climate
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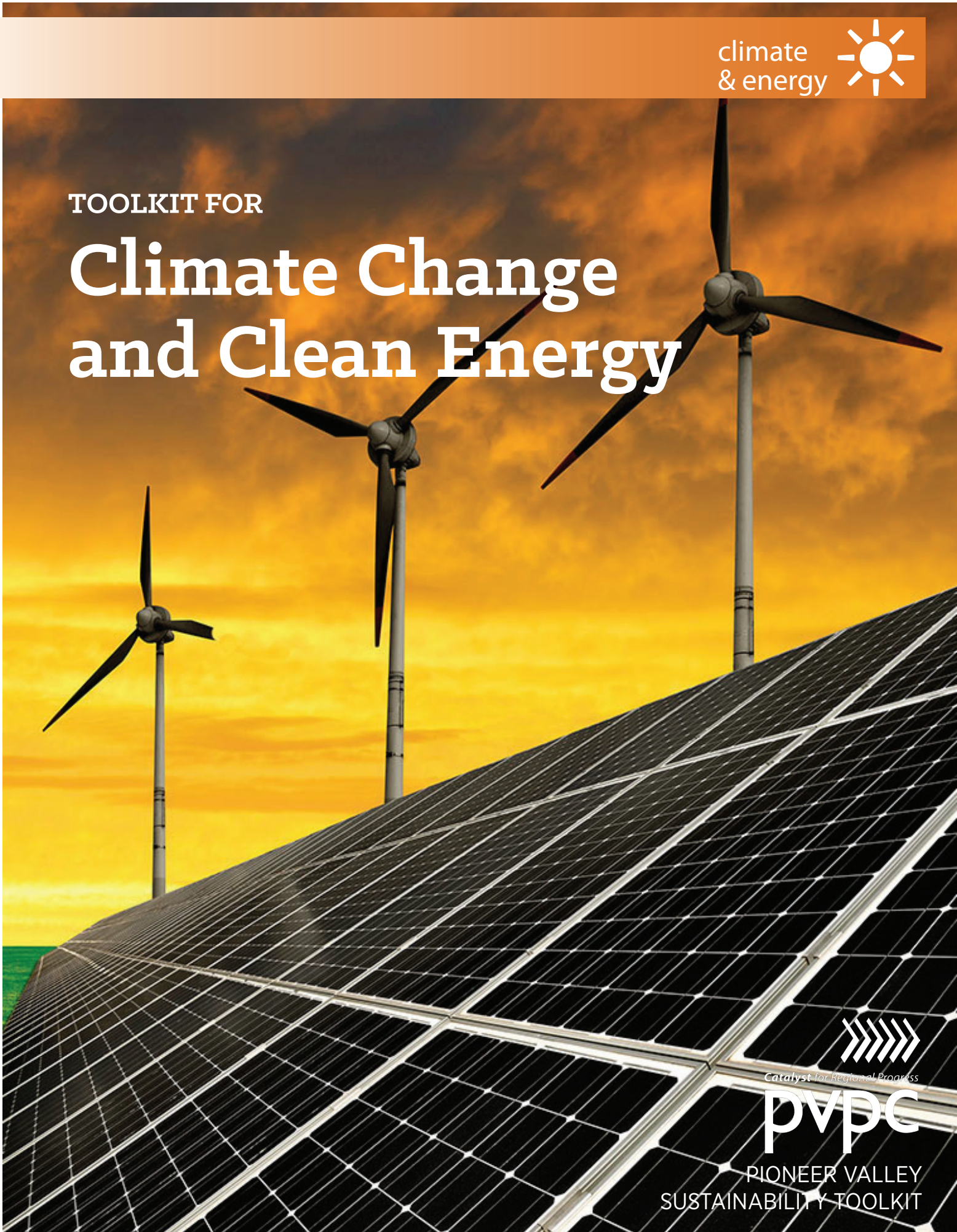
TOOLKIT FOR

Climate Change and Clean Energy



Catalyst for Regional Progress

PVPC

PIONEER VALLEY
SUSTAINABILITY TOOLKIT

TABLE OF CONTENTS

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Catalyst for Regional Progress

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PIONEER VALLEY SUSTAINABILITY TOOLKIT

UNDERSTANDING

Bike Access Standards

PURPOSE

To reduce vehicle trips and resulting greenhouse gas emissions by requiring bike racks and other bike amenities as part of development projects.

HOW IT WORKS

Communities can require, through either a general bylaw or a bylaw directed at a specified overlay district, that new buildings set aside indoor or outdoor parking for a set number of bicycles based on building square footage or number of tenants.

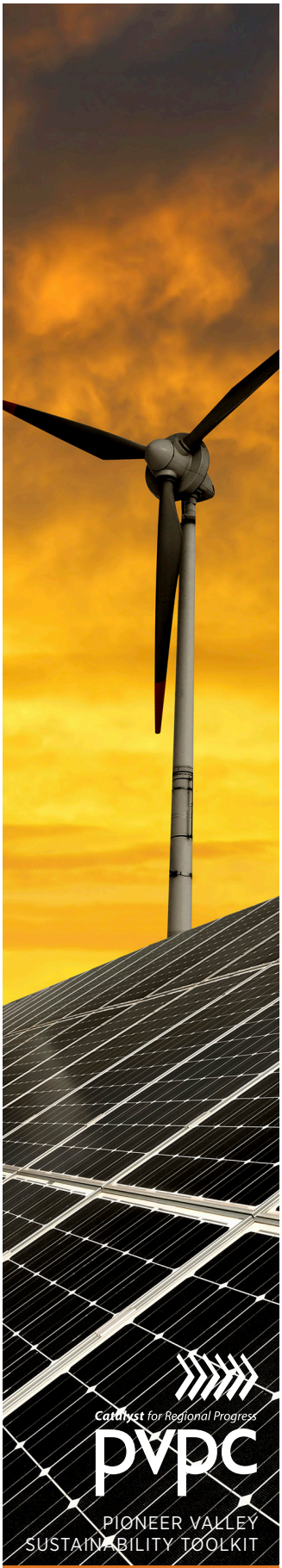
EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

New York City: BABs: Bicycle Access to Buildings Law

In 2009, New York City approved a Department of City Planning (DCP) initiative which requires secure parking for bicycles in new multi-family residential, commercial and institutional buildings throughout the city. It also applies to building projects where the structure is enlarged by 50 percent or more, and to building conversions to residential use.

This zoning ordinance requires bicycle parking spaces to be enclosed, secure, and accessible to designated users, such as residents, employees. To ensure that the new requirements do not encumber new development, required bicycle parking does not count against the permitted floor area. The following is a brief outline of NYC's bicycle parking requirements as they are illustrative of bicycle parking requirements in general:

- **Residential buildings with more than 10 units must provide secure bike parking for 50% of the units, or one space for every two units.**
- **Commercial office buildings must provide one space for every 7,500 square feet.**
- **Retail and most other commercial uses, as well as most community facility uses, are required to provide one space for every 10,000 square feet of floor area. Smaller buildings, where three or fewer bicycle spaces are required, can waive the requirement.**



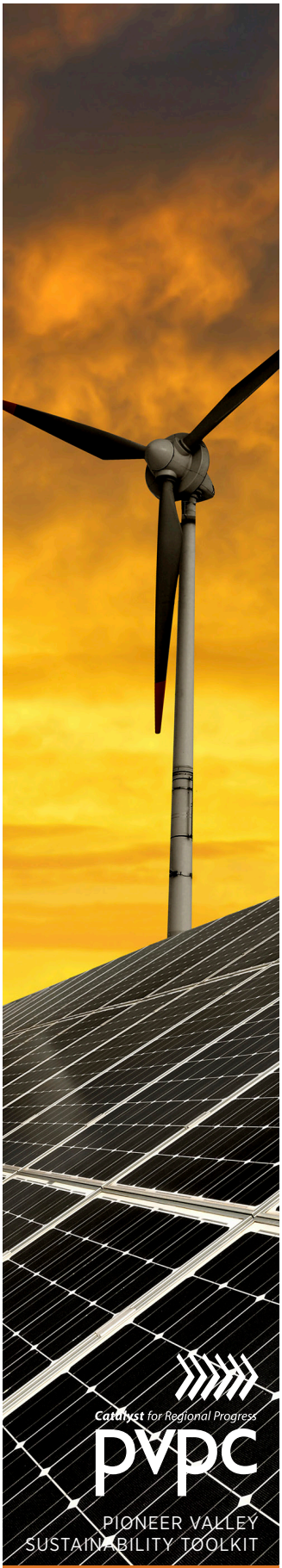
- Universities and hospitals must provide secure bike parking but special provisions would allow these institutions to locate spaces more flexibly in a campus setting.
- For industrial and semi-industrial uses, religious institutions, and certain other facilities with varied employment densities or unusual space demands, bicycle parking is required but would not count against permitted floor area.
- Public parking garages are required to provide one (1) bicycle parking space for every ten (10) automobile parking spaces.

New York City: BAOB: Bicycle Access to Office Buildings Law

New York City also passed a law that requires commercial office buildings to allow cyclists to bring bicycles into their offices by elevator, upon request. The law only applies to commercial office buildings with at least one freight elevator. It does not apply to residential buildings.

Cambridge, Massachusetts:

Requires bicycle parking for new development and redevelopment projects through its zoning. Locations and types of bike parking must be shown in building site plans and approved by the Traffic, Parking and Transportation Department and the Community Development Department. The City created user-friendly guidelines to provide clear direction to developers on how to meet the parking requirements.



LINKS TO MODEL BYLAWS OR MORE INFORMATION:

NEW YORK'S BICYCLE ACCESS TO BUILDINGS LAW:
The New York City Council - File #: Int 0871-2008

CAMBRIDGE, MASSACHUSETTS'S BICYCLE PARKING GUIDELINES:
http://www.cambridgema.gov/CityOfCambridge_Content/documents/tpat_BikeParkingBrochure.pdf

BICYCLE PARKING ONLINE, A BICYCLE PARKING BEST PRACTICES RESOURCE FROM THE CAPITAL BIKE & WALK ORGANIZATION IN VICTORIA, BRITISH COLUMBIA (BC), PROVIDES THE MOST COMPREHENSIVE COLLECTION OF MUNICIPAL LEGISLATION REQUIRING BICYCLE PARKING
http://www.bicycleparkingonline.org/Legislation

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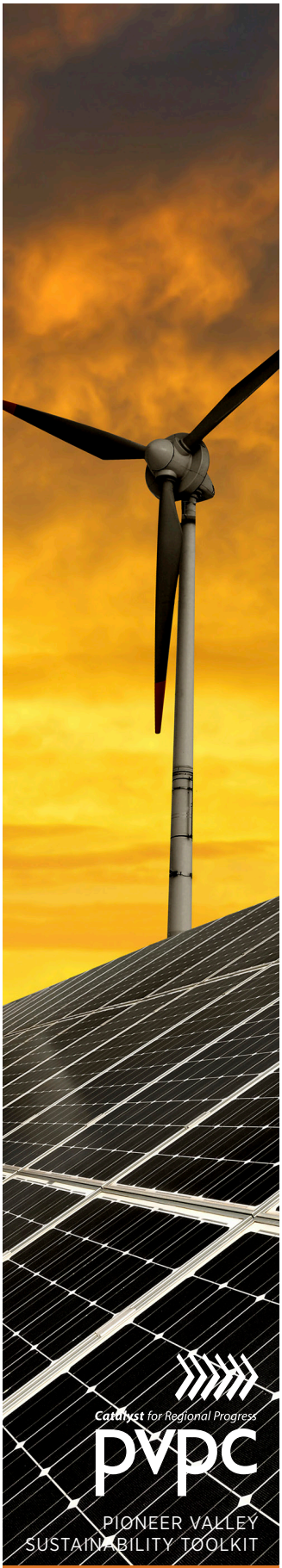

UNDERSTANDING

Carbon Offset & Impact Fee

PURPOSE

New development can burden a city or town with the responsibility for providing new facilities, infrastructure, and services to support the development. To reduce their financial burden, some communities assess impact fees to large developments. Impact fees can be used by the community to pay for necessary improvements, like roads or schools. Likewise, new development can increase a community's carbon footprint. Communities can gather carbon offset fees to pay for projects that will mitigate greenhouse gas emissions or help the community adapt to climate change impacts.

Note: Impact fees are not expressly permitted in Massachusetts currently. Zoning reform legislation currently before the Legislature would enable municipal impact fees.

HOW IT WORKS

Impact fees are an increasingly common way to shift some of the burden of growth back on the developer. Impact fees are financial responsibilities that a municipality places upon a developer to provide some or all of the physical improvements (from sewers and streets to parks and schools) necessitated by development and its impacts. Under this system, the developer pays a share that is reasonably proportional to the size of the development. There must be a justifiable connection between the new development and the need for new facilities. These physical improvements include improving transportation systems, updating storm water and sewage systems, upgrades to schools and libraries, or the provision of parks.

In addition to the strain on infrastructure within a community, development can results in greenhouse gasses (GHGs) emissions that can greatly increase a community's overall carbon footprint (a carbon footprint quantifies the total amount of greenhouse gasses emitted by a person, project, or activity). A development directly and indirectly emits GHGs during construction. Sources include producing materials, transporting materials and workes to the site, powering equipment, and the loss of carbon absorbing agriculture or forest land. After construction is complete, a development continues to have GHG emission impacts. Buildings consume electricity and heat—primary sources of GHG emissions. Development also generates traffic—another major source of GHG emissions.

Similar to using money from an impact fee to pay for a new school, the money from a Carbon Offset Fee goes towards mitigating GHG emissions within the community. The long term goal of applying a cost to greenhouse gas emissions is to provide incentives to developers to release as little emissions as possible. For example, a developer could

reduce their project's carbon footprint by minimizing land clearing, constructing energy efficient buildings, and choosing development sites that minimize traffic impacts.

The money generated by carbon offset fees can be used to reduce carbon emissions elsewhere within the community by planting trees, installing bike lanes, insulating houses or installing solar panels. Companies such as the American Carbon Registry, Verified Carbon Standard, or Carbon Trust Standard (to name a few) produce third-party documentation of a development meeting the rules set by a municipality and ensure that carbon offsets meet quality standards. Implementing impact or carbon offset fees can have lasting effects on the sustainability of a community.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

United Kingdom: Implementing carbon offset fees is an innovative development in mitigating climate change. In Europe, England's Magna Park Distribution Center is the leading example of a large development using fees to go carbon neutral. The growing town of Milton Keynes where the park is located has established a carbon offset fund that receives money from developments to the park. Developers pay into the fund according to the quantity of carbon emissions generated by their buildings. Since its introduction in 2008, developers have paid over £400,000. These funds have been used to help pay for energy efficiency improvements to 2,500 existing homes. The fund helps residents benefit directly from development in the area by increasing home values while

mitigating the communities overall impact on climate change.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

WATSONVILLE, CALIFORNIA, PROPOSED CARBON IMPACT FEE:
http://cityofwatsonville.org/permits-plans/climate-action-plan/carbon-fund-ordinance

AMERICAN CARBON REGISTRY:
http://www.americancarbonregistry.org/

CARBON TRUST STANDARD:
http://www.carbontruststandard.com/pages/home

INFORMATION ON IMPACT FEES BY STATE:
http://www.impactfees.com/state-local/state.php

MILTON KEYNES COUNCIL:
http://www.milton-keynes.gov.uk/mklowcarbonliving/

VERIFIED CARBON STANDARD:
http://www.v-c-s.org/

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UNDERSTANDING

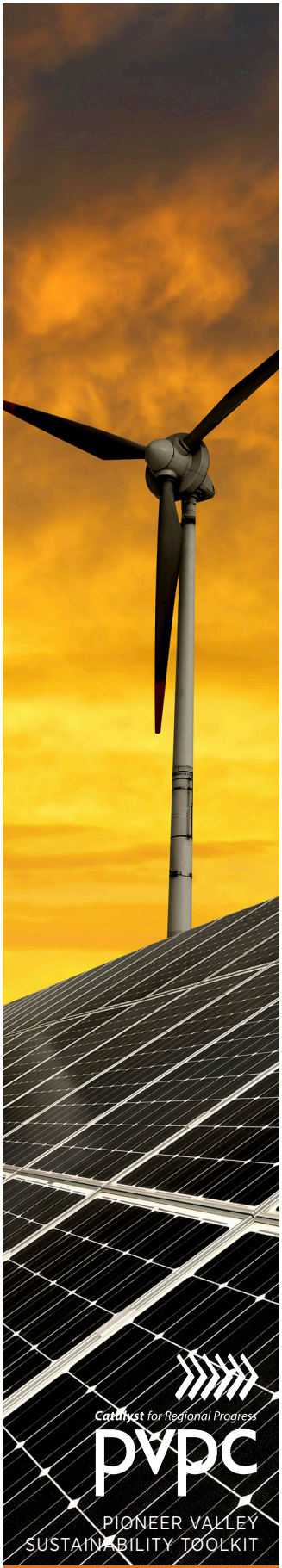
Complete Streets Policy

PURPOSE

To encourage low-carbon modes of transportation, including bicycling and walking, by ensuring that road design accommodates all users and all modes of transportation.

Transportation is one of the biggest contributors of greenhouse gas (GHG) emissions that cause climate change. In the Pioneer Valley, transportation accounts for about 31.8% of GHG—more than any other sector. Well designed roads can encourage low carbon transportation options like bicycling, walking, or use of mass transit.

Complete Streets Policies encourage, or require, road design and construction that adequately accommodates all users, including pedestrians, bicyclists, users of mass transit, people with disabilities, the elderly, motorists, freight providers, emergency responders, and adjacent land users. When correctly implemented, a complete street creates a safe, vibrant, engaging public space for everyone using it. Complete streets also contribute to the mitigation of climate change and the reduction of greenhouse gasses, through the promotion of transportation modes that generate little or no emissions.



HOW IT WORKS

Complete Streets policies can be adopted in a variety of ways. For example, a Complete Street policy can be an administratively issued directive that guides a Department of Public Works (D.P.W.) to consider all users in their projects. A Complete Streets Policy can be adopted as a standalone bylaw or ordinance. Complete Streets principles can be incorporated into zoning codes—particularly form-based codes. Complete Streets policies can also be part of a comprehensive transportation plan. Some communities choose to adopt detailed guidelines for design, construction, maintenance and repair of roads. These guidelines can include recommended street type classifications, recommended lane widths, intersection configurations, sidewalk requirements, where and what type of bike lanes to use, street furniture requirements, approval processes, etc.

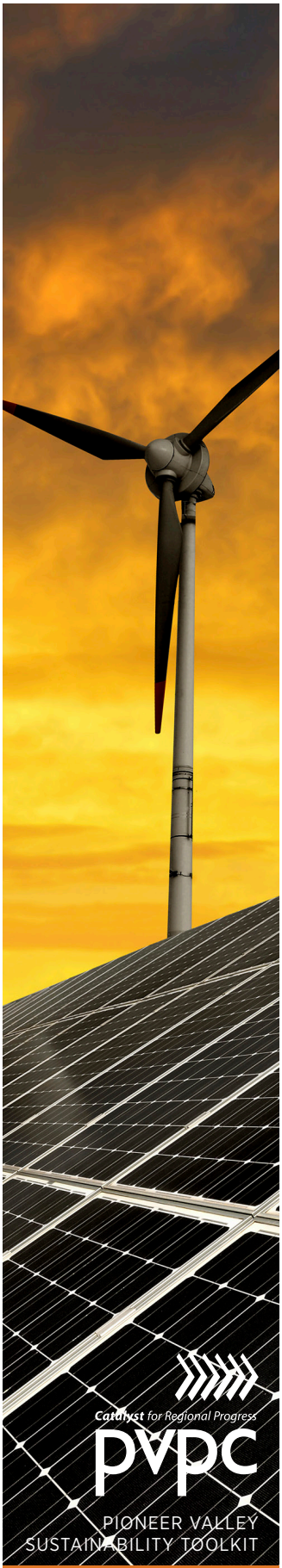
Successful complete streets policies result in projects that reflect a wide variety of community values, such as aesthetics, history, safety, mobility, and the environment.

Because the primary goal of a complete street is to accommodate all users, the first step in creating one is a thorough public outreach effort. The outreach should target various groups, including pedestrians, bicyclists, motorists, senior citizens, families, and users of public transit. Additionally, public safety officials should be consulted to ensure adequate accommodation for emergency vehicles.

Best practices to consider as part of a complete street design include:

- **Bike lanes that provide safe, free-flowing movement for bicyclists**
- **Continuous sidewalks with adequate widths and minimal tripping hazards**
- **Traffic calming devices (speed bumps, reduced lane widths, medians, etc.)**
- **Pedestrian features (crosswalks, crossing signals, street lights, etc.)**
- **Street furniture (bus shelters, bike racks, trees, trash cans, public art, newspaper boxes, etc.)**
- **Visually attractive methods for distinguishing space for different modes of transportation**
- **A well connected street grid with minimal use of cul-de-sacs or dead ends**
- **Helpful signage for pedestrians, bicyclists, and motorists (wayfinding, warnings, etc.)**

A municipality can use this list of best practices as a starting point for community discussion and to develop street designs that fits its unique context. Illustrations and case studies of best practices can be a useful component of the discussion and preliminary design. Regardless of the particular best practices selected, the chosen features should be designed as a cohesive vision, with various elements complementing each other.

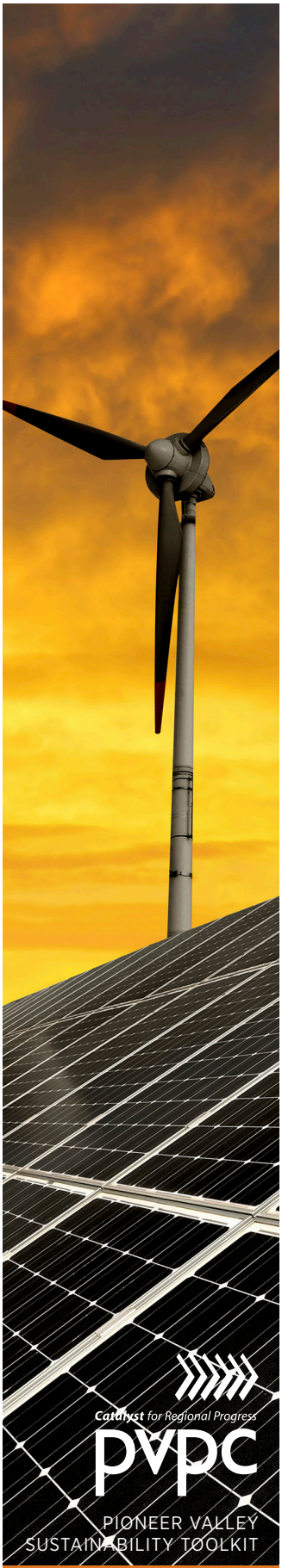


Examples that can be part of a cohesive vision include:

- **Coordinating the locations of bike racks, bike lanes, and signage indicating to motorists the presence of cyclists**
- **Incorporating individual bike lanes into an interconnected network**
- **Providing multiple features for pedestrians on the same road (traffic calming devices, benches, sidewalks, and pedestrian crossings located near each other)**

In addition to being part of a vision, design features should be examined for different road types, including local streets, collectors, and arterials. The design of complete streets for different roads will vary – for example, bicycles and cars may safely share a lane on low speed local roads, whereas major roads with heavy automobile traffic may require dedicated—even protected—bike lanes.

The examples in the next section include examples of several of the various types of documents that can be used for implementation. In addition, because the complete streets concept pertains to a wide variety of aspects of the built environment, officials from a variety of municipal departments should be consulted.



EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Northampton, MA

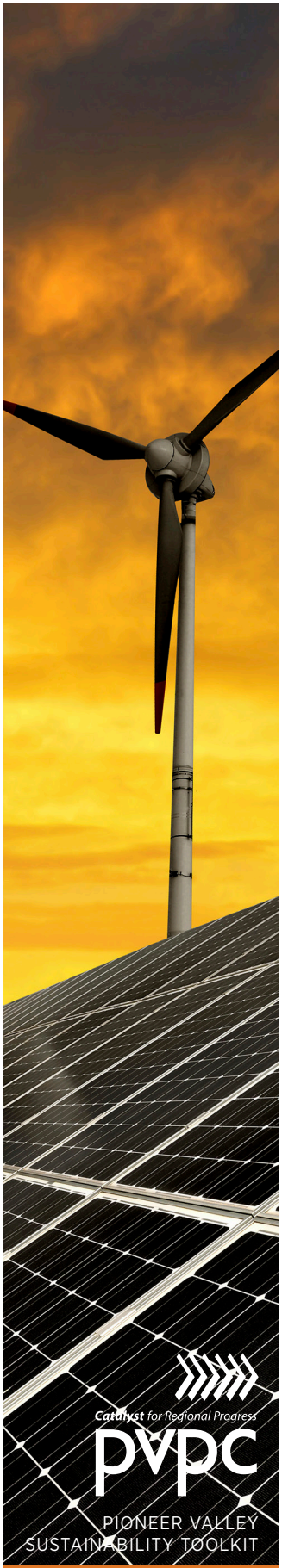
Northampton developed a Comprehensive Municipal Transportation Plan in 2005 which outlines a vision for all modes of transportation. The Plan's focus is the listing of 55 action policy actions, grouped by categories including core transportation policies, roadway and intersection policies, traffic calming, sidewalks, bicycle and multi-use travel and facilities, public transit, parking, enforcement, and transportation demand management. In addition, each policy action is assigned a set of municipal departments responsible for its implementation.

Bethlehem, NY

Bethlehem passed a resolution in 2009 to "recognize bicyclists and pedestrians as equally important as motorists in the planning and design of all new street construction and reconstruction." The resolution cites the goal of the Town's Comprehensive Plan to improve mobility of all residents, and lists the benefits of bicycle and pedestrian transportation. The resolution calls for the Highway Superintendant to enforce the resolution.

New York City, NY

The NYC Street Design Manual was published in 2009 and addresses all design components of a street, including suggested materials to use in construction, lighting, and the design of the right of way. The document's comprehensive focus includes the subjects of transportation, community, and environment. It has a variety of recommendations for different stakeholders, including design professionals, property owners, municipal officials, and citizens.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

COMPLETE STREETS MODEL GUIDELINES DEVELOPED BY THE NATIONAL COMPLETE STREETS COALITION:
http://www.completestreets.org/changing-policy/model-policy/model-state-legislation-options

MASSACHUSETTS LAW REGARDING ACCOMMODATION FOR BICYCLES AND PEDESTRIAN TRAFFIC:
http://www.malegislature.gov/Laws/GeneralLaws/PartI/TitleXIV/Chapter90e/Section2a

NORTHAMPTON MUNICIPAL TRANSPORTATION PLAN:
http://www.northamptonma.gov/opd/uploads/listWidget/2552/Northampton%20Transportation%20Plan--policies.pdf

BETHLEHEM RESOLUTION FOR COMPLETE STREETS:
http://www.townofbethlehem.org/images/pageImages/Paths4Bethlehem/CompleteStreetsResolution20090812.pdf

NEW YORK CITY STREET DESIGN MANUAL:
http://www.nyc.gov/html/dot/html/about/streetdesignmanual.shtml

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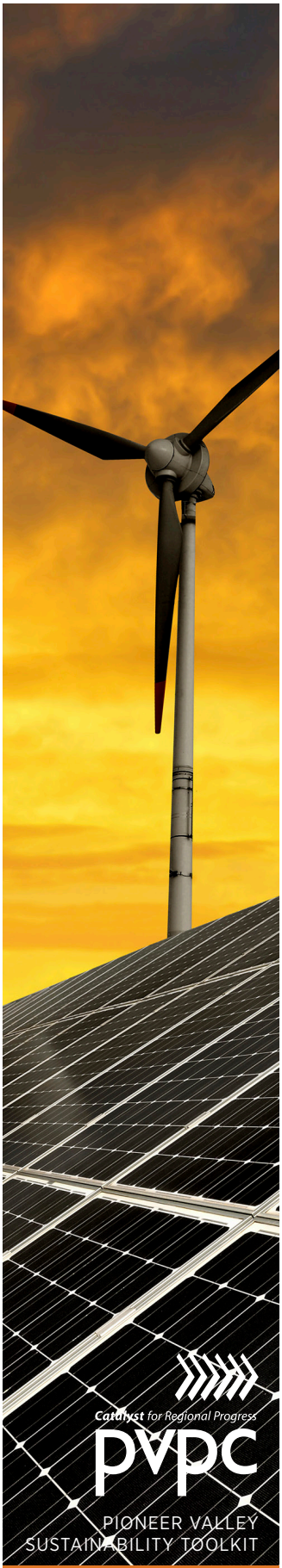
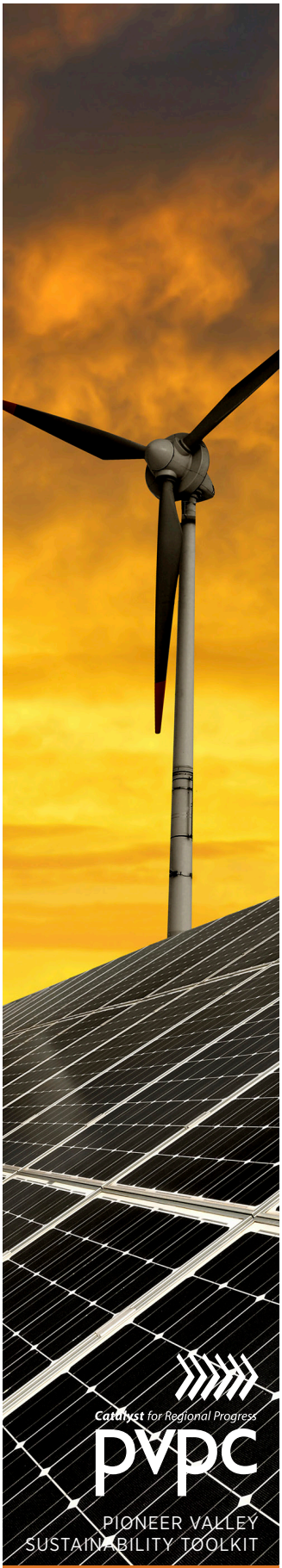


UNDERSTANDING

Energy Performance Scoring

climate & energy



PURPOSE

To reduce the use, impact and expenses of energy in homes and businesses by measuring the performance of buildings.

HOW IT WORKS

Energy performance scores are based on inspections from qualified professionals which test or audit the expected performance of a buildings' energy use. The score serves as a benchmark for home and building owners to compare how their property is performing, and how it could perform with improvements to the structure.

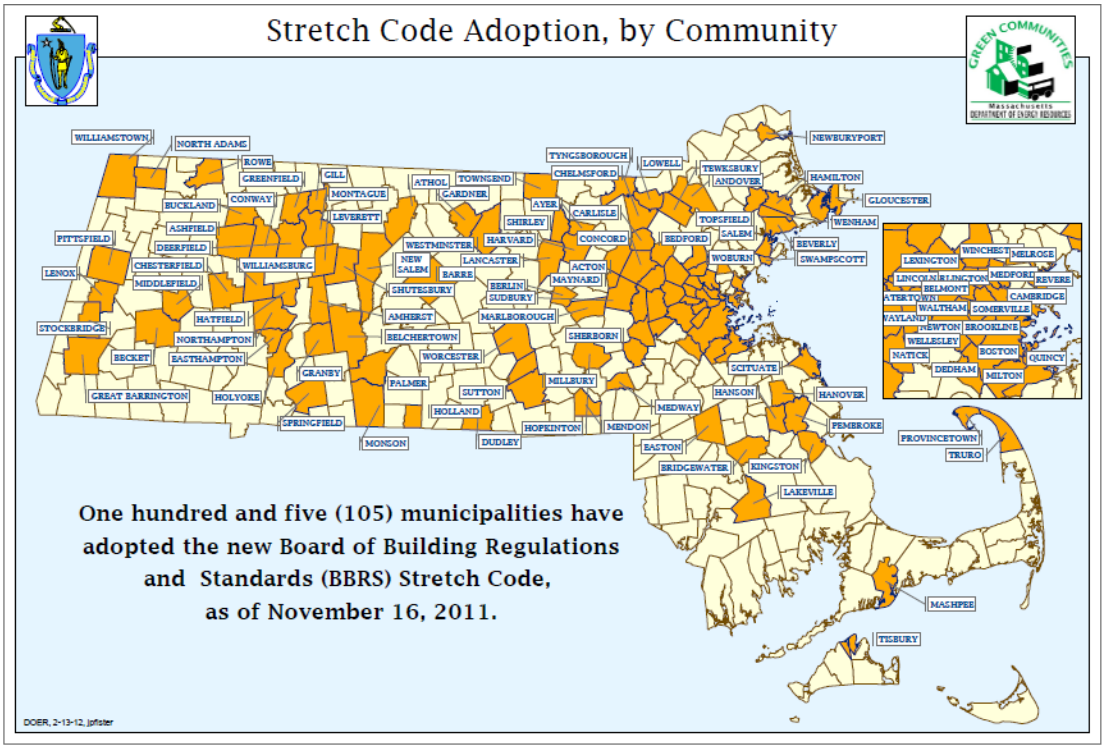
One common energy performance score used by municipalities in Massachusetts is the Home Energy Rating System (HERS), developed by the Residential Energy Services Network (RESNET), which is a national organization of energy-efficiency industries that set national standards for energy efficiency rating systems.

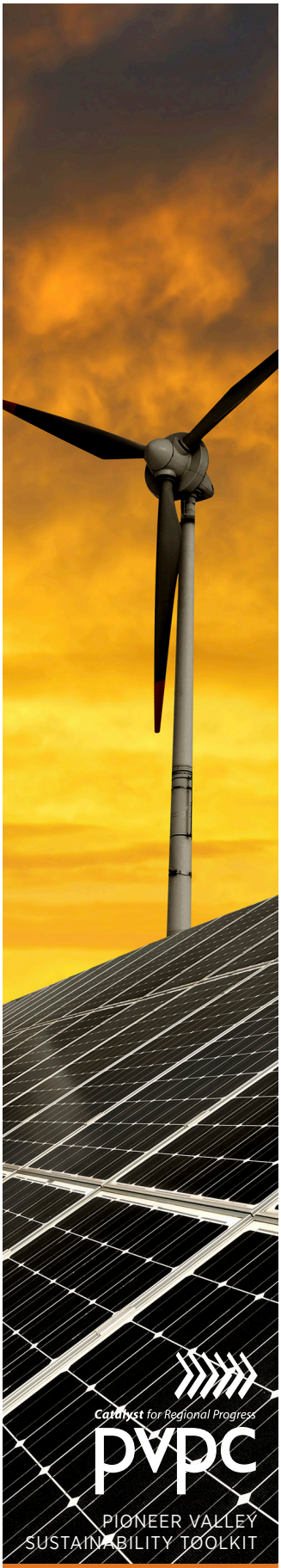
Through a home energy inspection and computer modeling, the HERS rating system compares the energy efficiency of the scored home with the efficiency of that home, had it been built to the standards set in the 2006 state building code. The hypothetical 2006 home score equals 100, and every point difference between the "standard" 2006 home and the scored home represents a percentage change in efficiency. For example, a home that scored 110 is 10% less efficient than the standard, while a home that scores 90 is 10% more efficient than the standard.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

The HERS performance score is being used in one hundred and five municipalities, about a third of all cities and towns across Massachusetts, to gauge compliance with the state "Stretch" Building Code, an amendment to the state building code that municipalities can voluntarily adopt as an ordinance or general bylaw. The Stretch Code requires all new homes under 2,000 square feet to have a HERS score of 70, while new homes over 2,000 square feet must have a score of 65. In other words, new homes in towns where the Stretch code has been adopted are 30% to 35% more efficient than the standard.

The stretch code is different from the basic building code because, instead of focusing on prescriptive measures – that is to say, government mandated materials and construction techniques – it relies on homes achieving specific performance scores. Homeowners therefore have more flexibility on what measures they pursue in order to achieve greater energy efficiency.





The Massachusetts Department of Energy Resources (DOER), in collaboration with the US Department of Energy and the Pioneer Valley Planning Commission, has also begun a pilot program called “Home MPG”, where residents of eight communities in the Pioneer Valley will be able to receive an energy performance score for their homes similar to a “Miles Per Gallon” score for vehicles. The Home MPG score is then used to show residents how their homes compare to state energy efficiency trends and targets, and what retrofits they can make in order to improve their score. Towns included in the pilot are Belchertown, East Longmeadow, Hampden, Longmeadow, Monson, Palmer, Springfield and Wilbraham.

