conditions around the globe. While the magnitude of these potential changes is difficult to predict, there is growing recognition that these climate changes will dramatically affect many aspects of our daily lives.

The transportation system is the second-largest contributor to GHG emissions in the United States, and the majority—approximately 72 percent—of the transportation sector’s emissions are generated by road transportation, including both passenger and freight travel. The large and increasing GHG emissions from road transportation present a major policy challenge.

Additionally, research studies have identified the serious impacts climate change poses for transportation. Increases in very hot days will increase the frequency of wildfires, compromise pavement integrity, and deform rail lines; increased flooding of coastal areas will inundate roads, bridges, and rail lines. Heavier rainfall may require redesign and replacement of local drainage structures; and more frequent and more severe hurricanes will disrupt service in affected areas and require devoting more resources to evacuations. Assessing the potential harm related to these climate effects allows highway planners to identify and address vulnerabilities. Because future climate change is projected to transcend the bounds of historic experience, it is likely to expose additional vulnerabilities as well.

As the second-largest contributor to GHG emissions, responsibility falls on the transportation sector to contribute its share towards the solution of the problem. Strategies and improvement projects that target climate change are also essential to the long term performance of the transportation system itself. Issues to be considered include VMT growth, congestion, changing development and land use patterns, sea level rise, accelerated aging of infrastructure from climate change, and rapidly changing fuel and vehicle technologies. Most demand management and system management strategies reduce GHG emissions, though not nearly to a significant extent.

Regardless of targeted actions, performance measures can assess whether or not objectives related to climate change are met. Performance measures can be unique to climate change and energy efficiency goals (for example, GHG emissions per capita, petroleum use per VMT, percent of alternative fuel vehicles) or relate to traditional transportation planning goals such as congestion or air quality (for example, transit mode share, average vehicle occupancy). Performance measures can be used to evaluate the existing system, compare and select alternatives, and measure the progress of the plan throughout its implementation. In addition, performance measures could assist in prioritizing projects for programming in the TIP.

## **C.2 Opportunities to Incorporate Climate Change in Transportation Planning**

Opportunities to incorporate climate change in an ongoing way, throughout the transportation planning process, include the following:

### ***C.2.1 Coordination***

Many of the agencies and stakeholders that already work with the CMMPO as interested parties may have particular interests in climate change or environmental issues. Particularly,

stakeholders involved in climate action planning at the state or metropolitan level can help coordinate transportation planning with those efforts.

### ***C.2.2 Integration with Land Use***

The promotion of compact and transit-oriented development patterns is potentially one of the most effective strategies to reduce GHG emissions from transportation in the long term, but it also requires a great degree of collaboration among agencies and among plans. While transportation planning has long considered future land use patterns in the development of travel demand forecasts, there has been less success in ensuring that transportation investment decisions support a regional vision for growth. Transportation planning can consider cross-linkages with land use plans and involve agencies with jurisdiction over land use plans.

### ***C.2.3 Existing Policies***

Existing policies that support the reduction of GHG include the state Global Warming Solutions Act (GWSA), making Massachusetts one of the first states in the nation to move forward with a comprehensive regulatory program to address climate change. The GWSA requires the Executive Office of Energy and Environmental Affairs (EOEEA), in consultation with other state agencies and the public, to set economy-wide greenhouse gas (GHG) emission reduction goals for Massachusetts that will achieve reductions of between 10 percent and 25 percent below statewide 1990 GHG emission levels by 2020, and 80 percent below statewide 1990 GHG emission levels by 2050. To ensure that these goals will be met, the Global Warming Solutions Act requires the Commonwealth to:

- Establish regulations requiring reporting of greenhouse gas emissions by the Commonwealth's largest sources
- Establish a baseline assessment of statewide GHG emissions in 1990, which will be used to measure progress toward meeting the emission reduction goals of the Act
- Develop a projection of the likely statewide GHG emissions for 2020 under a "business as usual" scenario that assumes that no targeted efforts to reduce emissions are implemented
- Establish target emission reductions that must be achieved by 2020, and a plan for achieving them. The GWSA requires that these must be established by January 1, 2011.

The majority of the State's GHG creation is not a result of transportation activity, and it is seen that other areas will likely have easier, more practical ways to produce near-term reductions. Still, the transportation sector will be expected to contribute to the effort as well. Staff in the state Department of Transportation offices is currently at work on an evaluation of current and projected statewide levels of transportation GHG in order to compare them to target levels.

