

CHAPTER 10

SUSTAINABILITY

The Pioneer Valley Planning Commission (PVPC) affirms the United Nations Bruntland Commission's definition of sustainable development as development that meets the needs of the present generation without jeopardizing the ability of future generations to meet their own needs. Applied to transportation this means keeping people and goods moving safely and efficiently throughout the Pioneer Valley by planning, designing, building and maintaining a balanced interconnected transportation system that includes sidewalks, on and off road bike ways, rail, airports, and miles of paved and unpaved roadways, while minimizing negative impacts on the region's air, land, water and people.

A. MASSDOT/GREENDOT

The function of the Regional Transportation Plan (RTP) is to define an overarching vision of the future of the region, establish principles and policies that will lead to the achievement of that vision, and allocate projected revenue to transportation programs and projects that reflect those principles and policies.

In order for our transportation system to be more sustainable, MassDOT has articulated the following 10 themes to guide transportation work:

- Improve transportation system reliability
- Focus more attention on maintaining our transportation system
- Design transportation systems better
- Encourage shared use of infrastructure
- Increase capacity by expanding existing facilities and services
- Create a more user-friendly transportation system
- Broaden the transportation system to serve more people
- Provide adequate transportation funding and collect revenue equitably
- Minimize environmental impacts
- Improve access to our transportation system

In addition, MassDOT has elaborated a Green DOT Vision:

“The Massachusetts Department of Transportation will be a national leader in promoting sustainability in the transportation sector. Through the full range of our activities, from strategic planning to construction and system operations, MassDOT will promote sustainable economic development, protect the natural environment, and enhance the quality of life for all of the Commonwealth's residents and visitors. This will enable MassDOT to use resources in a manner that serves its existing customers while preserving our resources for future generations.”

The following three mutually-reinforcing goals form the foundation of GreenDOT:

- Reduce greenhouse gas (GHG) emissions
- Promote the healthy transportation modes of walking, bicycling, and public transit
- Support smart growth development

The Global Warming Solutions Act requires Massachusetts to reduce economy-wide GHG emissions: 10% -25% below 1990 levels by 2020 and an 80% reduction below 1990 levels by 2050. The transportation sector is largest GHG emitter, producing 31% of 1990 emissions and projected to produce 38% of 2020 emissions. Figure 10-1 presents GHG emissions for the past 21 years and projected GHG emissions in the state of Massachusetts.

B. EXISTING CONDITIONS

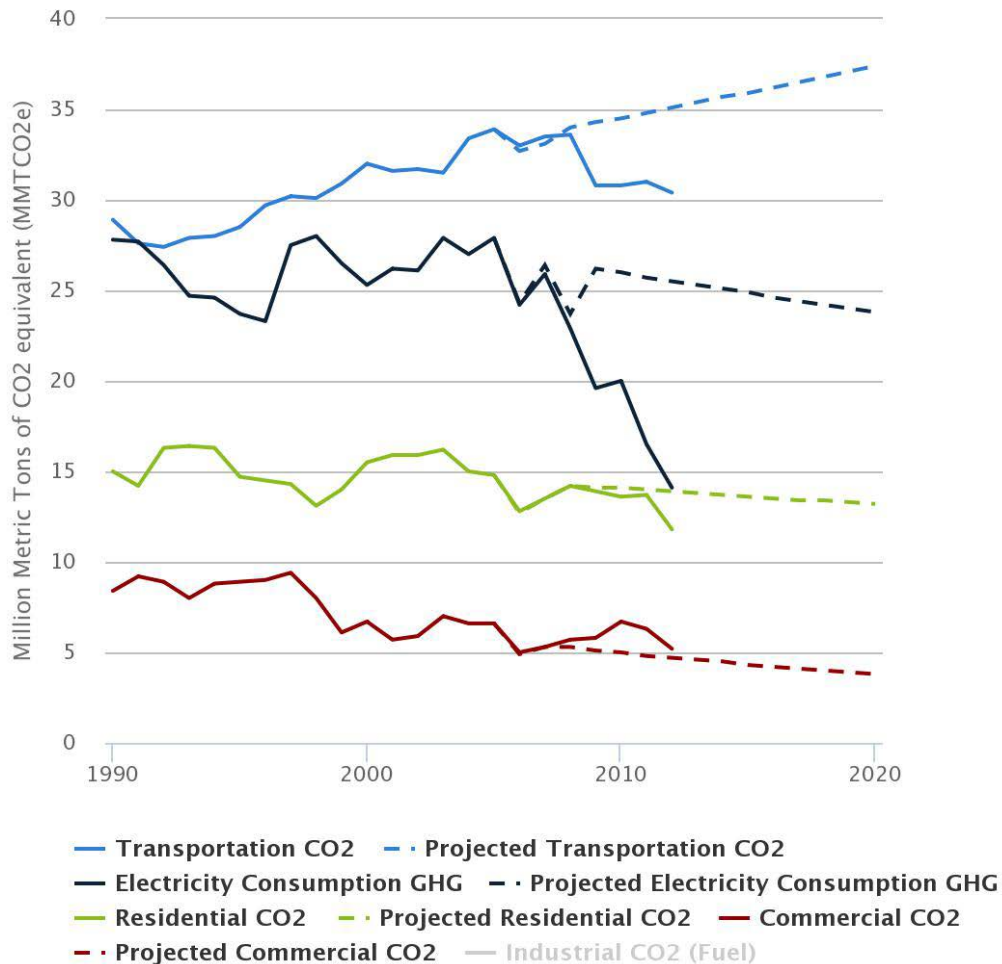
The Pioneer Valley Planning Commission (PVPC) evaluates existing conditions pertaining to sustainability and transportation in a variety of ways. A number of communities in the Pioneer Valley are not served by transit or do not have enough transit services. Some communities do not have enough infrastructure in place to make them pedestrian and bicycle friendly. However, in the last few years communities in the region had a great success in improving bicycle infrastructure, sidewalks and introducing new bicycle/pedestrian trails. In the Pioneer Valley we have almost 84 miles of on and off-road bikepaths.

Along with bicycle and pedestrian facilities, Pioneer Valley has 43 fixed transit routes with an estimated 15,000 to 20,000 regular riders. Between 2003 and 2015, there was an overall increase of 128,000 miles per average weekday in the regional VMT. Many of our communities are not well served by transit, nor are they bicycle or pedestrian friendly.

With all this progress our transportation system is still a not well-balanced system with accommodations for multiple modes of users. Our transportation system has a very negative effect on our environment: air, water, land and plants, and on our people. Many of these negative conditions that are diminishing the quality of life in the Pioneer Valley are directly or indirectly caused or exacerbated by our transportation system and the vehicles that use it. Preliminary analyses of sources of the region's GHG emissions suggest that, like the rest of the Commonwealth, approximately one-third of our GHG emissions come from transportation. Run-off from paved surfaces, both roads and especially parking lots, is polluting our rivers and streams. And since the vast majority of people in the region are dependent on the automobile for transportation, health professionals link it to increases in human sicknesses like cancer, obesity, heart problems and diabetes.

Figure 10-1 – Projected Greenhouse Gas Emissions
MA GHG Emissions and Business-As-Usual (BAU) Projections
for Major Sectors, 1990–2020

Source: MassDEP (2014). Massachusetts Annual Greenhouse Gas Emissions Inventory 1990–2011 with partial 2012 data



A good transportation system is vital for the Pioneer Valley region because none of the 43 cities and towns in the region are able to function independently. Everyone who lives here moves from municipality to municipality to shop, work, go to school, visit family and friends, or for recreational purposes. Because of this interconnection, people rely on automobiles which make up the largest part of the transportation system. There are people that don't have access to a personal vehicle or would prefer other modes of transportation. This brings up a need to enhance the transportation system to expand transit, walking and bicycling infrastructure for all to use.