LINKS TO MORE INFORMATION

STRETCH CODE:
http://www.mass.gov/?pageID=eoeeahomepage&L=1&L0=Home&sid=Eoeea and search for “stretch code”

RESNET:
http://www.resnet.us/home-energy-ratings

HOME MPG:
http://www1.eere.energy.gov/buildings/betterbuildings/ neighborhoods/massachusetts_sep_profile.html

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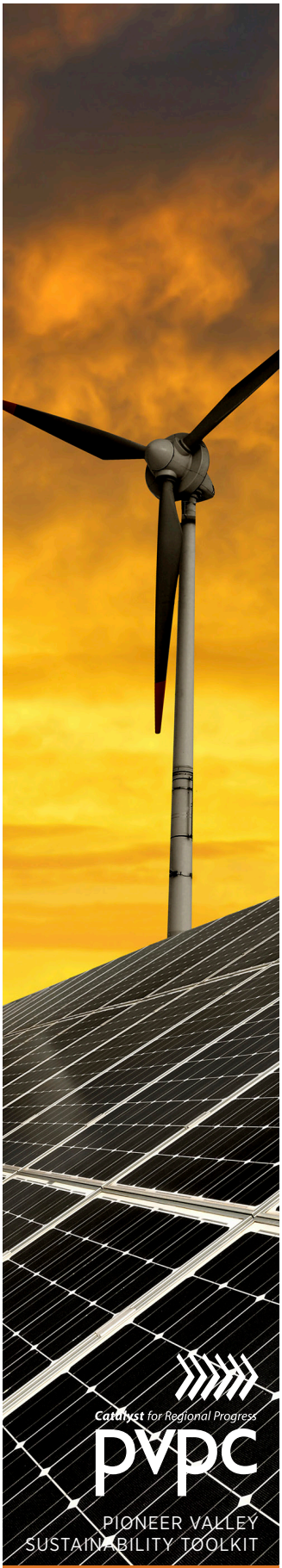

UNDERSTANDING

Fuel Efficient Vehicles Program

climate & energy

PURPOSE

To reduce carbon dioxide emissions from municipal vehicles by purchasing fuel efficient vehicles, which has a positive impact on the environment and saves the municipality money.

HOW IT WORKS

Local governments can adopt a policy that requires the purchasing of fuel efficient vehicles for municipal/school use when new vehicles are needed, and when such vehicles are commercially available and practicable. Local governments can develop and maintain an annual vehicle inventory of fuel inefficient vehicles and a plan for replacing these vehicles with vehicles that meet the fuel efficiency ratings below.

The US Environmental Protection Agency (EPA) maintains a database on vehicle fuel efficiency that is updated occasionally throughout the year, as new models are released. Municipalities that adopt a fuel efficient policy can reference the Massachusetts Department of Energy Resources Green Communities Program for the latest fuel efficiency MPG rating requirements.

Public and quasi-public agencies as well as private companies who offer transportation to consumers or maintain operation fleets—such as public transit authorities, airports, aircraft carriers, shuttle service companies, long-haul trucking companies, car rental agencies—are encouraged to adopt similar pledges and policies in an effort to reduce carbon emissions. An agency or company strategic plan should pledge the following considerations when opting to purchase new vehicles:

- **To purchase vehicles with fuel efficiency ratings;**
- **To purchase vehicles equipped with the most advanced emissions control systems available;**
- **To purchase vehicles equipped with devices that minimize idling and warm up time automatically; and,**
- **When feasible, to purchase vehicles that run on cleaner fuels like compressed natural gas.**

EXAMPLES OF ADOPTION

The University of Massachusetts adopted a policy in 2010 to consider the most economical, most fuel efficient, and lowest emission vehicles available in a particular model year that meet the operational needs and policy requirements when purchasing new vehicles. Previous policy language did not include discussion of fuel efficiency and low emission vehicles.

LINKS TO MORE INFORMATION

Massachusetts Fuel Efficient Model Policy

The Massachusetts Department of Energy Resources developed a model Fuel Efficient Vehicle Policy to encourage municipalities to reduce fuel consumption and energy costs. By adopting this policy, the municipality commits to purchasing only fuel efficient vehicles for municipal/school use whenever such vehicles are commercially available and practicable. This model policy was developed as part of the state's Green Communities Program, and adoption of this policy is one of the five requirements to be considered a "green community." Links to the model policy and guidance for complying with the policy are below. Over 70 Massachusetts municipalities adopted and implemented a version of this fuel efficient vehicles policy since 2012.

Massachusetts Model Fuel Efficient Municipal Fleet Policy

A LINK TO THE "GUIDANCE FOR COMPLIANCE WITH GREEN COMMUNITIES ACT CRITERIA 4"
http://www.mass.gov/Eoeea/docs/doer/green_communities/grant_program/GC-Guide-Criterion4-Feb22-2011.pdf

University of Massachusetts Policy

A LINK TO THE UNIVERSITY'S DEPARTMENT VEHICLE PURCHASING GUIDELINES IS PROVIDED BELOW.
http://www.umass.edu/procurement/policies/motorvehicles.htm

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UNDERSTANDING

Green Builder Programs

PURPOSE

To promote voluntary compliance by homebuilders with green building standards.

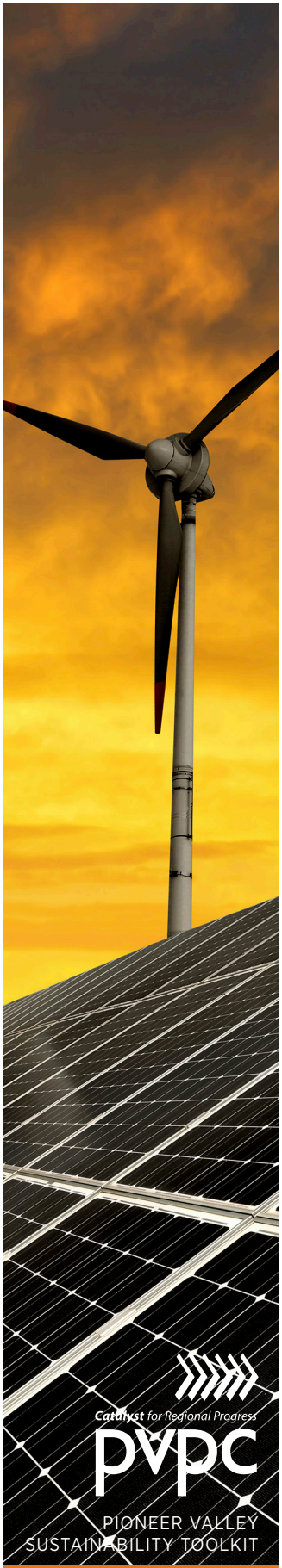
HOW IT WORKS

Communities can create voluntary builder certification programs offering incentives – such as priority plan review and guaranteed permitting timelines – to homebuilders who follow green building practices in new residential construction.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Nearby in the Northeast region, the Town of Acton, Massachusetts adopted a zoning by-law (section 5.5B.2.2.d) allowing for a density bonus for buildings achieving LEED certification in their East Acton Village District. The Township of Cranford, NJ adopted a similar measure (Ordinance No. 2005-46), establishing a Green Building Density Incentive program, whereby redevelopers who achieve LEED certification and comply with the specific program requirements may earn a development density bonus from the Township. The Town of Babylon, New York went farther by adopting a local law that requires LEED certification for any new construction of commercial buildings, office buildings, industrial buildings, multiple residence, or senior citizen multiple residence over 4,000 square feet. If certification is achieved, the Town refunds the certification fees paid to USGBC by the developer.

Further away, the City of Austin, Texas created what is now the Austin Energy Green Building program in 1985. The city-run program helps new and established contractors to design and build homes with the health of the occupant, the environment, and energy efficiency at the center of the process. The city provides information, resources, education, and consulting services related to green building to homeowners and developers in the voluntary program. The program is free and benefits the city, developers, and residents in different ways. The city gets a better designed, longer lasting, more energy efficient housing stock and thus a higher assessed value on the housing stock. The developer's project and the developer's company become part of Austin's searchable online directory of green building professionals, and are featured in bimonthly newsletters. The



homeowners benefit from owning a healthy, easy to maintain, and energy efficient home as well as qualifying for rebates, loans, and energy efficiency improvements.

Also, the City of Mill Valley, California, just north of San Francisco, has developed an incentive system for builders and developers who surpass the minimum environmental and ecological requirements for new construction. The rating system, which all new residential and commercial development must meet, is based on the LEED score, "Build it Green" checklist or "Green Point" checklist depending on size and type of development. All three systems are independent guides to assist in ranking a building's efficiency. The city provides some incentives to developments that exceed these requirements. The incentives include the presentation of a plaque from the city to the developer, allowing the contractor to use the City Green Building logo on promotional material, and featuring the business or project on the city's website.

LINKS TO MODEL BYLAWS OR MORE INFORMATION:

LEED BUILDING CODE INCENTIVES:
http://www.usgbc.org/ShowFile.aspx?DocumentID=2021

AUSTIN ENERGY GREEN BUILDING:
http://www.austinenergy.com/energy%20efficiency/ Programs/Green%20Building/index.htm

MILL VALLEY GREEN BUILDING:
www.millvalleylibrary.org/Index.aspx?page=948

US GREEN BUILDING COUNCIL:
http://www.usgbc.org/

BUILT GREEN:
http://www.builditgreen.org/

GLOBAL GREEN USA:
http://www.globalgreen.org/

US ENVIRONMENTAL PROTECTION AGENCY:
http://www.epa.gov/greenbuilding/

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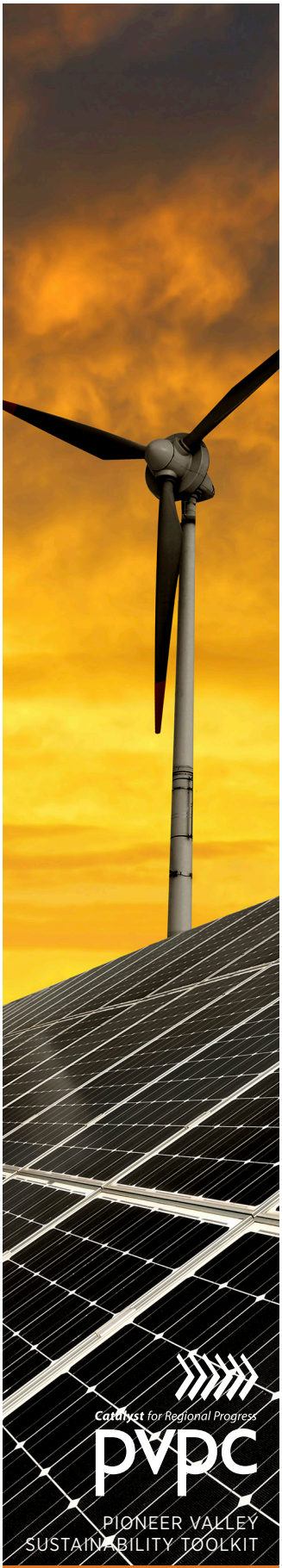

UNDERSTANDING

Greenhouse Gas Environmental Impact Statements

climate & energy

PURPOSE

To require new, large-scale developments to identify and evaluate measures to mitigate greenhouse gas emissions, including traffic reduction strategies, carpooling and transit access as part of Site Plan Review process.

HOW IT WORKS

Communities can adopt zoning regulations to require applicants of large developments to calculate, model, or estimate the amount of CO2 and other Greenhouse Gas (GHG) emissions from a project, including the emissions associated with vehicular traffic, energy consumption, water usage and construction activities. Developers would present the findings to the Planning Board or other similar permit granting authority for review. The permit granting authority either accepts the estimates or makes recommendations for how to reduce the GHG emissions as a requirement for receiving a special permit or building permit.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

State regulation enacted through the Massachusetts Environmental Protection Act (MEPA) requires large projects, such as those that are required to submit an Environmental Impact Report (EIR) or Environmental Notification Form (ENR) to the Executive Office of Energy and Environmental Affairs (EOEEA), to also include information on the projects' mobile- and stationary-source greenhouse gas emissions. This applies to emissions associated primarily with energy consumption, vehicle trip generation, and consumption of large quantities of water or wastewater generation. The regulation, known as the "Massachusetts GHG Emission Policy and Protocol" does not require quantification of other emissions categories, such as emissions associated with waste generation, materials consumption, conversion of biomass associated with land clearing, or construction period emissions.

Some Massachusetts communities already require some form of environmental reporting as part of the permitting process, and communities could require developers to submit the state GHG report for review by the local permitting authority. Communities could also require additional reporting requirements to cover land uses not addressed by state policy.

Further away from the region, San Francisco, California provides an example of where this concept has been implemented. The City has a policy to require the Planning Board to consider a development project's "impact on the San Francisco greenhouse gas emissions limits" as part of the City's review under California's GHG emissions policy. The City must determine whether a given project's climate change-related impacts are significant and recommend mitigation of significant effects.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

» **San Francisco GHG Reduction Ordinance**

http://www.sf-planning.org/ftp/files/MEA/GHG-Reduction_ApxB.pdf

» **California Governor's Office of Planning and Research. 2008. "CEQA AND CLIMATE CHANGE: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review." Technical Advisory:**

http://www.fire.ca.gov/resource_mgt/resource_mgt_EPRP_Climate/OPR_Technical_Advisory_Publication%20Ready_June%2019%202008%5B1%5D.pdf .

a. Interim guidance regarding the steps agencies should take to address climate change in CEQA documents.

» **Massachusetts Environmental Protection Agency. 2009. "(Revised) MEPA Greenhouse Gas Emissions Policy and Protocol." PDF available at**

http://www.env.state.ma.us/mepa/ghg.aspx .

b. Revised protocol for MEPA review's requirement for GHG quantification; includes mitigation suggestions.

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UNDERSTANDING

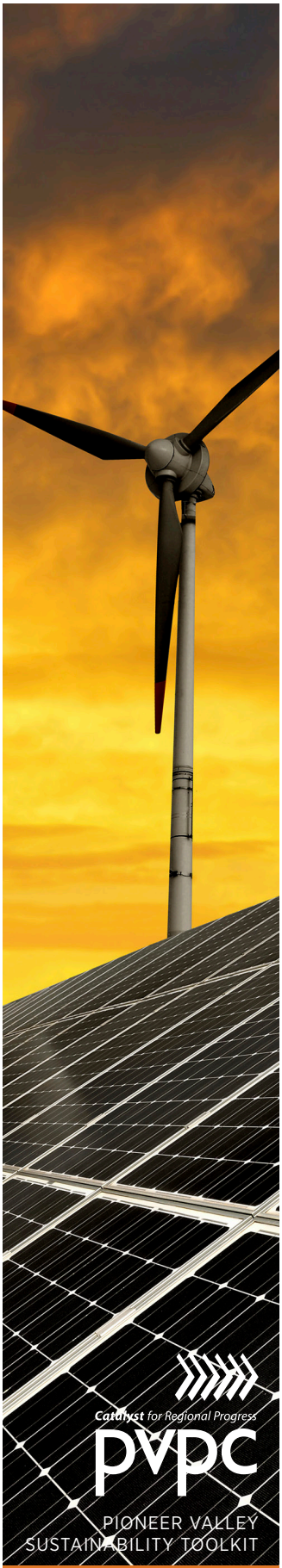
Idling Reduction Campaign & Program

PURPOSE

To educate citizens about air pollution resulting from vehicle idling and to reduce idling behavior.

Exhaust from motor vehicles can cause serious health effects on top of being a key factor of ground-level ozone or smog and a contributor to global warming. Fine particles emitted from diesel and gas engines are lung irritants and can trigger asthma attacks and more serious health conditions. All of these contaminants are produced when motor vehicles idle.

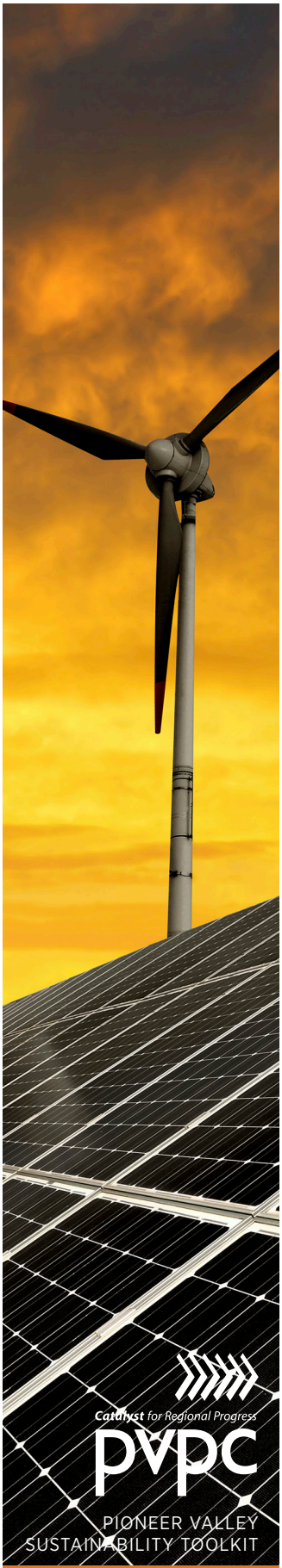
Massachusetts state law (M.G.L. Chapter 90, Section 16A) actually limits vehicle idling to five minutes, but many residents are unaware of this law, as are many local boards of health and local police who are charged with enforcing the state anti-idling law. Federal guidelines recommend that people turn their engines off after 10 seconds of waiting, except in traffic.



HOW IT WORKS

Local governments can take the following steps to implement an anti-idling educational campaign and program using parents of school-age children as a target population. Municipal and school district officials should re-launch the idling reduction campaign every three to five years to account for new populations cycling through the community.

1. The Board of Selectmen or City Council adopts a pledge to reduce unnecessary vehicle idling and/or adopts a municipal anti-idling policy. The Board of Selectmen or City Council then works with town/city staff to publicize local government adoption of pledge or policy through written notices such as emails and flyers to municipal staff and through newspaper articles, community access television, and temporary signs for the general public.
2. The Board of Selectmen or City Council contacts the school superintendent about idling reduction campaign and works with the superintendent to establish an anti-idling implementation committee made up parents, school staff, and municipal officials.
3. The implementation committee develops the program and gathers materials for an anti-idling education campaign and works with municipal or school communications staff to create a contact list for distribution of materials.
    - » **Sample materials are provided through the links below.**
    - » **Consider making this public anti-idling campaign as part of a complete "green team" or "green community" program.**
4. The implementation committee contacts local media to ensure widespread local coverage of this important initiative and asks the media to be a partner in the effort.
5. The implementation committee launches an anti-idling education campaign and distributes educational materials to its target audience.
6. Use town/city resources such as inserts in tax bills, and displays at municipal buildings, libraries, and schools to raise awareness of climate change and energy-saving opportunities available to local residents.
7. The implementation committee organizes training sessions for school bus drivers who have not yet received MassDEP's training.
8. The implementation committee works with school or municipal staff as well as elected officials to evaluate the results of the campaign. A final report is created after year one of campaign.



EXAMPLES OF COMMUNITY ADOPTION

The City of Northampton, City of Easthampton, and Town of Amherst banded together to create a model multi-community Idling Reduction campaign. This pilot project focused on changing the idling behavior of parents, municipal staff and bus drivers. The primary focus of this campaign was the school-aged children in the three participating elementary schools. The goal was to educate elementary school children and the children's parents/care-givers, about the negative effects that idling has on air quality and to encourage the children to try to change their parent's idling behavior. Secondary goals included educating municipal officials and their staff about the ill effects of idling and recruiting them as role models for appropriate idling behavior.

The projects in all three communities were resounding successes. They showed that targeted education and outreach efforts delivered to school-aged children and their families via their elementary schools can result in actual behavioral change to reduce unnecessary vehicle idling. The project organizers also believe the emphasis on children combined with the joint environmental and health-related message made the campaign more prominent as it captured both local and statewide media attention.

LINKS TO MORE INFORMATION

The Department of Environmental Protection (MassDEP) created an "Idling Reduction Toolkit" to help municipalities develop and implement idling reduction campaigns. Below are links to some of the toolkit items. If you have questions, need assistance with your idling reduction program, or would like a CD with the toolkit materials, contact MassDEP at 617-292-5648. http://www.mass.gov/dep/air/

Model Municipal Fleet Idling Reduction Policy

Model Municipal Resolution for Vehicle Idling Reduction Committee

"Do Your Share For Clean Air" Idling Reduction Fact Sheet

Massachusetts Fact Sheet on Idling Reduction

"Organizing Your Idling Reduction Campaign" Suggested Steps

Sample Pledge Form for Idling Reduction

Sample Letter to Parents (from school) about idling and health effects

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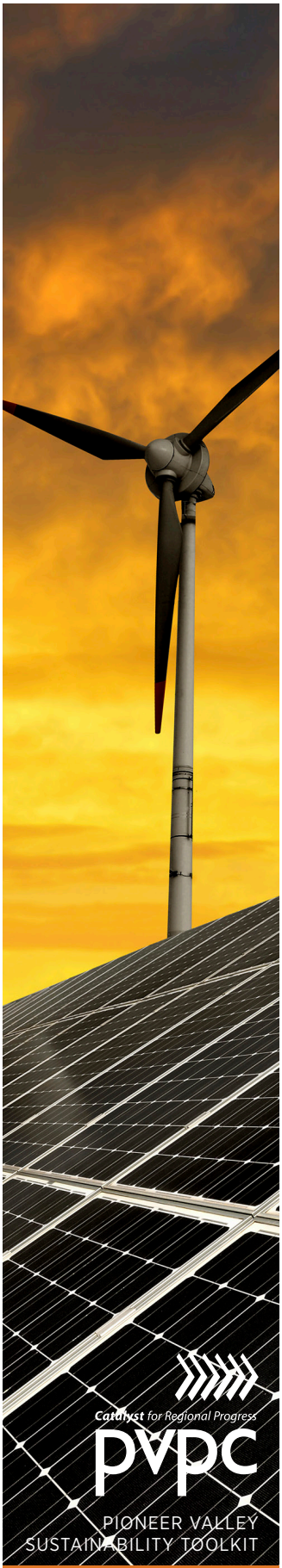

UNDERSTANDING

Infill Development & Adaptive Reuse

PURPOSE

To promote more compact growth and development in city and town centers and expand economic development opportunities.

Infill development and adaptive reuse reduces commercial and residential sprawl by redirecting investment back to already established urbanized community centers. It is more efficient and environmentally responsible to redevelop older buildings or to develop on existing lots where infrastructure such as water, sewer, and roads already exist, rather than build new construction on outlying greenfield sites.

HOW IT WORKS

To encourage property owners to bring underutilized or vacant parcels of land back into productive use or to discourage demolition or long-term vacancy of obsolete or underutilzed buildings, many Massachusetts municipalities have amended the zoning in these areas to allow a wider array of uses, densities, and dimensional requirements.

Some municipalities even renamed these rezoned areas with market-appealing terms to encourage the revitalization of these areas.

A municipality has two zoning options to encourage development or redevelopment.

1. Amend zoning in a designated area to allow for a wider range of uses, higher densities, and reduced setbacks.
2. Establish an overlay district with by-right or special permit approval for compatible residential, commercial uses, or mixed uses.

EXAMPLES OF COMMUNITY IMPLEMENTATION

Palmer— Adaptive Reuse & Infill Development

As part of its overhaul of municipal zoning bylaws, the Town of Palmer created a distinct set of development standards tailored to each of the four village centers in the community. In so doing, Palmer set the stage for new development and redevelopment that is sensitive to the historic layout of the villages and builds upon centuries of vernacular town-building experience. The layout of the Village District Bylaws is unique in the region. The entire bylaw for each village is presented on a single 11x17 page including an intuitive and graphical format detailing standards for land use, dimensions, yards, landscape, and parking. An illustrative photo and map of each village also helps to clearly identify the purpose and extent of the village regulations.

Amherst—Infill Development

Since the early 1970s, Amherst's zoning regulations have reflected the Town's growth management strategy of promoting development within its existing village centers while preserving outlying critical resource areas. Pomeroy Commons, a two-and-a-half story residential project that includes a mix of affordable and market rate units, was developed soon after Amherst re-zoned Pomeroy Village Center in the early 1990s to encourage a denser mix of retail, commercial, office, and residential uses. In Amherst Town Center,

the Boltwood Place mixed use project is currently under construction on the rear of a property already occupied by Judie's, a popular downtown restaurant. This project was made possible by two zoning amendments to the General Business District adopted in 2008-2009 that increased allowable residential density and relaxed the dimensional requirements for mixed use buildings.

Easthampton—Adaptive Reuse & Infill Development

By the end of the 20th century, most of the city's historic manufacturing companies had downsized, closed or relocated leaving ten large vacant or underutilized buildings in the city center with 1.5 million square feet of vacant space. These relics of a traditional manufacturing economy would not be easily reused for the demands of 21st century industry and that the sheer size of the buildings would be hard to fill with just industrial uses. To bring these buildings back to productive use, the City rezoned this 110 acre district from 'Industrial' to 'Mixed-Use/ Mill Industrial' in 1995. One year later, two men expressed interest in redeveloping a vacant industrial building within the Mixed-Use/ Mill Industrial District and successfully obtained special permit approval from the Planning Board. Known as Eastworks, this mill redevelopment project was the first of several redevelopment projects that has brought new jobs, retail and commercial space and housing to Easthampton.

Ware—Infill Development

The Town of Ware established an Infill Development Overlay District in 2006 to encourage development on parcels of land in the downtown area that did not meet minimum dimensional requirements of the Ware Zoning Bylaw. Within the boundaries of the Infill Development Overlay District, a lot with at least 5,000 square feet of area and fifty (50) feet of frontage may serve as the location for a single-family dwelling, two-family dwelling, or mixed use development. The new bylaw established that the lot must be served by town water and sewer and that the proposed building be consistent in architectural style, scale, setbacks, and frontage with abutting structures, and those in the immediate neighborhood.

LINKS TO MORE INFORMATION

TOWN OF AMHERST GENERAL BUSINESS ZONING DISTRICT
https://www.amherstma.gov/index.aspx?NID=476

TOWN OF PALMER VILLAGE CENTER ZONING DISTRICTS
http://www.townofpalmer.com/pages/PalmerMA_Planning/Chapter%20171.pdf

TOWN OF WARE INFILL DEVELOPMENT OVERLAY DISTRICT
http://www.townofware.com/Pages/WareMA_Planning/zoningbylaws.doc

CITY OF EASTHAMPTON CHAPTER 40R SMART GROWTH OVERLAY DISTRICT
http://www.easthampton.org/downloads/Smart%20Growth%20Zoning%20FINAL%2007-09-09.doc

CITY OF EASTHAMPTON MIXED USE / MILL INDUSTRIAL DISTRICT
http://www.easthampton.org/downloads/ZONING008102010.pdf

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UNDERSTANDING

Local Climate Neutral Pledges

PURPOSE

To reduce the amount of greenhouse gases (GHG) produced in a community as much as possible and capture or offset the GHGs that are still emitted.

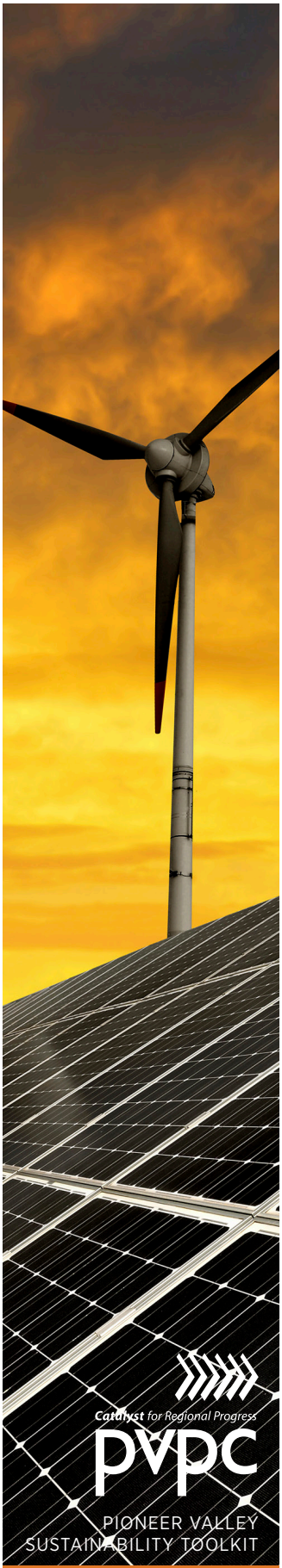
HOW IT WORKS

Greenhouse gasses (GHG) trap solar radiation which gradually increases the overall temperature in the earth's atmosphere in an effect known as "global warming". Carbon dioxide, methane and nitrous oxide are some of the main GHGs that our activities produce. Climate neutral pledges promote greater accountability on GHG emissions in a community and can lead to reductions of these emissions.

A climate neutral pledge works best when it is adopted as one step in a series of actions that cities and towns can choose follow in order to reduce their GHG emissions:

1. Identify and quantify all sources of greenhouse gas emissions.
2. **Adopt a Climate Neutral Pledge** that states emissions reduction goals.
3. Create an action plan that the community can implement to reduce or offset emissions and meet its goals
4. Implement the emission reduction plan through energy efficiency, renewable energy and other change as needed.
5. Review community successes, failures and lessons learned

In neighboring New York State, municipalities join the "Climate Smart Communities" program, where each participating community adopts a model pledge as a resolution of the governing body, and can add their own elements. Communities also agree to: set goals to reduce GHGs; establish a task force; gather data about local GHG emissions and sources; develop a local action plan for reducing GHG emissions; adopt the state's goal of reducing electricity use by 15% by 2015; maximize use of public energy generated from renewable sources; and adopt land use regulations to reduce sprawl and plan for climate changes, amongst other possible steps.



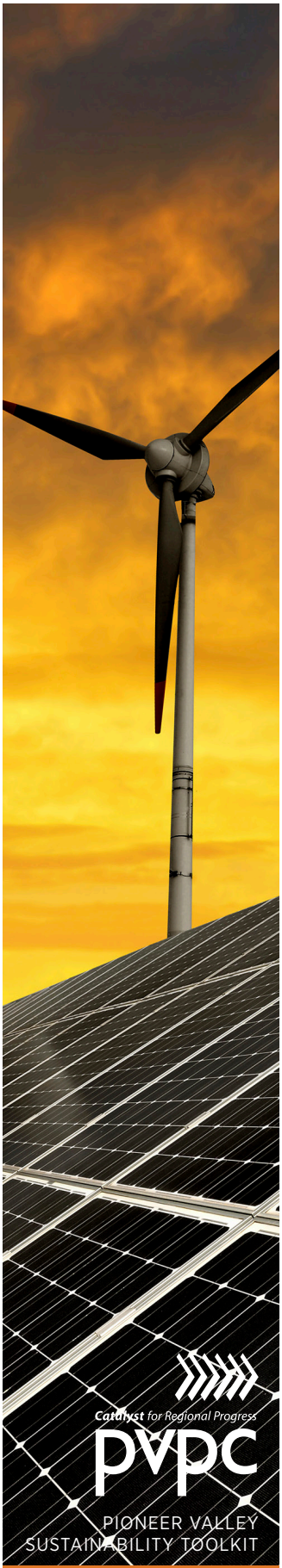
EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

In the United States, the city of Chapel Hill, South Carolina has long strived to reduce its impact on the environment, both within its municipal operations and more generally throughout the community. In 2006 the Town signed onto the Community Carbon Reduction (CRed) pledge, through which they aim to reduce the total carbon emissions attributed to Town municipal operations by at least 60% by 2050.

In New York state, Schenectady, Red Hook and more than 40 other municipalities recently adopted the "Climate Smart Communities Pledge", a commitment to systematically cut emissions of carbon dioxide and other GHGs. Schenectady has implemented several ambitious green initiatives, including an aggressive energy efficiency performance contract that has prevented emissions of more than 1 million pounds of carbon dioxide, an updated heating system for City Hall, energy conservation LED traffic lights, and a first-of-its-kind Green Homes program.

In Massachusetts, 86 municipalities, 12 of them from the Pioneer Valley, have already pledged to reduce their municipal government energy use by at least 20% in five years through the Green Communities program. These communities usually begin acting on that pledge like Schenectady, by aggressively implementing energy efficiency measures in public buildings, which creates savings both on emissions and on utility bills.

Over 270 American colleges and universities have adopted carbon neutral pledges, as well as a growing list of foreign countries, such as Costa Rica, Ethiopia, Iceland, The Maldives, Monaco, New Zealand, Niue, Norway, Pakistan, and Portugal.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

CLIMATE NEUTRAL NETWORK:
http://www.unep.org/climateneutral/About/tabid/95/Default.aspx

NEW YORK STATE SMART COMMUNITIES CLIMATE NEUTRALITY RESOLUTION TEXT:
http://www.dec.ny.gov/energy/65494.html

COMMUNITY CARBON REDUCTION (CRED) PLEDGE OF CHAPEL HILL:
http://sustainability.unc.edu/Initiatives/ClimateChange.aspx

AMERICAN COLLEGE & UNIVERSITY PRESIDENT'S CLIMATE COMMITMENT:
http://presidentsclimatecommitment.org/about/commitment

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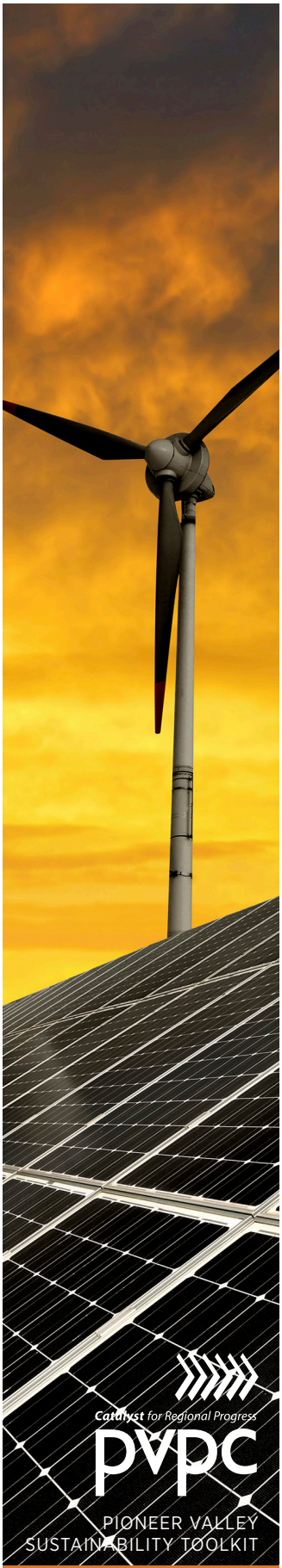


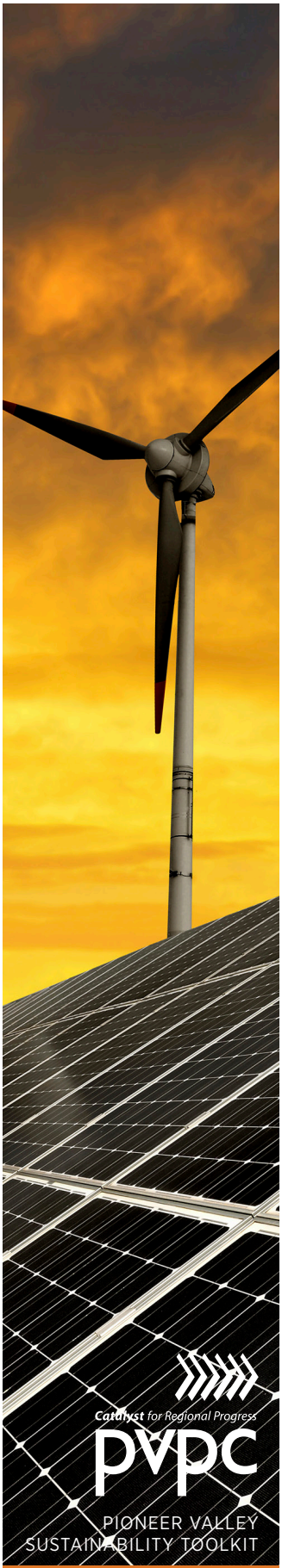
UNDERSTANDING

Methane Capture From Landfills

PURPOSE

To reduce the amount of harmful methane emissions that escape from decaying organic matter in landfills by capturing the methane and processing it for an alternative fuel resource.