Regionally, in June 2008, Massachusetts Governor Deval Patrick sent a letter to the governors of all 10 member states of the Regional Greenhouse Gas Initiative (RGGI) inviting them to work with Massachusetts on developing a Low Carbon Fuel Standard that would apply to the entire region, creating a larger market for cleaner fuels, reducing emissions associated with global climate change, and supporting the development of clean energy technologies. The Commonwealth's Clean Energy Biofuels Act, signed in July 2008, also required Massachusetts to seek an agreement with its fellow RGGI member states to implement a LCFS on a regional

basis. Based on Letters of Intent signed in December 2008 by state environmental commissioners, the participating states - the 10 RGGI states plus Pennsylvania - have been doing preliminary work toward designing a regional LCFS program. A Memorandum of Understanding has established a process to develop a regional framework by 2011, and examine the economic impacts of a LCFS program. Eleven states have committed to including strong business, energy and environmental stakeholder involvement in the process by providing opportunities for input and review of any proposed LCFS program.

Action on the national level continues to be considered and debated. Strong activity on actionable items such as vehicle and fuel standards as well as alternatives that would encourage reduction in VMT would be very useful to the cause.

#### ***C.2.4 Intelligent Transportation Systems (ITS) Technologies***

Some examples of the strategies and ITS technologies that alleviate congestion, while in turn reducing harmful emissions and providing fuel savings, include coordinated traffic-signal timing; electronic tolling systems; emergency and incident management; improved traveler information; speed harmonization via active traffic management; access management; integrated corridor management; and work-zone management. Examples of some of the environmental benefits of these strategies are described below.

- ***Traffic-Signal Timing***  
The “2007 National Traffic Signal Report Card” found that improving traffic-signal timing has a 40-to-1 or better return on investment, as state and local agencies that invested in signal timing found that every \$1 spent on technologies like synchronized and adaptive traffic signals returns \$40 or more to the public in time and fuel savings, while emissions are reduced by up to 22%. When combined with transit-priority systems, smart signals can reduce fuel use for transit buses by up to 19% and reduce bus emissions by up to 30%.
- ***Electronic Tolling***  
Reports on the E-Z Pass system show that electronic tolling reduces congestion, emissions and fuel use, with E-Z Pass reducing U.S. fuel consumption by almost 30 million gal and eliminating nearly 265,000 metric tons of emissions in 2007. Baltimore cut harmful emissions by 16% to 63% at upgraded toll plazas that implemented electronic toll systems. ITS systems like PrePass, which electronically verifies the safety, credentials and weight of trucks, reduced delays in 2008 by over 4.6 million hours, eliminated nearly 111,000 metric tons of emissions, conserved more than 11 million gal of fuel and saved U.S. truckers an estimated \$486 million.
- ***Incident Management and Traveler Information***  
In Georgia, the NaviGAtor incident-management program reduced annual fuel consumption by 6.83 million gal and contributed to decreased emissions, as carbon monoxide emissions fell by 2,457 tons, hydrocarbon emissions declined by 186 tons and nitrous-oxide emissions decreased by 262 tons. Integrating traveler information with traffic- and incident-management systems could further reduce emissions by up to 3% and improve fuel economy by about 1.5%.

## **D. LIVABILITY**

### **D.1 What Is It?**

America's transportation industry has built one of the world's largest and best highway networks, connecting people, businesses, and communities across the country, linked with extensive public transportation systems in major metro areas. However, we have not yet put the same effort into completing a system that works as well for walking, biking, or taking transit in most communities. While nearly four-fifths of Federal transportation funding goes to highway projects, almost 85 percent of people and jobs are in metropolitan areas, which offer the potential for significant improvements in multimodal travel choices. Since metropolitan regions are also where most trade, industry, and congestion occur—and where aging infrastructure requires significant reinvestment—a balanced approach can help maximize the effectiveness of existing transportation investments. The same is true for towns and villages in rural areas, which are struggling to remain economically competitive while preserving community character and maintaining viable mobility options. By targeting transportation funding to support reinvestment in existing communities, we can build more choice, convenience, and cost-effectiveness into the transportation system. Developing complete street networks that provide accessibility for all modes is a good place to start. As changing demographics and evolving markets increase demand for compact, walkable neighborhoods with a range of housing choices, transportation planning, programming, management and operations can help ensure that walking, biking, and transit are safe, convenient, and realistic choices for more people, making transportation systems more accessible, efficient, sustainable and equitable... that is to say, more “livable”.