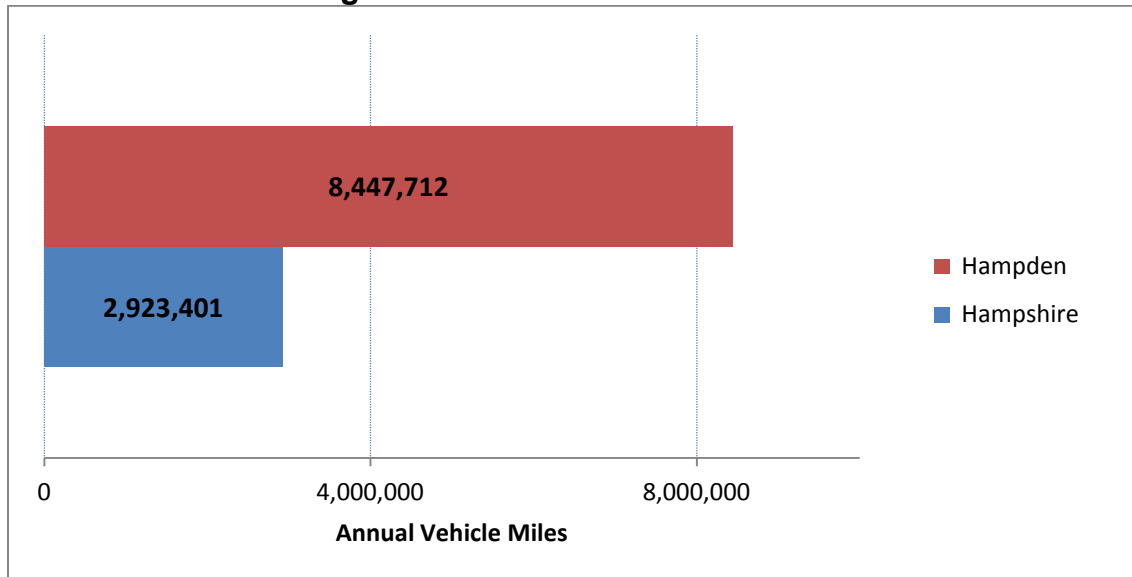
The Pioneer Valley Sustainability Network has identified 10 key indicators of sustainability. They are:

- Air quality
- Water quality
- Green House Gas Emissions (GHG)
- Health status
- Voter registration
- Recycling rate
- Housing affordability
- Graduation rate
- Local food production
- Vehicle Miles Traveled

To varying degrees, each of these indicators is affected by transportation. Motorized vehicles consume fossil fuels to operate and necessarily produce exhaust and other GHG emissions from burning these fuels. This affects air quality. Motorized vehicles require impervious surfaces, which pollute ground water, as well as surface water sources. Roads are impervious surfaces across which water has to run before being absorbed into surface water bodies or the ground. As noted above, the transportation sector is Massachusetts largest GHG emitter, producing 31% of 1990 emissions and projected to produce 38% of 2020 emissions. Transportation affects voter turnout by making it more or less easy to get to polls. Lack of transit services can hamper lower income people's ability to get to polls to participate in the democratic process. A balanced transportation system is more sustainable, as it meets more people's needs while using resources efficiently to make it more likely that future transportation systems will meet future generations' needs. Transportation doesn't have a very direct affect on recycling rate, but it certainly can affect housing affordability. Sprawl is the dominant form of housing development, and as a result homes are less affordable than in a region characterized by mixed use development. Local food production is not directly affected by transportation, although having the opportunity to produce local food can minimize transportation of food from outside the region to feed residents. The last sustainability indicator, VMT, is the cornerstone measurement of a sustainable transportation system.

The goal of PVPC's sustainable transportation system is to consistently reduce VMT per population. This can be accomplished by providing more access to resource efficient transportation options, especially public transportation. This, in turn can maximize social equity, increase social connectivity, maximize safety and maximize resource efficiency. Furthermore, public transit and ridesharing can reduce vehicle numbers on the road. Transportation efficiency benefits society and reduces its impacts, which account for one-third of greenhouse gas emissions and 20-25% of average U.S. household expenditures.

Figure 10-2 – Annual Vehicle Miles



In addition to the Pioneer Valley Sustainability Network’s indicators of sustainability, the Pioneer Valley Planning Commission has identified a number of indicators to assess the overall state of the region. One of the measures tracked is the annual dollar value of transportation improvement projects advertised for bid that rely on federal and/or state financial resources.

Transportation Improvement Projects included in this value are highway improvement projects identified through the Transportation Improvement Program report by the Pioneer Valley Planning Commission and Franklin Regional Council of Governments, and advertised by MassDOT. Between 2013 and 2014 Hampshire County saw an increase of \$12.5 million but Hampden Country saw a decrease of \$3.5 million. Constant level of transportation investment is highly desirable to sustain the transportation system.

B. ENHANCING SUSTAINABILITY

Many transportation initiatives are underway to enhance sustainability. The top priority new initiatives are described in greater detail below.

1. Promoting Smart Growth and Climate Action

Transportation planning needs to place greater emphasis on land use and development patterns; more concentrated development should be encouraged in urban areas and suburban development should be deemphasized. The goal should be to reduce the conversion of open land to development and make it easier and more attractive to develop underutilized urban land through improved transportation accessibility—especially transit.

Transit oriented development (TOD) should be planned regionally over the long-term and consideration of innovative financing, such as TOD land banks, should be explored. Transit oriented development can simultaneously improve both housing and transportation in urban areas. There also needs to be more express bus routes and park and ride lots to help reduce single occupancy vehicle trips. The RTP should encourage the adoption of more mixed use zoning and land uses to help achieve higher densities in areas that are already built and served by transit.

In addition, green house gas (GHG) monitoring and reduction measures need to receive greater study and be incorporated in transportation planning. Transportation planning needs to address the issue of adaptation to climate change (rather than focus only on the mitigation of GHG emissions). One important example is the need to improve the capacity and number of stream crossings of roadways to reduce the number and frequency of washouts. Most Pioneer Valley municipalities have hazard mitigation plans that identify problem culverts and areas that consistently flood. These plans should be used to identify and prioritize funding for replacement of under-sized culverts with ecologically friendly infrastructure alternatives.

Federal Highway has identified four primary strategies to reduce GHG from transportation. They are:

- Improve System and Operational Efficiencies
- Reduce Growth of Vehicle Miles Traveled (VMT)
- Transition to Lower GHG Fuels
- Improve Vehicle Technologies

These strategies should be integrated into the region's transportation planning activities. The strategies will help guide decisions by providing a framework to reduce GHG in the region. To be most effective, the region must pursue all four strategies together.

Every effort should be made to integrate the RTP with the state's Climate Change Mitigation Plan. All proposed and approved projects should demonstrate consistency with the recently implemented EOEEA GHG emissions reduction policy, even if the projects do not meet the threshold requirements of the GHG policy.

The allocation of Chapter 90 funds for local roadway repairs should be prioritized based on the density of population adjacent to the roadway and/or the usage of the road. The goal is to achieve the greatest benefit for the greatest number of drivers.

2. Ensuring Health and Safety

Health-related impacts of transportation projects, particularly those on environmental justice populations, need to receive greater consideration in transportation planning. The impacts of the aging population should receive greater consideration, as well as access to medical care and sources of healthy foods for all segments of the population. Both Springfield and Holyoke have been cited as “urban food deserts” where there are few supermarkets or grocery stores where fresh fruits and vegetables and unprocessed foods are available. Transportation planning needs to include measures and strategies to improve accessibility to healthy foods.

3. Avoided Trips

Transportation planning needs to place greater emphasis on broadband internet service throughout the region to help more people work at home, which will also reduce single occupancy vehicle trips. As noted previously, western Massachusetts is still relatively under-served with respect to broadband internet access and this hampers people’s ability to telecommute, shop on-line, and take classes on-line, making it more likely that they will need to drive to perform these functions of daily life.

4. Technology-Enhance Capacity of Existing Infrastructure

Intelligent transportation system (ITS) technologies need to be implemented to help existing transportation systems work more efficiently, rather than be expanded. This includes traffic congestion monitoring and transit schedule information as well as ride and car sharing programs linked to smart phones. Transportation planning needs to address and include electric charging infrastructure for electric-only vehicles coming from an expanding market. As the number of free electric car charging stations in Pioneer Valley grows, electric cars will become a more appealing choice for local residents. The use of highway medians and other transportation property for solar energy production needs to be studied. The use of recycled roadway materials should be encouraged on roadway projects carried out by MassDOT and municipal DPWs.

5. Complete Streets

The Complete Streets approach to roadway and street design should be incorporated in transportation projects in the region. This should include planting of trees on sidewalks, as the heat reduction benefits of urban foliage are significant. The RTP should offer a sample bylaw for requiring a tree canopy be retained wherever possible. Transportation planning needs to place greater emphasis on

pedestrian facilities, both for people who choose to walk for their trips as well as people who walk to transit and park and ride lots for car/van pools. Integral to complete streets is the need to have each complete street connected to other complete streets within a community.