Each day millions of tons of solid municipal waste are disposed of in sanitary landfills around the world. Many landfills produce methane gas as a byproduct of decaying organic matter, such as food and paper. When methane escapes from landfills and enters into the atmosphere it contributes to global climate change. Methane gas is the primary component of natural gas, which can be used for cooking, heating and generating electricity. Capturing methane from landfills can limit global climate change and be used for human needs.



HOW IT WORKS

Methane recovery systems can be installed to reduce the release of methane into the atmosphere from landfills by more than half. A series of vertical wells that are drilled down through layers of decaying matter, horizontal well connectors, and a vacuum system which directs the collected gas to the surface can be used to collect and pipe the methane to a central location.

The gas can be used in two ways. The landfill gas can be processed and made available as an alternative fuel. The quality of the power source is lower than pure methane or natural gas, but the cost to process the product is much lower and needs only minimal processing and minor modifications to be used in most modern combustion equipment. Another option is to create pipeline-quality gas from the landfill gas by processing and purifying the product, since only about one half of the landfill gas can be expected to be useable methane.

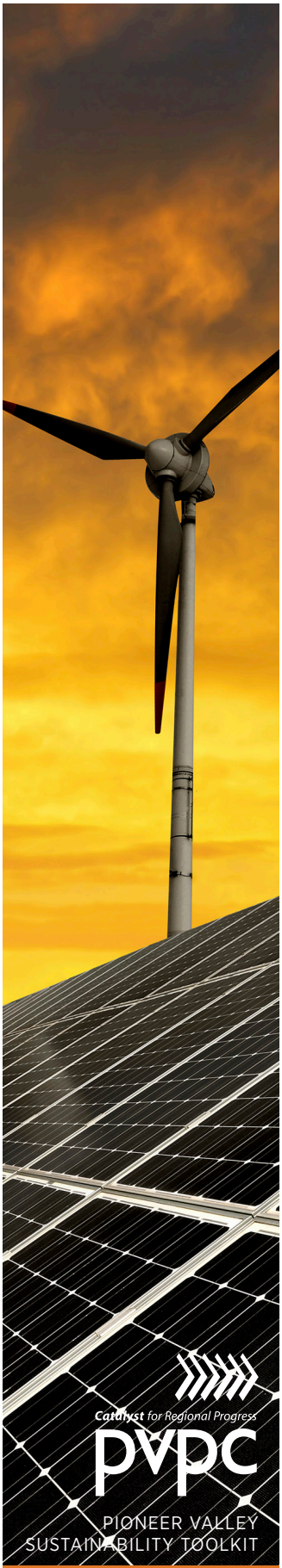
EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

North Country, New York

The Development Authority of the North Country (DANC), which receives around 1,000 tons of waste a day from three New York state counties, has a recovery system in place that captures excess methane and pipes it out of the landfill. The Authority has entered into a public-private partnership with Innovative Energy Systems to generate electricity from the captured methane. IES, which owns a total of nine power plants in New York, produces 4.8 megawatts of electricity from the landfill and sells it to the grid. The New York State Energy Research and Development Authority is providing a subsidy to the DANC at a rate of approximately $22 per megawatt. The Climate Action Reserve also awarded the DANC carbon credits, which are now being sold.

Vancouver, British Columbia

Vancouver has reduced GHG emissions from municipal operations 33% below 1990 levels. The most significant reductions have come from the Vancouver Landfill where the city captures methane gas and burns it to generate enough electricity for 7000 homes. The landfill gas collection system includes 200 vertical extraction wells and 10 horizontal extraction laterals, built at a cost of $1,750,000. The City selected Maxim Power Corporation to build a power station to burn the gases, and Maxim in turn sells electricity as “green power” at a premium price to B.C. Hydro.



Dartmouth, Massachusetts

The methane from the Crapo Hill Landfill in Dartmouth supplies fuel to a power plant that produces an estimated 3.3 million megawatts of electricity. Greater New Bedford Regional Refuse Management District owns and operates the landfill, which has 41 vertical wells and 20 horizontal extraction wells. The project also receives carbon credits.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

GREEN HOUSE GAS ONLINE HAS A RESOURCE PAGE DEVOTED TO EXPANDING KNOWLEDGE OF METHANE SOURCES, SINKS AND SOLUTIONS, PARTICULARLY LANDFILL PRODUCED METHANE. THE PAGE CAN BE FOUND AT:
http://www.ghgonline.org/methanelandfill.htm

THE EPA HAS A VOLUNTARY ASSISTANCE PROGRAM FOR PUBLIC AND PRIVATE ENTITIES TO BECOME ACTIVE IN LANDFILL METHANE GAS CAPTURE. MORE INFORMATION ABOUT THE PROGRAM CAN BE FOUND AT:
http://www.epa.gov/lmop/

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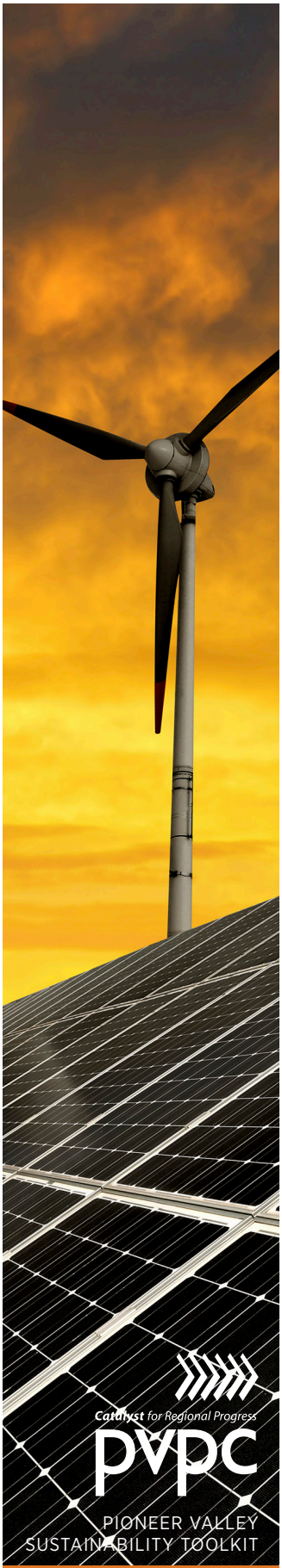
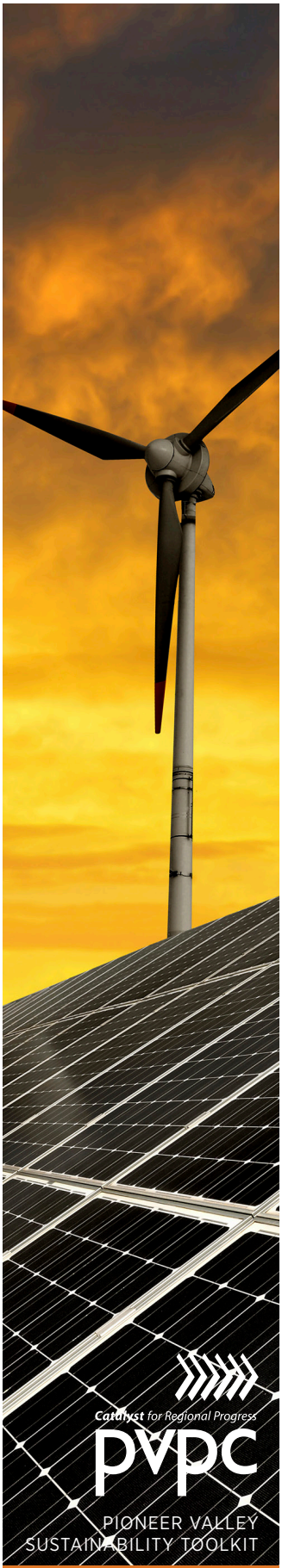


UNDERSTANDING

Municipal Climate Action Plans

climate & energy



PURPOSE

A municipal climate action plan is an important tool for engaging communities in the work of reducing GHG emissions and adapting to unavoidable local impacts of climate change.

HOW IT WORKS

A municipal climate action plan is an effective tool for guiding local actions to: 1) reduce greenhouse gas (GHG) emissions, and 2) improve a community's ability to withstand the effects of climate change that are now unavoidable, such as more floods, excessive and prolonged heat, and power outrages. A good municipal climate plan typically includes:

- An inventory of existing GHG emissions produced within the community.
- GHG reduction targets and timeframes.
- Strategies to reduce, or mitigate, GHG emissions.
- Strategies to improve the strength and resiliency of local infrastructure, roads, power systems and social services for heat-vulnerable residents.
- A prioritized schedule for implementing selected strategies and monitoring progress.

Critical to any municipal climate action plan is the convening and ongoing participation of a task force or advisory committee of stakeholders that includes elected officials, citizens, and business owners. The participation of municipal staff, especially public works and facilities personnel, is especially helpful. You may also wish to include members of regional and state agencies that are involved in climate action planning and have resources to share. If your budget allows, the assistance of an engineering or technical consultant with experience producing climate action plans will be important. Lastly, it is important that the plan have a clear rationale and mission statement. Why is it important for your community to respond to climate change and its related impacts? What will be the consequences if you don't?

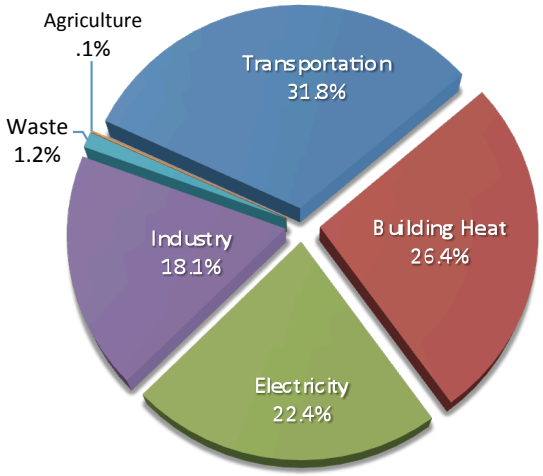
GHG EMISSIONS INVENTORIES

Greenhouse gas (GHG) emissions inventories estimate the quantities of these gases that are emitted within a city or town, as well as by power plants outside the municipality that supply electric power to customers within it. A typical GHG inventory lists energy

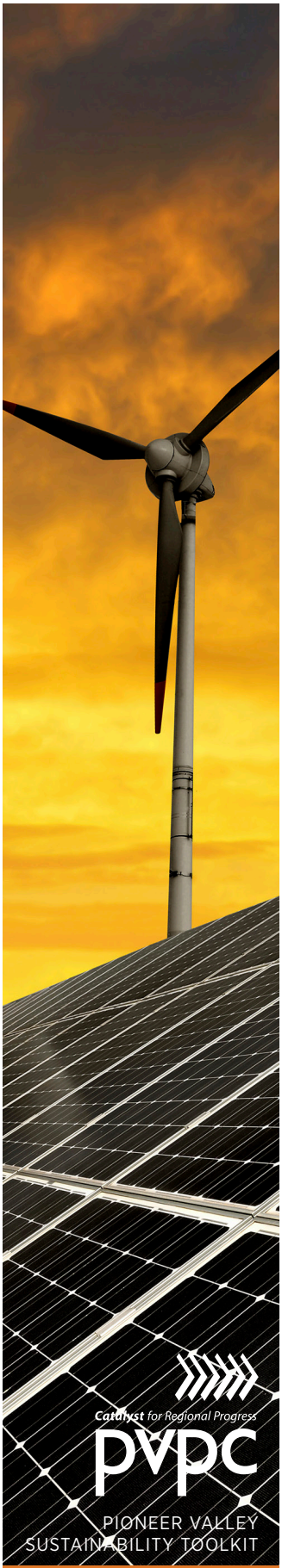
consumption from the municipality itself, as well as that of local businesses and households (if that information is available). Energy use is usually summarized in the following categories: electricity, building heat (oil, natural gas or wood/biomass), transportation (gasoline and diesel), agriculture (methane from livestock flatulence), and industry. Municipalities can help "lead by example" by tracking the energy use and emissions of public infrastructure, including water treatment plants, landfill methane off-gassing, power for street lights, and other typical public facilities.

Based on the type and quantities of fuels consumed, as well as the presence (or not) of other GHG-emitting activities, it is possible to estimate the quantities of GHGs that are released within the municipality.

Example GHG Inventory by Sector: Pioneer Valley



Above is the 2010 GHG inventory for the 9.2 million tons of carbon dioxide and equivalent GHG gases emitted in the 43 cities and towns of the Pioneer Valley that year. Similar GHG inventories can be produced for a municipality using data from utility companies, state transportation agencies and other sources.

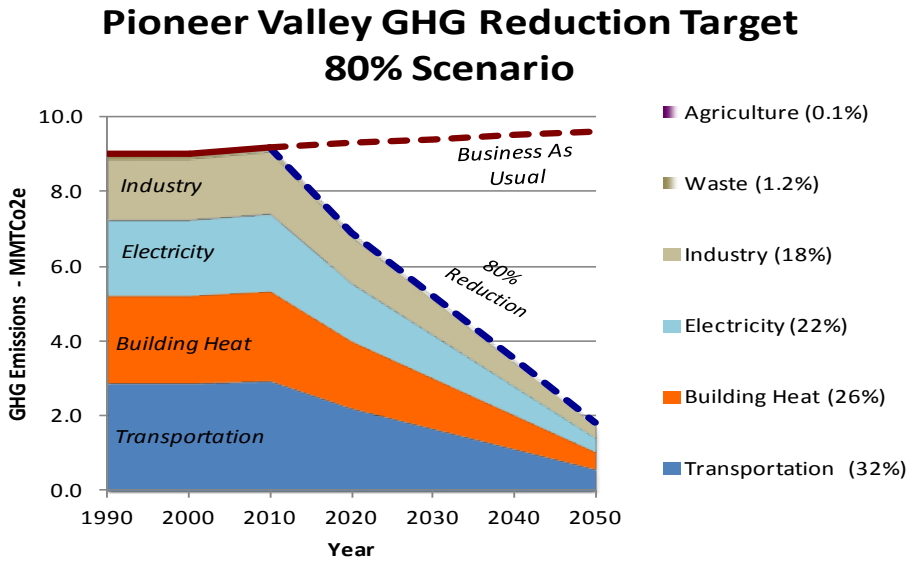


SETTING GHG REDUCTION TARGETS

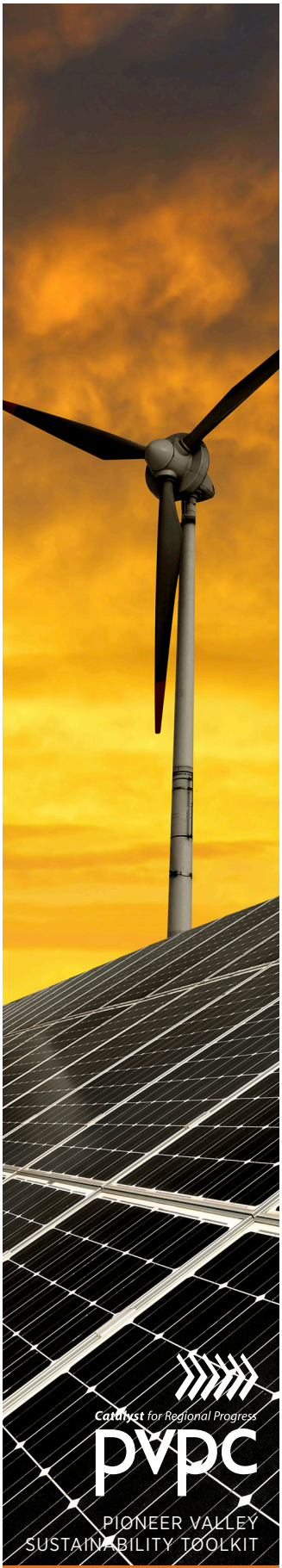
Setting GHG reduction targets means deciding the amounts by which your municipality wishes to reduce its GHG emissions and by when. It's helpful to imagine more than one scenario for doing this. For example, the Massachusetts Climate Action Plan sets two incremental target scenarios: a 20% reduction of GHGs (from 1990 emissions levels) by 2020, and an 80% reduction of GHGs by 2050. The Pioneer Valley Climate Action Plan has adopted this statewide 80% reduction goal for 2050 (see below) and also contemplates a "carbon neutral" scenario of a 100% GHG reduction (no net GHG emissions) by 2050.

Your community may wish to consider the feasibility of these targets, depending on the amount of GHG-emitting activities within your town boundaries, as they are consistent with established statewide goals. However, it may be easier for a small town that is largely residential to make short-term progress toward these goals than an urban area that depends on a heavily GHG-emitting industry for employment. Thus, the stakeholder discussion about setting feasible GHG reduction targets is a critical plan activity; achievable yet inspirational goals are essential to obtain the necessary "buy-in" of leaders and key participants for the long-term success of the plan.

Example GHG Reduction Targets: Pioneer Valley 80% GHG Reduction by 2050



This is an example of a GHG reduction scenario that assumes equal reductions in all sectors by the horizon year (2050). Your community may wish to set other targets and horizon years, based on the amount of commuting by residents, age and size of buildings, and the nature of local industrial facilities (if any).



STRATEGIES TO REDUCE GHG EMISSIONS

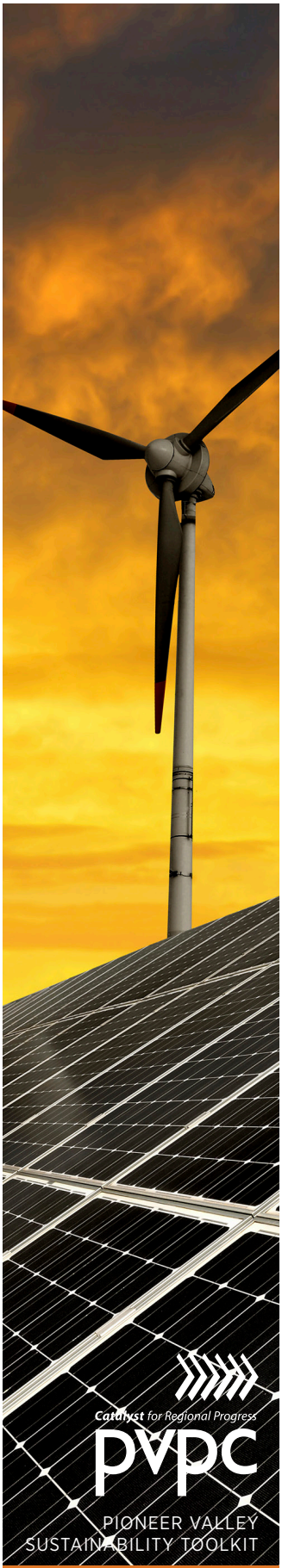
There are dozens of ways to reduce GHG emissions. Many are as simple as carpooling; others can require years of engineering work and financing. So it's important not to try to do them all at once, but rather to choose a few to start with on which your community can make some real progress—and get results. Chapter 8 of the Pioneer Valley Climate Action and Clean Energy Plan offers dozens of possible strategies for reducing GHG emissions that are tailored to communities in Western Massachusetts. Some highlights are offered below.

Short-term GHG reduction strategies

- Use car sharing (i.e., Zip Car) and carpools
- Bike, walk and/or ride the bus instead of driving whenever possible
- Incentives to switch to a more fuel-efficient personal vehicle
- Install solar photovoltaic and/or solar hot water panels
- Get a no-cost Mass Save home energy assessment to receive free weather-stripping, LED and compact fluorescent light bulb replacement
- Plant trees to shade your house and soak up carbon dioxide

Longer-term GHG reduction strategies

- Promote zoning that allows a greater mix of uses to help reduce distances and the need to drive
- Encourage green building practices and investments in energy efficiency in homes, commercial buildings and industrial facilities
- Establish and improve recycling and composting programs
- Support the production and consumption of local and organic foods to help reduce long distance shipping and the use of petroleum-based fertilizers



STRATEGIES TO IMPROVE RESILIENCY TO UNAVOIDABLE CLIMATE IMPACTS

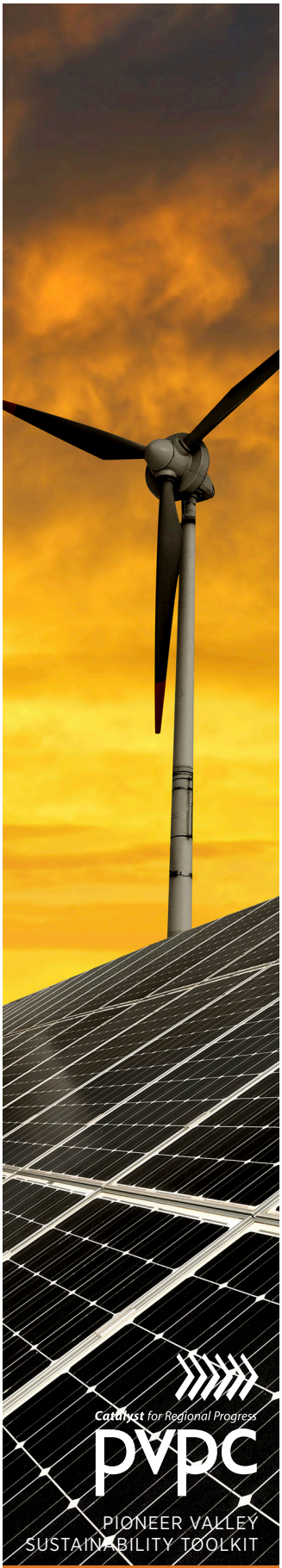
While GHG mitigation can reduce the future effects of climate change, it will not eliminate the effects of climate-related changes that are already happening. These include severe weather, early winter storms, more frequent flooding and record breaking heat. A Climate Action Plan can help your community decide which strategies are most needed to adapt to these and other climate-related impacts. Chapter 8 of the Pioneer Valley Climate Action and Clean Energy Plan offers dozens of possible strategies for adapting to climate impacts that are tailored to communities in Western Massachusetts. Example climate adaptation strategies include:

1. Update municipal emergency response and communication plans
2. Change agriculture practices to use less water and help prevent soil degradation and erosion
3. Reduce impervious surfaces and encourage on-site stormwater infiltration
4. Encourage efficient water use and establish back-up municipal water sources
5. Upgrade stormwater systems, inspect dams for safety, and keep buildings out of floodplains and stream channels
6. Use low impact development (LID) and "green infrastructure" landscape management

MONITORING PROGRESS

A climate action plan is never "done." But once you begin, it's important to track the progress you've made from your starting point. For GHG mitigation, the ongoing monitoring of energy use and GHG emissions is essential, as well as the cost of energy. Monitoring the progress of adaption measures is not as simple, but can be tracked by recording indicators such as the cost and square footage of flood damage, number and severity of road repairs, the number of people using cooling centers, admissions to local hospitals for heat-related illness and injuries, changes in property insurance rates (usually flood insurance), the number of households affected by power outrages and their durations, and so on. Collecting all this information is essential to gauging the value of the plan.

A climate action plan should be updated at least every five years – or sooner if needed. Your community may experience a severe weather event that could affect your choice of strategies. Or new information may become available about energy use that will suggest new opportunities for improving efficiency. And so it's important to be flexible; you can also add new monitoring indicators as you go along.

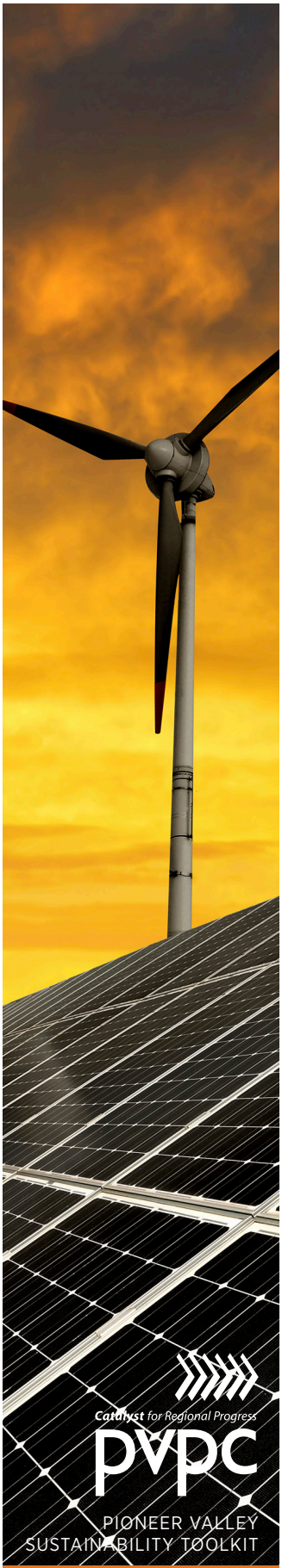


EXAMPLES OF SUCCESSFUL CLIMATE ACTION PLANS

In Massachusetts, the communities of Amherst, Northampton, Falmouth and Marshfield have produced notable municipal climate action planning documents and GHG inventories. Some of these are stand-alone plans; others are supplemental chapters to local comprehensive plans.

> Marshfield first created a GHG emissions inventory in 2008 by gathering community energy use data through billing records obtained from the local utility providers NSTAR electric and Bay State Gas. This information included residential, commercial, solid waste and transportation energy usage. Data about the energy use of municipal buildings, vehicles, waste, water treatment, street and traffic lights, as well as solid waste, was collected from the Department of Public Works. Additional information was estimated from national energy surveys, as well as transportation estimates from the Massachusetts Department of Transportation Highway Division. Marshfield then used Clean Air and Climate Protection software provided by ICLEI to estimate existing GHGs and future emissions. The inventory provided the baseline information necessary to set a municipal GHG reduction target of 20% within five years of the plan's adoption date (2009).

The City of Boston in 2009 adopted a comprehensive Climate Action Plan with the goal of reducing GHG emissions by 25% by 2020, developing green businesses and workforce skills, engaging all parts of the community in climate leadership, and integrating climate change considerations into all planning decisions. Boston's plan estimates the adverse effects of climate change on the community including: more urban air pollution, longer summer heat waves, rising sea levels, unreliable water quality, loss of revenue from seasonal activities, and changes in agricultural production. The Boston plan presents many strategies to improve energy efficiency in buildings, transportation, and waste management. The plan also proposes new ways to generate more clean energy within the city.



LINKS TO MORE INFORMATION AND EXAMPLES

AMHERST, MASSACHUSETTS CLIMATE ACTION PLAN:
https://www.amherstma.gov/DocumentCenter/Home/View/612

CITY OF BOSTON, MASSACHUSETTS CLIMATE ACTION PLAN:
http://www.cityofboston.gov/climate/bostonsplan/

INTERNATIONAL COUNCIL FOR LOCAL ENVIRONMENTAL INITIATIVES:
http://www.iclei.org/

MARSHFIELD, MASSACHUSETTS GREENHOUSE GAS INVENTORY
http://marshfieldenergy.org/wordpress/wp-content/uploads/2013/03/GHGInventory-MarshfieldMA.doc

MARSHFIELD, MASSACHUSETTS ENERGY MANAGEMENT PROJECT
http://marshfieldenergy.org/projects/

MASSACHUSETTS CLIMATE CHANGE ADAPTATION REPORT:
http://www.mass.gov/eea/waste-mgnt-recycling/air-quality/green-house-gas-and-climate-change/climate-change-adaptation/climate-change-adaptation-report.html

MASSACHUSETTS STATE CLEAN AIR ACT EMISSIONS INVENTORY:
http://www.mass.gov/eea/agencies/massdep/air/reports/emissions-inventories.html

PIONEER VALLEY CLIMATE ACTION AND CLEAN ENERGY PLAN
http://www.pvpc.org/plans/climate-action-and-clean-energy-plan

U.S. ENVIRONMENTAL PROTECTION AGENCY—HOW TO CREATE A GHG EMISSIONS INVENTORY:
http://www.epa.gov/air/aqmportal/management/emissions_inventory/

FOR MORE INFORMATION, PLEASE CONTACT

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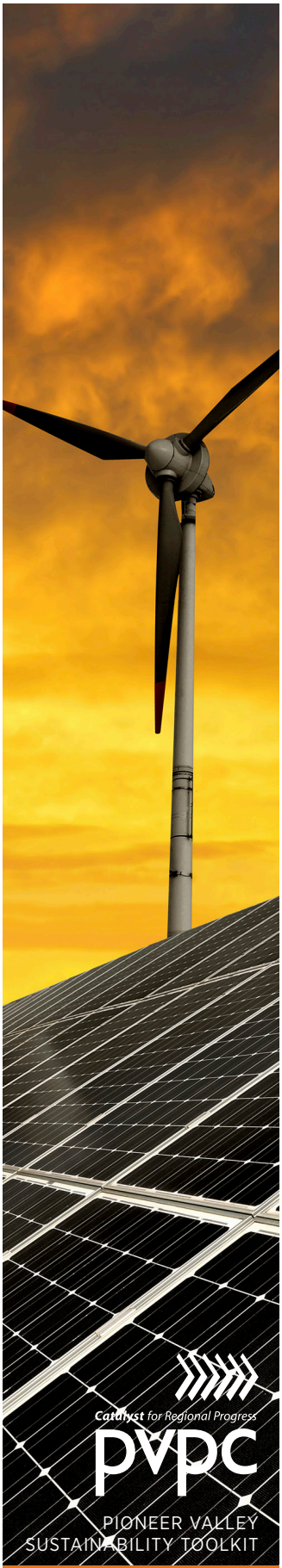
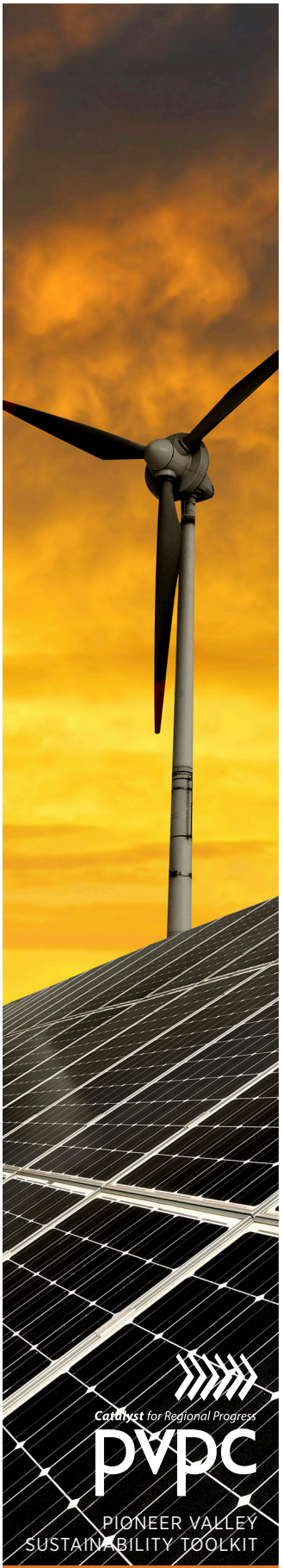


UNDERSTANDING

Municipal Renewable Energy Purchase Programs

climate & energy



PURPOSE

To help municipalities buy more power that is generated by solar, wind and other renewable energy sources.

As large energy consumers, municipalities can influence demand for renewable energy by simply buying more of it. Even small communities may spend millions of dollars per year on energy, wielding considerable market influence. Increasing the demand for renewable sources of power is a crucial step toward increasing the energy industry's overall capacity to generate and distribute clean energy to all users—not just municipalities. The eventual benefits for all power users will be lower clean energy costs, decreased greenhouse gas (GHG) pollution, and more jobs in the clean energy economy.

HOW IT WORKS

First, municipal leaders must decide that a certain portion of the energy that their municipality buys should be purchased from renewable generating sources, including wind, solar and hydro power. This decision can be formalized in a resolution, ordinance or bylaw—or it can be a simple administrative action. After this fundamental decision is made, the municipality can solicit requests for competitive proposals from power distributors, electric power aggregators and/or energy service companies (ESCOs). The municipality may benefit from using an experienced energy service consultant to help with the review process, as there are many technical variables and financial incentives involved in deciding what the best deal for an individual town or city may be.

Typically, electric power is where most municipalities will be able to shift to buying more renewable energy.

There are currently very few incentives and technologies available that will help shift away from use of fossil fuels for heating, including the use of natural gas, heating oil, gasoline and diesel fuels. Energy conservation incentives that are available for these

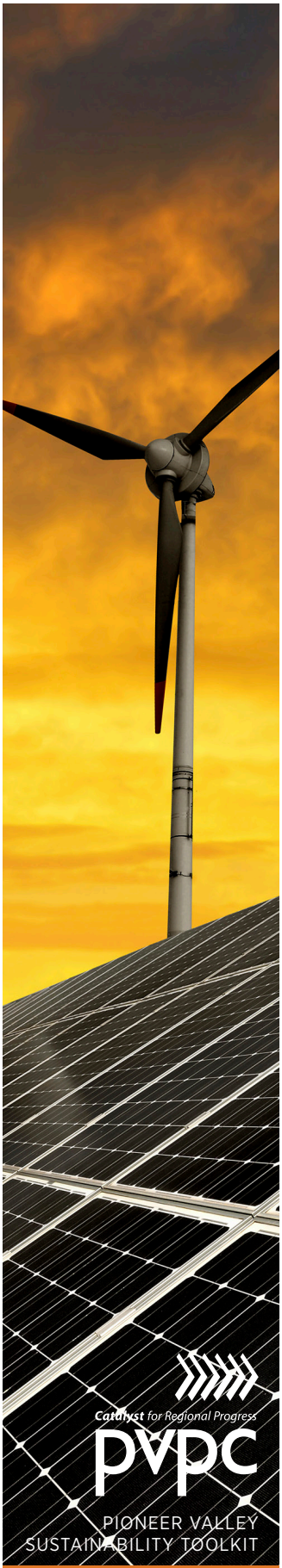
fuel types (see MASS SAVE) and improving the thermal performance of buildings, and/or upgrading heat systems, can have a significant impact on the amount of fuel used. Significantly, if a building becomes tight enough, alternative heating and cooling sources become more viable, including air-source heat pumps (also known as mini-splits).

Once a renewable electricity provider has been selected, the municipality may sign a contract to purchase electric power from the new source of green energy. As demand for renewable electricity has increased in recent years, its cost has become competitive with electricity that is generated using fossil fuels. Further, many electric power aggregation companies now offer price guarantees that ensure that a municipality does not see a disproportionate increase in the cost of renewably generated electricity versus that generated with fossil fuels.

WHERE IS MUNICIPAL RENEWABLE PURCHASING WORKING?

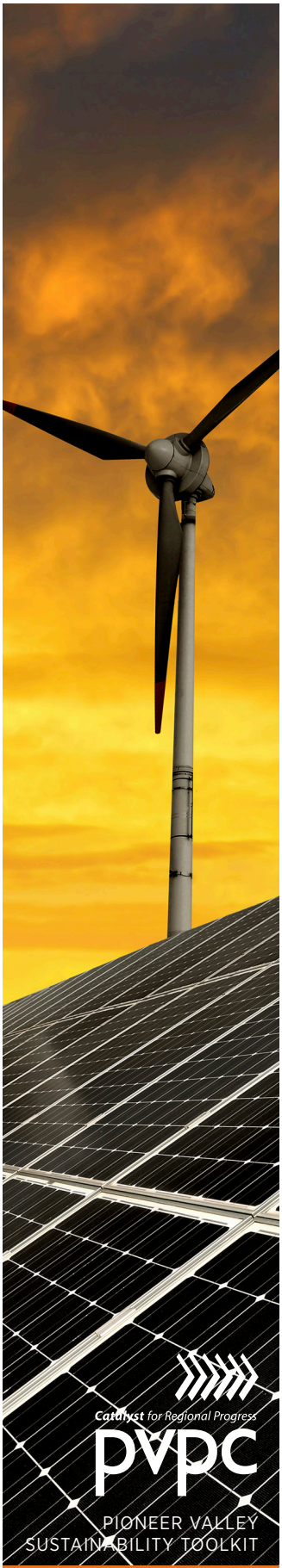
The Commonwealth of Massachusetts Green Power Purchase programs for public buildings has set goals of a 15% total renewable power purchased by 2020 and 30% by 2030. Massachusetts spends about 80% of its annual energy expenditures on procuring energy from outside of the state, but it is steadily replacing imported fossil fuels with renewables.

In 2005, the City of Aspen, Colorado set a goal to purchase 75% of the City government's energy from renewable sources by 2010. The City met this goal in December, 2006, and so set a new goal of powering 100% of city-owned building with renewable sources by 2020. One source of renewable energy is wind power from Holy Cross Energy, and a new wind farm in Nebraska.



The City of Santa Monica, California has also adopted a green power purchase strategy that saved more than 13,000 tons of carbon dioxide from entering the atmosphere. By shifting electricity generation from fossil fuels to renewable energy, Santa Monica led by example and encouraged business and home owners to switch, as well.