By incorporating livability principles into transportation plans and programs, communities can maximize the efficiency of existing transportation investments while providing better access within and between activity centers. Livability approaches can also be a catalyst for reinvesting in aging suburban corridors, restoring complete streets and networks, and revitalizing rural small towns. A transportation system that provides reliable, safe access to jobs, education, health care and goods and services is every bit as important to rural communities as it is to urban areas. Rural communities present unique mobility challenges, and the types of transportation options needed in rural areas can be different in order to ensure access for older citizens to services and activities, and to improve connections and service between communities. Linking transportation investments to compact development and revitalization strategies can preserve natural and cultural resources, while better preparing communities to mitigate and adapt to the impacts of climate change. Making sure that people of all ages have real choices to walk and wheel in the course of daily living, and making communities age-friendly, can support active living, and help improve health and quality of life.

Incorporating livability into transportation planning, programs, and projects is not a new concept. Communities, developers, advocacy groups, businesses, and neighborhood residents have been working for generations to make places more livable through transportation initiatives with varying degrees of support from local, regional, State, and Federal agencies. These initiatives have used a range of names to describe an overlapping set of objectives and strategies—livability, sustainability, smart growth, walkable communities, new urbanism, healthy neighborhoods, active living, transit-oriented development (TOD), complete streets, and many others. While advocates for each approach or “brand name” might find differences, most transportation industry practitioners understand the common element is that transportation

planning is no longer a stand-alone exercise. Increasingly, transportation planning and project development are being more fully integrated with broader community goals, addressing a wider range of needs and leveraging the effectiveness of other programs.

## **D.2 Livability and Sustainability in Transportation**

Livability in transportation is about using the quality, location, and type of transportation facilities and services available to help achieve broader community goals such as access to good jobs, affordable housing, quality schools, and safe streets. This includes addressing road safety and capacity issues through better planning and design, maximizing and expanding new technologies such as intelligent transportation systems (ITS) and quiet pavements, and using travel demand management (TDM) approaches in system planning and operations. It also includes developing high quality public transportation to foster economic development, and community design that offers residents and workers the full range of transportation choices. And, it involves strategically connecting the modal pieces—bikeways, pedestrian facilities, transit services, and roadways—into a truly intermodal, interconnected system.

Sustainable transportation provides exceptional mobility and access to meet development needs without compromising the quality of life of future generations. A sustainable transportation system is safe, healthy, and affordable, while limiting emissions and use of new and nonrenewable resources. It meets the needs of the present without depleting resources or harming the environment. It also considers the long-term economic health and equity—or social fairness—of a community. “Smart growth” focuses growth in existing communities to avoid sprawl; and advocates compact, transit-oriented, walkable, bicycle-friendly land use, including neighborhood schools, complete streets, and mixed-use development with a range of housing choices. Its goals are to achieve a unique sense of community and place; expand the range of transportation, employment, and housing choices; and to equitably distribute the costs.

In 2009 the U.S. Department of Housing and Urban Development (HUD) and U.S. Department of Transportation (DOT) announced an unprecedented agreement to implement joint housing and transportation initiatives. With the U.S. Environmental Protection Agency (EPA) joining the partnership later in the year, the three agencies agreed to work together to ensure that the goals of gaining better access to affordable housing, more transportation options, and lower transportation costs are met while simultaneously protecting the environment, promoting equitable development, and helping to address the challenges of climate change. DOT, HUD and EPA have created a high-level interagency partnership to better coordinate federal transportation, environmental protection, and housing investments and to identify strategies that promote and put into action the following Livability Principles:

- ***Provide more transportation choices.*** Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation’s dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health.
- ***Promote equitable, affordable housing.*** Expand location- and energy-efficient housing choices for people of all ages, incomes, races, and ethnicities to increase mobility and lower the combined cost of housing and transportation.