6. Land Use Policy

Road discontinuation, especially in rural areas of the region, is an opportunity to help municipalities reduce maintenance costs, as well as reduce approval not required (“ANR”) residential development. Using the Congestion Management Process (CMP) to identify top priority projects based on congestion integrates the goal of reducing GHG emissions into planning because where there is congestion, there is excess GHG emissions.

7. Invest in Transit

Funding should be increased for greater PVTA bus operating frequencies and hours (especially Sunday service). Promote and encourage transportation centers, such as the Holyoke Transportation Center, Westfield Transportation Center and Springfield Union Station, because they expand transit accessibility and connect the region to destinations outside the region.

8. Institutionalize Sustainability and Smart Growth into Decision-Making Process

Regional and municipal planners should strive to do more prioritization of the transportation assets in greatest need of maintenance, such as specific portions of roadway that would do the most damage if they were to fail, or areas with high numbers of wildlife collisions. Design guidelines for transportation projects should place greater emphasis on mitigating impacts to natural resources. The FEMA natural hazard resource map is one source of information for this type of prioritization.

The region will continue to monitor the progress of FHWA Infrastructure Voluntary Evaluation Sustainability Tool (INVEST). INVEST was developed by FHWA as a practical, web-based, collection of voluntary best practices, called criteria, designed to help transportation agencies integrate sustainability into their programs (policies, processes, procedures and practices) and projects.

9. Education/Training

The PVPC should consider offering a briefing to incoming elected municipal officials on the overall regional transportation planning process and the development and evaluation of individual transportation projects.

C. SUSTAINABLE TRANSPORTATION ELEMENT PLAN

The Pioneer Valley has actively incorporated sustainability planning practices to improve the regional quality of life. These projects improve livability of neighborhoods, promote alternate modes of transportations to reduce environmental impacts and enhance access for pedestrian, bicycle and transit use. Increased access to bicycling, transit and walking reduces individual reliance on automobiles and can improve the local environment by using a cleaner and healthier mode of transportation.

The Sustainable Transportation Element Plan is a recent document prepared by PVPC in February, 2014. The document identifies the existing sustainable transportation initiatives in the region and develops strategies to improve the sustainability of the regional transportation system. The plan identified how sustainability can be incorporated into the transportation planning process in order to meet existing needs without compromising the assets of future generations.

While sustainability can be measured using a wide variety of indicators, the indicators used in Table 8-1 were chosen because they have a direct relationship to transportation planning practices. Each sustainability project has a relationship to one of the transportation sustainability indicators seen in Table 10-1. Each indicator has a correlating recommending agency: Federal Highway Administration (FHWA), MassDOT, or the PVSustain Network. The FHWA recommendations were formulated through information from “Context Sensitive Solutions: Integrating Sustainability and Climate Change Concerns and CSS Principle” and “Four Strategies to Reduce Green House Gases.” MassDOT recommendations were formulated through “GreenDOT’s Policy Directive.” Lastly, transportation related sustainability indicators were selected from the Pioneer Valley Sustainability Network. These three agencies were used to integrate federal, state and regional sustainability goals.

Table 10-1 – Transportation Sustainability Indicators

Transportation Sustainability Indicators	Effect	Recommending Agency
Reduce VMT	Implementing land use strategies and transportation alternatives that lessen the need to drive. Providing transit options, pedestrian and bicycle facilities, park and ride facilities, telecommuting and travel demand management programs.	FHWA (Context Sensitive Solutions, Strategy to Reduce GHG)
Reduced GHG Emissions	Reduce GHG emissions from transportation construction and operations. Reduced GHG would improve regional air quality as well as the health of the region's population.	FHWA, MassDOT, PVSustain
Improved Transit Accessibility	Investment in transit infrastructure to expand services to larger population and improve the system's ease of use.	MassDOT
Livability	Livability is about tying the quality and location of transportation facilities to broader opportunities such as access to good jobs, affordable housing, quality schools, and safe streets. This includes addressing safety and capacity issues on all roads through better planning and design, maximizing and expanding new technologies such as ITS and the use of quiet pavements, using Travel Demand Management approaches to system planning and operations, etc.	FHWA, GreenDOT (Smart Growth)
Promote Healthy Transportation Modes	Reducing automobile travel resulting from transportation investments that improve pedestrian, bicycle and public transit infrastructure and operation.	FHWA and MassDOT
Transition to Lower GHG Fuels	Replacing gasoline and diesel with fuels and systems which emit less GHG over the lifecycle.	FHWA, PVSustain
Water Quality	Water nourishes human communities, wildlife and the natural and built landscape. It contributes to aesthetic and recreational values that often translate into higher property values. Drinking water quality is a community and public health asset. Protecting water quality in our streams, ponds, lakes, rivers and aquifers is the focus of much regulatory policy at all levels of government.	PVSustain

1. Bus System

The bus system is operated by the Pioneer Valley Transit Authority (PVTA) and is one of the primary mechanisms the Pioneer Valley possesses to attain greater sustainability. The system currently operates in 24 of the region's 43 communities and provides connection to academic institutions, major places of employment, shopping centers, and recreational areas. The transit system promotes regional

sustainability by reducing the number of vehicle trips, reducing emissions from fewer vehicle trips, promoting transportation options, and by providing connection to intermodal facilities.

The PVRTA has pursued sustainability efforts from two perspectives: capital improvements and operational improvements. Capital improvements include improvements to the infrastructure of the system and the vehicles that operate on the system (e.g. bus replacement, facility improvement, and shelter maintenance). Operational improvements include efforts to make the system function more efficiently (e.g. ITS, traffic signal prioritization, and surveying).

a) Capital Improvements

i) Intermodal Centers and Transportation Centers

The PVRTA has actively pursued planning and construction efforts of intermodal and transportation centers within the region to improve connectivity and increase rider experience. These transportation centers enhance sustainability by improving transit access, increasing livability and promoting healthy transportation options.

Transit access is improved by providing hub points for passengers to transfer to intraregional bus routes and to intercity bus carriers. Rider experience is increased through the provision of amenities not typically associated with an outdoor bus stop. These constructed and proposed centers possess indoor waiting areas, bathrooms, customer service booth(s), and television monitors displaying schedule departures. The centers amenities make the system easier to use for riders.

ii) Vehicle Improvements

Vehicle improvement is a direct method to impact system reliability and system energy requirements and can optimize a user's ability of the system. PVRTA phases the replacement of their vehicles to limit capital expense each year. Bus emissions have improved as technology has improved. Newer buses produce less GHG's than their earlier counterparts. Replacement of vehicles is one of the most effective methods for PVRTA to reduce their vehicle emissions. In 2011-2013 PVRTA has received 31 new Gillig busses as well as 29 Xcelsior Diesel New Flyers, 10 Xcelsior Diesel Hybrid New Flyers and 4 articulated hybrid buses. The new Diesel and Hybrid buses replaced 1995 Conventional Diesel buses that exceeded their useful life. PVRTA continues to pursue grant funding opportunities for hybrid vehicles, including articulated buses with greater passenger carrying capacity.

iii) PVRTA Amenities

Bus system amenities can attract new riders who would otherwise travel using another mode. PVRTA has bus shelters along many of the routes, and the majority of them have benches and trash cans. Shelters improve the accessibility of transit through protection of riders from weather such as rain and snow, and

provide shade in the summer. PVTA is now installing solar-powered lighting at shelters and bus stops, as funds permit.

b) Operational Improvements

i) Surveys

Surveys of the existing PVTA passengers and routes provide an opportunity to identify system deficiencies and barriers that customers face when using the service. Once challenges have been identified, measures can be implemented to improve the systems efficiency and ease of use. Removing barriers is important to generate new riders and retain current riders. In order to better align existing services with customer demand, PVTA retained a consulting team of Nelson\Nygaard Consulting Associates and ASG Planning to prepare a Comprehensive Service Analysis (CSA). The objective of the CSA was to conduct a detailed review of existing transit services, identify strengths and weaknesses, and develop recommendations to improve service for existing riders and attract new riders. The effort was closely coordinated with Pioneer Valley Planning Commission (PVPC), one of PVTA's partners in designing and planning transit services for the region.