Anoka, Minnesota offers a "Green Power Choice" voluntary program to customers of the Anoka Municipal Utility. By participating in the program, customers can support increased reliance on renewable energy sources by purchasing blocks of energy from hydroelectric and wind power sources. Green Power is offered in blocks of 100 kilowatt hours (kWh) for a charge of $1.75 per block. The cost of green power purchased is added to customers' regular electric bill every month. For example, if a customer chooses to buy four blocks (400 kWh) of hydropower, an additional $7.00 is added to their monthly electric bill.



LINKS TO MORE INFORMATION AND MODEL REGULATIONS

MUNICIPAL CLEAN ENERGY TOOL KIT:
http://www.icleiusa.org/action-center/tools/municipal-clean-energy-toolkit

MUNICIPAL GREEN POWER PURCHASING PROGRAMS:
http://www.icleiusa.org/action-center/tools/municipal-clean-energy-toolkit/purchasing

NATIONAL GRID "GREEN UP" PROVIDERS:
http://www.nationalgridus.com/niagaramohawk/home/energychoice/4_greenup_provider.asp

ASPEN, COLORADO GREEN POWER PROGRAM:
http://www.aspenpitkin.com/Living-in-the-Valley/Green-Initiatives/Renewable-Energy/

BOSTON, MASSACHUSETTS GREEN BUILDING STANDARDS:
http://www.cityofboston.gov/images_documents/Article%2037%20Green%20Buildings%20LEED_tcm3-2760.pdf

MASSACHUSETTS GREEN POWER PROGRAM:
http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=MA15R&re=1&ee=1

BELLINGHAM, WASHINGTON GREEN POWER PROGRAM:
http://www.piersystem.com/go/doc/1264/180215/

ANOKA, MINNESOTA UTILITY GREEN POWER PROGRAM:
http://anokaelectric.govoffice3.com/index.asp?Type=B_BASIC&SEC=%7B384DB703-5584-499A-AA3C-B102143D31B8%7D

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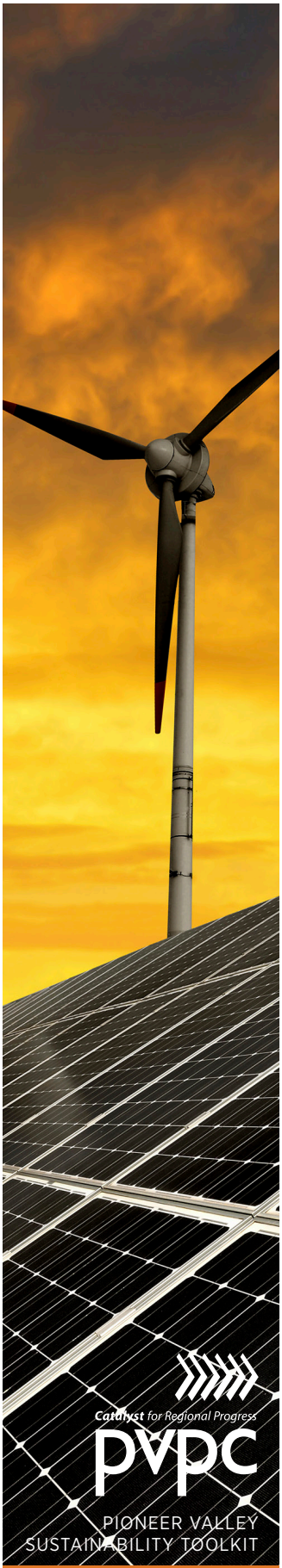


UNDERSTANDING

Neighborhood Solarize Programs

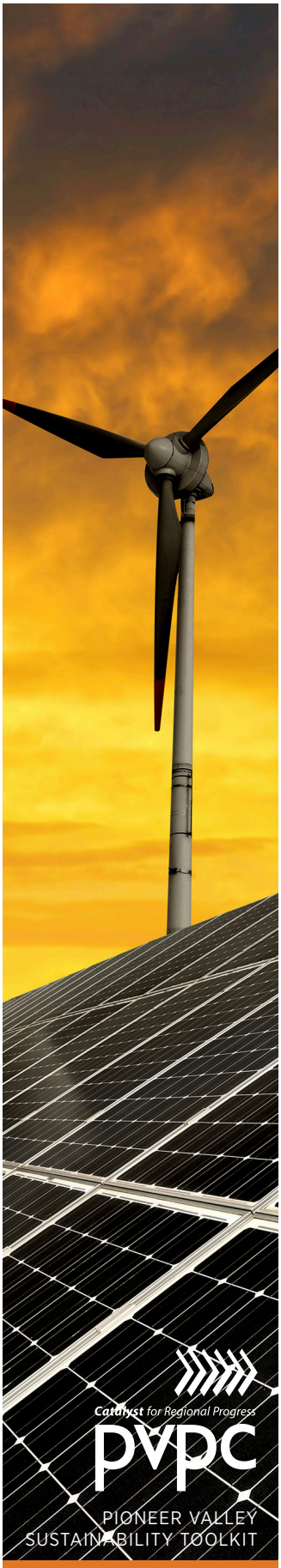
PURPOSE

Reduce the start-up costs of installing solar energy systems for residents and small businesses by organizing group purchases to achieve bulk purchase discount pricing.

HOW IT WORKS

As members of Sam's Club and Costco know: buying in bulk saves money. The same is true for installing solar energy systems on your home or business. One important tool for achieving this kind of group purchasing discount power for solar energy is group purchase discount, sometimes known as "solarize," programs. A solarize program encourages property owners to sign up to have a pre-qualified solar vendor install a solar energy system on their building. And the more property owners who sign up, the greater the discount the vendor agrees to give—which can be as much as 20% less than the cost of individual installation.

Solar group purchase discount programs depend on a strong public education and outreach effort to reach potential customers. With numerous state and federal financial and tax incentives available, property owners need time to ask questions and work the numbers to understand how to get the best deal. Programs may focus on a single neighborhood, or on a large city or region. The key is to make the outreach fun! By talking with neighbors and other property owners to learn about the potential benefits of solar energy, people also make social connections within their community.

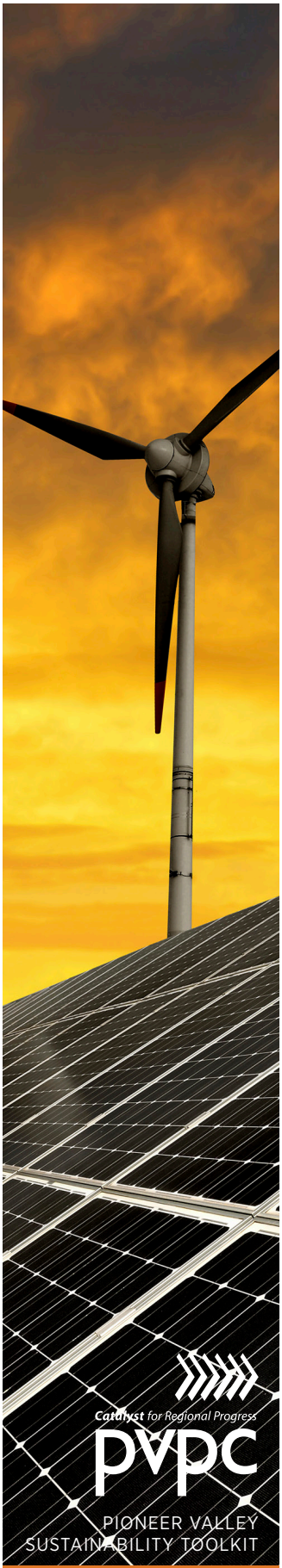


EXAMPLES OF SUCCESSFUL "SOLARIZE" PROGRAMS

Solarize Mass, Massachusetts

The Solarize Mass program of the Massachusetts Clean Energy Center is one of the most successful solar energy group purchase programs in the county. Solarize Mass kicked off in 2011, and as of 2014 has yielded nearly 1,000 new solar energy systems being installed on homes and businesses in 25 communities.

The Solarize Mass program depends on local grassroots outreach that is led by local volunteers. It features a tiered pricing structure that increases the savings as more home and business owners in a community sign up. This further encourages neighbor-to-neighbor outreach to increase sign-ups. Property owners can choose to own their own system, or opt for a power-purchase agreement arrangement that requires little or no up-front costs (the installer owns the panels and installment payments are paid from the revenue that they generate by feeding electricity back into the grid).



Portland, Oregon

Oregon has also been a "Solarize" leader, supporting group purchase discount programs throughout the state. Solar Oregon assists through solar education outreach and data management.

In the City of Portland, the "Solarize Portland" program run by several Portland neighborhood associations. Photovoltaic systems are purchased in bulk, and are then installed by a single solar contractor to reduce costs. The program's first round achieved 120 new residential installations in just six months. This unexpected success spurred more projects in other neighborhoods of Portland and other Oregon cities.

LINKS TO MORE INFORMATION

SOLARIZE MASS:
http://www.masscec.com/solarizemass

SOLAR OREGON:
http://solaroregon.org/residential-solar/solarize-communities

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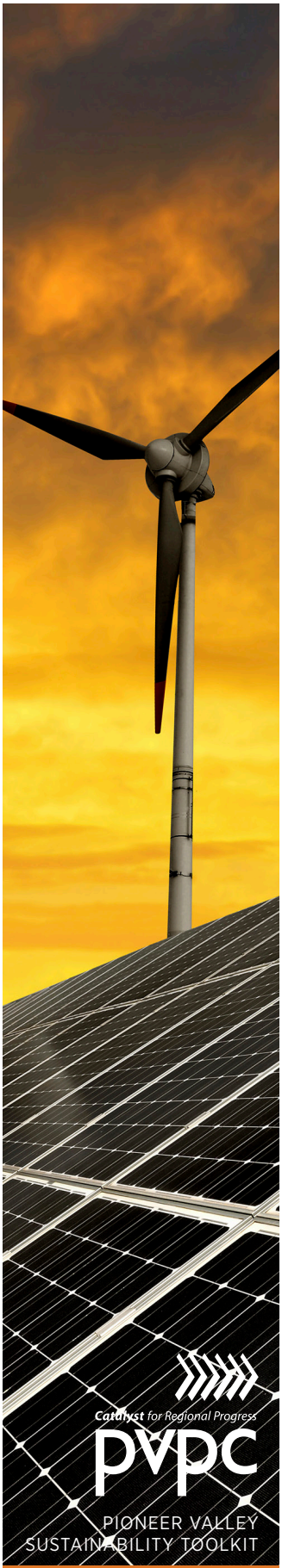

UNDERSTANDING

Organic Waste Composting & Material Reuse

PURPOSE

To reduce energy usage by encouraging composting of organic waste and re-use of building materials.

Commercial composting programs and building material re-use programs are waste diversion strategies that save valuable landfill space, conserve energy, and reduce the emission of greenhouse gas.

Through composting, organic waste is transformed into natural fertilizers for farming and gardening. This process decreases the energy demands of farming by offering a natural alternative to petroleum-based chemical fertilizers. Compost also retains more moisture in soil, reducing the need for irrigation. Additionally, the greenhouse gas produced from composting is completely captured and used for energy, rather than released into the atmosphere as occurs in a landfill.

In a building material re-use program, unwanted but reusable building materials from remodeling projects--including lumber, doors, kitchen appliances, and cabinets--are made available to non-profit organizations, businesses, and individuals for construction projects. Material re-use requires less energy and natural resources than the creation of new products and can minimize the fuel consumption necessary for transporting new products to the marketplace.

HOW IT WORKS

Implementing a Commercial Composting Program

The primary activities that form a commercial composting program are the collection of organic waste from commercial generators (restaurants, school cafeterias, hospitals, and supermarkets), composting the waste at a waste facility, and transporting the finished compost to farms and gardens. Municipalities can assist in these activities through the following actions:

- Identifying and permitting composting facilities - Assisting in the permitting process can make it easier to recruit organizations to invest in and operate the facility. The permitting process is controlled by the Massachusetts Department of Environmental Protection (DEP). The DEP recommends that new composting facilities be established on active or inactive landfill or transfer station sites, because these facilities already have a "site assignment" permit. Facilities that compost brush do not have a current DEP site assignment. While these sites represent potential sites for a composting facility, they would require the full permitting process to accept food wastes. Any local Board of Health regulations should also be reviewed to ensure that the composting facility meets these requirements.
- Facilitating participation from waste generators and farmers - Outreach to businesses in order to educate them about the benefits of composting is an important first step to creating a commercial compost program. Outreach should be directed to managers and owners of restaurants and operations managers of schools and hospitals. As per a state ban that started on October 1st, 2014, large food waste producers can no longer send discarded food to the landfill, so these are excellent candidates for participation in the program. Overreliance on a specific large waste generator or compost user can make the program fragile, but working with other communities to expand the system can reduce this risk.
- Encourage haulers to provide separate organic waste collection - municipalities can encourage and train local commercial waste haulers about organic waste source separation. They can also make haulers aware of waste generators who are interested in participating in a commercial composting program, in order to facilitate the creation of new organic waste hauling routes. Municipalities can also implement bylaws that require businesses to separate organic waste and give haulers a financial incentive to compost by increasing municipal landfill tipping fees.

- Recruit compost facility investors and owner-operators - In addition to facilitating permitting for composting facilities, municipalities can release requests for proposal to identify potential investor-operators, corporations, or others that may have an interest in operating a composting site. Municipalities can also reach out to existing organizations in the region, such as Amend Organics in Amherst, which operates a full commercial composting program and are involved in collection, composting, and delivery of compost. Municipalities can also help secure funding for a composting program by applying for grant funding from the Massachusetts DEP's Sustainable Materials Recovery Program (SMRP).

Implementing a Building Material Re-Use Program

Most building materials re-use programs maintain a storage facility of used items, where individuals, businesses, and institutions who are involved in building construction can deliver and purchase materials. Items that are commonly part of a re-use program are: windows, hardware, cabinets, fixtures, doors, paint, furniture, computers, office equipment, carpet, and wood. Ways in which municipalities can assist with a re-use program are:

- Provide a building materials storage facility - finding a physical structure for a re-use program is often the largest challenge and expense to its implementation. Providing municipally-owned space for this purpose, even if only small, can provide a solution to this challenge.
- Partner with non-profit organizations to run the program - Re-use programs can be run as a joint effort between municipalities and non-profit organizations. Partnering allows the program to tap into an existing volunteer network that can help operate and staff the program.
- Promote existing re-use programs in the Pioneer Valley - The non-profit Center for EcoTechnology runs the EcoBuilding Bargains store in Springfield, which is the largest program in New England. Encouraging residents, businesses, and non-profits to utilize this existing program is an excellent alternative to starting a new program.

EXAMPLES OF COMMUNITY IMPLEMENTATION

Northampton, MA

The Pioneer Valley's largest commercial composting effort to date, called the Northampton Source Separated Organics (SSO) Program, ran between 1991 and 2002. The program was a collaboration between the City of Northampton and the Center for EcoTechnology, a local non-profit organization. For the first seven years of the program, Smith Vocational High School Farm in Northampton operated a food waste composting facility at their school farm. The program was expanded in 1998 through a CET-provided grant to include large supermarkets (Stop & Shop and Big Y), food processors (e.g. Hot Mama's), small markets (e.g. Serio's and Coopers), restaurants (e.g. La Cazuela and Northampton Brewery), institutions (e.g. Smith College and the Hampshire County Jail), health care facilities (e.g. Cooley Dickinson Hospital), and public schools (e.g. JFK Middle School). Most of the compost was used by the Smith Vocational High School Farm (25-30 tons of food per week), with other area farmers accepting some as well. In 2004, composting at the high school's farm ceased due to changes in school administration, and the program ended without an identifiable backup composting facility. The program was successful while in operation, but also demonstrates the need to have more than one composting facility in order to ensure the resiliency of a composting program.

Amend Organics, Amherst, MA

Amend Organics is an agriculture-based non-profit that offers composting to farmers, commercial food generators, and municipalities in western Massachusetts. The company collects leaves, cow manure, horse bedding, and food scraps to create compost for agricultural use. Beginning its composting operations in 2012, the company has a lease with the New England Small Farming Institute to use the composting facility at the NESFI-operated Book & Plow Farm located on land owned by Amherst College. Amend Organics also runs a food scraps collection program at the Town of Amherst Transfer Station. The program is funded through compostable bags sold through the Amherst Transfer Station for collection of food scraps.

EcoBuilding Bargains, Springfield, MA

EcoBuilding Bargains, located in Springfield, Massachusetts, offers reused and surplus building materials, including cabinets, furniture, doors, tile, lighting fixtures, appliances, and lumber. The 30,000 square foot facility accepts donations from homeowners, contractors, manufacturers, retailers and municipal collection centers. The program,

which is the largest in New England, was created by the Center for EcoTechnology, a non-profit community-based environmental organization started in 1976. The revenue from reselling the donated building materials provides the program enough funding to cover its operational costs. The program started in 2001 in a much smaller facility in Springfield, and was started with just under $200,000 in grant money from sources including the Massachusetts DEP, US Department of Commerce Economic Development Administration, and private foundations.

LINKS TO MORE INFORMATION

CONSTRUCTING A REGIONAL ORGANIC WASTE MANAGEMENT PROGRAM FOR THE CENTRAL PIONEER VALLEY, CREATED BY THE PIONEER VALLEY PLANNING COMMISSION:
http://www.northamptonma.gov/DocumentCenter/View/333

STRATEGIES FOR STARTING A MATERIALS RE-USE PROGRAM, CREATED BY THE UNIVERSITY OF WISCONSIN:
http://infohouse.p2ric.org/ref/21/20193.pdf

CENTER FOR ECOTECHNOLOGY'S ECOBUILDING BARGAINS WEBSITE:
http://ecobuildingbargains.org

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UNDERSTANDING

Pedestrian Access

climate & energy

PURPOSE

To reduce greenhouse gas emissions by increasing walking and reducing driving.

Transportation is one of the largest contributors to greenhouse gas (GHG) emissions. In the Pioneer Valley, transportation accounts for about 31.8% of GHG—more than any other sector. Creating a transportation network that provides local residents with safe, convenient access to destinations by walking will reduce these emissions by replacing car trips with increased walking.

Promoting pedestrian access also provide residents with a low-cost alternative to driving, saving them money and reducing traffic congestion. As an easy way to exercise, walking also promotes mental and physical health. Regardless of the destination, every trip begins and ends by walking, meaning that promoting pedestrian access provides benefits to everyone.

HOW IT WORKS

Municipalities can require private development to promote pedestrian access through the use of zoning and subdivision bylaws. In order to encourage walking, the following elements should be included in these regulatory documents. These elements can be included as a new, separate section of the bylaws, or integrated into existing text:

- **Requiring sidewalks as part of all new development, on both sides of the street, so that pedestrians have safe places to walk. Sidewalks should be at least five feet wide with smooth, high-grip surfaces.**
- **Limiting the number and width of driveways and curb cuts, in order to minimize the number of locations where pedestrians are at risk of getting struck by cars crossing the sidewalk.**
- **Requiring appropriate streetscape design, including guidance about appropriate sidewalk design, street trees, benches, light fixtures, outdoor dining areas, signs, etc.**
  a. Using design guidelines and/or form-based codes to require building development that contributes to a high-quality pedestrian realm. The regulations can encourage or require appropriate building massing, setbacks, and architectural detail including the use of awnings, windows, and varied building materials.

b. Allowing for close proximity of different land uses, or mixed-use development, to enable travel between uses that only requires a short, easy walk.

» **Ensuring parking lots are safe for walking, by requiring clearly designated, raised sidewalks from the street to all building entrances, installing speed bumps or other traffic calming measures to reduce motorist speeds, requiring adequate tree cover to shade the parking lot, and providing bike parking.**

Designing new subdivisions to encourage pedestrians, including providing a well-connected street grid with short blocks, rather than cul-de-sacs or dead ends, to minimize walking distances, providing sidewalks, requiring street trees, appropriate lighting, minimizing the width of new roads to slow car traffic, and providing traffic calming measures, where appropriate.

» **Specifying that the above items will be reviewed as part of the municipality's site plan review process for new development projects.**

Integrating pedestrian features into a municipality's regular construction and maintenance of roads is another effective way to promote pedestrian access. Specific pedestrian features to be included are:

» **Installing traffic signaling at intersections that have pedestrian countdown timers and signals that allow pedestrians a chance to enter the street before motorists, so they are more visible to turning cars.**

» **Providing designated mid-block pedestrian street crossings that have clear signage and prominent pavement markings.**

» **Installing sidewalk bump outs at pedestrian crossings. Bump outs extend the sidewalk area and reduce the width of crossings, which increases safety and comfort for pedestrians.**

» **Providing wayfinding signage that provides pedestrians with the direction, distance and time between popular destinations.**

» **Installing traffic calming devices, such as speed bumps, reduced lane widths, and medians, that encourage motorists to drive more slowly.**

» **Installing street lights that provide adequate street and sidewalk lighting. Adequate lighting is particularly important at locations with grade changes, potential obstacles in a pedestrian's path, and where auto traffic crosses pedestrian paths. Lighting should minimize glare.**

» **Installing street furniture, including bus shelters, bike racks, trees, trash cans, public art, and newspaper boxes that make the street visually interesting, provide opportunities for rest, and provide a sense of separation between roads and sidewalks.**

Municipalities can also pass a Complete Streets policy, which promotes design and maintenance of streets and sidewalks that balances the needs of all users, including pedestrians, bicyclists, users of mass transit, people with disabilities, the elderly, motorists, freight providers, emergency responders, and adjacent land users. A Complete Streets policy would be passed by the City Council or Select Board and take one of two forms:

- **A resolution, which is a non-binding, official statement of support for approaching community transportation projects as a way to improve access, public health, and quality of life.**
- **An ordinance, which legally changes the municipal code to require the needs of all users to be addressed in new transportation projects.**

Both resolutions and ordinances help promote pedestrian access. However, because resolutions do not require action, they are more likely to be neglected than a legally-binding ordinance.

EXAMPLES OF COMMUNITY IMPLEMENTATION

Springfield, MA

In 2014, the City of Springfield completed its first Complete Streets Plan, which recommends a network of roadways throughout the city to receive upgraded accommodations for bicyclists and pedestrians. The plan emphasizes pedestrian access improvements that can have the most impact for the least cost, such as pedestrian crossing pavement markings and wayfinding signage. The plan, developed for the City by the Pioneer Valley Planning Commission and MassBike, was funded through a grant from the Centers for Disease Control. As part of the plan, a sidewalk inventory was conducted that identified all existing sidewalks. The City is currently considering passing a Complete Streets policy in conjunction with completion of the plan. The City has also undertaken various pedestrian access improvements in recent years, such as installing new sidewalk ramps and pedestrian crossing markings on Main Street in downtown.

Northampton, MA

The City of Northampton's zoning ordinance requires all new development to prepare an interior traffic and pedestrian circulation plan that is designed to minimize conflicts and safety problems with motorists, as well as provide safe and adequate pedestrian access through the construction of sidewalks. The ordinance also requires that sidewalks connecting "from the building to the street be clearly delineated through materials and/or markings to distinguish the vehicular route from the non-vehicular route." Sidewalk construction specifications are also included that require sidewalks to be a minimum of six feet in width and located on both sides of the street. In addition to these zoning

requirements, the City incorporated pedestrian access into the street design of Elm Street near Smith College, where there are multiple pedestrian crossings with medians, signage alerting motorists to the crossing, and prominently visible pavement markings. The City is also currently considering adding additional design specifications, such as sidewalk and crosswalk widths in parking lots, for internal pedestrian circulation within new developments.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

THE FEDERAL HIGHWAY ADMINISTRATION'S GUIDE TO DESIGNING SIDEWALKS AND TRAILS FOR ACCESS:
http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalks/

MODEL SIDEWALK REGULATIONS – PIONEER VALLEY PLANNING COMMISSION AND OTHERS:
http://walkbikecny.org/wp-content/uploads/2014/06/20140617_Final_Reference_Manual_a_C.pdf

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION INITIATIVES TO PROMOTE PEDESTRIAN TRANSPORTATION:
http://www.massdot.state.ma.us/GreenDOT/PedestrianTransportation.aspx

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION PEDESTRIAN PLAN:
https://www.massdot.state.ma.us/planning/Main/StatewidePlans/PedestrianPlan.aspx

FOR MORE INFORMATION, PLEASE CONTACT

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413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org

UNDERSTANDING

Retrofit Municipal Buildings

climate & energy

PURPOSE

To increase energy efficiency and reduce energy waste in municipal buildings.

Public buildings lose significant amounts of energy through poor insulation of walls, windows, ducts and pipes, as well as poor monitoring and maintenance of building structures. When municipalities improve energy efficiency by retrofitting public buildings, they use less energy over the long-term, reduce pollution, lower the amount of greenhouse gas emissions from their operations, and reduce energy spending.

HOW IT WORKS

Older public buildings are often energy inefficient. They can quickly lose heat in the winter and prove difficult to keep cool in the summer because of a compromised building envelope that allows a large volume of air exchange between the outside and inside of the building. Securing this building envelope with better insulation, window glazing, as well as updating the mechanical systems of a building, such as the boiler, air conditioners, lighting and plumbing will help reduce energy use, cost, carbon dioxide emissions and other pollutants.

A municipality can partner with an Energy Service Company or the local utility company to complete energy audits of buildings. The steps in this process are to agree upon:

- **proposed improvements;**
- **timeline for improvements;**
- **payback period on improvements; and**
- **financing for the work to be completed.**

Often the Energy Service Company will guarantee that the energy savings from proposed improvements will at least equal the cost of the proposed improvements, thus allowing the improvements to move forward without any out of pocket expenses for the municipality.

Belchertown Town Hall received energy efficiency upgrades in 2011

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Belchertown, Massachusetts authorized the use of either traditional tax-exempt bonds or qualified energy conservation bonds to pay for the installation of roughly $3.3 million worth of energy upgrades for town and school buildings. The energy services company predicted that the upgrades will save the town $256,000 annually for a period of 17 years. These savings are based on fuel and electricity prices for 2010.

West Springfield, Massachusetts approved bonding $3.8 million to fund energy-saving projects for various municipal buildings such as boiler replacements for several of the town's schools. The energy service company guaranteed that the improvements would generate savings, and the contract with the City states that the company will pay the city the difference if it does not.

Toledo, Ohio sold bonds to finance a project with a systems controls company to complete energy efficiency improvements in municipal buildings. The contract with the city's systems control company guaranteed that financial savings from improved efficiency

would pay back the bonds—any shortfalls were covered by the controls company and any savings accrued to the city. This financing system has paid for building improvements of over $10 million.

Portland, Oregon completed comprehensive retrofits of city buildings that included installing energy efficient lighting and windows. These energy efficiency measures resulted in cost-savings through lower utility bills. Portland has saved over ten percent on annual utility bills, or approximately $1 million per year, since implementing the program.

LINKS TO MORE INFORMATION:

INFORMATION ON ENERGY SERVICE COMPANIES PROVIDED BY THE NATIONAL ASSOCIATION OF ENERGY SERVICE COMPANIES:
http://www.naesco.org/

INFORMATION ON THE FUNDING OPPORTUNITIES THROUGH THE MASSACHUSETTS GREEN COMMUNITIES PROGRAM:
http://www.mass.gov/?pageID=eoeeasubtopic&L=3&L0=Home&L1=Energy%2c+Utilities+%26+Clean+Technologies&L2=Green+Communities&sid=Eoeea

INFORMATION ON PORTLAND OREGON'S CITY ENERGY CHALLENGE:
http://www.smartcommunities.ncat.org/success/city_energy.shtml

FOR MORE INFORMATION, PLEASE CONTACT

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REGIONAL STRATEGY

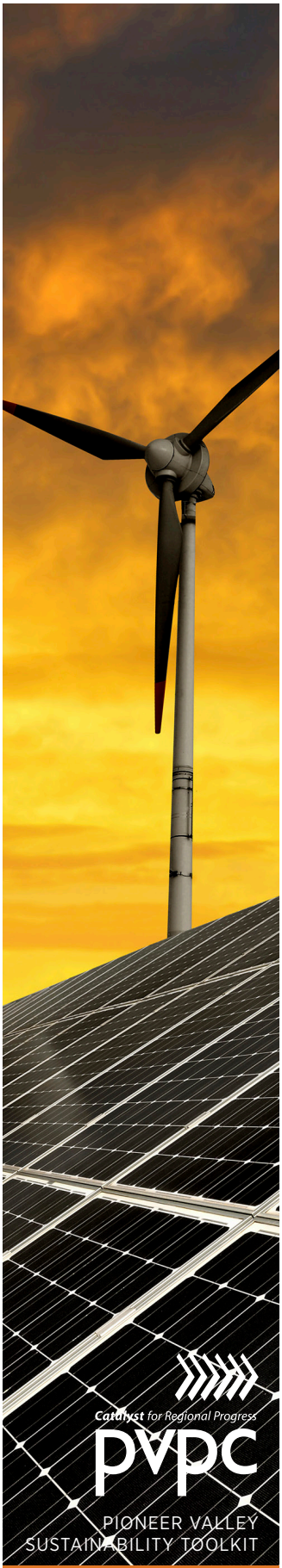
Solar Energy Incentives

PURPOSE

To promote installation of more solar energy capacity in Massachusetts by providing financial and tax incentives.

INCENTIVES FOR SOLAR PV AND SOLAR THERMAL SYSTEMS

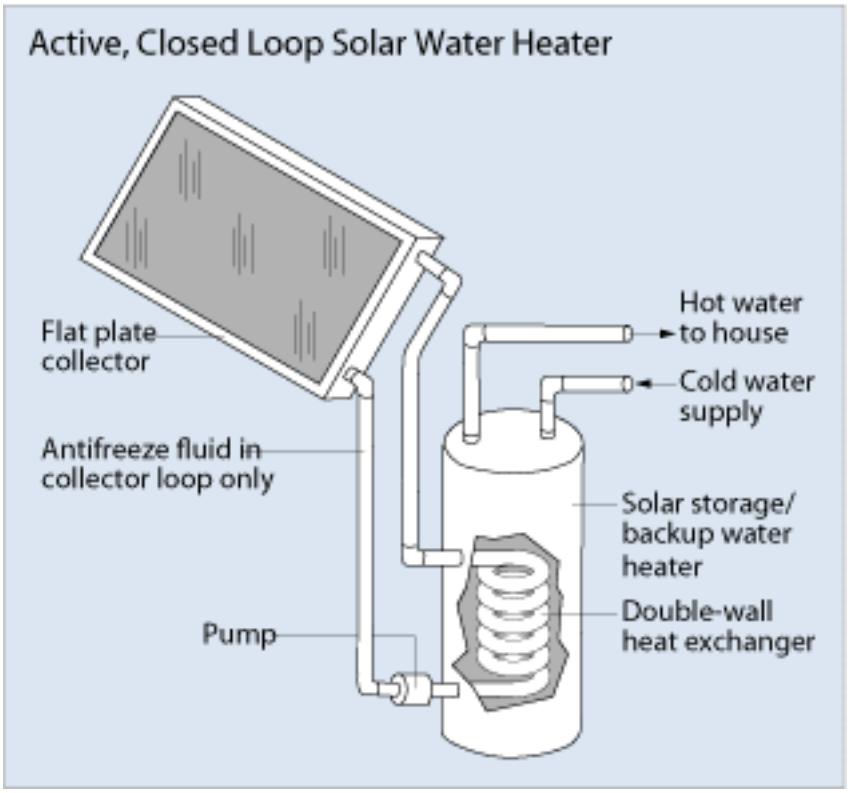
The Commonwealth of Massachusetts offers a variety of financial and tax incentives to help encourage more home owners, businesses and governments to install solar energy systems—namely solar photovoltaic (PV) electric systems and solar thermal hot water heating systems. With the help of these incentives, Massachusetts since 2008 has boosted installed solar electricity capacity to more than 400 megawatts (MW) statewide (enough to power about 38,000 homes under typical conditions) and thousands of building hot water heating systems, which can provide up to 80 percent of a building's hot water needs.

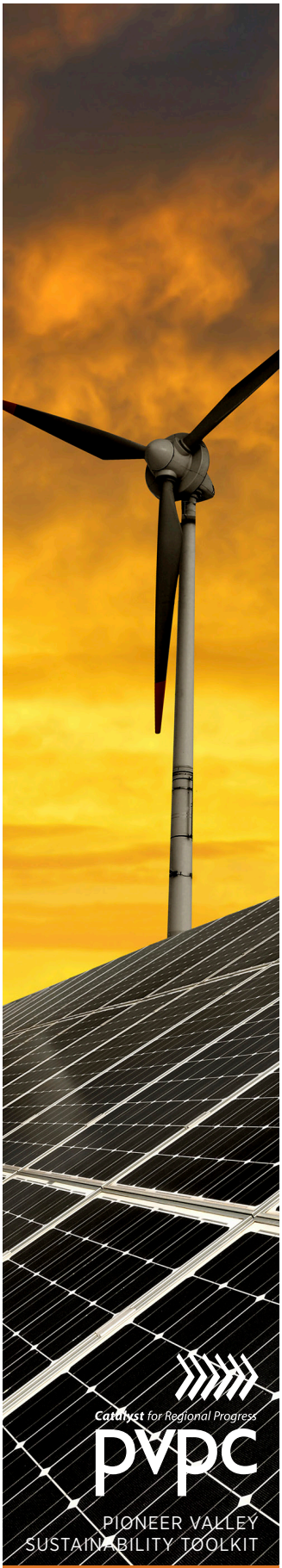


Massachusetts Solar "Carve-Out" Program and Solar Renewable Energy Certificates (SRECs) –

The Commonwealth is creating incentives for solar PV systems through a market-based incentive program to "carve out" a portion of Massachusetts' electricity market for solar PV. An initial statewide carve-out goal of 400 MW of new solar PV power was reached in 2013, and so in 2014 a new goal of 1,600 MW of in new solar PV was set for the year 2020.

The solar carve-out program is driven by an innovative market-based financial product called solar renewable energy certificates, or SRECs. Solar energy system owners receive one SREC from the Commonwealth for each megawatt of solar energy that their system generates. SRECs can then be sold or traded with utilities and other energy system owners. The larger the system, the more SRECs received. In Massachusetts, utility companies are motivated to buy SRECs because they must deliver a certain percentage of the energy (currently 4%) from "green" generate sources, such as solar. If they do not, a penalty is assessed. SRECs are currently valued at about $280 to $350 each, and their value fluctuates with the market. The revenue from SRECs is critical to offsetting the currently initial higher start-up costs of new solar energy systems to reduce their payback period, versus that of conventional technologies (though in the long term, solar energy systems still cost less to own and operate than purchasing power from the grid).





Net Metering

Net metering allows owners of renewable energy systems who feed power back into the electrical grid to receive credits on their bills for that power. The practical effect of net meeting is dramatic: Any electric utility customer can become an electricity producer, too. They can earn money by generating more than they need when the sun is shining (i.e., "the meter is spinning backwards") to offset the cost of drawing power from the grid at night or during cloudy times – in many cases, resulting in net annual electricity costs of $0. In addition, utility customers without a power system of their own can buy green power from any supplier and also receive a credit for it on their bill.

Renewable Energy Income Tax Credit

Massachusetts also offers a tax credit for homeowners who install renewable energy systems. In the first year of installation, the homeowner is eligible for a 15% credit (up to $1,000) on their state income tax for the net expenditure (including installation costs) for a solar PV system on a primary residence. If the tax credit amount is greater than the owner's income tax liability, then the excess credit may be carried forward up to three years.

Commonwealth Solar II Program

This program of the Massachusetts Clean Energy Center is targeted to homeowners and businesses with solar PV systems that produce less that 15 kW of power. It provides a rebate of about 25 cents per installed watt, plus additional incentives. Project must be approved before installation through a non-competitive application process.