- ***Enhance economic competitiveness.*** Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services, and other basic needs by workers, as well as expanded business access to markets.
- ***Support existing communities.*** Target Federal funding toward existing communities—through strategies like transit oriented, mixed-use development, and land recycling—to increase community revitalization and the efficiency of public works investments and safeguard rural landscapes.
- ***Coordinate and leverage Federal policies and investment.*** Align Federal policies and funding to remove barriers to collaboration, leverage funding, and increase the accountability and effectiveness of all levels of government to plan for future growth, including making smart energy choices such as locally generated renewable energy.
- ***Value communities and neighborhoods.*** Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods.

The partnership promised to:

- ***Enhance integrated planning and investment.*** The partnership will seek to make planning grants available to metropolitan areas, and create mechanisms to ensure those plans are carried through to localities.
- ***Provide a vision for sustainable growth.*** This effort will help communities set a vision for sustainable growth and apply federal transportation, water infrastructure, housing and other investments in an integrated approach. Coordinating planning efforts in housing, transportation, air quality and water will make more effective use of federal housing and transportation dollars.
- ***Redefine housing affordability and make it transparent.*** The partnership will develop federal housing affordability measures that include housing and transportation costs and other expenses that are affected by location choices. Affordability will be redefined to reflect those costs, improve the consideration of the cost of utilities and provide consumers with enhanced information to help them make housing decisions.
- ***Redevelop underutilized sites.*** The partnership will work to achieve critical environmental justice goals and other environmental goals by targeting development to locations that already have infrastructure and offer transportation choices.
- ***Develop livability measures and tools.*** The partnership will research, evaluate and recommend measures and provide analytical tools that indicate the livability of communities, neighborhoods and metropolitan areas. These measures could be adopted in subsequent integrated planning efforts to benchmark existing conditions, measure progress toward achieving community visions and increase accountability. Incentives will be developed to encourage communities to implement, use and publicize the measures.
- ***Align HUD, DOT and EPA programs.*** HUD, DOT and EPA will work to assure that their programs maximize the benefits of their combined investments in our communities for livability, affordability, environmental excellence, and the promotion of green jobs of the future.
- ***Undertake joint research, data collection and outreach.*** HUD, DOT and EPA will engage in joint research, data collection, and outreach efforts with stakeholders, and identify best practices.

A similar effort is underway in the state itself under the auspices of the Massachusetts Healthy Transportation compact. While more directly pointed toward “health” concerns, its objectives are quite similar to, and resonate with, the themes and purposes of “livability” initiatives. The compact’s goal is to “Adopt best practices to increase efficiency to achieve positive health outcomes through the coordination of land use, transportation and public health policy.” It is a key requirement of the landmark state transportation reform legislation signed into law in June 2009. Co-chaired by the Secretary of Transportation and the Secretary of Health and Human Services and including the Secretary of Energy and Environmental Affairs, MassDOT Highway Administrator, MassDOT Transit Administrator, and Commissioner of Public Health, this inter-agency initiative is designed to facilitate transportation decisions that balance the needs of all transportation users, expand mobility, improve public health, support a cleaner environment and create stronger communities.

The compact is charged with:

- Promoting inter-agency cooperation to implement state and federal policies and programs that support healthy transportation.
- Reducing greenhouse gas emissions, improving access to services for persons with mobility limitations and increasing opportunities for physical activities.
- Increasing bicycle and pedestrian travel and facilitating implementation of the Bay State Greenway Network.
- Working with the Massachusetts Bicycle and Pedestrian Advisory Board (MABPAB) to effectively implement a policy of complete streets for all users, consistent with the current edition of the Project Development and Design Guide.
- Implementing health impact assessments to for use by planners, transportation administrators, public health administrators and developers.
- Expanding service offerings for the Safe Routes to Schools program.
- Initiating public-private partnerships that support healthy transportation with private and nonprofit institutions.
- Establishing an advisory council with private and nonprofit advocacy.
- Developing goals for the Compact and measuring progress toward these goals.

## **E. CHALLENGES**

Despite the clear and forthright progress made in recent years in fully extending the consideration of environmental effects in the state to all types of transportation (and other) activity and to all time frames - long as well as short - many major challenges remain in further defining and implementing action to achieve necessary goals.

### **E.1 Coordination and Integration of Planning Activities**

In particular, how do we effectively link land use planning and transportation planning, while keeping responsibilities in line with allocated authority? As noted above, integration with land use planning takes a concerted coordinated effort with appropriate prioritization and funding. Common goals must be established and pursued cooperatively while individual responsibilities are met concurrently.