Completion of this effort brings PVTA into compliance with the requirements of the Massachusetts Transportation Finance Act of 2013 which directed each regional transit authority to develop a comprehensive regional transit plan. The plan involved consultation with the Massachusetts Department of Transportation (MassDOT), local employers, business associations, labor organizations and transit authority riders.

ii) Intelligent Transportation Systems

An intelligent transportation system enables systems to operate more efficiently, saving resources and energy, and improving rider experience. These systems use high tech solutions to allow the system to communicate information instantaneously. This information improves the ability of transit operators to react to daily challenges and allows more in depth data on route usage. Passenger experience will improve, as bus arrival and departure times will be more easily attainable for customer service agents.

2. Bicycle Planning

The Pioneer Valley region possess high quality bike lanes and bike trails that connect people to neighborhoods, shopping, recreational areas, major places of employment, and schools. These trails and lanes allow users to travel safely and quickly to accomplish daily activities. The extensive network of bike lanes and the areas they serve make the bicycle a viable transportation option in the Pioneer Valley region.

The network consists of on-road bike lanes and off-road bike trails. The on-road bike lanes have pavement markings and are approximately 3.5 feet wide. Bike lanes must have the appropriate width to allow for safe and adequate spacing between

automobile and bicycle. The majority of the region's off-road bike trails are placed on top of old rail lines, a strategy and program known as "rails-to-trails." The majority of the industry that utilized the rail system has left the Valley and provided an opportunity to expand alternate mode facilities on former rights of way.

a) Regional Bike Share Study

A feasibility study of a regional bicycle sharing system was completed in 2014. Amherst, Northampton, Holyoke, and Springfield were included in the study, which explored and evaluated the approaches of purchasing or leasing bicycle share equipment and operational services on a regional basis to serve the four communities. An advanced feasibility study will be completed in 2015 to evaluate vendor cost estimates, etc. A regional bike share program would utilize existing on- and off-road bicycle networks in and between these communities.

b) Bicycle Linkages

Among the many existing and planned bicycle routes throughout the region, there are multiple linkages that would help form a connected network. An analysis and prioritization of these linkages is currently underway, with a focus on those linkages that form an in-tact network north-south along the river; between the college towns of Northampton and Amherst; and over the border into Connecticut.

c) Other Bicycle Planning Efforts

Bicycle planning efforts are also pursued through regular surveying and marketing. Surveying users of these trail systems provides an opportunity to identify system deficiencies and barriers individuals face when using the system. Once challenges have been identified measures can be implemented to improve the systems ease of use. Marketing efforts such as Bay State Bike Week promotes the use of bicycles. This week long initiative encourages people to use their bikes to complete their commuting, shopping, recreational and social trips.

3. Passenger and Freight Rail

The Pioneer Valley is served by both passenger and freight rail. Possessing these rail lines expands transportation options for traveling within the region and allows more environmentally friendly modes of transport for goods imported and exported. Springfield's Union Station is currently served by 11 trains daily providing extensive service in the northeastern U.S. and connections nationwide. Passenger Rail service is provided on both East-West routes and North-South Routes through the region. The Pioneer Valley has an additional station located in Amherst that is served by two trains per day. The region's major freight and intermodal yard is located in West Springfield (CSX). CSX has made significant infrastructure improvement to the West Springfield facility. The region is served by two class one shippers, Pan Am and Norfolk Southern. Goods are also transported by CSX Transportation, New England Central, Pioneer Valley Railroad and MassCentral Railroad.

4. HUD Sustainable Communities Initiative Grant

PVPC, in collaboration with the Capitol Region Council of Governments (CROCG) in Hartford and the Central Connecticut Regional Planning Agency (CCRPA), was awarded a federal Sustainable Communities Initiative regional planning grant from the Department of Housing and Urban Development, (HUD) with an explicit goal of lessening the transportation and housing burden on the region's population via promotion of transit-oriented development.

This grant resulted in the development and adoption of the region's first sustainability plan, titled ***Our Next Future***, which was adopted by vote of the full Pioneer Valley Planning Commission in October 2014. ***Our Next Future*** contains sections on Sustainable Transportation and Green Infrastructure.

Moving forward land use, housing, and transportation must be planned together to create a sustainable region. The two main goals of the HUD Sustainable Communities Initiative regional planning program are:

- To identify sustainable transportation strategies and projects for the Knowledge Corridor.
- To advance Transit-Oriented Development (TOD) in the Pioneer Valley.

5. Land Use

The coordination of Land Use and Transportation Planning is an essential step in attaining sustainability opportunities for the region. Moving Ahead for Progress in the Twenty-first Century (MAP-21) promotes the coordination of transportation with land use, particularly early in the alternatives analysis/NEPA process. This means that plans created by communities are even more important to the development of transportation project alternatives. Coordination of transportation and land use provides opportunities to maximize the potential use and efficiency of development and transportation investments. Some of the most effective coordination efforts come from city and town master planning, transit oriented development districts, and creation of bicycle parking standards.

a) Master Planning

Master plans provide a vision for how a given municipality will grow, plan, and develop for the future. Incorporating sustainability into this process encourages towns to implement the concept into their standard practices. A number of municipalities in the region are currently updating their own master plans, including Holland and Plainfield.

b) Transit Oriented Development

Transit Oriented Development (TOD) promotes a balance of jobs and housing, and encourages the use of bus and other transit opportunities, combined with walking

and bicycling, to create a vibrant environment in which it is convenient and desirable for people to reduce their single occupant vehicle trips and bicycle, use public transit or walk. TOD is also strategy to limit suburban sprawl, improve air quality, and provide access to goods, services and jobs in close proximity to residential areas. This is accomplished because TOD districts offer higher density development that increases the viability of transit. TOD applications in the region are expected to increase as the use of rail becomes a more viable option for the region's population. The Knowledge Corridor rail line opened in late 2014 and has proved popular. Increased frequency of passenger cars along the Corridor and more direct connections to cities outside the region (such as Boston) will create more opportunities to concentrate development in areas served by multiple modes of transportation (cars, buses, streetcars, intercity buses, and more).

6. Gravel Roads

Gravel roads require proper design, maintenance and repair to prevent erosion and sedimentation. Heavy storms produce rapid water velocities that increase the potential for soil erosion, especially on and around gravel roads. Pollutants such as oil and grease can also be washed from gravel roads along with exposed soil, fine sands and silts. These sediments and pollutants are then carried away into nearby streams and ponds. Gravel roads can contribute heavily to significant water pollution problems if not managed properly. Sediment loading is a major cause of water quality problems in both lakes and streams, often carrying phosphorous and nitrogen that can lead to algal growth, or clouding cold water fisheries that are important to fish reproduction. Management of gravel roads is especially important in the face of increased intensity storm events due to climate change.

D. SUMMARY OF RELATED REGIONAL SUSTAINABILITY PLANS

A series of regional plans focusing on sustainability in various topics of regional importance have been produced since the 2012 RTP was adopted. These new plans are:

- Pioneer Valley Brownfields Plan 2014
- Pioneer Valley Climate Action and Clean Energy Plan 2014
- Pioneer Valley Regional Housing Plan 2014
- Pioneer Valley Environment Plan 2014
- Pioneer Valley Food Security Plan 2014
- Pioneer Valley Green Infrastructure Plan 2014
- One Region, One Future: An Action Agenda for a Connected, Competitive, Vibrant Green Sustainable Knowledge Corridor 2014 (PVPC, CRCOG, CCRPA)

This section summarizes the key findings and recommendations of these plans as they relate to regional transportation. Copies of these plans are available at www.pvpc.org

1. Pioneer Valley Brownfields Plan 2014

This plan facilitates the assessment, cleanup, and redevelopment of contaminated and blighted properties in the region by identifying 20 neighborhood-scale Areas of Brownfield Interest (ABI) where brownfields are pervasive, and resources to address them are most needed. The plan analyzes the location of brownfields in the context of low income and minority block groups and offers a series of strategies for each ABI relative to site-specific environmental assessment, cleanup and/or redevelopment planning.