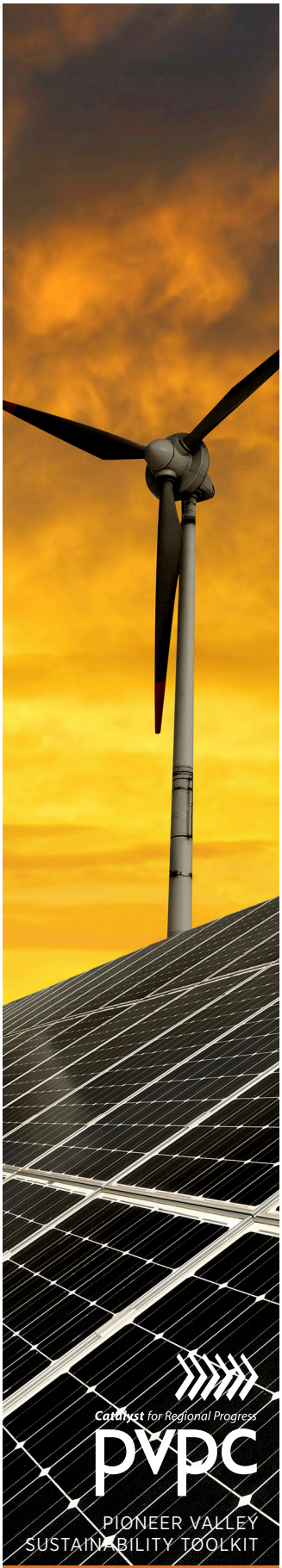
MORE INFORMATION ABOUT SOLAR ENERGY INCENTIVES

The solar energy needs and generating potential of every property are different. The solar energy market is new and evolving. Like the price of heating oil or natural gas, the price of solar energy can change based on market conditions. Therefore, it is important to get information ahead of time and work with an installer that you trust. Every home solar installation should begin with a free Mass Save energy assessment to understand how much power can be conserved—so unneeded solar panels are not purchased.

CALCULATE SOLAR SAVINGS AND FIND LOCAL SOLAR INSTALLERS:
http://www.solar-massachusetts.org/

DATABASE OF STATE INCENTIVES FOR RENEWABLES AND EFFICIENCY:
http://www.dsireusa.org/solar/incentives/

APPLICATION TO FOR MASSACHUSETTS SOLAR CARVE-OUT PROGRAM:
http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/solar/rps-solar-carve-out/statement-of-qualification-application.html



MASSACHUSETTS CLEAN ENERGY CENTER:
http://www.masscec.com/

MASSACHUSETTS SOLAR HOT WATER (THERMAL) PROGRAM:
http://www.masscec.com/programs/commonwealth-solar-hot-water

COMMONWEALTH SOLAR II PROGRAM
http://www.masscec.com/solicitations/commonwealth-solar-ii-block-19

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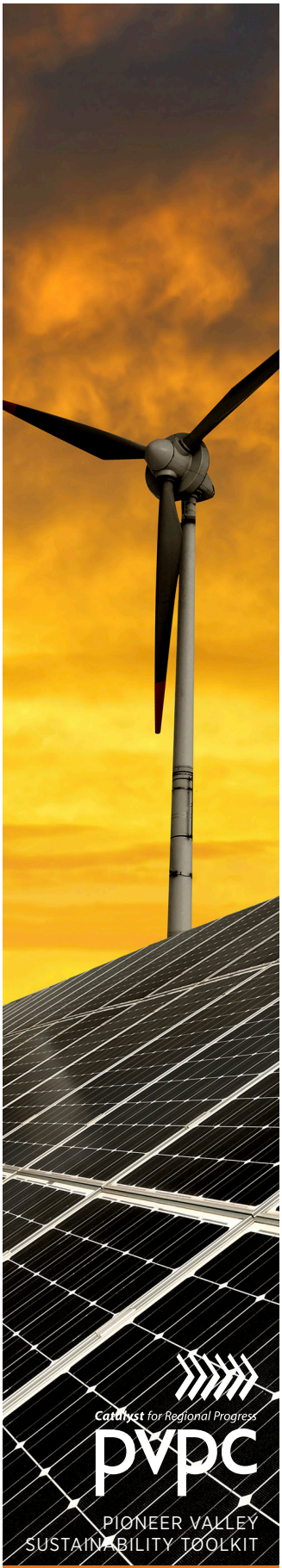


UNDERSTANDING

Strategies For Residents & Businesses

PURPOSE

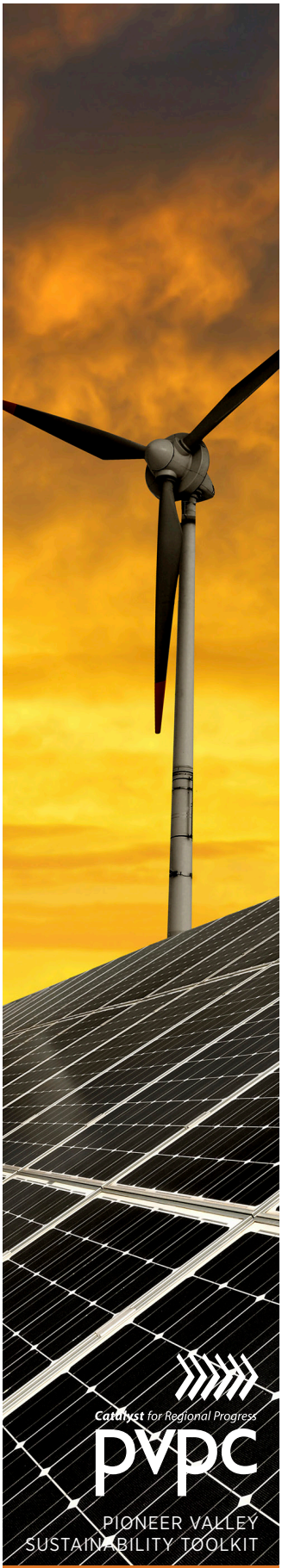
Personal choices directly impact greenhouse gas emissions and the future quality of our environment. Every person has the power to change his or her behavior, reduce greenhouse gas emissions, and slow global climate change.

Simple Steps That Work

The choices we make as individuals can have a significant impact on greenhouse gas emissions. We can choose to conserve resources and reduce emissions—in our homes, in our cars, in the products we buy, etc. Many people think that climate-positive choices require sacrifices. The truth is they often result in a better quality of life and improved financial well-being. Improving the energy efficiency of your home helps slow climate change, but it also improves the comfort of your home and saves you money. Walking or biking whenever possible saves money on gas and improves your health. "Eco" driving habits reduce emissions but also increase the life of your vehicle. Purchasing local, organic foods stimulates your local economy, and the food often tastes better and is more nutritious.

Here are **eight simple steps** any citizen or business can take to reduce their environmental footprint and emissions of carbon dioxide, the leading greenhouse gas contributor to climate change.

1. Increase your energy efficiency
2. Use renewable energy
3. Use alternative transportation
4. Conserve resources
5. Be a smart consumer
6. Respect your environment
7. Get involved! Learn more!



PURPOSE

Improving the energy-efficiency of a home or business can reduce utility bills while also cutting greenhouse gas emissions.

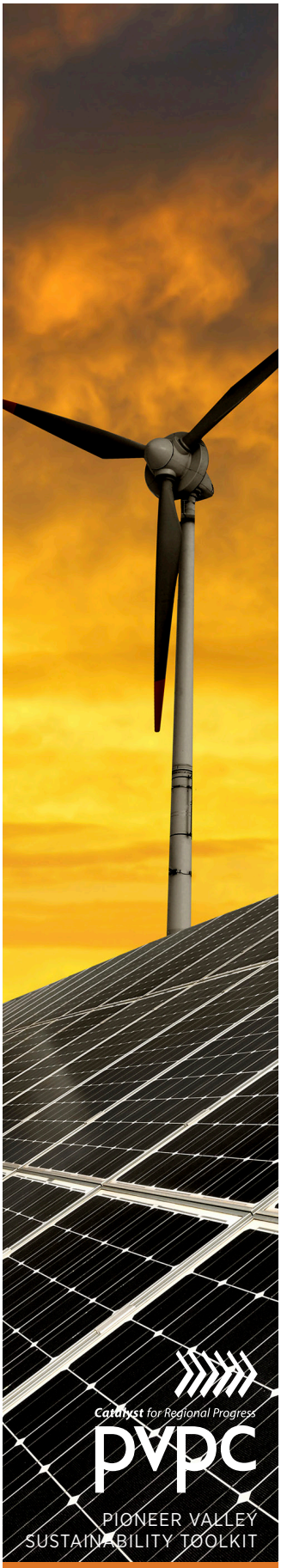
WHAT TO DO:

Investing in the efficient energy performance of your home or business is one of the most important steps an individual can take to reduce his or her carbon footprint. Even if you are considering installing on-site renewable energy generation like solar panels,it is wise to make improvements in energy efficiency first. Every $1 spent on energy efficiency, saves $3 to $5 in renewable energy system costs. Here are some measures you can take to increase your efficiency:

a. Schedule an energy audit through the MassSave program: Massachusetts utilities check customers' homes, provide simple energy-saving devices such as Compact Fluorescent Lights (CFLs) for FREE, and offer suggestions on improving insulation and energy efficiency. These "retrofit" improvements include a wide range of installation and maintenance technologies such as: installing renewable energy systems, plugging air leaks in siding, using water saving technologies, planting environmental landscaping or switching to CFLs. There are economic incentives for residents and businesses that decide to make large retrofits to their properties. For example, the "HEAT" loan provides up to $25,000 of subsidized loans to finance energy audit recommendations. Best of all, following those audit recommendations can lead to very large savings on your energy bill. Start today by scheduling an audit at www.MassSave.com or call them at 1-800-666-3303 for WMECO customers, 1-800-632-8300 for National Grid. Contact your municipal utility for more information if they are your provider.

b. Replace regular light bulbs with compact fluorescent light bulbs (CFLs) or LED bulbs: New fluorescent bulbs use 60% less energy, last for 6 times longer and save and save approximately $40 over their lifetime when compared to older incandescent bulbs. Handle them carefully, as they contain small amounts of mercury. Best of all, they are free with a MassSave audit! LED bulbs generally cost more upfront but last significantly longer than CFL lightbulbs. They typically last for more than 20 years!. A single Energy Star rated LED bulb can save $135 in electricity costs over its lifetime and prevent 1,800 pounds of greenhouse gas emissions, the equivalent of keeping 850 pounds of coal from being burned.

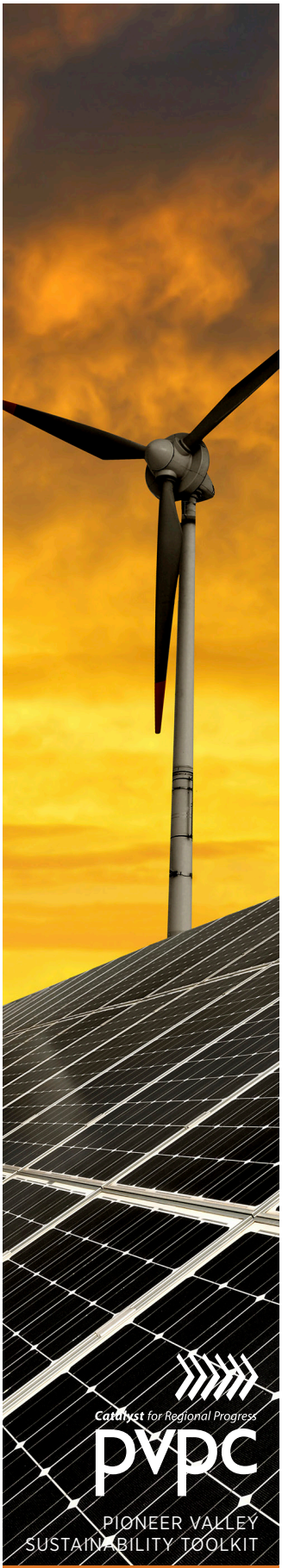
c. Keep an eye out for efficient appliances: Use the Energy Star rating system as a guide when purchasing electric equipment. It will show you how the product's energy consumption measures up with similar items. Eliminating or replacing



appliances such as old refrigerators commonly used for secondary storage with a new Energy Star rated refrigerator can go a long way to reduce your electric consumption. When shopping for these appliances, it is important to think long term instead of only looking at the up-front costs. Although they might cost more initially, these appliances easily pay for themselves through energy savings on your utility bill.

d. Monitor your electricity consumption: "You can't manage what you don't measure" so Tracking tracking a home or business' energy usage is the first step in moving toward efficiency. There are a number of appliances that help track where and how much electricity is used within a building. "Watt-hour meters" are small, inexpensive devices that are easily plugged into any home device. They measure how much electricity is being drawn by that particular appliance. There are also slightly more expensive "whole-house meters" that give data about every appliance in your house. Both types help pinpoint which appliances are drawing the most energy. With this information, it is easier to make small changes that reduce your utility bill.

Smart Meters are an innovative way to accurately measure energy consumption in your home or business. These meters take hourly measures of how much energy is used and transmit it wirelessly to the electric utility, providing them with data to help serve your needs better. Across the country, electric utilities are installing these systems for homeowners free of charge. These meters will allow the utility to bill more accurately and provide power at critical parts of the day. These appliances are a gateway to an increasingly more efficient national "Smart Grid" energy system that is the newest innovation within the energy delivery and usage system. WMECO and National Grid are currently installing these systems in communities across Massachusetts. Contact your local provider for more information about installing a smart meter in your home.



LEARN MORE:

MASS SAVE UTILITY PROGRAM AND AUDIT SCHEDULING:
www.MassSave.com

ABOUT ENERGY EFFICIENT APPLIANCES:
http://www.nrdc.org/air/energy/fappl.asp

ABOUT ENERGY STAR PRODUCTS:
http://www.energystar.gov/index.cfm?fuseaction=find_a_product.

ENERGY STAR FINANCIAL INCENTIVES:SAVER, US DEPARTMENT OF ENERGY'S HIGH QUALITY WEBSITE ABOUT ENERGY SAVINGS:
http://www.energysavers.gov/financial/70020.html

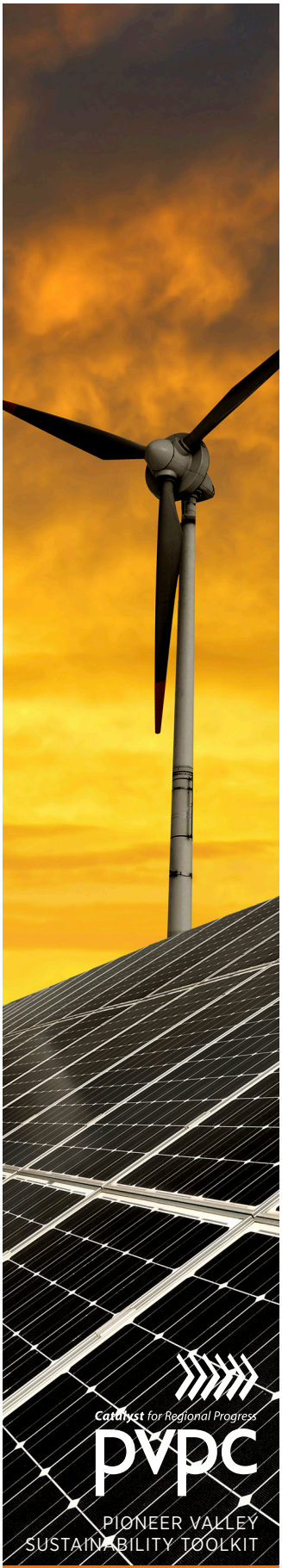
http://energy.gov/energysaver/energy-saver

ENERGY STAR HOME ENERGY PERFORMANCE AUDITS:
http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_audits

REDUCING GREENHOUSE GAS EMISSIONS - STRATEGIES FOR HOMEOWNERS: MASSACHUSETTS' RECOMMENDATIONS FOR REDUCING EMISSIONS
http://www.mass.gov/eea/air-water-climate-change/climate-change/massachusetts-global-warming-solutions-act/how-can-i-reduce-my-emissions.html

http://www.mass.gov/dep/air/climate/reduce.htm#homeowners

LEARN ABOUT SMART METERS:
http://www.pge.com/myhome/customerservice/smartmeter/



PURPOSE

Using renewable energy in your home or small business is a personal investment towards energy independence, a cleaner environment and climate change mitigation.

WHAT TO DO:

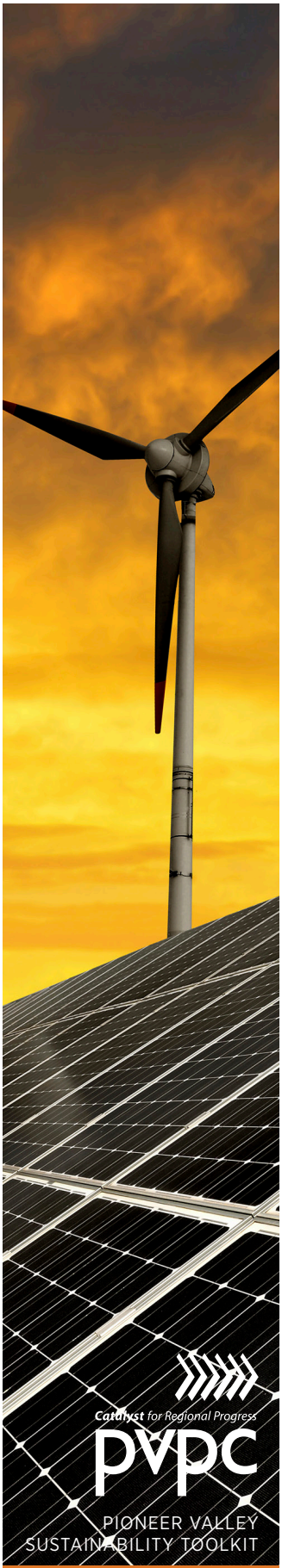
Renewable energy has become more common and cost-efficient effective in recent years. Types of renewable energy systems include solar panels, wind turbines, and microhydropower and heating and cooling systems. Massachusetts consumers can also purchase renewable energy through a utility by signing up through various available programs. These investments and consumer choices can pay for themselves through energy savings, tax breaks, incentives and benefits to the environment.

Ways to use renewable energy include:

a. Utility purchasing program: The easiest way to consume renewable energy without putting a new system on your property is through your utility's renewable energy purchasing program. Massachusetts utilities such as National Grid allow you to purchase part or all of your electricity from renewable sources through their "Green-Up" program. WMECO also encourages consumers to purchase from renewable energy sources by providing a growing list of renewable energy suppliers on their website. Customers must call the supplier to sign up, and then that company makes all necessary changes with WMECO. While the electricity you directly receive at your home or business will remain unchanged, the utility uses the money you pay for electricity towards paying renewable energy providers; therefore you "consume" renewable energy.

b. Renewable heating and cooling: Solar water heaters and geothermal heating and cooling systems are two ways to use renewable energy without generating electricity in your home or business. Solar water heaters use the sun's heat to warm up water, reducing the use of oil or natural gas hot water heaters. Geothermal heating and cooling systems function by circulating air through tubes many meters underground. Consistent moderate temperatures within the ground cools the air in the summer and heats it during the winter while using substantially less fuel.

c. Electric generation system: Homes and businesses can install electrical generation systems such as those that use solar panels or wind turbines. Massachusetts encourages businesses, municipalities and residents to invest in and install energy saving technologies. There is a multitude of ways for Massachusetts residents to benefit both economically and environmentally through state programs such as:

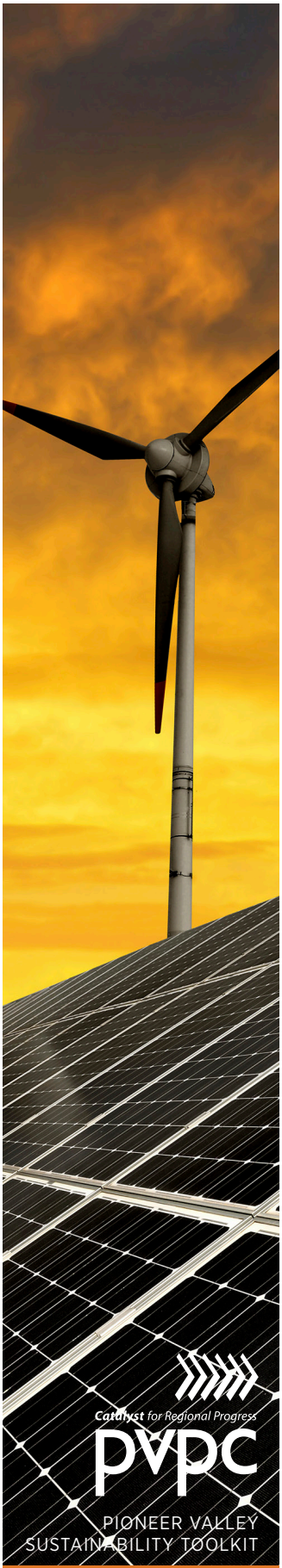


i. Commonwealth Solar II Program: This program is designed for homeowners and businesses that produce less that 15 kW of solar energy. It provides rebates (minimum of $.40/watt) to smaller projects to make them more appealing. The project must be approved before installation through a non-competitive application process. For example, a 5 kW system which could provide enough energy for a standard single family house would save the homeowner $2,000 through this program alone.

ii. Renewable Energy Income Tax Credit: Homeowners installing renewable energy systems are eligible for a 15% credit -- up to $1,000 -- against the state income tax for the total installed cost of the system. If the credit amount is greater than a resident's income tax liability, the excess credit amount may be carried over and used within three years.

iii. Net Metering : Many forms of distributed renewable energy do not produce a consistent amount of energy throughout the course of a day or year. For example, solar photovoltaic panels do not produce electricity at night. To provide consistent power, users of distributed renewable energy generators can either store excess power in batteries or connect to the electric grid. Typically, an electric company customer with a grid-tied renewable energy generator produces more electricity than they need at some times. This is "exported" to the grid. At other times, the renewable sources don't generate enough electricity and the customer "imports" energy from the grid. Net Metering enableallows for these electric company customers to financially balance the value of the energy that they export with the cost of the energy they import. renewable systems without any batteries. Within this program, owners sell extra daytime solar energy to the utility in exchange for a credit. These credits can be used at night or whenever you need extra electricity - no batteries necessary! At the end of the month, you the customer isare only billed for the "net" amount of electricity you they drew from the grid. Leftover credits can be carried over to the next billing cycle.

iv. Solar Carve-Out Program and SREC's: The Solar Carve-Out program is a market based incentive to support residential, commercial, public, and non profits in developing 400MW of solar photovoltaic across Massachusetts. The program requires utilities to purchase a quota of solar renewable energy every year. Utilities can take credit for a homeowner or business' solar energy system by purchasing that system's Solar Renewable Energy Credit (SREC). Currently the minimum mandated SREC price is $285, but that could rise as high as $600 due to market conditions. This subsidy amounts to approximately a $5,000 to $6,000 incentive to small-scale system owners.



When all of these renewable energy subsidies and incentives are added together, they accumulate to a lot of savings for the homeowner! One Massachusetts company estimates that an average sized system with decent southern exposure can produce 8,000 kWh of energy and reduce a $200/month electric bill by half. This system costs approximately $19,000, but would produce a savings of $3,500 a year when all of incentives and credits listed above are used. Therefore, it would pay for itself within 5 ½ years while also in cash and even more in increasedadding value to the home home value. In fact, it is estimated that in 20 years, this system will have paid back the homeowner $100,000 in addition to the monumental significant environmental benefits.

LEARN MORE:

DATABASE OF STATE INCENTIVES FOR RENEWABLES AND EFFICIENCY:
http://www.dsireusa.org

MASSACHUSETTS CLEAN ENERGY CENTER:
http://www.masscec.com/

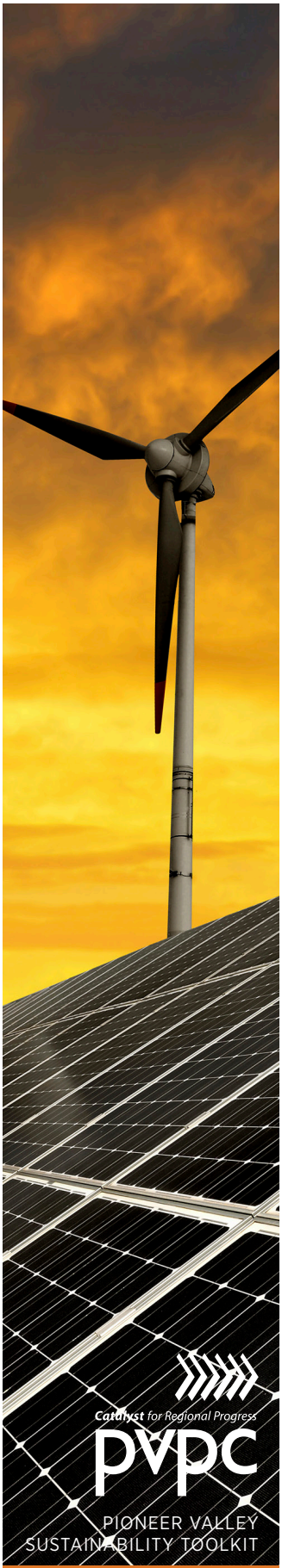
SOLAR HOT WATER:
http://energy.gov/energysaver/articles/solar-water-heaters

http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=12850

GEOTHERMAL HEAT PUMPS:
http://energy.gov/energysaver/articles/geothermal-heat-pumps

http://www.energysavers.gov/your_home/space_heating_cooling/index.cfm/mytopic=12640

NATIONAL GRID “GREEN UP” PROGRAM:
http://www.nationalgridus.com/masselectric/business/energychoice/3_renewable.asp



PURPOSE

Private automobiles are the most common form of transportation within the Pioneer Valley. Automobiles are also one of the largest contributors to greenhouse gas emissions and other air pollutants that cause climate change and reduce air quality. By following "eco friendly" driving practices, a driver can reduce pollution, save money by using less fuel, and increase the useful life of their vehicle.

WHAT TO DO:

Lighten Your Load:

Remove unnecessary items from your vehicle. Every extra 100 pounds in or on the vehicle could reduce your miles per gallon (mpg) by up to 2%. Remove unused roof, ski, and bike racks and when possible try not to carry items on your roof or on a trailer as they increase aerodynamic drag and fuel use.

Keep Your Cool;

It's a Breeze: Roll down windows and use the flow through air vents when first getting into a hot car and generally when driving under 40 miles per hour (mph). Above 40 mph, air conditioning is more fuel efficient than open windows. Use the "recycle inside air" feature that reuses the cooled air inside the car and so doesn't take as much gas to run. Try to park in the shade or use a window heat reflector.

Use the Highest Gear Possible:

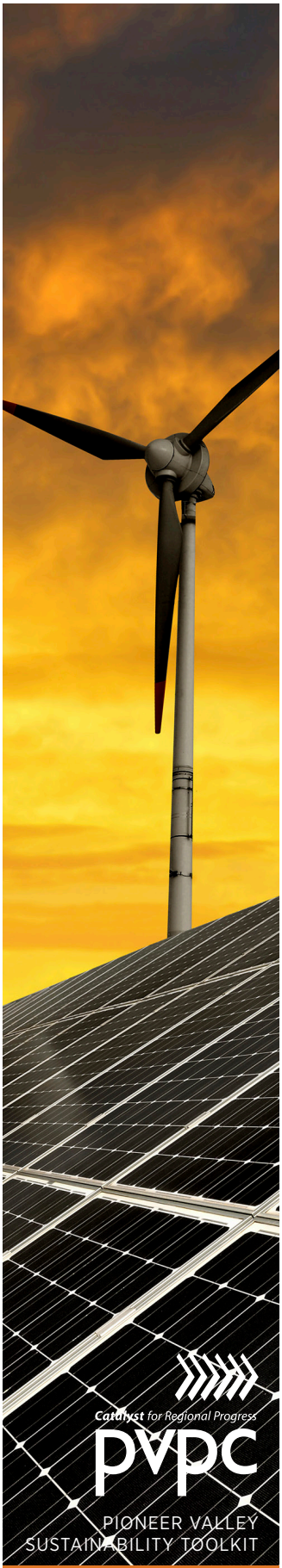
Use the highest gear, or overdrive, on highways if your car has this feature. This practice requires less power while reducing fuel consumption, emissions, and engine wear.

Drive the Posted Speed Limit or the Minimum Allowed:

Vehicle fuel consumption increases about 5% for every 5 mph driven above 60 mph. Overall savings in fuel costs from slower driving can range from 7% to 23%.

Avoid Rapid Starts & Stops and Maintain a Constant Speed:

Quick starts and hard stops can increase fuel use by up to 40% but reduce travel time by only 4%. Instead, accelerate gradually and coast up to stops where not prohibited. Conserve momentum; a steady speed often helps avoid red lights and keeps cars moving more efficiently. By driving sensibly, an individual can save 5% to 33% in city driving costs. The MassPike FAST LANE transponder will let you sail through road, tunnel, and bridge toll plazas in 12 Eastern states. High occupancy vehicle (HOV) lanes save time, fuel and hassle.



Avoid idling:

Idling gets zero mpg. Do not idle or race your engine to warm it up; the engine will warm up quicker when you are driving. If you need to idle, shift to neutral, so the engine is not working against your brake and consuming more fuel.

Optimize vehicle trips:

Schedule travel so that multiple tasks can be accomplished in one trip.

Read your Vehicle Owner's Manual & Follow the Recommended Maintenance Schedule:

Change engine oil with correct grade oil (1-2% mpg benefit), replace your clogged air filter (up to 10% mpg benefit), and tune your engine (4% average mpg benefit). Practicing routine maintenance on your car helps it last longer and run more efficiently.

Check Your Tire Pressure Monthly:

An estimated 25% of all vehicles are running on under inflated tires. Tire pressures change an average of 1 pound per square inch (psi), a common unit of pressure, for every 10ºF change in air temperature and can deflate naturally up to 1.5 psi per month. Proper tire pressure is safer, extends tire life, reduces risk of a flat tire, and can improve mpg by up to 3%. You can purchase a tire pressure gauge for accurate readings, and check tire pressure when tires are cold (when not driven for at least 3 hours or for less than 1.5 miles).

Consider Purchasing Fuel-Efficient Tires:

"Lower rolling resistance" tires that can improve mileage are now available. Tire traction and handling characteristics for your car should be checked when considering these tires.

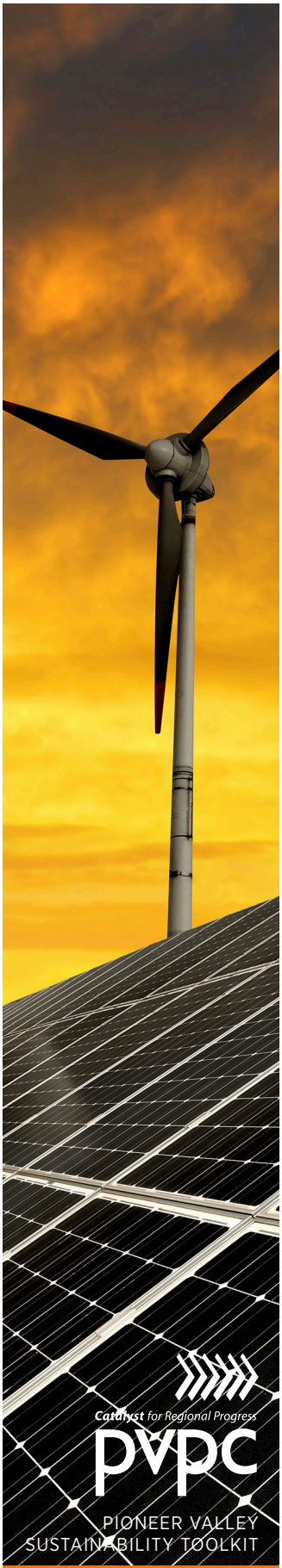
Tighten Your Fuel Tank Cap:

A loose, damaged, or missing fuel tank cap can cost you as much as 30 gallons of fuel a year. Unsecure or missing fuel caps can also lead to fuel contamination and engine malfunctions that can be costly.

Learn More:

MASSACHUSETTS GAS SAVING TIPS:
http://www.eot.state.ma.us/gastips/Learn to raise your fuel economy

FROM AN ONLINE COMMUNITY:
http://www.cleanmpg.com/



PURPOSE

Using alternative transportation such as biking, walking, vanpools or busses has many benefits. They include increased energy efficiency, reduced air pollution, money savings in automobile costs and individual health benefits.

WHAT TO DO:

a. Bike or walk for short errands: According to the Alliance for Biking and Walking, 40% of all US trips generated in 2009 were shorter than two miles, yet 87% of those trips were made by car. It is recommended that adults get about 30 minutes of exercise per day, such as walking or biking. So the next time you only need to travel a mile or two, try biking or walking to save on gas and burn some calories instead! If you are a business owner, providing showers for those who bike to work provides incentives to continue biking.

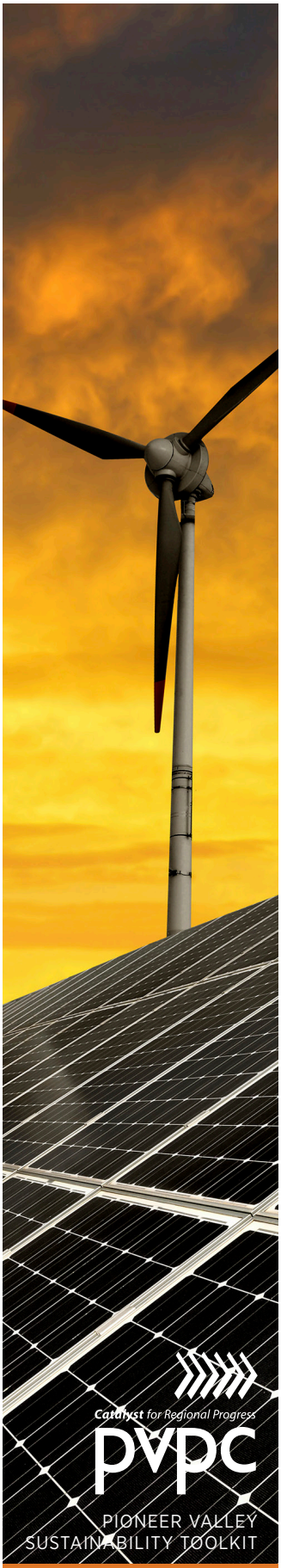
b. Use mass transit – The Pioneer Valley Transit Authority (PVTA) provides bus services as well as disabled and elderly services in the Pioneer Valley. Rides cost $1.25 or less for the elderly and children. Taking the bus is much more cost and fuel efficient than driving alone in a car. The bus is also a good choice for longer trips. Other bus systems operate throughout the entire country and though it may take a little longer, taking the bus is almost always cheaper than flying and the climate impact is significantly less.

c. Use carpools and vanpools: Carpoolers can save money on fuel, insurance, and car maintenance. The ability to use high occupancy vehicle (HOV) lanes often reduces commuter time spent in traffic. When they are not behind the wheel, carpoolers can read, nap, or chat, which is shown to reduce stress and improve health. Fewer cars on the road also means less air pollutants and less greenhouse gas emissions.

d. Register with NuRides: Get rewards when you walk, bike, telecommute, carpool, vanpool, take a train, bus, or even work a compressed week. When you record trips with NuRide, it tallies the CO2 you save and gives you points that are redeemable for real discounts at major national and local stores. There are currently 66,000 members and growing!

e. Consider transit opportunities when deciding where you live and work: Living near your work, shopping, food stores, schools, and transportation systems saves time, money and pollution. Denser, multiuse development generally provides communities with less congestion, better accessibility to necessities and an increased sense of community.

f. Use a car share program when you need an automobile: Choosing not to own a car is a viable option for people who live close to public transportation, but



sometimes it is necessary to drive just for a few hours or a day. "Car sharing" programs are incredibly easy and affordable. A frequent user of one car share program can report an average monthly savings of $500 over owning a car. Car shares can be more affordable and friendly than taxis and can get you to destinations that public transportation sometimes can't. They also help the commuters and the environment—each car share vehicle by taking takes an estimated 15 privatelypersonally- owned vehicles off of the road. For the infrequent driver, car shares can be the perfect solution.

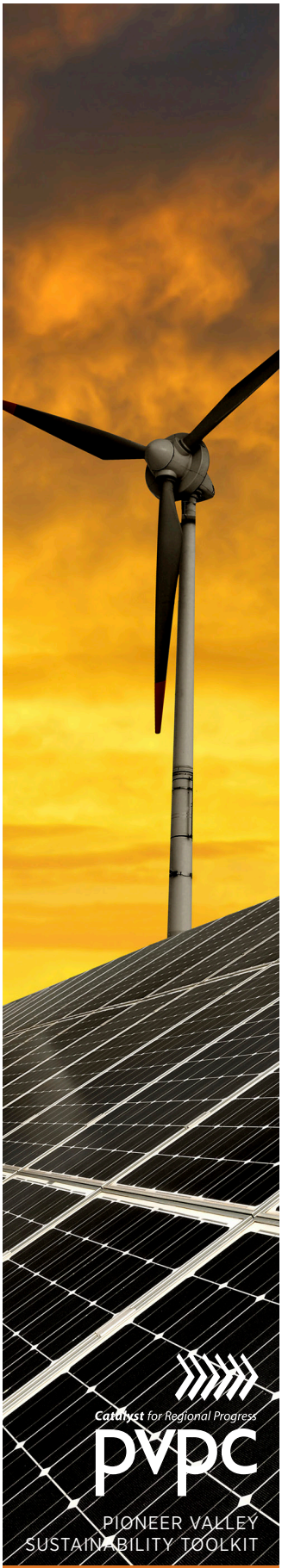
g. Allow employees to telecommute: Telecommuters are people who occasionally work from home and are connected to a business through various communication systems. This system can offer fuller employment by allowing parents or retirees a chance to work from home. It also reduces traffic congestion, energy use and greenhouse gases. For companies, it requires a different management style, but offers many benefits such as less sick days taken by employees, increased accountability for work and reduced overhead costs. Successful telework operations can save up to $20,000 per employee per year.