## **E.2 Societal Decisions on Environmental Progress Tradeoffs**

Many more easily implementable strategies to reduce GHG will have impacts that have costs in the form of pure dollars or cost of living tradeoffs. For example, sustainable energy generation units are infrastructure investments that must be made with real dollars that cannot then otherwise be used. Additionally, many suggested solutions are perhaps of lower dollar costs but extract an investment in other ways, such as by longer travel times due to congestion or required use of alternative modes. More time spent travelling is largely less time available to use doing something else.

## **E.3 “Livability” is Not Enough**

Studies have shown relatively minor changes to GHG levels from making denser transit-orientated areas a reality. “Non-sprawl” activities, even if palatable and socially acceptable, are not enough. What can be done that would be more directly effective? For transportation, these choices perhaps boil down to

- Introducing low-carbon fuels;
- Increasing vehicle fuel economy;
- Improving transportation system efficiency; and
- Reducing carbon-intensive travel activity.

Transportation system efficiency is within the purview of transportation planners and the CMMPO, and perhaps so is influencing carbon-intensive activity reduction. However, transportation fuel and vehicle fuel economy requirements and standards are matters that can only effectively be influenced and changed on a larger scale, through national leadership and legislation as necessary. We have seen bold and strong action along these lines in the past when it was deemed appropriate. Perhaps we can find the inspiration to follow in those footsteps now despite troubled economic times.

## **E.4 Transportation is Not Enough**

Greenhouse gases generated by the transportation sector amount to less than 30% of the total. Progress is needed (and is seen to be very possible) in other areas such as power generation, manufacturing and agricultural activities.

## **F. REGIONAL EFFORTS, ACTIVITIES AND PLANS**

While many of the long-term answers to the challenges above require national and global planning and resolve, there are still many small steps that can be taken regionally and locally. These measures can also help to expose the public to environmental problems and their possible solutions via smaller, more palatable “bites”. It is indeed one of the CMMPO’s adopted goals to “*Promote livable communities and improved air quality through context-sensitive design and reduced traffic congestion*”, and by extension, through any other planning means consistent with overarching goals and purposes.

## **F.1 Previous Regional Efforts**

Projects and undertakings that pertain to dealing with climate change are not new to central Massachusetts. We note that the city of Worcester has achieved Commonwealth “Green Community” status. CMRPC has partnered with MassRides and the WRTA, a CMMPO partner, to coordinate promotion of alternative modes of travel via efforts to reach large employers, and has worked with the WRTA to replace its aging fleet of vehicles with new clean-diesel and hybrid buses. CMRPC has also worked towards development of a multi-use hub at the Union Station intermodal center and helped to plan the replacement of an environmentally unsafe maintenance and operations facility. In addition to a vehicle idling education program, the CMMPO staff has been seeking ways to encourage implementation of better traveler information techniques that are responsive to changes in peak period congestion along I-290, in order to avoid the spread of congestion and its air quality effects. And, in recognition of the fact that global warming would have severe consequences to infrastructure, efforts to map flood-prone areas have begun, in order to support an analysis of the vulnerability of critical transportation infrastructure.

Considering livability aspects, broad-based initiatives to work with state, local, and regional groups to encourage healthy living, including assessment of healthy transportation policies, walkability assessments, and employer transit forums have been part of recent MPO staff activity. Groundwork for the 2010 Bicycle and Pedestrian plan included walkability assessments of town centers and walkability workshops for the interested and the uninitiated. Access Management Toolkits have been developed to provide community land use planners with tools for managing internal and external multimodal access. Targeted Jobs Access Reverse Commute funding activities helped outline and display transit access potentials between urban core and suburban job opportunities. Work continued with the WRTA to encourage large employers to promote employee use of transit as a “green” effort and to save money. CMRPC has provided geo-coding of employee addresses and matched them with bus route schedules for impact locations and employers. In addition, materials have been produced that are tailored to individual employer needs, such as consolidated schedules and personalized mapping.

Developing transportation projects are always monitored to see that the spirit of Complete Streets design carries forward; examples include the walkability of the new Worcester/Shrewsbury Route 9 bridge over Lake Quinsigamond as well as the inclusion of appropriate transit and pedestrian facilities for the planned improvement of the joint section of Routes 12/20 in Auburn.