One key finding of the Brownfields Plan is that minority and low-income populations disproportionately live in brownfield areas. Because brownfields are often an impediment to the redevelopment of downtowns, they are a factor in driving urban sprawl. The plan supports the development of transit-oriented development in urban centers in order to help the assessment and remediation of brownfields.

a) Transportation-related Recommendations and Integration with RTP

In addition to generally supporting transit-oriented development in urban centers, the plan identifies ABI-specific strategies throughout the region. Some of these ABIs are sites that support the region's current or future transportation network:

- Complete Site Cleanup in Holyoke: Train Station (among other non-transportation-related sites)
- Undertake Union Station Site Cleanup: Complete site cleanup, including partial demolition (baggage warehouse); Site cleanup at adjacent vacant lot (former Hotel Charles); Complete Phase I construction of bus terminal and parking garage; Restore pedestrian tunnel linking the station with train

boarding platforms and Lyman Street; Advance Phase II construction including addition of more office and retail space in the terminal building.

2. Pioneer Valley Climate Action and Clean Energy Plan 2014

This plan promotes greater understanding of the causes and consequences of climate change in the Pioneer Valley. Significantly, the plan found that more than 38% of GHG emissions in the region are generated by transportation-related sources.

This plan presents strategies for local and regional stakeholders to reduce greenhouse gas emissions through greater energy efficiency, produce more clean and renewable energy; it also offers recommendations to help protect people and infrastructure from climate-related damage by adapting to help make communities more resilient and able to recover from disasters.

a) Transportation-related Recommendations and Integration with RTP

- Transit Oriented Development (TOD) Zoning: Promote transit-oriented development through support for municipal adoption of TOD zoning districts around and along high-volume PVTA hubs and corridors, as well as passenger rail stations.
- Sustainable Transportation Project Criteria: Work with MDOT, Joint Transportation Committee and the PVMPO to advance adoption of sustainable project review criteria for review and ranking of transportation projects in regional Transportation Improvement Plan (TIP).
- Regional Funding for TODs: Regional planning and transportation agencies in many areas of the United States provide funding to promote and support TODs for a variety of uses including TOD planning, site acquisition and clearance, and project development costs.
- Transportation Funding Strategies: Utilize Congestion Mitigation Air Quality (CMAQ) funds for projects that reduce GHGs.
- Trip Reduction: Municipalities can require trip reduction plans for large-scale commercial and residential developments to reduce single-occupancy automobile travel.
- GHG Emissions Tracking: Tracking of GHG emissions is needed to understand progress of transportation-related emissions reduction efforts and progress toward the GHG targets specified in the 2008 Massachusetts Global Warming Solutions Act.
- Complete Streets Policies: Encourage municipal adoption and implementation of complete streets, including: bike lanes, sidewalks, traffic calming devices, pedestrian crosswalks, street furniture, bus shelters, bike racks, trees, sidewalk pavers, and interconnected streets.
- Fuel Efficient Vehicles: Local governments and private companies can require that new vehicles purchases are fuel efficient and/or run on cleaner fuels.
- Safe Routes to Schools: Improvements to increase safety and number of children walking to school, including continuous and wider sidewalks,

improvements to inter-sections and traffic signals, pedestrian connections and snow clearing.

- **Safe Biking:** Safer bicycling routes, including bike lanes and off-road bike paths.
- **LED Traffic Signals and Street Lights:** LED traffic signals and lights consume 80% to 90% less power and last up to six to eight times longer than conventional lights.
- **Idling Reduction Campaign:** Local governments should implement anti-idling educational campaigns using parents of school-age children as a target population.
- **Revised Parking Regulations:** Municipal parking requirements for multi-family and apartment residences could be set at a maximum of 1 car per unit, with developer incentives for units with no or shared parking.
- **Highway Tolls and Climate Revenues:** Implement tolls on major highways, scaled to weight of vehicle and time of day, thereby reflecting the greater impact that heavier vehicles have on road conditions and the greater GHGs emitted.
- **“Farebox Free” Bus Fares:** A prepaid bus fare program, modeled on the system that is already in use in the UMass/Amherst PVRTA service area, could replace the farebox share of the cost of PVRTA service (typically 15-20%). Possible revenue sources include employer contributions, regional self-assessments, municipal self-assessments, additional state and federal support, tolls on single-occupant vehicles, savings from the elimination of the farebox system, or a combination of these.
- **Improved Regional Ride Sharing:** Support for private or nonprofit entities that use social media or web-based technologies to increase user trust of shared rides, such as institutional sponsorship, certification and user satisfaction reports.
- **Park and Ride Lots:** Work with MassDOT to expand the availability of park and ride lots to promote ease of commuter ride sharing.
- **Telecommuting Centers:** Establish telecommuting centers where workers can use computers and the internet to reduce the number and distance of commutes to employment centers.
- **Inventory, Vulnerability Assessments and Protection of Critical Infrastructure:** Assessments of critical infrastructure are needed to understand vulnerabilities from flooding and severe weather. The resiliency of transportation facilities, especially roads and highways, are critical to disaster recovery.
- **Upgrades of Stream Crossings, Bridges and Culverts:** Pro-active replacement of underperforming culverts and bridges with larger structures that are adequately designed to accommodate floods and promote wildlife passage is essential.

3. Pioneer Valley Regional Housing Plan 2014

This plan identifies opportunities to improve housing market stability, housing affordability and fair access to housing in the Pioneer Valley. The overall goal is to

create a region in which all residents are able to choose housing that is affordable and appropriate to their needs. The plan is geared to assist municipal officials, state government, and fair housing associations in creating a sustainable region that empowers our urban, suburban, and rural places.

One key finding of this plan is a significant shortage of multi-family homes throughout the region. Location of multi-family homes within walking distance of public transportation services is cited by the plan as a critical goal for meeting the demand for housing by younger families (“millennials” age 20 to 35) who are more open to a car-free lifestyle than older generations. The plan also cites lack of public transportation in suburban and rural areas as an impediment to greater choice in the housing market, as well as a lack of convenient transportation links from these communities to employment centers.

a) Transportation-related Recommendations and Integration with RTP

This plan does not contain recommendations that directly involve transportation. This plan does cite the general role that transportation plays in the “liveability” of a community, which is one of the key attributes in attracting a variety of housing types and diversity of residents.

This plan notes the importance of transportation connections between homes and employment centers. Commute times of 10 minutes or less by car, 15 minutes by transit and 20 minutes by bike or on foot are desirable—as well as having key destinations for shopping, school and recreation within these ranges. Areas with this level of access are considered to be of “high economic opportunity,” while those that are more remote or less connected, particularly by public transit, are considered to be of “low economic opportunity.”

This plan also cites the “drive to quality” phenomena in which housing prices or rents near employment centers have risen to a level where workers must seek homes further and further from their jobs in order to find a one for which they can satisfy bank financing requirements. Transportation is a relatively non-discretionary part of family budgets, for which a desirable target is no more than 15% of total household monthly costs to avoid being “cost-burdened.”

Finally, a principal theme of this plan is that public and private investments in housing need to be balanced with those in transportation, infrastructure, services, environmental conservation and other factors to achieve the desired goal of a more equitable and stable housing market.

4. Pioneer Valley Environment Plan 2014

This plan presents strategies to protect ecosystems, biodiversity, wildlife habitat, and water quality, and to coordinate land uses in ways that are harmonious with the environment. The plan also aims to protect farmland and create a regional trail network.

One key finding of this plan is that water quality is improving, particularly along the Connecticut River, but that public access to the river is limited and inconsistent. Investment in riverfronts – such as through riverwalks and strategically located trail networks – is one way to both enhance environmental stewardship of rivers and also increase the regional transportation network.

a) Transportation-related Recommendations and Integration with RTP

- Upgrade stream crossings and culverts: Integrate culvert and bridge replacement into road and utility maintenance projects in order to upgrade underperforming culverts/bridges with those that meet MA Stream Crossing standards.
- Create storm-proofed infrastructure: Increase the resilience of infrastructure, including roads and bridges, to withstand severe storm events and flooding due to climate change.
- Conduct a Bi-State Trail Linkages Study: Conduct a bi-state trail linkages study to identify opportunities for linking trails, such as the Connecticut Riverwalk and Farmington Canal Heritage Trail, between Massachusetts and Connecticut.
- Support Pioneer Valley Regional Trails Coalition: Participate in the development and implementation of a Pioneer Valley Regional Trails Coalition to increase local/ regional capacity for developing and stewarding regional trail networks
- Implement Zoning for Bike and Pedestrian Amenities to Support an Intermodal Pedestrian and Bicycle Network: Help communities adopt zoning bylaws to require sidewalks, bike path connectors, bike parking and amenities in new developments, and internal pedestrian linkages in large projects.
- Complete the Connecticut Riverwalk and Bikeway Buildout: Work with Chicopee, Agawam, West Springfield and Holyoke to complete the design and build-out of Connecticut Riverwalk segments.
- Design and construct four trails and river access areas along Connecticut River Byway (Red Rocks River Trail along the riverbank in North Hadley, MA; Porter Phelps Huntington House to Mount Warner Trail in Hadley; Connecticut River to Mount Holyoke Range Trail in South Hadley; and Connecticut River Car-top Boat Access at Ferry Road in North Hadley, MA.)
- Create Connecticut River Greenway Park and Trail, Northampton, MA: Develop river access for CT River Greenway riverfront park and multi-use trail along CT River from Norwottuck Rail Trail on Damon Road to Elm Court, Hatfield.
- Create linkages: Create trail linkages between Connecticut Riverwalk at the Chicopee River delta, and connection to the Chicopee Riverwalk in downtown Chicopee; and link the Connecticut Riverwalk to Forest Park and Agawam.