LEARN MORE:

MASSRIDES REWARDS FOR COMMUTING ALTERNATIVES:
www.commute.com

NURIDE BENEFITS:
www.nuride.com

PIONEER VALLEY TRANSIT AUTHORITY:
www.pvta.com



PURPOSE

Conserving resources is a simple way to use less energy, reduce food and packaging waste in landfills, prevent water pollution and decrease fossil fuel consumption.

WHAT TO DO:

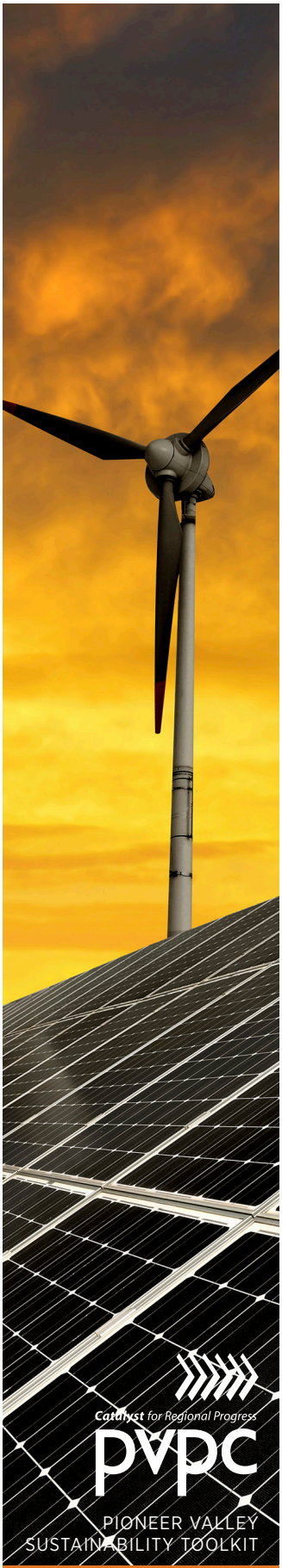
Understanding where waste occurs is the first step in conserving resources. Water, electricity, oil, and gas can all be wasted without a home or business owner's knowledge. Give these tips a try for a month and compare your energy usage. You will be surprised how much money and energy you save!

a. Use less water:
   i. Try installing a low-flow showerhead and low-flow toilets, or place a displacement object in your toilet's tank to reduce the water used with each flush.
   ii. Wash clothes in cold or warm water instead of hot. This can save 850 pounds of carbon dioxide savings from entering the atmosphere each year.
   iii. In your garden, plant vegetation that doesn't require a lot of water. Locally found vegetation is a great choice because it is used to surviving with your climate and water availability.
   iv. Shut off the faucet while you brush your teeth.
   v. If you own a pet, wash them outside where the waste water can be used to water the lawn.

b. Be aware of phantom loads: 5-10% of American energy use is a result of electronic devices using electricity while they are off or in standby mode. Even if some appliances are powered off, they can still draw power and cost you money! To reduce this "phantom load", unplug appliances you don't use frequently, and put those you do on a power strip or "smart" strip (image on right). That way, you can turn them off easily at night or when you don't need them. For businesses, make sure computers are completely off at the end of the day.

c. Insulate your water heater: Wrap an insulation blanket around your water heater to save 10% of energy used by this appliance. While you're at it, set the unit's thermostat to no higher than 120 degrees Fahrenheit. Any temperature higher than this is a waste of energy.

d. Adjust your thermostat: Buttoning up instead of raising the heat can have significant money savings, since heating and cooling account for half of all energy use at home. Set your thermostat 2 degrees Fahrenheit lower in winter



and 2 degrees higher in summer.

e. Recycle: Reuse products as much as possible, and when it's time to dispose of them – recycle! Most products – cell phones, clothing, batteries, light bulbs, computers, other large appliances and even paint can be responsibly recycled. Many programs take electronics for free and some even pay you for your used electronics! Earth911.com provides lists of local recycling centers for all products, making it easy to find a place to dispose of your unwanted items.

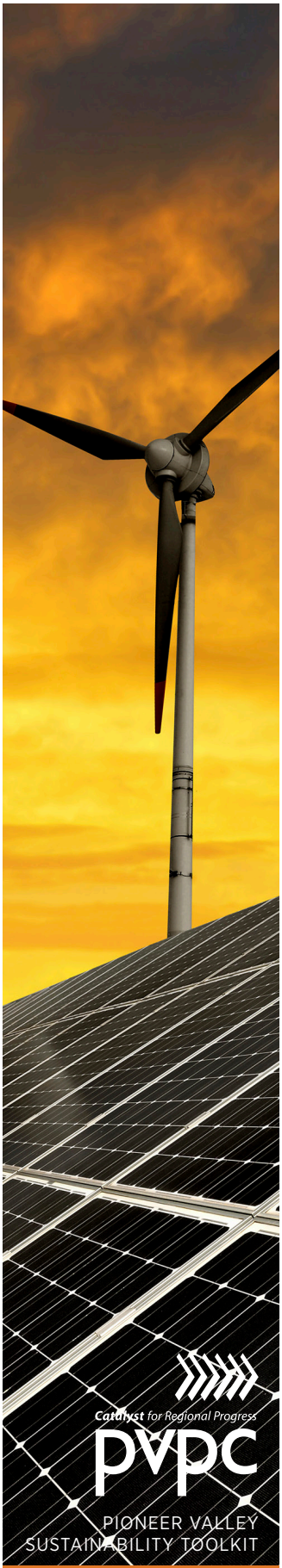
f. Practice cooking and ordering the right amount of food: Approximately 11.2% of all trash thrown in landfills in America is wasted food. Combined it is enough food to feed the 1 billion hungry people on the planet! This waste depletes natural resources, raises the cost of food and contributes to pollution. Practice cooking the right amount and not wasting any food. Compost leftover food and use it to fertilize your garden. The environment and your pocket will thank you.

LEARN MORE:

FIND RECYCLING CENTERS:
http://earth911.com/

HOW TO MEASURE ACCURATE PORTIONS:
http://www.lovefoodhatewaste.com/perfect_portions

LEARN ABOUT RECYCLING FROM THE MASS DEP:
http://www.mass.gov/dep/recycle/reduce/recyclin.htm



PURPOSE

As a consumer, you have the power to "vote with your wallet". Purchasing eco-friendly products has a direct impact on what and how consumer products are produced. When buying goods, understanding how it is made and what it contains can protect your health and the health of the environment.

WHAT TO DO:

a. Avoid products with excessive packaging: Avoiding products with extra Styrofoam, cardboard or plastic wrap can reduce the amount of trash you need to recycle or throw away by 10%.

b. Bring your own shopping bag: Choosing between paper and plastic at the grocery store is usually a lose-lose situation. In an average year, a grocery store uses 86,000 trees in paper bags. Although plastic can be recycled, in reality less than 3% of all bags get to the recycling plant. Keep reusable shopping bags in your purse or car. Many stores have incentive programs for shoppers who bring their own bags. You can save a little money while saving trees!

c. Buy local food: Purchasing in season, organic or locally grown foods can be healthier for you, your local economy and the environment. In today's globalized food market the average product travels 1,200 miles from farm to shelf. Fossil fuels are wasted in the transportation of these items. By purchasing organic food from local vendors, you keep money within the community which benefits everyone in the long run by boosting the economy, decreasing pollution and reducing chemicals used in conventional food production.

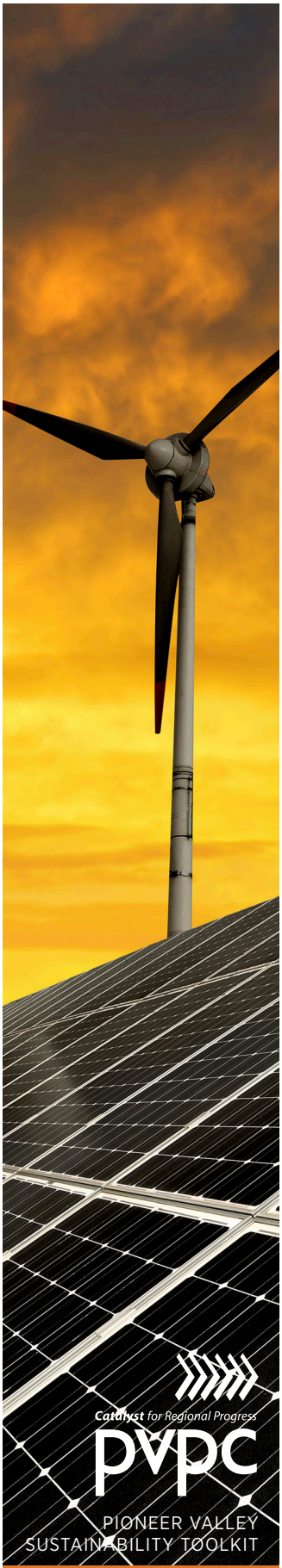
d. Explore close to home: Air travel is more popular than ever and fuel prices have made it increasingly expensive. Try taking a bus or train and explore the regions near where you live. If it is necessary to fly, offset the carbon released by flying through a carbon offset program.

e. Purchase more efficient vehicle: When replacing your car, choose a more fuel-efficient vehicle. If you are in the market for a new or used car, buy the most fuel-efficient one that will meet your family's needs. Miles per Gallon (mpg) ratings for all new cars can be found at: www.fueleconomy.gov. No matter what size vehicle you need, you can save a lot of gas by choosing one of the models with the best mileage ratings. For example, if gas costs $3 a gallon and you drive 15,000 miles a year, you could save $1,300 a year by buying a 26 mpg mid-size car rather than a 15 mpg sports utility vehicle (SUV).

LEARN MORE:

WHAT IS LOCAL FOOD?:
http://www.sustainabletable.org/issues/eatlocal/

HOW TO OFFSET YOUR CARBON FOOTPRINT:
http://www.carbonfund.org/



PURPOSE

A The health of thehy environment largely impacts human health. Planting gardens and trees, reducing chemical waste and picking up trash are easy ways to keep your community beautiful and clean for this and future generations to come.

WHAT TO DO:

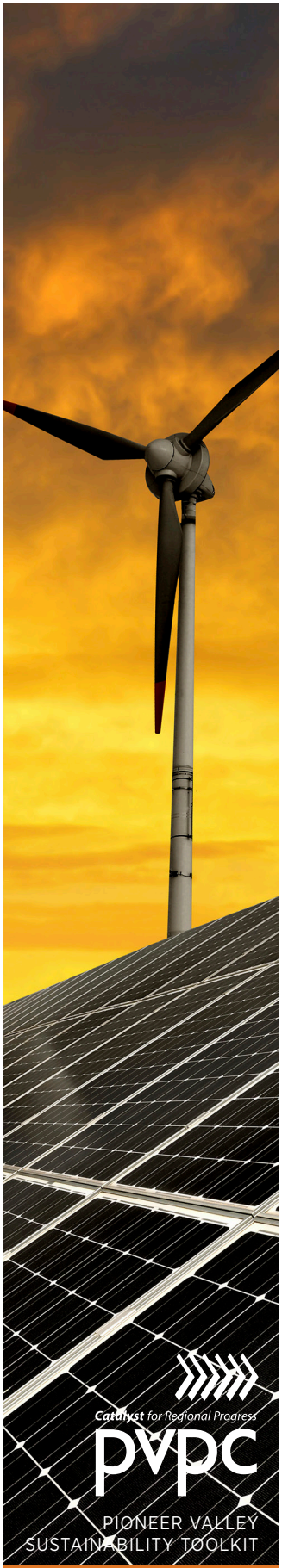
a. Plant trees: Trees are the earth's air filters. Areas with more trees see increased economic, social and environmental benefits. According to the Massachusetts Department of Conservation and Recreation, these benefits include decreased energy costs due to shading as well as improved air quality for residents. Vegetation provides a sense of place as well as community valuation. More trees are shown to increase revenue from tourism from fall foliage viewing, as well as raise property values and revenue through taxes by 7-10%. Moreover, plantings can reduce storm water runoff and decrease the likelihood of flooding. Fruit and nut bearing trees can provide food to communities while beautifying the city streets.

b. Re-use Gray Waters: Gray water is any wash water used inside the home (excluding toilets) as well as collected rain water. These sources account for 50-80% of residential "waste" water that usually either runs off into rivers or is directed to a waste water treatment plant. This water is safe to use for other purposes such as toilet flushing, or landscape irrigation. A grey water system collects this water and passes it through an advanced filtration system. Once filtered, it is reused by pumping it into your garden or lawn or directly into the bathroom where it can be used to flush toilets. Increasing gray water usage lowers fresh water use, reduces strain on septic tanks or treatments plants and reclaims nutrients lost in the water. These measures reduce storm water and waste water volumes and lower the chance of flooding within these systems. Moreover, installing a gray water system is incredibly safe – there has never been a case of gray water illness of 22 million users in the US.

c. Reduce chemical use: Harmful chemicals are around us every day, but we often don't realize their health effects. Use environmentally- sensitive chemicals to clean your house such as those with the "Green Seal" third party standard rating. Time-tested products such as baking soda and vinegar are safe and inexpensive ways to clean your home. Be careful to not to put spill oils and or chemicals into onto the streets because they end up polluting rivers and streams. Consider organic fertilizing fertilizers rather than chemical fertilizing fertilizers and eliminate pesticide use on your lawn. It is much healthier for your lawn, your family and even your pets, who have a greater exposure risk to chemicals.

LEARN MORE:

EPA FACTSHEETS ABOUT COMMON HOUSEHOLD CHEMICALS:
http://www.epa.gov/chemfact/



PURPOSE

Knowledge is empowering! Continue your education about ways to fight climate change and help others learn about their environment as well.

WHAT TO DO:

a. Calculate your carbon footprint: It's hard to change if you don't know where to start. Calculate your personal or household impact on climate change by using the Nature Conservancy Carbon Footprint Calculator at: http://www.nature.org/greenliving/carboncalculator/. Find out how your home electricity use and transportation choices affect air quality and global climate change with the EPA Power Profiler found at: http://www.epa.gov/cleanenergy/energy-and-you/how-clean.html.

b. Attend town meetings: Make yourself heard in your local community. Voice concerns about environmental problems and offer solutions to mitigating climate change on a local level such as implementing recommendations found in this toolkit.

c. Educate yourself and others about energy efficiency: Teach your children, family and friends about the importance of protecting our environment. The world we create now has all the air, water and food we and our children will consume for generations to come. Do your part in protecting it and helping others learn how to as well.

d. Get the word out about MassSave.com: Tell you neighbors about the free energy audit that Massachusetts utilities offer. They might want to know that they can get renewable energy too!

e. Share this Toolkit with others: Email, call or use social media to tell others about how much you saved by making simple changes. By encouraging others to modify behaviors, larger change is possible!

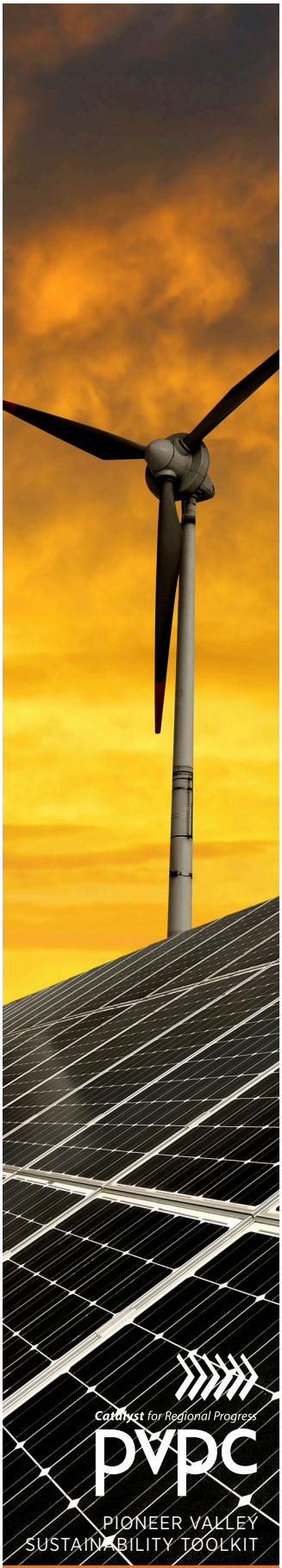
f. Visit www.SustainableKnowledgeCorridor.org for more information on sustainability and learn about the projects that are happening right here in the Pioneer Valley to make our communities more sustainable.

FOR MORE INFORMATION, PLEASE CONTACT

Pioneer Valley Planning Commission
413-781-6045

60 Congress Street, Floor 1
Springfield, MA 01104-3419

www.pvpc.org



UNDERSTANDING

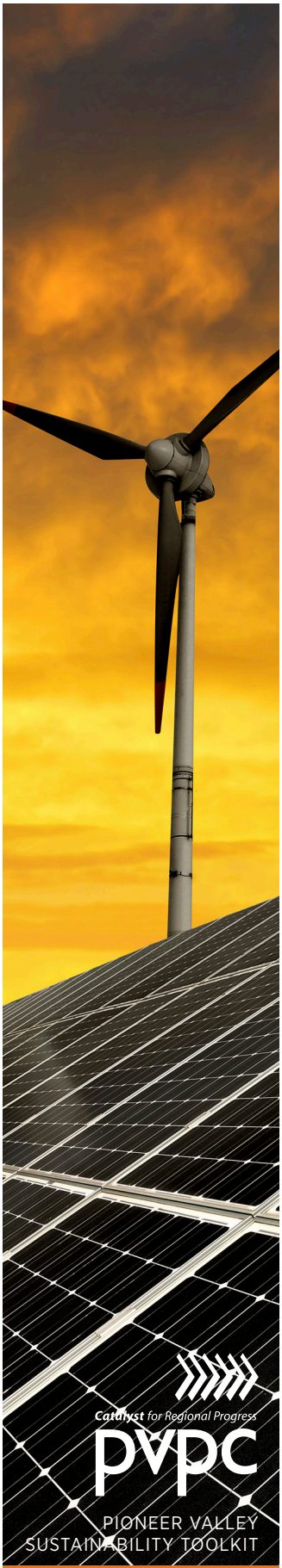
Sustainable Landscaping & Tree Preservation Standards

PURPOSE

To promote landscaping around development that is compatible with the existing environment, and which reduces greenhouse gas emissions by requiring a minimal use of energy and natural resources for growth and maintenance. To mitigate climate change through the planting of new trees, preservation of undeveloped space, and protection of larger and special interest trees in new developments.

Ordinances that protect trees and encourage the planting of native, non-invasive vegetation help to reduce greenhouse gasses and mitigate climate change. Native vegetation requires fewer resources to grow because water and nutrient needs are already in line with that provided by the surrounding weather and climate. Mature trees require less maintenance which also makes them more energy efficient. Additionally, trees and vegetation absorb carbon dioxide and reduce the urban heat island effect.

climate & energy



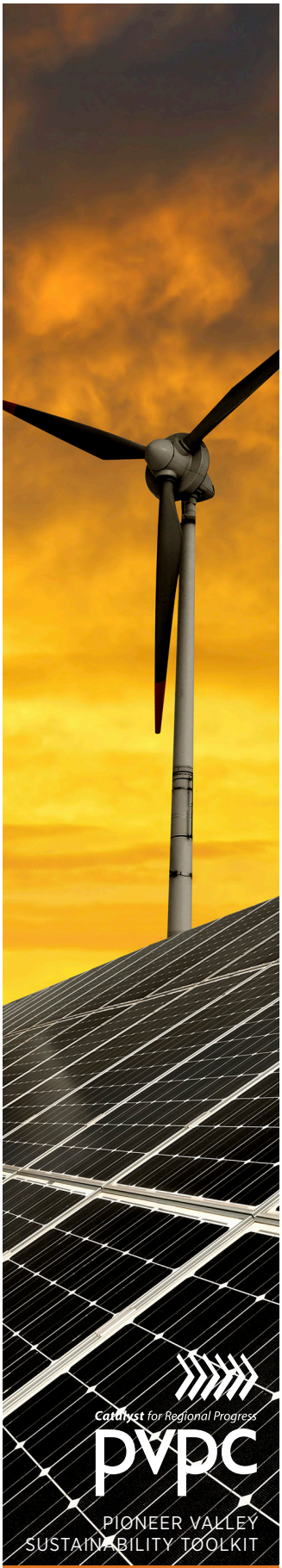
Due to time and cost factors, the construction of new development often involves the clearing and grading of land rather than retention of native vegetation and trees. This large-scale clearing and grading has several negative effects, including increased stormwater runoff, reduced water quality, threatened wildlife habitat, and a decline in aesthetic appeal. Additionally, even when newly planted trees grow to maturity, they often do not provide the same level of structural diversity and other benefits to wildlife that the original tree canopy offered.

HOW IT WORKS

An ordinance can be implemented to control large-scale clearing and grading of vegetation, as well as encourage protection of the tree canopy during the development process. Effective implementation of these regulations consists of several elements:

- **Defining and enacting an ordinance regarding the protection and types of trees and vegetation**
- **Setting out a pre-development procedure for protecting trees and vegetation**
- **Providing a means for compensatory mitigation where trees and vegetation cannot be retained on-site**
- **Verifying and enforcing compliance with regulations after new developments are completed**

Municipalities should consult with their staff and residents to determine what specific requirements are to be enacted. The language in the bylaw should carry provisions for the types of vegetation and trees allowed, the maximum number or percentage of trees and vegetation that can be removed, and construction best practices that can help reduce damage to existing trees during development. Other protections may also be put in place targeting trees that are determined to have special significance because of their history, age, or size.



Pre-development requirements establish what a potential developer must submit prior to receiving approval from the municipality. These requirements can be incorporated into the building permit application directly, or as a required accompanying application document such as a landscape protection plan or forest preservation plan. The application or plan should include information about the location of trees and vegetation on site, their size and species, and what actions will be undertaken to ensure their protection. Requiring that this information be provided before development begins allows the municipality to strictly enforce its regulations.

In cases where it is deemed impossible or inappropriate to keep trees and tree cover intact, or when it is deemed acceptable by the municipality to limit the protection of individual trees or tree cover, regulations should provide for an alternative method of compliance. Once again, these alternative methods can be incorporated into the existing building permit application or landscape protection plan, as set forth in the tree ordinance. Alternative compliance methods include planting trees on site after construction has concluded, placement of cash value for trees lost in a municipal account for street tree planting, or addition of other green initiatives that closely match the benefits of keeping the tree cover on site such as green roofing, green walls, rain gardens, or bio swales.

Once the building permit application or landscape protection plan has been approved through either direct compliance or mitigation methods, development can occur. To ensure compliance, post-development monitoring is necessary. The monitoring can incorporate the information collected prior to development and compare it to the post-development conditions existing on-site. Depending on the language in the bylaw, enforcement might be the responsibility of the zoning inspector, building inspector, or a tree board.

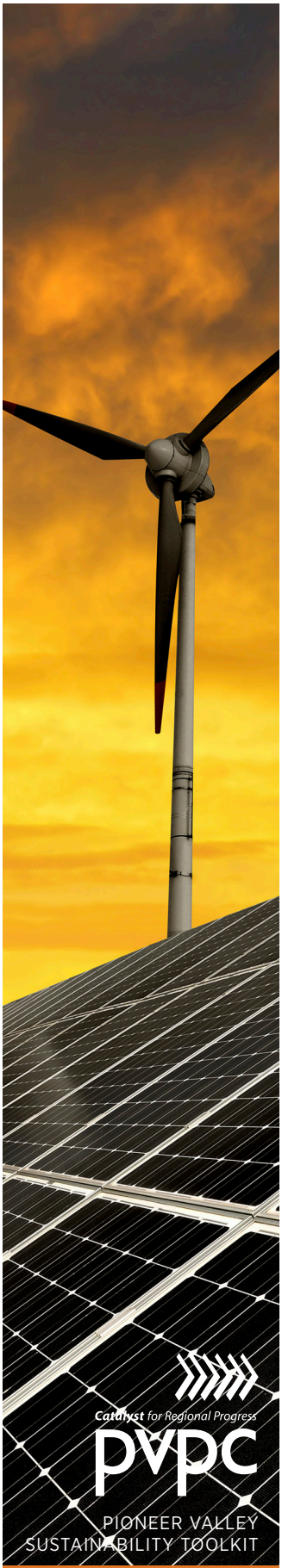
EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED:

Carroll County, Maryland

The Carroll County Forest Conservation Ordinance requires Forest Stand Delineations and Forest Protection Plans to accompany development applications. In addition, the ordinance requires reforestation activities to accompany any type of land development. Except in agricultural districts, the ordinance specifically requires one acre of forest to be planted for every acre removed. The ordinance also designates priority areas for reforestation, (i.e., stream buffers, wildlife corridors, steep slopes, etc.).

Chapel Hill, North Carolina

The Chapel Hill Tree Protection Ordinance requires applicants for a development permit to submit a Landscape Protection Plan that details how preservation of specimen and rare trees and significant tree stands will occur. In addition, as part of its carbon reduction strategy, the Town is considering revisions to the ordinance that will require no net loss of



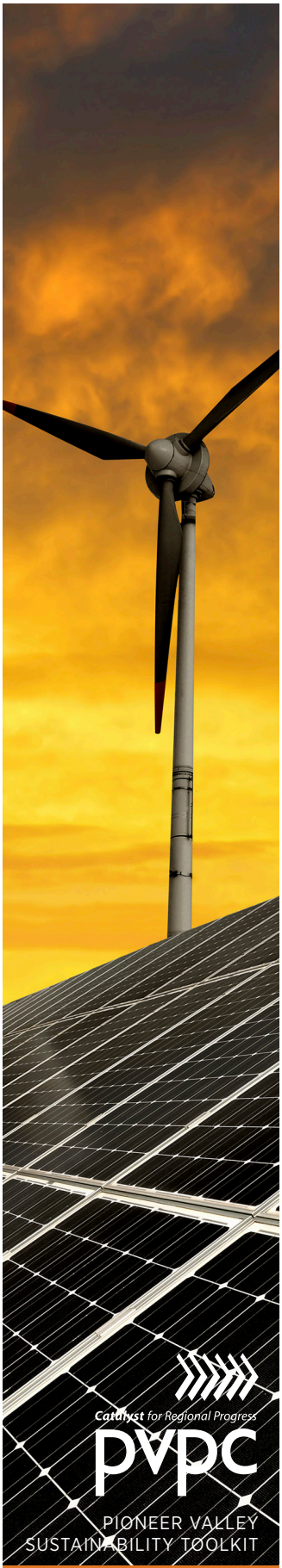
the canopy cover and an increase in trees proportional to population growth.

Amesbury, Massachusetts

The Amesbury Tree Ordinance sets out regulations concerning trees along streets and public parks. The ordinance includes a list of approved tree species, regulations for how much pruning and cutting can be performed, and provisions for the establishment of a three-person Town Tree Board. The Tree Board is charged with administering a written plan for the care and maintenance of public trees. The ordinance also includes requirements for a minimum of twenty foot spacing between smaller trees and forty foot spacing between large trees.

Lexington, Massachusetts

Lexington passed a tree ordinance in 2001 which included the creation of a tree committee and provisions requiring the protection of trees during major construction. The ordinance was followed up by additional tree and landscaping protection efforts through a Tree Management Manual, created in 2003 and updated in 2009. The Tree Management Manual covers a variety of topics directed towards the preservation and cultivation of healthy trees, including guidelines for the protection of trees during site construction, priority locations for where trees should be planted so that they will grow successfully, and maintenance specifications.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

CARROLL COUNTY:
http://townhall.townofchapelhill.org/agendas/2007/02/12/4c/4c-2_lumo_excerpts.htm

CHAPEL HILL:
http://ccgovernment.carr.org/ccg/resmgmt/forconsmanual.pdf

AMESBURY:
http://www.mass.gov/dcr/stewardship/forestry/urban/docs/ordames.pdf

LEXINGTON TREE MANAGEMENT MANUAL:
http://ci.lexington.ma.us/committees/tree/TreeManualRevised2009%20much%20smaller.pdf

PVPC HAS DEVELOPED MODEL BYLAW "GREEN DEVELOPMENT PERFORMANCE STANDARDS" WHICH ADDRESS THE CONCEPT OF SUSTAINABLE LANDSCAPING AND TREE PRESERVATION:
http://www.pvpc.org/val_vision/html/toolbox/index.html

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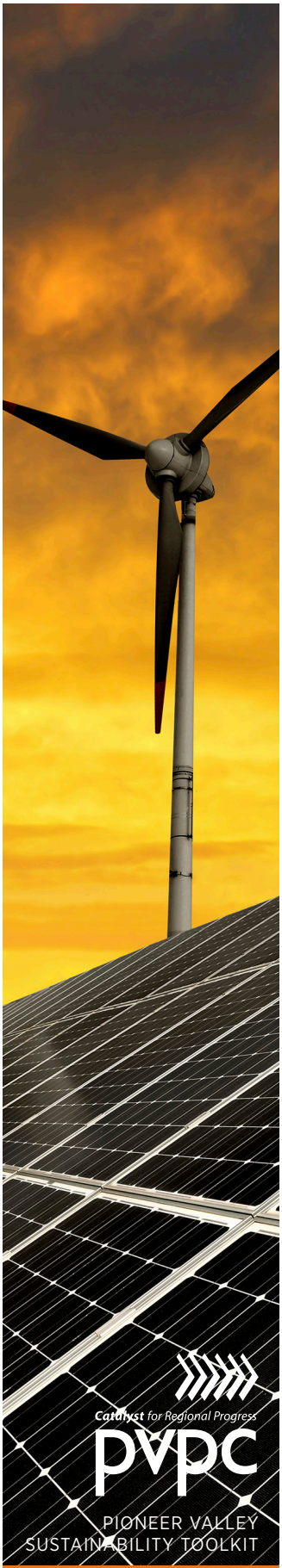
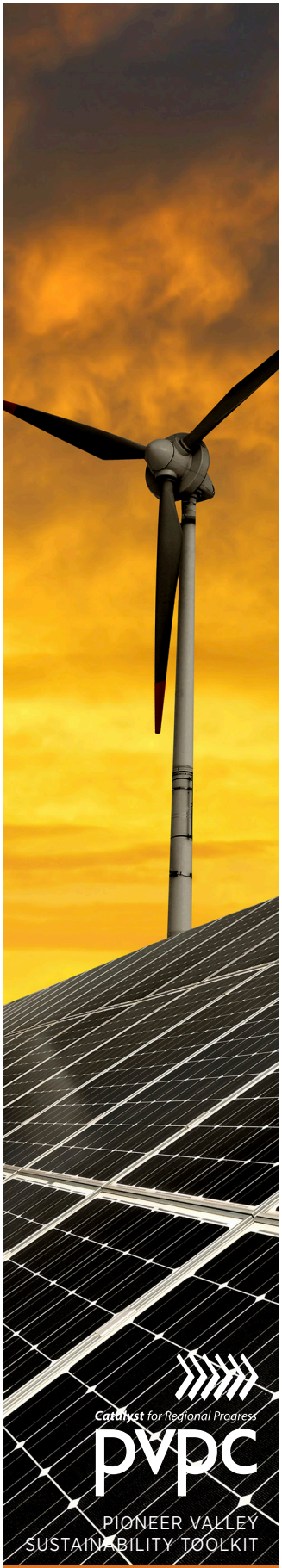


Tax Incentives Solar & Clean Energy

climate & energy



PURPOSE

To encourage the wider and more rapid purchase and installation of clean energy generation and energy conservation measures by providing income tax credits to individuals and businesses.

THE BASICS

Many states now offer credits to reduce state income and business taxes that help offset the initial costs of purchasing and installing clean energy generation equipment and energy conservation measures. This credit functions as a subsidy that helps shorten the "payback" period for the start-up cost of clean energy equipment. Consumers begin to realize the savings over conventional energy systems sooner—often within three to five years, and sometimes immediately.

CLEAN ENERGY TAX INCENTIVES IN MASSACHUSETTS

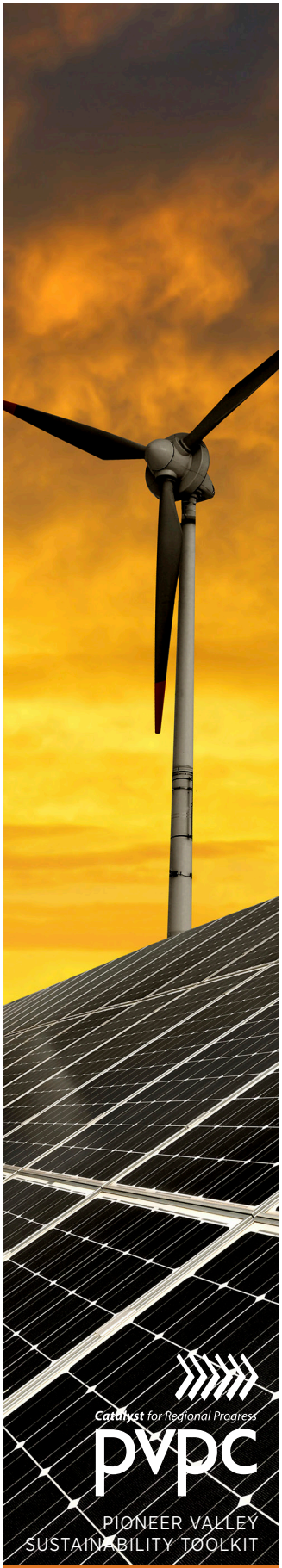
The Massachusetts Residential Renewable Energy Income Tax Credit offers a 15% credit, up to $1,000, off a person's state income tax if they buy and/or install a renewable energy system for their primary residence (renters are eligible, too). Products that are eligible for this credit include solar hot water, high efficiency heat pumps, solar photovoltaic (PV) and wind-energy systems. Energy efficiency measures for new and retrofitted buildings are also eligible, including insulation, air sealing, window replacement and other measures to save energy.

For example, a person who has extra insulation blown into their attic and walls for a typical cost of $2,000 would see their state income tax bill reduced by $300 (15% of $2,000). If a person purchases and installs a rooftop solar PV system (which can cost between $15,000 and $30,000), he or she would receive the maximum tax credit of $1,000. If the person's tax credit is greater than their total tax bill for the year the system is installed, then the extra savings can be carried forward and spread out for up to three years.

Businesses have an additional benefit available to them: Massachusetts law (M.G.L. Chapter 63, Section 38H) exempts 100% of any "solar or wind powered climatic control unit and any solar or wind powered water heating unit" or any other unit or system powered by solar or wind from corporate excise tax for the length of the system's depreciation period. Corporations that install qualifying solar or wind units can exempt the value of the unit from the overall property valuation used to assess the corporate excise tax.

FEDERAL CLEAN ENERGY TAX INCENTIVES

The U.S. government also offers tax credits or deductions for individuals and businesses that invest in renewable energy or energy efficiency. Individuals can receive up to $500 in federal income tax credits for "Energy Star" certified energy efficient equipment, including biomass stoves, HVAC, insulation, roofs, water heaters, windows and doors, geothermal heat pumps, small wind turbines, and solar energy systems. And both individuals and businesses can earn up to a 30% tax credit on renewable energy generation equipment purchases, such as solar panels, heat pumps and wind turbines.