In land use coordination, whenever possible, large local/regional development plans have been reviewed for traffic impact and alternative mode accommodations. The Scenic Byway Corridor Management Plan along Route 122 from Paxton to Petersham was assisted and promoted as well. Through currently programmed state enhancement funding, badly needed drainage improvements will soon be made adjacent to the Wachusett Reservoir on Route 70 in Boylston and Clinton, including the elimination five existing stormwater drainage discharges that direct runoff and accidental release materials to the water body. The work will include modification to the existing drainage system, and the installation of new structures and piping, in addition to necessary roadway work.

## **F.2 Plans to Continue the Momentum**

The CMMPO and its staff will continue to monitor Global Warming Solutions Act activities and other federal/state compacts and initiatives related to reducing greenhouse gases, and will consistently and diligently look for opportunities to integrate local transit promotion, Travel Demand Management (TDM) and congestion reduction into these initiatives. The analysis of vulnerability of critical transportation infrastructure, based on the mapping of flood prone and poor drainage areas, will be completed and recommendations for addressing vulnerable transportation infrastructure, including review of all TIP projects for potential design changes, will be provided.

Efforts will continue with the WRTA to replace the existing bus fleet with fuel-efficient, low emissions vehicles. Additionally, work will continue on broad-based community initiatives with the WRTA, MassinMotion, Common Pathways and other groups to promote availability of alternative modes of travel. This will include the expected development of Health Impact Assessments and the review and evaluation of an implementation of Ozone Action day strategies.

CMMPO staff will continue efforts with local MassDOT-Highway Division staff to investigate traveler information techniques that are responsive to changes in peak period congestion along I-290, as recognized in the Worcester regional Mobility Study. In the continuing vein of public information access and education, a CMMPO web page presence is planned to begin promoting the consideration of environmental problems and solutions.

Coordination of transportation planning and strategies with local housing and development policies is a difficult but worthy aim. CMMPO staff intends to establish mechanisms to review all TIP projects and major economic/housing development projects to see that there is an inclusion of features that allow better access to alternative transportation modes and their connectivity, and to work with local officials to grow a consistent consideration of such features in all local roadway projects. Access Management Toolkits that assist in thinking about managing internal and external multimodal access are also useful “starter tools” in helping local planners to consider the linkages between land use and transportation. Perhaps once some minor early successes are achieved, inherent and continued interest in more substantial local contributions to ecological problem solving will evolve.

The City of Worcester, through its Energy Efficiency and Conservation Program, aggressively pursued the State's designation as a "Green Community" as part of its Climate Action Plan initiatives. Perhaps other communities in the region can be inspired to participate as well.

Finally, the CMMPO has partnered with a regional organization, the Institute for Energy and Sustainability (IES), housed at Clark University, to apply for HUD/DOT/EPA grants to develop regional initiatives for sustainability. The IES is a partnership of universities, local governments, and regional groups that are committed to developing a more sustainable manner of growth.

## **F.3 Ongoing Regional Environmental Mitigation**

The SAFETEA-LU law and its implementing regulations include provisions intended to enhance the consideration of environmental issues and impacts within the transportation planning process. These provisions encourage the continued evolution of the metropolitan planning process by

means of “discussion of types of potential environmental mitigation activities [at the plan level]”, which shall be developed “in consultation with federal, tribal, wildlife, land management and regulatory agencies”.

As this evolutionary process continues for the CMMPO, steps have been taken to meet with environmental stakeholders, identify and share key GIS mapping data, to map both projects that are nearer to implementation as well as projects that are part of corridor-level planning studies, and to share this information with community officials and implementing agencies. The resource mapping efforts, explained in Chapter II (Regional Characteristics), have produced valuable early identification of sensitive areas, and have led to avoidance and minimization strategies as well as mitigation activities during the project implementation phase.

Future CMMPO efforts will include environmental mapping of major infrastructure projects identified in this plan. In addition, efforts will include the development of mitigation strategies, at the plan level, in consultation with a broad group of environmental stakeholders.

The above materials are based largely upon information made available, both generally and specifically, from the following organizations:

- U.S. Energy Information Administration
- Massachusetts Department of Environmental Protection
- Federal Highway Administration
- American Association of State Highway And Transportation Officials (*Primer on Transportation and Climate Change*)
- United States Department of Transportation (*Transportation’s Role in Reducing US Greenhouse Gas Emissions; Livability in Transportation Guidebook*)