5. Pioneer Valley Food Security Plan 2014

Plan Description: This plan is strategic in nature, created to help the region's food producers, consumers, hunger relief organizations and others advance their shared

goals and strategies for creating a more robust and sustainable food system. The plan is organized around two large and inspirational themes: “No one goes hungry” and “We grow our own food.”

The lack of access to healthy food is a critical concern in the Pioneer Valley. Of the region’s 695,000 residents,⁷ an estimated 91,000 people (12%) do not have enough money to regularly buy food for a healthy diet.⁸ Approximately 35,500 people of the region (5%) live in so-called “Food Deserts” – neighborhoods that are considered by the U.S. Department of Agriculture (USDA) to have “low access” to sources of healthy food, usually no full line supermarket.⁹ And up to 24,627 people (4%) live in rural areas more than 10 miles from the closest store that sells fresh foods.¹⁰

To begin to address this concern, the Food Security Plan includes an analysis of food accessibility to help set priorities for efforts to improve access to healthy food. This analysis considered three key factors (drawn from USDA Food Desert analysis) that are related to a person’s mobility and ability to buy food from supermarkets:

- Poverty (defined as the federal poverty level of \$15,000 per year per person)
- Distance from a supermarket (outside a 1-mile walk or connecting PVTA bus route in urban areas, or outside a 10-mile drive in rural areas)
- Access to a private automobile.

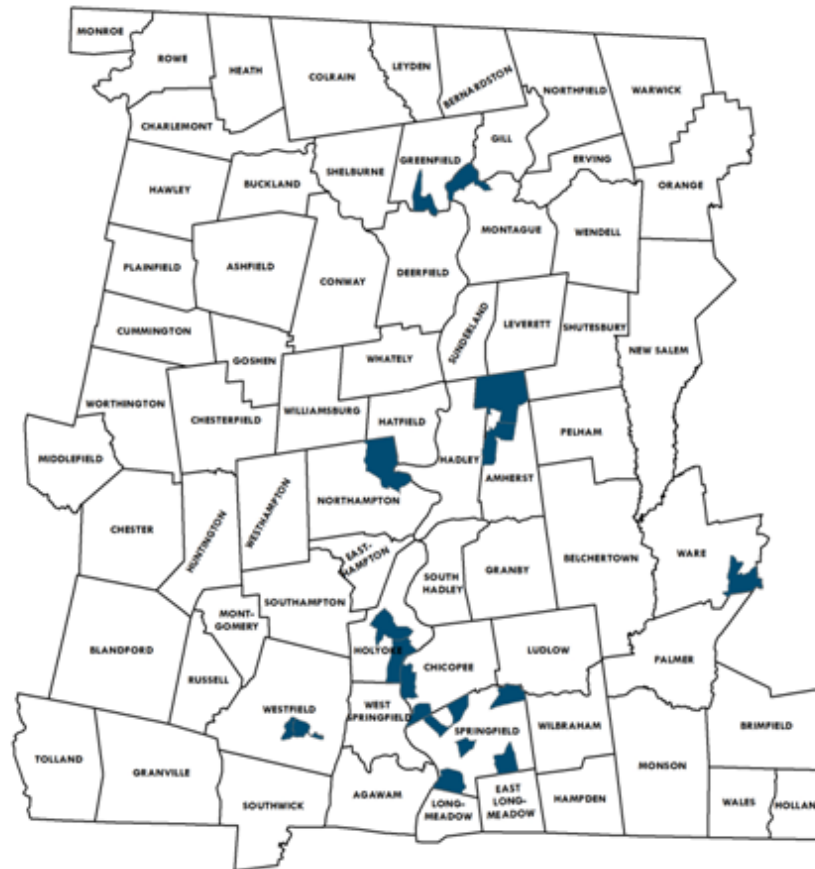
⁷ U.S. Census 2010. Hampden, Hampshire and Franklin Counties.

⁸ Feeding America. “Hunger in America.” 2011.

⁹ U.S. Department of Agriculture. Food Desert Locator Tool. Accessed 10/15/12.

¹⁰ Pioneer Valley Planning Commission. Analysis of U.S. Census 2010.

Figure 10-3 – Target Priority Areas for Improved Access to Healthy Food



This analysis finds that lack of access to healthy food is a widespread problem for residents of the region, but especially for those living in the 18 target areas identified by analyzing poverty, proximity and transportation availability of residents in the region.

Similarly, in 2014 a municipal-scale grocery store accessibility analysis for residents of housing developments in Amherst was produced by PVPC as part of the implementation of the Food Security Plan. This analysis found that lack of access to a car more than doubled travel times to stores that were less than 3 miles away, highlighting the inconveniences that people throughout the region face in trying to shop for healthy food without a car. As a result, many people choose less healthy options, such as highly processed and high calorie foods, simply because they are available at nearby convenience stores and restaurants.

a) Transportation-related Recommendations and Integration with RTP

The Food Security Plan offers 31 recommendations geared to enhance local food production and businesses in the region and reduce hunger and food insecurity. There is one recommendation the directly involves transportation:

- **Provide Access to Sources of Healthy Food:** Provide free or reduced-fare bus passes to low-income riders for trips to garden plots, farmers' markets and other community food sources.

6. Pioneer Valley Green Infrastructure Plan 2014

The Pioneer Valley Green Infrastructure Plan acknowledges that roads can serve to clean our water and green our neighborhoods with the integration of green infrastructure. The plan calls for green infrastructure to be integrated into new road development projects and road reconstruction projects whenever possible and feasible. Green infrastructure works by naturally filtering stormwater from road runoff, and also provides shade and greenery for both motorists and pedestrians.

One key finding of this plan is that green infrastructure can be more cost-effective than traditional “gray” infrastructure by reducing the need for pipes, treatment systems, etc., and by reducing flooding. Sustainable funding options are needed to support green infrastructure, and one strategy is to integrate green infrastructure into already-planned road maintenance projects.

a) Transportation-related Recommendations and Integration with RTP

- Couple “complete street” with “green street” projects: Promote dialogue on how municipal stormwater managers can collaborate with their colleagues tasked with improving the street experience for pedestrians and bicyclists to produce projects that result in “complete green streets.”
- Hold regular municipal cross departmental roundtable discussions to encourage the integration of green infrastructure in all projects involving stormwater management: This could lead away from single purpose construction projects to more cost effective projects that serve multiple purposes.
- Coordinate with MassDOT’s Impaired Waters Program to reduce peak flow in CSO communities: Provide information to MassDOT’s Impaired Waters Program about locations where runoff from MassDOT roads such as I-91 contributes to combined sewer flows.
- Amend road building practices to better reduce total impervious area and to manage stormwater runoff from roads: Update subdivision regulations, and capitalize on lane narrowing in urban locations to introduce roadside planters and other small-scale green infrastructure.
- Promote Federal Highway funding for projects that incorporate green infrastructure: Ensure that new project scoring criteria used by the Metropolitan Planning Organization in evaluating Transportation Improvement Program (TIP) projects include points for managing stormwater through green infrastructure.
- Develop a model green infrastructure policy: Including a “Green Streets Policy” to ensure that green infrastructure is included in all new road and road reconstruction projects.