LINKS TO MORE INFORMATION

MASSACHUSETTS RESIDENTIAL CREDITS:
http://www.mass.gov/legis/laws/mgl/62-6.htm

MASSACHUSETTS CORPORATE CREDITS:
http://www.mass.gov/legis/laws/mgl/63-38h.htm

FEDERAL INCENTIVES FOR CLEAN ENERGY:
www.dsireusa.org

FOR MORE INFORMATION, PLEASE CONTACT

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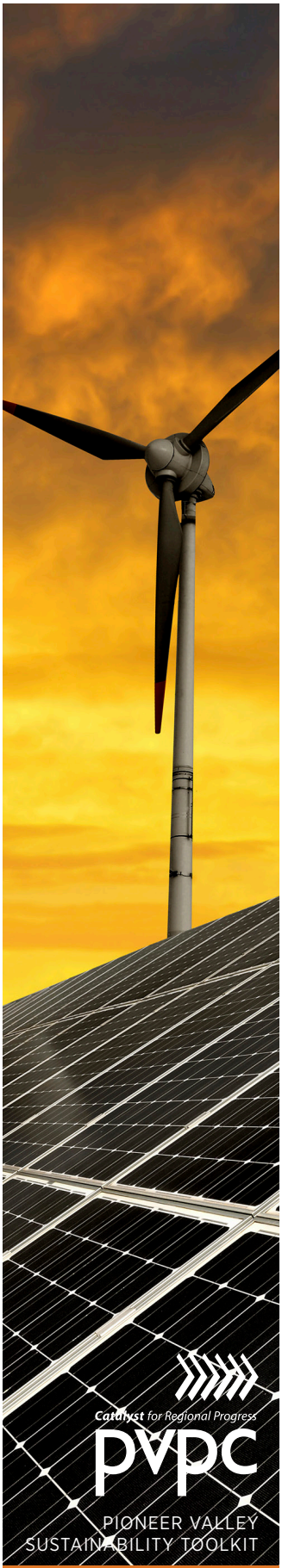


UNDERSTANDING

Traffic Signals

PURPOSE

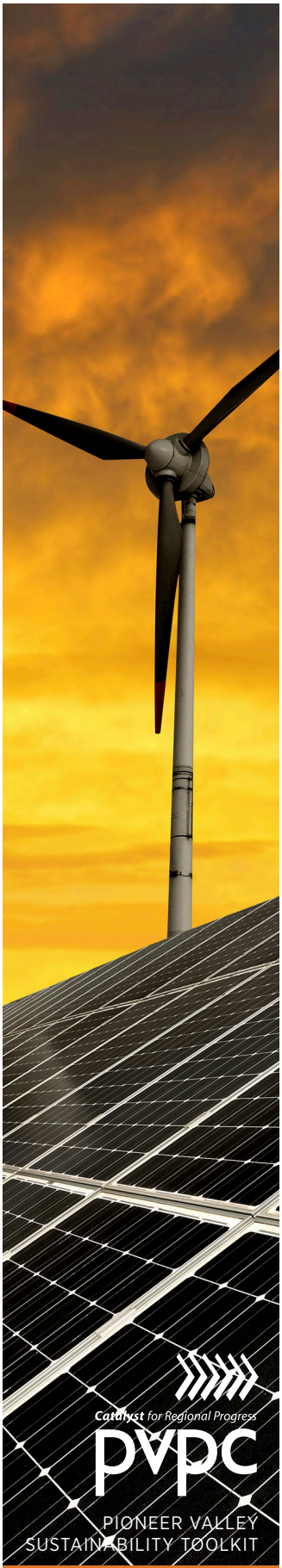
To reduce energy use and municipal utility bills by replacing inefficient traffic signals with very efficient Light Emitting Diode (LED) lighting.

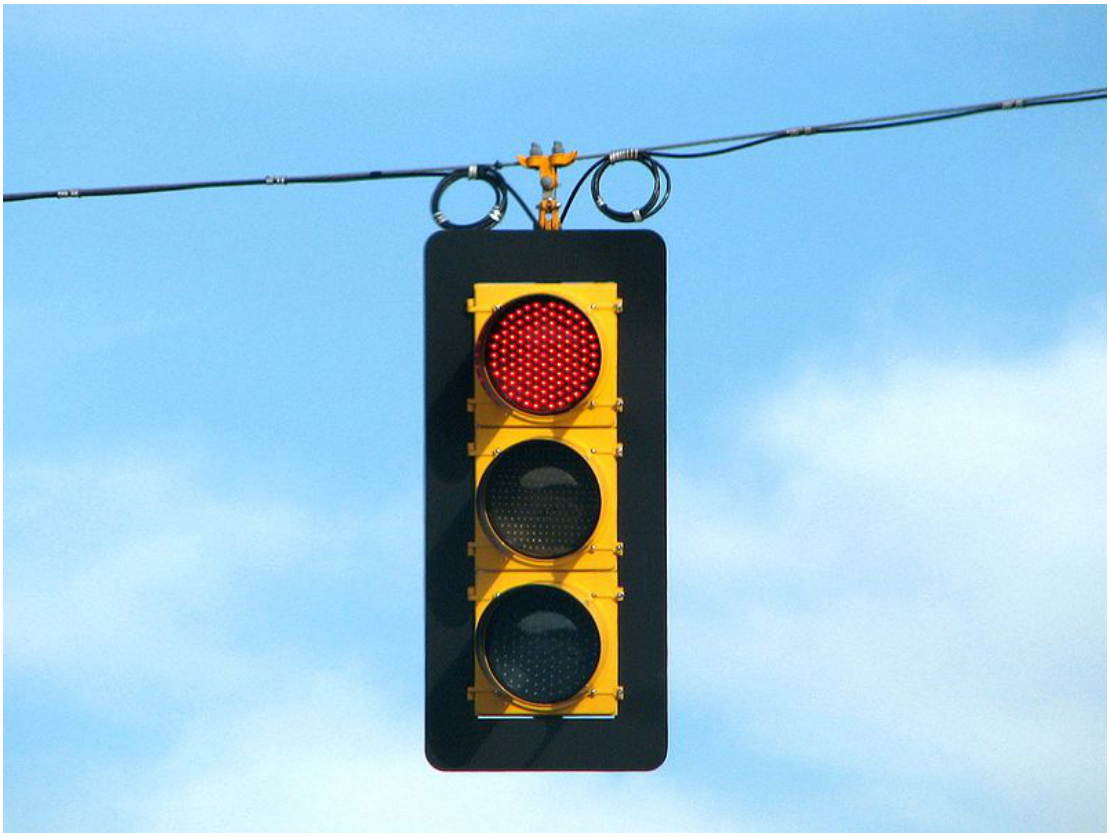
HOW IT WORKS

New LED traffic signals consume 80 to 90 percent less energy and last up to six to eight times longer than traditional incandescent signals. Initial purchase cost for LEDs are much higher than incandescent, fluorescent, compact fluorescent, or other electric light sources. However, monetary savings come in the form of lower utility bill and saved labor for replacement and maintenance of traditional incandescent signals. How to pay for this? Options include grants (see below) and incremental purchases as light replacements are needed.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Easthampton, MA decided to replace over 400 street lights with LED high-efficiency street lights in 2011 to conserve energy as well as save money on annual maintenance and operating costs. The City estimated that the LED streetlights would save the city an estimated $23,700 in energy bills and $13,000 in maintenance costs each year. Easthampton was the first municipality in western Massachusetts to use the Green Communities Grant to create a large-scale installation of LED street lighting. The Mayor of Easthampton noted that the LED bulbs not only are more energy efficient but they also cause less light pollution and will last 10 to 15 years longer. The total cost of this project was $223,000 of which all but $300 was covered by grant funding from the Massachusetts Green Communities Program ($170,000) and from the Western Massachusetts Electric Company ($52,700).





Weymouth, MA is among the many communities statewide that recently changed its traffic signals to LED lighting. The town's Economic Development Planner estimates that the switch to LED will reduce energy use by 85 percent and maintenance by 50 percent. Weymouth also received grant funding through the Green Communities Program.

LINKS TO MORE INFORMATION

CITY OF EASTHAMPTON, MA, DEPARTMENT OF PUBLIC WORKS
http://www.easthampton.org/

MASSACHUSETTS GREEN COMMUNITIES PROGRAM:
http://www.mass.gov/?pageID=eoeeasubtopic&L=3&L0=Home&L1=Energy%2C+Utilities+%26+Clean+Technologies&L2=Green+Communities&sid=Eoeea

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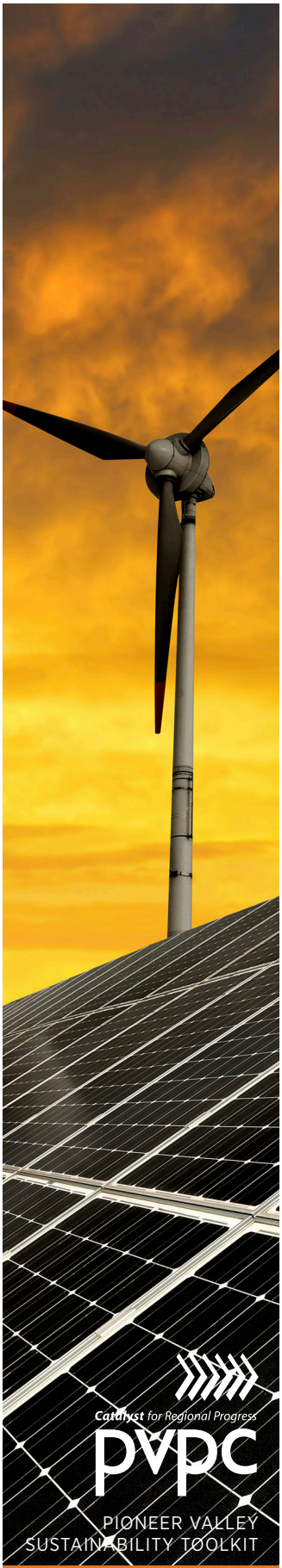
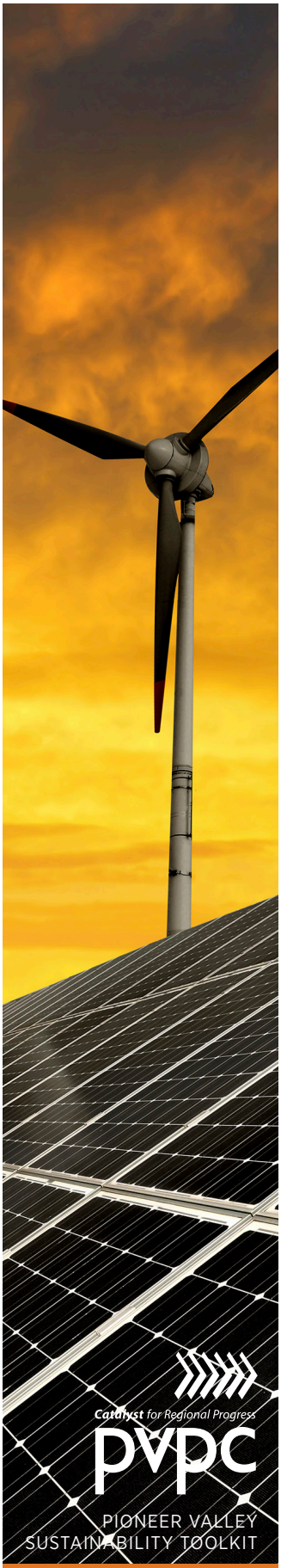


UNDERSTANDING

Transfer of Development Rights For GHG Reduction

climate & energy



PURPOSE

To provide bonus densities for developers in and around existing town and city centers, requiring in exchange, that the development include transit, bicycle and pedestrian amenities, as well as on-site workforce housing. Increased density reduces vehicle miles travelled, resulting in reduced greenhouse gas emissions.

HOW IT WORKS

Transfer of Development Rights (TDR) is a planning tool that can protect important habitats and ecosystems while promoting economic growth and denser development in less sensitive areas.

Most TDR programs designate a "Sending Area" and a "Receiving Area" with established boundaries. Sending Areas can include the community's priority areas for land protection, such as farmlands, river corridors, water supply areas and wildlife habitat areas. Receiving Areas can include areas designated by the community to receive higher density development, such as areas in and around city/town centers, designated

SENDING

RECEIVING

growth centers, areas served by existing infrastructure/transit and brownfields ready for redevelopment. The TDR program enables landowners in the sending area to sell development rights to landowners or developers in the receiving area.

The TDR process uses a Special Permit from the Planning Board for all TDR transactions. Applicants are developers of land in "Receiving Areas" seeking additional density or reduced lot size, parking, or height requirements. Applicants must identify a willing seller of development rights in the "Sending Area". They must file development plans for both the Sending Area and Receiving Area parcels affected. The plans must illustrate the lots to be transferred from the Sending Area, and the lots to be created or increased density or reduced parking proposed in the Receiving Area. The Planning Board reviews the Special Permit application and approves or denies the application based on detailed criteria in the ordinance.

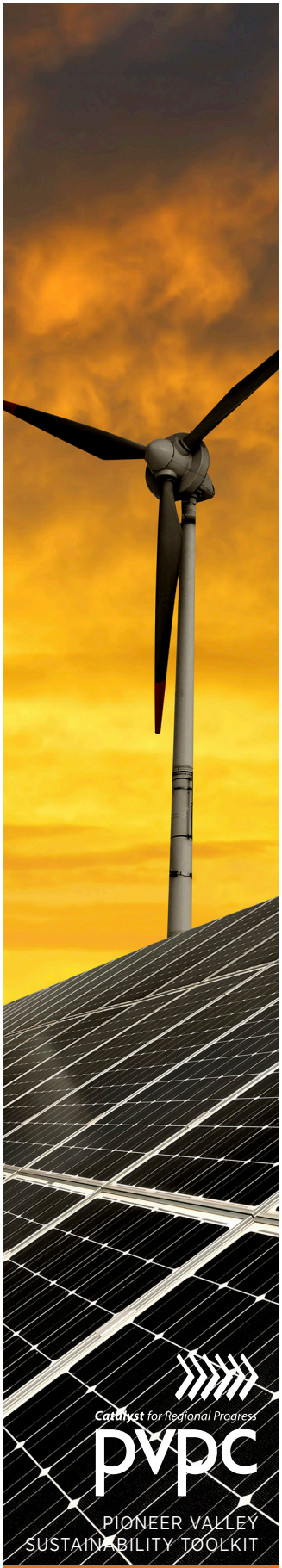
In some cases, TDR bylaws/ordinances are set up to enable developers to make cash payments, equal to the value of needed development rights, to the city/town in lieu of purchasing development rights from another landowner. This option simplifies the TDR process for developers and enables more participation in the program. Communities then use the cash payments to either buy development rights directly for priority parcels, or leverage state/federal funds to make larger purchases.

While TDR has been used extensively across the United States to preserve farmland, its use to reduce greenhouse gas emissions has little track record to date. The King County, Washington TDR program described below is one area where this approach is proposed.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Pioneer Valley Region: The Pioneer Valley Planning Commission has a model TDR bylaw/ordinance that is unique in the United States, in that it enables the transfer of development rights from farmland to commercial or industrial properties. The PVPC model has been adopted, to date, in three communities: Hadley, Easthampton and Westfield, Massachusetts. In Hadley, the TDR bylaw has been particularly effective, and has resulted in the payment of $338,000 in TDR cash payments to the town, which have in turn leveraged $3.8 million in state/federal funds, and used to preserve nine farms and 239 acres of important farmland.

King County, Washington: This TDR program has been very effective and has preserved 92,000 acres of valuable open space and fish and wildlife habitat since 2000. The county has provided increased housing and infrastructure improvements in urban areas around the county's municipalities. The newly adopted 2008 King County Comprehensive Plan stipulates that TDRs are an option available to developers to mitigate for project-related



greenhouse gas (GHG) emissions that exceed a set threshold. That is, developers who use TDRs for increased density can also capture the GHG reducing benefits that TDRs create to meet emission reduction requirements. The requirements, which are forthcoming in 2009, will be in accordance with the State Environmental Policy Act. The idea is that TDRs carry with them a GHG reduction "value" which is based on the vehicle miles that will not be traveled as a result of restricting future development on rural TDR sending sites and relocating the development potential onto projects within existing urban areas – areas known to require less driving and commuting.

Montgomery County, Maryland: This TDR program was established to preserve farmland and curb sprawl originating from Washington D.C. The county has promoted development in areas that are readily served by public services such as transportation, wastewater, and public water supply. Montgomery County is touted as having one of the most successful TDR programs in the nation. Since its inception in 1980, the county has protected over 50,000 acres of farmland and open space. Montgomery County's achievement is due in large part to its success in forming a market for development rights.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

PIONEER VALLEY PLANNING COMMISSION:
http://www.pvpc.org/val_vision/html/toolbox/index.html

KING COUNTY, WASHINGTON TDR PROGRAM:
See http://dnr.metrokc.gov/wlr/tdr/.

MONTGOMERY COUNTY, MARYLAND PROGRAM:
www.mcparkandplanning.org/community/plan_areas/rural_area/planning_process/about_the_process/tdr.shtm

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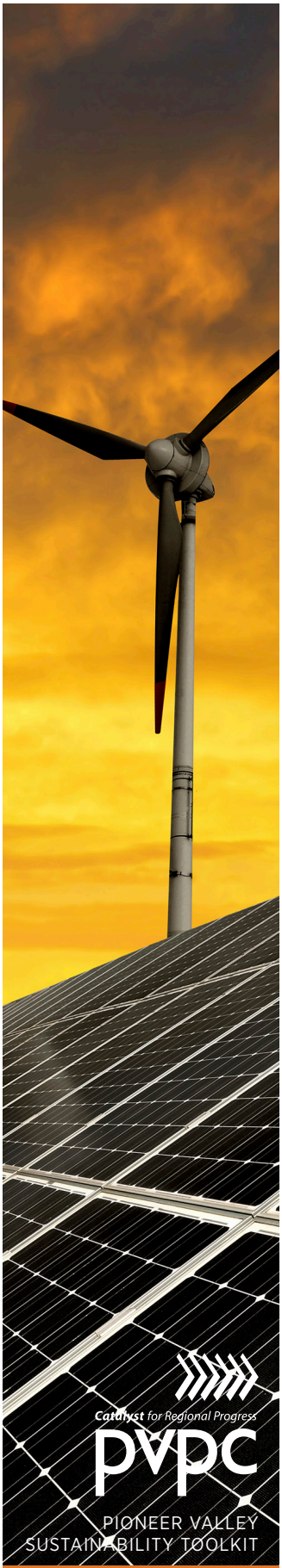


UNDERSTANDING

Transit Oriented Development

PURPOSE

To encourage a vibrant mix of residential, retail and commercial development and activities within walking distance of public transportation hubs.

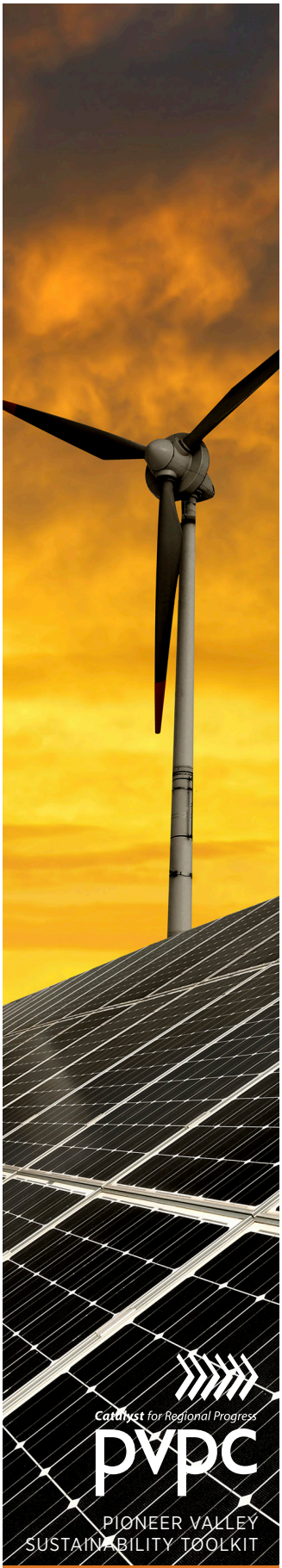
Transit-oriented development (TOD) has been around a long time. Since the colonial era, our homes, shops, eating establishments, businesses, and work places have tended to be grouped within walking distance of ports, roads, trolley lines and train stations. It's only since the 1950s that an automobile-centric approach to development and zoning has largely reshaped communities and made it virtually impossible for many people to live without using a car for every trip they make.

But in recent years, many communities have begun to re-discover the benefits of encouraging the location of more people and jobs near transportation nodes. By returning to our TOD tradition in development patterns, communities are increasing the home values and walkability of their neighborhoods. TOD neighborhoods often include multifamily homes, parks, cafes, restaurants and civic gathering spaces, helping to strengthen the social and economic fabric of the community. These kinds of housing choices and neighborhoods are very appealing to retiring Baby Boomers (ages 55+) and the upcoming Millennials (ages 21 to 35), many of whom are seeking alternatives to single-family suburban homes on large lots.

Although most TOD districts are built around a transit or bus station, not every TOD district requires one. What is required are a walkable environment and multiple transportation options—especially public transit that is frequent, reliable, and easy to use.

HOW TOD ZONING WORKS

Transit-oriented development (TOD) zoning involves updates to local bylaws or ordinances to give property owners near transit stations greater flexibility to create homes and commercial buildings that are responsive to market demands and create high-quality pedestrian environments that encourage walking and transit use. This can be accomplished by: 1) establishing a new base zoning district with TOD-supporting performance standards; 2) adding TOD standards to an existing zoning base district; or 3) creating (or modifying an existing) overlay district to include TOD standards.



Geographically, a TOD district usually focuses on an area that is within a 5- to 10-minute walk of a transit station, usually ¼ to ½ mile. Critical to the success of a TOD district are dimensional and density standards that foster more compact and fully built-out development near transit—and yet are compatible with the general existing neighborhood context. For example, a residential density of 25 to 40 units per acre (or more) is typically desirable in a downtown TOD neighborhood with high-capacity subways and/or light rail, but 12-15 units per acre may be more appropriate for a village TOD center served by commuter rail. Similarly, building heights, floor-area ratios, setbacks, lot coverage and other standards should encourage greater density while preserving what people like about the existing neighborhood.

TOD: A MIX OF USES

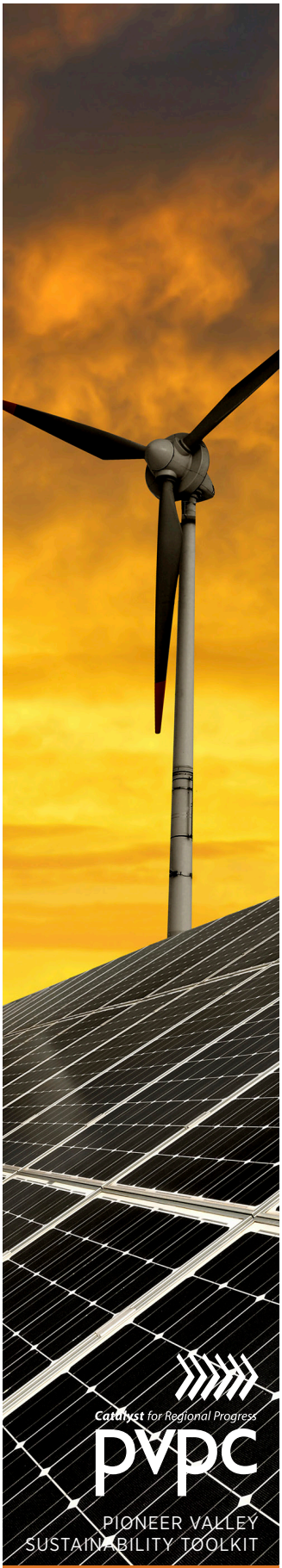
A diverse mix of residential and commercial uses is also desired in TOD districts. The optimal mix depends a lot on the station area context, whether it is a busy downtown area, a suburban location, or even small town center. Typical uses to consider include:

- **Multi-family homes (townhouses or apartment buildings with at least 3 units)**
- **Live-work units (in which some occupants are also employed by a business also on the premises)**
- **Grocery stores**
- **Restaurants, cafes and bars**

Uses that involve less efficient land use are not usually desirable in a TOD district and include auto sales, large parking lots (more than 50 spaces), mall-style shopping centers, drive-through restaurants and large-scale industry (though some types of manufacturing facilities may be a good fit).

Attractive street design is an important consideration for TOD zoning. Every attempt should be made to improve the safety and appeal of the pedestrian environment by minimizing curb cuts, requiring street-facing windows and entrances on buildings, specifying adequate sidewalk widths, allowing sidewalk café seating, locating parking at the side or rear of buildings, and using other complete streets techniques.

The issue of parking is critical to TOD districts. In many cases, a community will want to consider setting maximum parking limits in a TOD district, rather than minimum parking requirements for various types of uses. This approach relies more on developers' knowledge of parking needs for their respective uses, and can effectively reduce the amount of land that is devoted to autos. Strategies for meeting parking demand in TOD districts include shared parking among residential and commercial/office uses (residents park in the spaces during the evenings; shoppers or office workers during the day); credit for available underutilized on-street spaces; setting an appropriate price for



public parking; neighborhood parking permit systems; and developing public parking—especially parking garages.

ENGAGING STAKEHOLDERS

As with other zoning update process, it is important that community stakeholders participate. While TOD is actually a historically well-established development pattern, reaching community consensus about the best regulations and standards for TOD in your community can be challenging—especially because of the emphasis it places on pedestrian and transit access, versus the private automobile. It's also important to understand the existing and potential market for real estate development in the future district; can the market support the densities and uses needed to make TOD succeed? Therefore, it is strongly recommended that any TOD zoning effort include the participation of a local advisory committee. Before drafting the zoning code itself, it may be helpful to produce a station-area plan; this could be a brief vision statement about the goals for the new zoning district, or a more detailed document. Think not only about the land uses and transit services that exist in the area today, but those that are likely to be there 20 or 50 years in the future.

ASKING THE RIGHT QUESTIONS

Now is the time to ask questions about potential barriers to TOD development—and how to overcome them. Consider:

- **Are existing sewer, water and other infrastructure adequate for desired densities and uses?**
- **If infrastructure upgrades are necessary, how they be funded? How long will they take?**
- **Does the proposed TOD district currently have, or will have, reliable and frequent transit service? ("Frequent" usually means a minimum of every 15 minutes during peak travel hours). Is the service frequent enough to support targeted residential densities? (see below)**
- **Is there enough parking for new growth? If not, where will it be provided and by who?**
- **Are existing streets pedestrian-friendly? Is funding available for public streetscape improvements, and how long will it take to put them in place?**
- **What park and streetscape improvements are needed to attract private investment?**

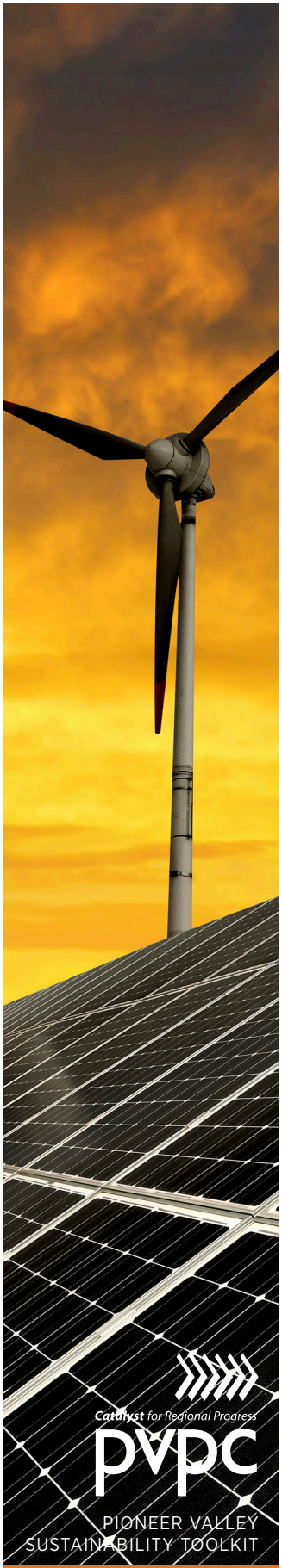


Table 1: Residential Density Associated with Levels of Service

Service	Frequency	Coverage	Dwelling Units Per Acre
Commuter Rail	5 Minute Peak Headways[1]	100 – 150 mile corridor	12
Light Rail	5 Minute Peak Headways	20 – 100 mile corridor	9
Bus – Frequent Service	**120 Buses per Day**	**½ mile between routes**	**15**
Bus – Intermediate Service	40 Buses per Day	½ mile between routes	7
Bus – Minimum Service	20 Buses Per Day	½ mile between routes	4

Source: Pushkarev, B.S., Zupan, J.M. and R.S. Cumella. Urban Retail in America – An Exploration of Criteria for Fixed-Guideway Transit. Bloomington: Indiana University Press. 1982.

EXAMPLES OF TOD ZONING

TOD zoning has been implemented in numerous communities in Massachusetts and the United States, including Abington, MA; Ashland, MA; Concord, MA; Needham, MA; Woburn, MA; Atlanta, GA; Columbus, OH; Hartford, CT; Lower Merion, PA; and Seattle, WA.

LINKS TO MORE INFORMATION

CENTER FOR TRANSIT-ORIENTED DEVELOPMENT:
http://www.ctod.org/

HARTFORD CAPITOL REGION COUNCIL OF GOVERNMENTS TOD MIXED USE MODEL CODE:
http://www.sustainableknowledgecorridor.org/site/sites/default/files/CRCOG_MU_TOD_FINAL%204-4-2014.pdf

MASSACHUSETTS SMART GROWTH TOOLKIT MODEL TRANSIT-ORIENTED DEVELOPMENT OVERLAY DISTRICT BYLAW:
http://www.mass.gov/envir/smart_growth_toolkit/pages/mod-tod.html

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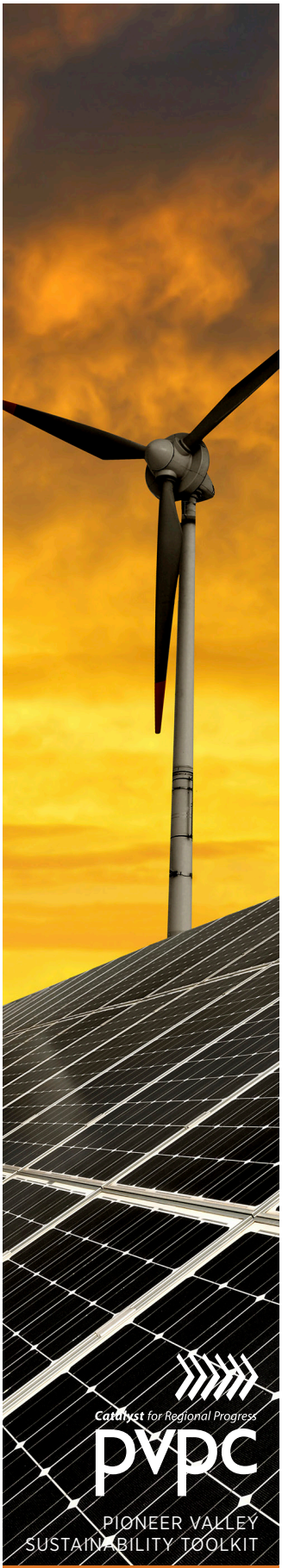

UNDERSTANDING

Tree Planting & Reforestration

PURPOSE

To promote the planting of trees and forests. Planting trees improves air quality and absorbs carbon from the atmosphere, provides shade, cooling and water management benefits as well as improving quality of life through beautiful public places and increased community valuation.

HOW IT WORKS

Planting trees and reforesting is a simple way to mitigate climate change while improving quality of life within a community. Areas with more trees see increased economic, social and environmental benefits. According to the Massachusetts Department of Conservation & Recreation, these benefits include decreased energy costs due to shading as well as improved air quality for residents. More trees are shown to increase revenue from tourism related to fall foliage viewing, as well as raise property values and revenue through taxes by 7-10%. Moreover, plantings can reduce storm water runoff and decrease the likelihood of flooding. Fruit and nut bearing trees can also provide food to communities while beautifying the city streets.

There are different ways to promote tree planting and reforestation in a community:

1. Urban and Community Forestry Program: Creating a municipal forestry department with management plans and professional staff is a strong way to encourage tree planting. These groups aim to improve their local environments and enhance livability of communities by protecting, growing and managing community trees and forests. The overall management plan should focus on caring for mature trees, creating planting programs and conserving the overall canopy as well as using the staff and funding to educate the public about the importance of trees in their community. Creating and following tree ordinances as well as adhering to state policies and regulations including Massachusetts General Law Chapter 87 is crucial for these bodies. Forestry programs within the government structure benefit by having city funding and enforcement agencies to support tree maintenance. Forestry programs can range from paid full time employees to a volunteer community tree board with a city budget.
2. Tree Ordinances: There are three basic types of tree ordinances:
    a. **Planting and removal ordinances** regulate tree requirements within the public realm, such as the replacement of damaged or removed trees, plantings within new developments as well private tree removal if they pose a hazard to passing public.
    b. **Tree protection ordinances** protect native or historic trees. These ordinances require a permit for pruning or removal of these trees.
    c. **View ordinances** create rules for homeowner disputes about blocked views, shade or sunlight due to tree planting or removal. They set guidelines for planting trees that protect private property rights, scenic landscapes, and viewsheds. These ordinances attempt to provide a consistent process that homeowners must follow when planting or removing trees, so that conflicts can be minimized.
3. Volunteers and Non-Profit Organizations: Another way to promote tree planting is by engaging volunteer and citizens. Volunteer groups can help to secure outside funding to buy trees and supplies. Citizen members can encourage their neighbors to care for their current trees, and request new trees to be planted in beneficial locations. Success within these groups can be the catalyst for expanding tree planting within a community and eventually help in the creation of an Urban and Community Forestry Program.
4. Schools: Involving children in tree planting programs is a common way to get added help while teaching them about the importance of a healthy environment. Children have a lot to benefit from a shaded school and community environment and are willing to improve their town or city.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Million Trees NYC

A public-private program that aims to plant one million trees in New York City. When complete, the effort will have increased the urban forest by 20%. To date, over 900,000 trees have been planted.

Boston Tree Party

The Boston Tree Party is an Urban Agriculture project run by a non-profit organization with the collaboration of organizations, institutions and groups across Boston. Their main goal is to support the planting of heirloom apple trees throughout the city. Communities request to be "Tree Delegations" – groups that work together to plant the trees in their communities and commit to the future care of their environment. Various companies throughout the city donated all supplies and helped organize the launch of the project.

Casey Trees, Washington D.C.

Casey Trees is a non-profit organization established in the nation's capitol to restore the tree canopy. Their education coordinator helps schools make a treescape plan and implements the planting at the school. Casey Trees holds a rally for students, teaching them about the importance of planting trees and the varieties that will be planted. Then, the students get to plant these trees with the help of the Casey Trees employees. Programs such Casey Trees and the Boston Tree Party are located throughout the country. They help utilize youth volunteers while educating at the same time.

City of Cambridge Tree Planting

The Cambridge Urban Forestry Department uses a variety of tools to make tree planting successful in their city. Their website outlines exactly how to request a tree be planted on the sidewalk, or within a property. Their department handles the actual planting, but citizen volunteers are a crucial aspect of their department. Neighborhoods are asked to water newly planted trees, and people are asked to attend public hearings about new plantings and maintenance. They have programs for children to be involved in tree care.

Tree City USA

Throughout the country, communities have become members of Tree City USA, an organization that formally recognizes a town or cities commitment to planting, protecting and managing community forestry projects. It is a partnership of The Arbor Day Foundation, the USDA Forest Service and the National Association of State Foresters. There are 3,400 communities involved throughout the country - 89 in Massachusetts. Many of these communities are within the Pioneer Valley – including Amherst, Chicopee, Longmeadow, Springfield and Westfield. Receiving this recognition bestows a positive image on the community and enhances town pride, while letting citizens actively participate in their urban forestry program. Communities must apply to become a Tree

City USA member, and meet certain criteria established by the program. Criteria include having a party legally responsible for the care of and responsibility of the community's trees. The tree board can be an entire department, or a volunteer tree board. A tree ordinance must designate the establishment of a tree board or forestry department and give this body the responsibility for writing and implementing an annual community forestry work plan. The tree ordinance provides rules for planting, maintaining and removing trees. The third criterion is a $2 per capita budget for the program, which many municipalities often already spend in maintenance. The goal is to use these funds in preventative care instead. The final criterion is that the community must participate in an Arbor Day Celebration, a fun event for the community.

Universities

The University of Arizona has thousands of olive trees flanking its roads and sidewalks. They recently conducted a study of their benefits and found that the trees reduced heating cost by $18,230 per year, and intercepted over one million gallons of storm water. The University of California at Davis also has an abundance of olive trees. Instead of letting the olives drop to the ground, they collect and use them to create olive oil to sell for profit; making a once burdensome problem into a money making idea.