7. One Region, One Future: An Action Agenda for the Sustainable Knowledge Corridor 2014

This plan presents a action agenda for the broader Knowledge Corridor region that includes the Pioneer Valley, Greater Hartford and Central Connecticut planning areas. This plan is a summation of the Sustainable Knowledge Corridor regional planning project supported by the HUD Sustainable Communities Initiative regional planning program. The plan's overall goals are to create a region that is connected, competitive, vibrant and has a green future.

This plan presents the following goals that are most directly related to regional transportation:

- Increased transportation and communication choices.
- Access to passenger rail and bus rapid transit services through the New Haven-Hartford- Springfield and Vermonter rail projects, and the CTfastrak bus rapid transit project.
- A network of bicycle and pedestrian paths, bike lanes, sidewalks, bike share programs, and related bike infrastructure.
- Complete streets that provide safe and convenient access for pedestrians and bicyclists, as well as vehicles.
- Reduced dependency on auto trips and resulting savings in energy use and less air pollution.
- High speed internet access for all businesses, schools, residences and local governments throughout the region

E. DOCUMENTING GHG-EMISSIONS REDUCTION FOR GREENDOT IMPLEMENTATION

MassDOT, using its statewide travel demand model, has provided the Pioneer Valley MPO with statewide estimates of CO₂ emissions resulting from the collective list of all recommended projects in all the Massachusetts RTPs combined.

Emissions are estimated in the same way as the criteria pollutants (volatile organic compounds, nitrogen oxides, and carbon monoxide) whose emissions are required for the air quality conformity determination (for further description, see Chapter 16). However, the CO₂ emissions shown here are part of an effort separate from the conformity analysis and are not part of those federal standards and reporting requirements.

The Global Warming Solutions Act (GWSA) legislation requires reductions by 2020 and further reductions by 2050, relative to the 1990 baseline. The project mix from this RTP (and all other RTPs) was modeled for both 2020 and 2035 using an Action (Build) vs. Baseline (No-Build) analysis to determine the CO₂ emissions attributed to the all MPO's mix of projects and smart-growth land use assumptions. The estimates of the modeled CO₂ emissions are provided below:

Table 10-2 – Massachusetts Statewide CO2 Emissions Estimates

(all emissions in tons per summer day)

Year	CO2 Action Emissions	CO2 Base Emissions	Difference (Action – Base)
2010	101,514.4	101,514.4	n/a
2020	105,747.5	105,856.4	-108.9
2035	115,034.1	115,028.0	6.1

As shown above, collectively, all the projects in the RTPs in the 2020 Action scenario provide a statewide reduction of nearly 109 tons of CO₂ per day compared to the base case. However, the 2035 Action scenario estimates an increase of about 6 tons of CO₂ emissions compared to the base case. It should be noted that this current analysis measures only projects that are included in the travel demand model. Many other types of projects that cannot be accounted for in the model (such as bicycle and pedestrian facilities, shuttle services, intersection improvements, etc.) will be further analyzed for CO₂ reductions in the next Transportation Improvement Program development cycle. This information will be updated and reported at that time.

Working closely with MassDOT, the Pioneer Valley MPO will continue to report on its actions to comply with the GWSA and to help meet the GHG reductions targets. As part of this activity, the MPO will provide further public information on the topic and will advocate for steps needed to accomplish the MPO's and state's goals for greenhouse gas reductions.

F. IMPLEMENTATION PROJECTS

Implementation projects are transportation plans and projects that are expected to be completed over the next few years that will assist in the advancement of the Sustainable Transportation Plan. These projects are summarized in Table 10-3.

Table 10-3 – Sustainable Transportation Plan Implementation Projects

PROJECT NAME	RESPONSIBLE PARTY
TOD Market Analysis	CRCOG/PVPC
TOD Transit Planning Study	PVPC
Regional Greenhouse Gas Monitoring	PVPC
Transportation Evaluation Criteria	MassDOT, Pioneer Valley MPO
East/West Passenger Rail Study	MassDOT
TOD Investment Fund	PVPC
Green Street Policies	PVPC, DPWs, MassDOT
Replacement of Under-sized Culverts and Stream Crossings	PVPC, MassDOT, FEMA
Reduce CSO Impacts	PVPC, MassDOT
Funding for Bikeway/Walkway Projects	PVPC, MassDOT
Land Use Priority Plan	PVPC, EOHED, EOEEA
Regional Bike Share Program	PVPC, communities

1. TOD Market Analysis

The Pioneer Valley Sustainable Knowledge Corridor Transportation and TOD element plan is a parallel effort alongside a broader real estate market analysis for the 10 Knowledge Corridor passenger rail stations in Massachusetts and Connecticut with new or increased Amtrak and commuter rail service and the 11 CT Fastrak bus rapid transit stations between New Britain and downtown Hartford. The TOD market analysis is an implementation-oriented effort that is identifying the types of TOD investments that are likely to attract and retain homeowners, renters and commercial property owners within walking distance of these stations. For each station type, the analysis proposes strategies that can be initiated at the state, regional and local levels to support desired development. Key emerging strategies include the active engagement of major educational and medical anchor institutions in TOD planning, the creation of TOD zoning districts, streetscape inventories and bike/pedestrian enhancements, and land banking, to name a few.

2. TOD Transit Planning Study

An ongoing component of the Sustainable Transportation Element Plan is an analysis of the level and type of development transit can support in the Pioneer Valley region. The PVPC has developed a process to build upon existing regional plans such as Valley Vision 4 and the Plan for Progress to identify a series of potential sites for Transit Oriented Development (TOD) demonstration projects. An alternatives analysis of select regional sites that have the potential to support TOD sites will be performed to identify the transportation merits of each location. This alternatives analysis will be matrix driven and include information on the

demographics, existing transit service, known transportation needs, and potential to support TOD.

Upon completion of the alternatives analysis, one site will be chosen for a more detailed analysis geared towards the implementation of TOD in the future. Specifically, ridership surveys will be conducted along PVRTA routes that are anticipated to be impacted by the proposed site to identify how proposed transit route modifications might impact existing ridership. In addition, an assessment of the location and condition of existing sidewalks in the vicinity of the proposed site will be conducted to identify key maintenance projects to maintain a safe walking environment. A series of short and long term recommendations would be developed based on the results of the analysis to assist in fostering economic development, advance projects that address congestion and pedestrian needs, and identify performance measures that can assist in monitoring effectiveness.

The goal of this study will be to develop substantive next action steps in cooperation with an expanded project advisory committee to instruct how to achieve measurable results. Potential place-based actions include: TOD overlay zoning, TOD amenities to encourage bicycle, transit and pedestrian improvements, promotion of a TOD investment fund, and enhanced coordination of transit services for residents with income and language barriers.

3. Regional Greenhouse Gas Monitoring

The Pioneer Valley Planning Commission recently procured a greenhouse gas monitor for the University of Massachusetts Transit Services (UMass Transit) as part of a FTA grant to fund their new bus garage. The Picarro Cavity Ring Down Spectroscopy (CRDS) Analyzer measures three primary greenhouse gases, CO₂, CH₄ and H₂O, down to parts-per-billion (ppb) sensitivity. The analyzer incorporates temperature and pressure control and uses time-based measurement system via a laser to quantify the greenhouse gases. The analyzer can be used as a stationary device or as a mobile device.

PVPC is working in cooperation with the University of Massachusetts to identify uses for the monitor. Current efforts are focused on integrating mobile measurements taken by the analyzer into the regional Congestion Management Process (CMP). It is necessary to quantify greenhouse gas levels along CMP corridors in order to develop new performance measures to assist in identifying and prioritizing congestion in the region. The device will also be used at congested intersections to demonstrate the impact peak hour traffic flows have on greenhouse gas production.

4. Transportation Evaluation Criteria

Projects considered for funding as part of the Transportation Improvement Program for the Pioneer Valley (TIP) are reviewed using project review criteria endorsed by the Pioneer Valley Metropolitan Planning Organization (MPO). This criteria was

updated in 2015 to incorporate the requirements of the new federal MAP-21 legislation as well as the GreenDOT policy to promote smart growth and green infrastructure, and reduce greenhouse gas emissions as appropriate. More information on the update to the Transportation Evaluation Criteria is provided in Chapter 12.

5. East/West Passenger Rail Study

MassDOT and the Vermont Agency of Transportation, in collaboration with the Connecticut Department of Transportation, are conducting a study to examine the opportunities and impacts of more frequent and higher speed intercity passenger rail service on two major rail corridors known as the Inland Route and the Boston to Montreal Route. The study of these two rail corridors has been designated the Northern New England Intercity Rail Initiative. The consulting firm HDR in Boston has been retained to conduct this study which is expected to be complete by 2015. This planning effort provides an opportunity to develop a long term master plan for Passenger Rail in Southern New England. It is the intention that this plan will explore opportunities for passenger rail service and provide a scalable, incremental plan for implementation of new or expanded services. Particular emphasis will be placed on developing an innovative funding strategy as well as looking at the economic impacts that rail service would have on affected communities.

6. TOD Investment Fund

A Transit-Oriented Development (TOD) Investment Fund can be an effective tool to promote TOD development around the region, especially near high-volume passenger rail stations in Springfield, Northampton and Holyoke. TOD Investment Funds could be utilized for advance public acquisition of underutilized properties near rail stations and for public infrastructure improvements, in order to provide incentives for re-development of these properties for mixed use development. TOD investment funds have been used successfully in many U.S. cities, including Minneapolis and Atlanta.

7. Green Streets Policies

The Pioneer Valley Planning Commission has developed a model “Green Streets and Green Infrastructure Policy Statement”, which promotes the use of green street facilities and green infrastructure in public and private development through regulatory, capital investment, and management mechanisms as a cost-effective and sustainable practice for stormwater management in current and future projects wherever technically and economically feasible. This includes:

- Road reconstruction, new road development and bicycle or pedestrian projects;
- Stormwater projects; and
- New development and redevelopment projects

The Green Streets Policy further establishes new city policies to:

- Incorporate and maintain green street facilities and green infrastructure into all City-funded development, redevelopment, and enhancement projects, to the extent technically and economically feasible, and utilizing the best technology available at the time to meet water quality goals with the lowest maintenance costs; and
- Ensure that regulations require and incentivize all development to incorporate some Green Streets and green infrastructure features; and
- Ensure coordination and communication between City departments, in particular, Public Works and Planning and Sustainability, to ensure implementation of this policy, as well as fully addressing competing priorities.

PVPC has worked with the City of Northampton toward adoption of this policy, and offers technical assistance to other communities in adoption.

8. Replacement of Undersized Culverts and Stream Crossings

Hurricane Irene and its after-effects clearly demonstrated that many of the region's roadway culverts and stream crossings are undersized for major storm events, and vulnerable to being damaged or washed away. In addition, recent work by the University of Massachusetts has identified that many of the region's roadway culverts and stream crossings are improperly designed to facilitate fish and wildlife passage. In PVPC's *Climate Action and Clean Energy Plan*, culverts and stream crossings that could improve ecological and hydrological connectivity are mapped, and recommended for upgrades.

The region should take advantage of all opportunities to upgrade its roadway culverts and stream crossings to meet the twin and compatible goals of:

- Improving the readiness of the region's infrastructure for severe storm events;
- Improving the region's culverts and stream crossing to promote fish and wildlife passage.

Opportunities for culvert and stream crossing improvement include: using federal FEMA mitigation grants; roadway reconstruction projects; and new construction.

9. Reduce Combined Sewer Overflow Impacts from State Highways

Runoff from state highways, particularly Interstates 91 and 291 has continued to be a source of stormwater inflow to combined sewer overflows (CSOs) in Springfield and Holyoke, causing increased frequency and volume of CSO pollution to the Connecticut River. The Connecticut River Clean-up Committee, created by an intergovernmental compact between Springfield, Holyoke, Chicopee, Ludlow and PVPC, made a formal request of MassDOT to prioritize reducing stormwater to CSOs from state highways in the Pioneer Valley region.

During storm events the runoff from these large impervious highway areas can quickly enter the CSO systems, where such resulting high stormwater flow rates

displaces sewage, and contributes to overflows of raw sewage to the Connecticut River or its tributaries. The region has already committed over \$356 million dollars to reduce and eliminate CSOs. The cities affected most by this problem, Springfield, Chicopee and Holyoke, are interested in collaborating with MDOT to help accomplish these goals.

MassDOT has indicated an interest in sewer separation as part of future programmed projects. The following specific programmed projects which could have the largest impacts on CSOs in our region if the projects are designed to include stormwater retrofits. These projects are summarized in Table 10-4.

Table 10-4 – Summary of MassDOT CSO Projects

MDOT Project Number	Location/Name	Est. Construction Date	CSO's Affected
607564	Springfield-Chicopee I-291 Maintenance	2019	CSO's #10-16
606156	I-91 Exit 17, Holyoke	2018	CSO #18
606459	I-91 Viaduct	2019	CSO #10-16
609365	Bridge Replacements, Holyoke Canals	2015, 2018	CSO's # 9,16
603264	Canalwalk, Holyoke	n.a.	CSO #11
n.a.	Heritage, front, Dwight St., Holyoke	2018	CSO #16

As the design scopes for these projects are developed, they should include consideration of CSO abatement measures. Springfield, Chicopee, and Holyoke are experienced with the type of design and construction for CSO abatement projects and have the knowledge of where MassDOT drains tie into their wastewater collection systems. Reduction and/or elimination of highway runoff from the combined sewer systems can be achieved using “grey” and “green” infrastructure, including but not limited to targeted areas of stormwater separation, stormwater detention, infiltration, including but not limited to targeted areas of stormwater separation, stormwater detention, infiltration, green streets and the use of various forms of rain gardens and vegetated swales.

Each of these communities is under significant regulatory pressure to reduce, and where possible eliminate CSO. Including the Connecticut River Clean-up Committee in the planning phase of these projects can insure that MassDOT fully understands the significant impacts that highway runoff has on the issues associated with CSOs.

10. Funding for Bikeway/Walkway Projects

PVPC has established a goal, in the *Our Next Future*, to build a linked network of off-road bicycle and pedestrian paths and on-road bike routes. In order to achieve this goal, the region must incrementally allocate funding toward construction of bikeway/walkway projects in its regional Transportation Improvement Plan. The region has utilized funding programs such as the Congestion Mitigation Air Quality program (CMAQ) to advance bikeway/walkway projects in the region.

PVPC has developed an analysis of the region's bikeway-walkway network linkage needs and opportunities that can help to guide this process. Key components of the region's bikeway-walkway system that provide a backbone for future additions include:

- Connecticut Riverwalk and Bikeway
- Norwottuck Trail
- Manhan Trail
- Northampton Bikeway
- Southwick-Westfield Rail Trail.

11. Land Use Priority Plan

In 2014-15, PVPC has worked with the Massachusetts EOEEA and EOHEd, to prepare a Land Use Priority Plan (LUPP). This plan, which was formally adopted by vote of the full PVPC, includes the following components:

- Maps of regional priority development and regional priority preservation areas,
- Lists of local and regional priority development areas and priority preservation areas,
- A summary of the process for updating the regional priority areas
- A summary of the EOHEd/EOEEA state priority mapping and analysis, as well as a map of the state priority areas.

The overall purpose of the LUPP is to help better guide growth and development in the region, better coordinate state and regional priority areas, and to promote smart growth, compact mixed use development, protection of key resources.

The primary purpose of the Regionally-identified Priority Development and Protection Areas is to guide in development of local master plans, open space plans and zoning, and guide local decisions in land protection and economic development.

The primary purpose of the State-identified Priority Development and Protection Areas is to guide state investments for land protection and economic development.

12. Regional Bike Share Program

The Pioneer Valley region and its member communities are committed to creating more livable communities and downtowns, as well as reducing single occupancy vehicle trips and the resulting air pollution and greenhouse gas emissions. The region is working to increase bicycling, transit and walking. The region is also seeking to establish commuter rail service along the north-south Amtrak rail line serving Springfield, Holyoke and Northampton, and a bike share program could provide a complementary “last mile” component to this service.

In 2014, PVPC developed a detailed Feasibility Study for a Pioneer Valley Bike Share Program, in collaboration with the communities of Northampton, Springfield, Amherst and Holyoke. This study included:

- Evaluation of existing bike share programs;
- Identification of regional characteristics that support bike share;
- Demand analysis and proposed service area;
- Potential funding sources and financing options;
- Financial analysis of financing and operation costs;
- Recommended Business Model, Operating Structure, and Financing;
- Recommended Implementation Framework

PVPC is currently conducting advanced feasibility analysis for a pilot scale bike share program.