LINKS TO MORE INFORMATION

MILLON TREES NYC
http://www.milliontreesnyc.org/html/home/home.shtml

BOSTON TREE PARTY
www.bostontreeparty.org

CITY OF CAMBRIDGE TREE PLANTING PROGRAM
http://www.cambridgema.gov/theworks/ourservices/urbanforestry/citystreeplantingprograms.aspx

MASSACHUSETTS DCR URBAN AND COMMUNITY FORESTRY RESOURCES
http://www.mass.gov/eea/agencies/dcr/conservation/forestry-and-fire-control/picks-and-shovels-urban-and-community-forestry-faqs-resources-fact-sheets.html

http://www.mass.gov/dcr/stewardship/forestry/urban/urbanFAQs.htm

TREE CITY USA
http://www.arborday.org/programs/treeCityUSA/index.cfm

FOR MORE INFORMATION, PLEASE CONTACT

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UNDERSTANDING

Trip Reduction Plans

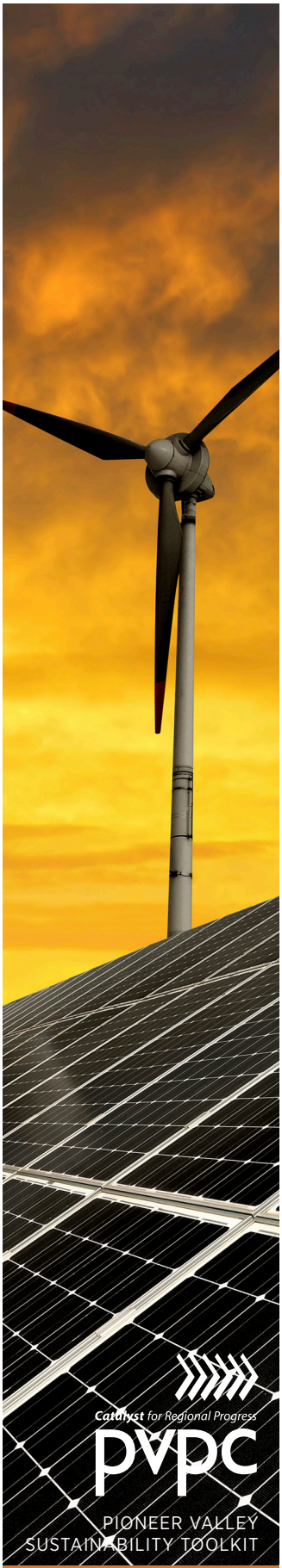
PURPOSE

To encourage the use of alternative modes of transportation for day to day travel by requiring plans for vehicle trip reduction as part of large-scale commercial or residential development proposals. Trip reduction directly reduces greenhouse gas emissions.

HOW IT WORKS

Reducing the number of trips one makes is a key element in reducing overall greenhouse gas emissions. Communities can require trip reduction plans for large-scale commercial or residential developments to reduce single-occupancy automobile travel through zoning regulations. A municipal trip reduction plan regulation typically requires that the applicant outline the methods the development will employ to reduce single-occupancy automobile travel. Common methods include:

- Provision of an on-site bus stop shelter if development is along an existing transit route.
- Installation of bike racks and provision of bike storage areas.
- Rideshare matching through carpools or van pools.
- On-site postings of public transit schedules.
- Financial incentives for commuters such as: free or discounted transit fares, travel reimbursement policies that reimburse bicycle or transit mileage for business trips, and Parking 'Cash Out' payments equivalent to the subsidy that employees receive for parking spaces in lots or garages at or near the place of employment.



- **Financial disincentives for commuters who drive alone such as elimination or reduction of parking subsidies for employees.**
- **Alternative scheduling opportunities that allows for flextime, compressed work weeks, and working from home.**

An effective municipal Trip Reduction Plan policy should be supported by an overall municipal Transportation Demand Management (TDM) that encourages more efficient travel patterns while taking into account local and regional travel patterns and socioeconomic conditions. A TDM program is a comprehensive set of policies to reduce travel demand, specifically that of single occupancy private vehicles. A TDM program may include bicycle and pedestrian amenities, subsidized transit costs, transit infrastructure, ridesharing programs and other measures.

EXAMPLES WHERE STRATEGY HAS BEEN IMPLEMENTED

CITY OF NORTHAMPTON, PROJECTS REQUIRING SITE PLAN APPROVAL AS MAJOR PROJECTS
http://www.ecode360.com/?custId=NO2226

TOWN OF HADLEY, COMMERCIAL DEVELOPMENT & PERFORMANCE STANDARDS
BYLAW HERE

CITY OF EASTHAMPTON, COMMERCIAL DEVELOPMENT PERFORMANCE STANDARDS
http://www.easthampton.org/downloads/ZONING008102010.pdf

LINKS TO MORE INFORMATION

VICTORIA TRANSPORT POLICY GROUP, ONLINE TRANSPORTATION DEMAND MANAGEMENT ENCYCLOPEDIA.
http://www.vtpi.org/tdm/tdm9.htm

THE NATIONAL CENTER FOR TRANSIT RESEARCH'S NATIONAL TDM AND TELEWORK CLEARINGHOUSE
http://www.nctr.usf.edu/clearinghouse/tro.htm

MASSRIDES PROGRAM
http://www.commute.com/

MASSBIKE
http://www.massbike.org/aboutus/pioneer-valley-chapter/

FOR MORE INFORMATION, PLEASE CONTACT

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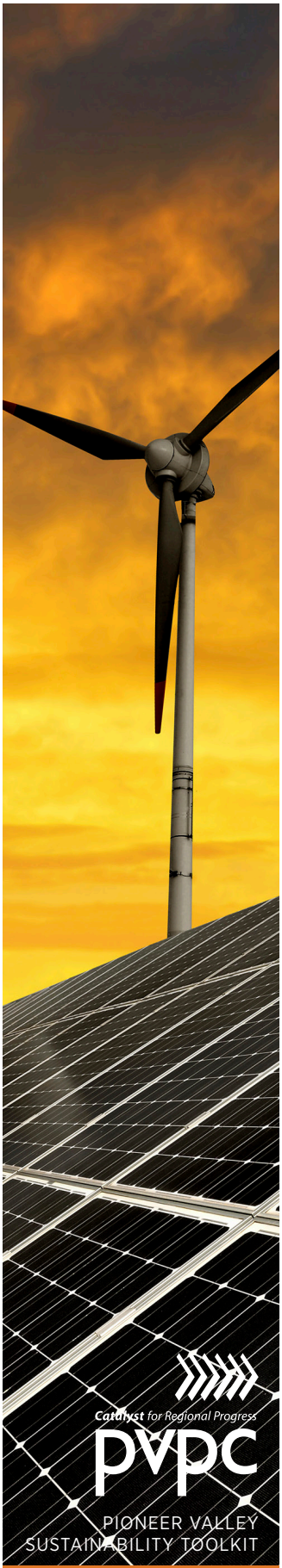

REGIONAL STRATEGY

Address Climate Action Goals In Regional Transportation Planning

PURPOSE

To include consideration of goals for reducing greenhouse gas emissions (GHG) and climate action in regional transportation plans and transportation project selection. This will encourage expenditures of federal and state transportation funding for projects which will help to reduce vehicle miles traveled (VMT) and greenhouse gas emissions.

HOW IT WORKS

Metropolitan Planning Organizations and Regional Planning Agencies can significantly affect how public transportation funds are spent, and how transportation projects affect carbon emissions. Here are some examples:

1. Include Climate Goals in Regional Transportation Plans
   GHG and VMT reduction targets can be included in regional transportation plans, which are blueprints to guide investments in the region's transportation system.
2. Quantification of GHG Impacts in Transportation Plans
   Some metropolitan regions are now creating GHG inventories, and are taking steps to quantify the GHG emissions of transportation projects within their Regional Transportation Plans (RTPs). This can be done with sophisticated models or simple Vehicle Miles Travelled (VMT) multipliers applied the outputs of the travel demand model.
3. Regional GHG Inventories and Reduction Targets
   Creating a regional GHG inventory with reduction targets is an important first

step in addressing GHG emissions from regional transportation projects. There are no standard tools yet for this task, and regions are trying a variety of approaches. Two regions, Philadelphia and Washington, are currently engaged in this process, with EPA assistance.

4. Redirect Transportation Funds from Road Expansion to Transit and Bike/ Pedestrian Facilities
   Metropolitan Planning Organizations (MPOs) can shift investments away from road expansion toward transit, bicycling and walking facilities.
5. Calculation of Emissions from Specific Projects
   Some MPOs have begun calculating GHG emissions from specific highway and transit projects, as part of evaluating projects for funding.
6. Adding GHG Criteria for Evaluating Transportation Improvement Plan Projects
   Regions currently use a variety of criteria for reviewing and ranking transportation projects to be placed on the Transportation Improvement Plan or TIP. Regions could add new criteria to this evaluation, by evaluating GHG emissions from individual projects and including these criteria in their rankings.
7. Alternative RTP Investment Packages
   Regions can calculate and evaluate the GHG emissions from Regional Transportation Plan alternative investment packages. This is different from the traditional approach to RTPs, where only a single proposed package is evaluated. The San Francisco region is currently using this approach (see below).

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Quantification of GHG Impacts in Transportation Plans

The EPA's MOVES model is the recommended tool for GHG analysis. The MOVES model develops on-road energy consumption and emissions estimates based on speed and vehicle power output. The MOVES model has already been used by several State and local agencies for GHG analyses.

Metropolitan Transportation Commission, San Francisco

The Metropolitan Transportation Commission (MTC), the MPO for the San Francisco Bay Area, adopted performance targets for GHG emissions in its Regional Transportation Plan. Targets are to reduce CO2 emissions 40% below 1990 levels by 2035, and to reduce VMT per capita by 10 percent by 2035. Proposed packages of investments are being analyzed for their ability to meet these targets, including:

» **freeway investment with modest efficiency improvements,**

» a high-occupancy toll (HOT) network with expanded express bus service,

» an expansion of rail transit,

» a comprehensive road-pricing policy, and

» a land-use strategy based on smart growth principles.

» Puget Sound Regional Council

The Puget Sound Regional Council, the MPO for the Seattle area, is using the U.S. EPA's Motor Vehicle Emission Simulator (MOVES) model to do a regional level analysis of GHG emissions in its Long Range Transportation Plan.

Missoula County

Missoula County, Montana undertook a regional land use and transportation visioning exercise called Envision Missoula. Missoula plans to provide a basic estimate of CO2 emissions from the plan, probably using a simple VMT multiplier applied to the outputs of the travel demand model.

Capital District Transportation Committee

Albany's Capital District Transportation Committee (CDTC) incorporates analysis of GHG emissions in its planning process in two ways. First, CDTC applies a "full cost analysis," including analysis of global warming costs, to major system decisions. Full cost analysis is also used to evaluate candidate TIP projects. Second, the agency estimates the GHG emissions resulting from its LRTP. New York requires MPOs to estimate the energy and CO2 emissions from their long range transportation plans and also from their transportation improvement programs.

CDTC has taken an innovative approach to the use of their travel demand modeling. The region has been proactive in encouraging concentrated, sustainable development patterns, and has a focused interest in establishing linkages between policy setting and environmental responsibility. CDTC forecast a 15% reduction in trip generation per household based on a range of policies and principles, such as urban reinvestment, transit oriented development, and bus rapid transit.

Sacramento Area Council of Governments

SACOG is working with several modeling applications to analyze the impacts of different transportation and land use scenarios. SacSim, the agency's new travel demand forecasting model, is the first regional model to use individual land parcels as the level of input data.

REGIONAL GHG INVENTORIES AND REDUCTION TARGETS

Delaware Valley Regional Planning Commission, Philadelphia PA

The Delaware Valley Regional Planning Commission (DVRPC) is in the process of preparing a regional GHG inventory for 2005, as well as projected GHG emissions for 2035. Among the sources to be included in this inventory are emissions from on-road transportation, which are expected to be one of the region's primary sources of GHG emissions. CO2, CH4, and N2O emissions will be calculated using modeled estimates of annual average daily vehicle miles traveled (VMT) by vehicle type and road class. Per mile emissions factors will be applied to the VMT totals. The VMT estimates will be generated by DVRPC's regional transportation model, which is used to support the region's long range transportation planning and air quality conformity analysis process. The regional transportation model will also be used to generate GHG emissions estimates for various transportation plan alternatives.

Metropolitan Washington Council of Governments, Washington DC

A regional inventory of CO2 emissions from transportation was developed by the Metropolitan Washington Council of Governments (MWCOG). CO2 estimates from mobile sources were calculated using data and forecasts of vehicle miles of travel (VMT) by vehicle type from the region's air quality conformity analysis. Emission factors were modeled using the software MOBILE6 and travel patterns in the COG region on network and local roadways. Emissions forecasts to 2030 were developed using the MOBILE6 model and the COG's travel forecasting model.

MWCOG has proposed two GHG emission reduction scenarios for development. The first scenario reflects the current Long Range Transportation Plan. The second scenario examines how new long-term goals could be achieved using various combinations of interventions, including improved fuel efficiency, alternative fuels, and reducing vehicle travel. The first step in developing this scenario is identifying a CO2 emission reduction goal. The COG's Climate Change Steering Committee has discussed a proposed regional goal of reducing overall regional CO2 emissions by 70-80% below 2005 levels by 2050.

CALCULATION OF EMISSIONS FROM SPECIFIC PROJECTS

New York

The State's Energy Plan requires an energy and GHG analysis for MPO transportation plans and TIPs and for all regionally significant projects and other projects that may lead to large increases in vehicle miles traveled. The environmental documents for those proposed projects typically include an analysis of projected CO2 emissions associated

with construction and operation of each alternative.

Massachusetts

Certain projects subject to the Massachusetts Environmental Policy Act are required to include a quantification of GHG emissions as well as consideration of measures to avoid, minimize or mitigate such emissions. Massachusetts also has GHG planning level requirements under its GreenDOT initiative

California

The California Coastal Conservancy has developed a methodology for calculating GHG emissions from specific projects, including construction emissions, lifecycle emissions, operational emissions, building energy use, transportation trip generation, and alteration of land use cover or vegetation.

Metropolitan Transportation Commission, San Francisco

The Metropolitan Transporation Commission, the MPO for the San Francisco Bay Area, is currently evaluating the CO2 impacts of individual highway and transit projects. This analysis will feed into a performance comparison of projects.

LINKS TO MODEL BYLAWS OR MORE INFORMATION:

MASSACHUSETTS' GREENDOT PROGRAM:
http://www.massdot.state.ma.us/GreenDOT.aspx

DELAWARE VALLEY REGIONAL PLANNING COMMISSION GHG INVENTORY:
http://www.dvrpc.org/EnergyClimate/inventory.htm

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REGIONAL STRATEGY

Integrating Land Use And Transportation Strategies

climate & energy

PURPOSE

To help reduce green house gas emissions by aligning transportation plans with sustainable land use strategies through strategic targeting of federal and state funds for sustainable infrastructure/development projects.

HOW IT WORKS:

Long-range Regional Transportation Plans (RTPs) and Transportation Improvement Plans (TIPs) provide the most important opportunities for linkages with local and regional land use goals. These linkages can take the form of evaluation criteria for analyzing potential transportation investments, or targeting of transportation funds for sustainable development projects.

Transportation agencies can:

1. include land use goals as part of scoring criteria for transportation projects, and;
2. create specific funding programs for transportation projects that support community and land use goals, such as pedestrian or streetscape improvements, mixed-use infill, transit-oriented development and transit improvement projects.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED:

1. Include land use goals as part of scoring criteria for transportation projects

Aligning Transportation with Land Use: Atlanta Regional Commission

In Georgia, the Atlanta Regional Commission has taken several steps to better align its long range transportation decision-making processes with local land use goals. For the 2025 Regional Transportation Plan, ARC's scoring criteria for federal STP and CMAQ funds included support of local land use, which can provide a maximum of 15 points out of 135 total.

ARC has also created a $350 million fund to help local agencies implement bicycle and pedestrian projects, streetscape projects, transit access improvements, and parking coordination efforts. To help local jurisdictions develop projects for this fund program, ARC has also provided funding for planning under a separate grant program called the Livable Centers Initiative.

Supporting Sustainable Land Uses with Transportation: North Central Texas COG

NCTCOG's Mobility 2030 Plan is the Metropolitan Transportation Plan for the Dallas-Fort Worth area, which establishes sustainable development as the region's strategic approach to transportation planning, programming, and construction. Sustainable development leverages the land use/transportation relationship to improve mobility, enhance air quality, support economic growth, and ensure the financial stability of the transportation system. The plan recognizes four categories of sustainable development:

- Strategic Urban Development
- Integrated Land Use Planning/Urban Design
- Transit-Oriented Development
- Access Management

The NCTCOG's Sustainable Development Funding Program was created by its policy body, the Regional Transportation Council (RTC), to encourage public/private partnerships that positively enhance existing transportation system capacity, rail access, air quality concerns, and/or mixed land uses. By allocating transportation funds to land use projects promoting alternative transportation modes or reduced automobile use, NCTCOG and its regional partners are working to address escalating air quality, congestion, and quality of life issues.

The program is designed to encourage planning and foster growth and development in and around historic downtowns and Main Streets, infill areas, and along passenger rail

lines and at stations. Three Calls for Projects were conducted in 2001, 2006, and 2010 to fund Sustainable Infrastructure, Landbanking, and Planning projects.

Program goals include:

- **Respond to local initiatives for town centers, mixed use growth centers, transit oriented developments, infill and brownfield developments, and pedestrian-oriented developments;**
- **Complement rail investments with coordinated investments in park-and-ride, bicycle and pedestrian facilities;**
- **Reduce the growth in vehicle miles traveled per person;**
- **Promote economic development throughout the region through public-private partnerships.**

Staff review project applications for the following criteria:

- **the proposed land-use change;**
- **the private/public partnership and commitment to the project;**
- **the project's consistency with the Mobility 2025 Update;**
- **the project's consistency with Regional Transportation Council (RTC) policy on sustainable development.**

Sustainable Development projects of approximately $124 million over the past decade have been selected for funding through the program, with additional local match contributions of $31 million from local governments and the private sector. Most of the funding is provided by Regional Toll Revenues (RTR).

This program supports private sector investment in mixed/integrated land use, infill development, transit, and pedestrian-oriented development by providing dedicated planning assistance and designating transportation project investments to support those projects. NCTCOG works through local governments to identify potential Development Excellence partners, to support their participation in the process, and ultimately to select projects that will receive dedicated transportation support. The program focuses on "joint ventures", referring to the contributions from multiple stakeholders: in addition to the developer's investment and the transportation investments, selected projects receive local tax, zoning, and other regulatory support.

FOR MORE INFORMATION:
http://www.nctcog.org/trans/sustdev/landuse/

Denver (Colorado) MPO

The Denver Regional Council of Governments' (DRCOG) selection criteria for local projects in the 2005-2010 TIP include up to 16 points (out of 100) for various, specified local actions supporting the regional Metro Vision. Points are awarded for a variety of criteria including signing the regional Mile High Compact, protecting open space, approving infill and mixed use development plans, adopting zoning changes, completing major streetscape projects, and building multi-family housing.

Wilmington (Delaware) MPO

In the late 1990s, the Wilmington Area Planning Commission (WILMAPCO) designated "Transportation Investment Areas" in the Wilmington region, including Center, Community, Development, and Rural areas. The agency has used these areas in the screening of projects for the LRTP to ensure that projects are appropriate to their respective area. WILMAPCO reports that a primary application of the policy has been to identify urban centers in which pedestrian and bicycle facilities should be included along with roadway improvements. Contact: Heather Dunigan, Principal Planner (302-737-6205).

Maryland State agencies, including DOT

Since the late 1990s, the State of Maryland has used priority funding areas to set criteria for State investments, including transportation investments by the Maryland Department of Transportation (MDOT). Priority Funding Areas are locations where the State and local governments want to target their efforts to encourage and support economic development and new growth. The criteria have led to the removal of bypass projects from MDOT's capital funding program, multimodal improvements in urban areas, and the use of access control as a tool for locating development. Contact: Don Halligan, MDOT Transportation & Land Use Planning (410-865-1294).

Seattle (Washington) MPO

The Puget Sound Regional Council's (PSRC) 2002 Regional TIP Policy Framework includes project selection criteria for consistency with Vision 2020, a regional transportation and land use vision adopted in 1990 and updated in 1995. Candidate TIP projects receive points for supporting designated urban centers, manufacturing/industrial centers, and connecting corridors, with specific criteria including circulation/continuity, urban environment, mobility/accessibility, benefit to the center, and sustainability. See: Puget Sound Regional Council, "Regional Project Evaluation Criteria."

LINKS TO MODEL BYLAWS OR MORE INFORMATION:

FOR MORE INFORMATION ON THE ATLANTA REGIONAL COMMISSION:
http://www.atlreg.com/transportationair/transportationair.html

2. Create specific funding programs that support community- and land use- oriented transportation projects, such as pedestrian, streetscape, mixed-use infill, transit-oriented development and transit improvement projects

EXAMPLES:

San Francisco (California) MPO

Since 1998, the Metropolitan Transportation Commission's (MTC) Transportation for Livable Communities program has provided planning and capital improvement grants for town centers, public transit hubs, key streets and other improvements designed to foster community vitality. The Housing Incentive Program provides additional funding for streetscape, pedestrian, bicycle, and other infrastructure improvements for communities building housing within 1/3 mile of rapid transit stations. Between 1998 and 2003, the programs funded $2.2 million in planning grants and over $54 million in capital grants and housing incentives. Funding has come from Federal sources including STP, CMAQ, and Transportation Enhancements, as well as from the State Transportation Development Act. Contact: Evelyn Baker, MTC (510-464-7753).

Dallas (Texas) MPO

Through the Land Use-Transportation Joint Venture Program, the North Central Texas Council of Governments (NCTCOG) provided $41 million in STP and CMAQ funds between 2002 and 2004 for 19 transportation improvements (such as pedestrian and bicycle improvements) supporting transit-oriented developments, mixed-use, urban developments, and infill developments. Federal funds were matched with local, private sector funds, local/city funds, tax increment financing district funds, and right-of-way land donations. Due to the success of the first call for projects, NCTCOG issued a second $40 million Sustainable Development call in October 2005. In addition to transportation infrastructure improvements, funds are available for land banking and local sustainable development planning programs. NCTCOG reports that as a result of the first call for projects and in anticipation of the second call, many local governments have updated or changed their zoning to include classifications that will allow mixed-use sustainable development projects to be built by right. In addition, NCTCOG is "trading" local for federal dollars to streamline and quicken implementation of small infrastructure projects that support development. Contact: Alicia Hopkins, NCTCOG (817-608-2380).

Massachusetts Executive Office of Transportation

The 2004 Massachusetts' Transportation Bond Bill directed the Office for Commonwealth Development (OCD) to create a Transit Oriented Development Infrastructure and Housing Support Program, to be administered through the Executive Office of Transportation (EOT). The program is providing $30 million in financial assistance to public agencies for pedestrian improvements, bicycle facilities, housing projects, and parking facilities in mixed use developments located within one-quarter mile of a transit station. EOT is

collaborating with the Department of Housing and Economic Development (DHED) on implementing the housing component of this program. To ensure that projects support TOD principles, OCD, in consultation with EOT and DHED, established specific evaluation criteria for each of the four project types. Contact: Jane Healey, OCD (617-573-1388).

California: MPOs assigned responsibility for reducing GHG emission from cars and light trucks

In December 2008, the California Air Resources Board (CARB) approved the Climate Change Scoping Plan, which contains the main strategies California will use to reduce GHG emissions. An essential component of the state Scoping Plan is reducing GHG emissions from transportation. In September 2008, Governor Schwarzenegger signed Senate Bill (SB) 375 which mandates an integrated, regional land use and transportation planning approach to reducing GHG emissions from cars and light trucks. Cars and light trucks generate about 31% of statewide GHG emissions. The law directs CARB to establish regional GHG reduction targets for cars and light trucks and assigns Metropolitan Planning Organizations (MPOs) throughout the state (the Association of Bay Area Governments and the Metropolitan Transportation Commission in the Bay Area) to develop plans for achieving those targets. Essentially, SB 375 is a mechanism for implementing the measure in the state's Scoping Plan related to reducing regional transportation-related GHG emissions. Through the SB 375 process local governments in the Bay Area (and in other regions) will have to work together to integrate development patterns and transportation networks in a way that achieves regional GHG reduction targets while also meeting housing needs, protecting greenspace, and addressing other regional planning objectives.

LINKS TO MODEL BYLAWS OR MORE INFORMATION:

SAN FRANCISCO METROPOLITAN TRANSPORTATION COMMISSION'S (MTC) TRANSPORTATION FOR LIVABLE COMMUNITIES
http://www.mtc.ca.gov/planning/smart_growth/tlc/

MASSACHUSETTS TRANSIT ORIENTED DEVELOPMENT INFRASTRUCTURE AND HOUSING SUPPORT PROGRAM
http://www.reconnectingamerica.org/resource-center/browse-research/2006/transit-oriented-development-infrastructure-and-housing-support-program-guidelines/

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UNDERSTANDING

Regionalized Performance Contracting

climate & energy

PURPOSE

To reduce the upfront cost of pursuing energy efficiency measures in municipal buildings by pooling the demand of several municipalities into one regional service contract for capital improvements.

Energy use in municipally-owned buildings, such as administrative offices and schools, accounts for a significant percentage of municipal budgets. One way to accomplish significant energy efficiency improvements in public buildings at no incremental cost to the local public purse is to engage an energy service company (ESCO) through a performance contract.

HOW IT WORKS

Through a performance contract, an ESCO will identify and evaluate energy-saving opportunities and recommend improvements, such as new lighting technologies, boilers and chillers, energy management controls, to be paid for through monthly energy savings over several years. The ESCO will guarantee that savings meet or exceed annual payments to cover all project costs. To ensure savings, the ESCO offers staff training and long-term maintenance services. If savings don't materialize, the ESCO pays the difference, not the municipality.

Town	Annual Savings
Belchertown	$300,000
Easthampton	$166,262
Granby	$60,000
Hadley	$60,000
Holyoke	$360,000
Ludlow	$120,000
Monson	$120,000
Palmer	$120,000
South Hadley	$120,000
Southampton	$60,000
Southwick	$120,000
Wilbraham	$120,000
TOTAL	**$1,726,262**

However, ESCOs have drawn a line at undertaking performance contracts directly with smaller municipalities, because the savings from energy consumption is deemed too small to cover their costs. As a result, many municipally owned structures in smaller communities and regional school districts have a harder time accessing these services. But by pooling the energy demand from buildings in multiple municipalities, such as town centers and schools from neighboring towns, officials can increase their municipality's profile and make energy performance contracting viable to companies.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

In 2008, the Franklin Regional Council of Governments (FRCOG) launched a regionalization effort for energy savings performance contracting that encompassed sixteen towns and three regional school districts. FRCOG was able to successfully pool municipal demand, launch a Request for Proposals on behalf of the municipalities, and contract an ESCO for the initial energy audits. Once the ESCO provided initial energy audits, each town had the ability to decide whether or not to contract the ESCO for the capital improvements and longer-term repayment of the improvements through energy savings.

Likewise, the Pioneer Valley Planning Commission (PVPC) launched a regional energy auditing and building efficiency services initiative in 2010, assisted by funding provided by the Massachusetts Legislature and administered by the Department of Housing and Community Development. PVPC pooled the energy demand of buildings in over a dozen towns and regional school districts and successfully procured an ESCO at a lower-than-market price. The participating communities were Belchertown, Easthampton, Granby, Hadley, Holyoke, Ludlow, Monson, Palmer, South Hadley, Southampton, Southwick, Wilbraham and Williamsburg. The school districts for Chesterfield-Goshen, Southwick-Tolland and Granville also participated in the pool to contract an ESCO. The total estimated savings

LINKS TO MODEL BYLAWS OR MORE INFORMATION

ENERGY SAVINGS COALITION:
http://www.energyservicescoalition.org/resources/whatis.htm

FRANKLIN COUNTY COUNCIL OF GOVERNMENTS (FRCOG) ENERGY SAVINGS PERFORMANCE-BASED CONTRACTING:
http://www.frcog.org/services/regional_services/svcs_energy.php

PIONEER VALLEY PLANNING COMMISSION (PVPC) REGIONAL ENERGY AUDITING AND BUILDING EFFICIENCY SERVICES:
http://www.pvpc.org/pressreleases/pr-jul-16-09_enaud.shtml

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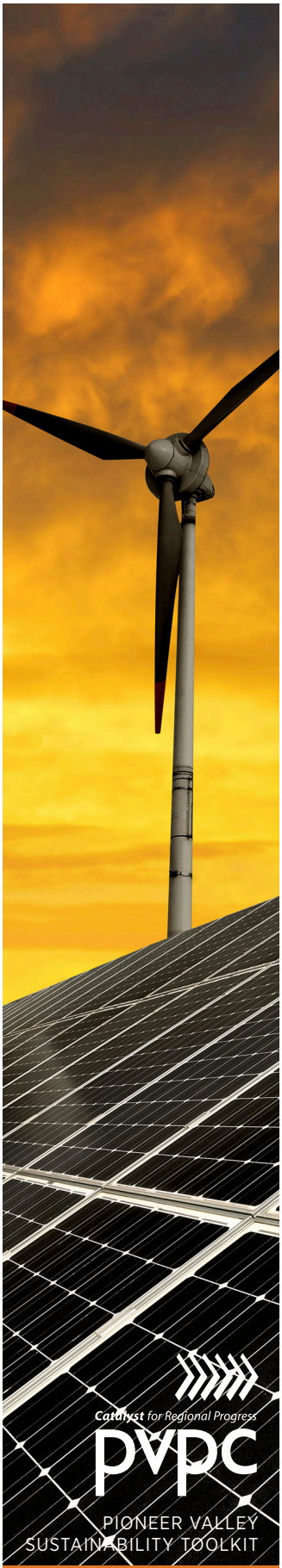
UNDERSTANDING

Conservation Zoning

climate & energy



PURPOSE

To promote responsible use of natural resources by preserving open space and ensuring that development has minimal adverse impact.

Conservation zoning protects public open space, natural wildlife habitats, and scenic areas. It also reduces stormwater runoff and erosion. The preservation of vegetation and trees reduces the quantity of greenhouse gas in the atmosphere. By preventing development in areas that are susceptible to flooding, conservation zoning also helps adapt to the increased rainfall that will occur from climate change.

The language and methods used to regulate development through zoning ordinances, such as restrictions on density and land use, are well suited for implementing conservationist principles.

Conservation zoning is the act of restricting development completely in an area , because it is in a floodplain, there is a risk of soil erosion, or there or because they considered environmentally sensitive water table, risk of soil erosion, or fragile ecosystem. The most common conservation zoning ordinances are floodplain bylaws.

HOW IT WORKS

Similar to other zoning districts, conservation zoning focuses primarily on the density and type of permitted uses. Examples of commonly permitted uses for conservation purposes include fishing, forestry, wildlife preserves, and single family detached homes. Density requirements may be based on the floor-area ratio or total lot area coverage. For example, model zoning guidelines for Lancaster County, Pennsylvania includes a requirement that 80% of each lot be pervious. The particular details of the conservation district will be based on a community's needs and context. For example, municipalities that have a large amount of farmland may enact an agricultural zoning district. Similarly, in areas with wetlands, the zoning will have the purpose of protecting waterbodies and their associated watersheds.

The language for a conservation district can be incorporated into the zoning ordinance either as a stand-alone district or an overlay, the latter placing an additional layer of regulations on top of an existing district. For both methods, the implementation of the conservation district or zoning will be based on the municipality's standard procedures. Conservation zoning may also be incorporated into a municipality's subdivision code, in

order to reduce the environmental resources consumed by large-scale developments. Subdivision regulations can promote the use of cluster development, in which all buildings and impervious area are concentrated in one portion of a development. This allows the remaining land to be left untouched and kept as public open space or wildlife habitat.

EXAMPLES OF COMMUNITY IMPLEMENTATION

Frederick County, Maryland

The County's zoning includes a resource conservation (RC) district, which allows for low intensity uses in areas of forests and steep terrain. The County also incorporates an agricultural district that allows the operation of farms and related light industrial uses, and a floodplain district which requires a permit for all development within it.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

WHITE TOWNSHIP IN NEW JERSEY HAS A CLUSTER DEVELOPMENT ORDINANCE:

LANCASTER COUNTY, PENNSYLVANIA DEVELOPED MODEL CONSERVATION DISTRICT ZONING LANGUAGE, WHICH CAN BE FOUND AT:
http://www.co.lancaster.pa.us/toolbox/cwp/view.asp?a=3&q=641973

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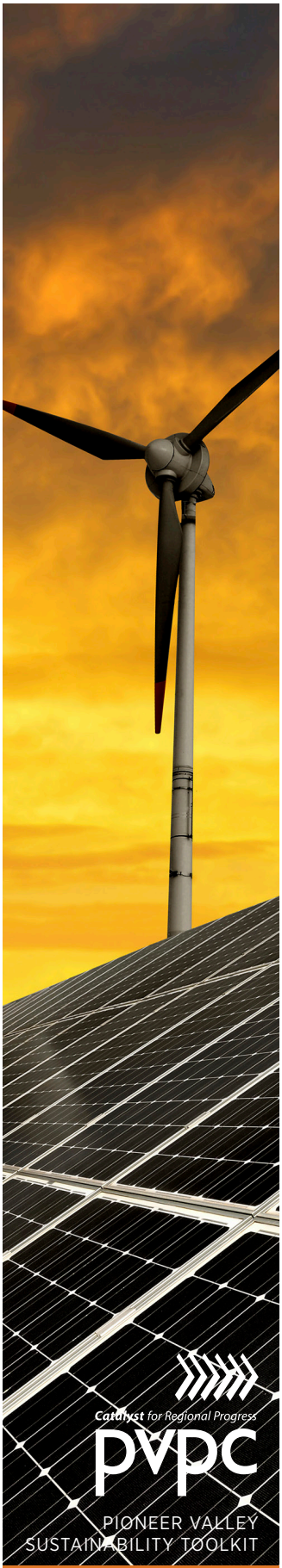

UNDERSTANDING

Energy Efficient Building Requirements

PURPOSE

To improve building energy efficiency for new and existing buildings in Massachusetts by locally adopting a building code which is a more energy efficient alternative to the state's Building Code.

There are many benefits associated with improving building energy efficiency. Residents, business owners, and municipal governments see energy savings and reduced energy bills. Energy efficient buildings consume less energy which helps to reduce greenhouse gas and environmental pollution. Increased energy efficiency also reduces dependence on foreign oil resources.

HOW IT WORKS

A Massachusetts municipality seeking to ensure that construction within its boundaries is designed and built above the energy efficiency requirements of the existing State Building Code (780 CMR) may elect to adopt a super-efficient building code known as the "Stretch Code" in place of the State's existing "base" Building Code. The term "stretch code" refers to the stretching of the existing Massachusetts State Building Code to cover more energy efficient measures. As of December, 2011, over one hundred municipalities had adopted the "Stretch Code" in Massachusetts.

climate & energy

The “Stretch Code” requires all new residential, commercial and industrial construction to minimize, to the extent feasible, the life-cycle cost of the facility by utilizing energy efficiency, water conservation and other renewable or alternative energy technologies. The “Stretch Code” uses real-world testing to ensure residential energy savings, and energy modeling to ensure commercial energy savings. Performance testing is necessary because prescriptive codes do not guarantee good installation, air and water tightness, or that thermal insulation will be effective. Even the smallest air gaps can reduce the thermal resistance value of insulation by 50% or more.

Any town or city in the Commonwealth may adopt the “Stretch Code” by decision of its governing body following a public hearing. In a city, the governing body is the city manager and the city council, or the mayor and city council. In towns, the governing body is the Board of Selectmen. In order to be adopted, the “Stretch Code” must be first considered at an appropriate municipal public hearing, subject to the municipality’s existing public notice provisions.

Adoption Process

- Training for building officials
- Public education campaign
- Municipal Public Hearing
- Vote of Town Meeting, or Mayor and City Council

Timing of Adoption

- Municipal vote can be at any time
- Code change takes effect on January 1st or July 1st
- Base & Stretch Code both in place for the first 6 months (concurrency period) during which builders can choose EITHER code.

Towns are advised to seek adoption of the Stretch Code as a general bylaw through a vote of Town Meeting. There can be no amendments to the bylaw/ordinance language in order for the bylaw / ordinance to be in effect. Municipalities that successfully adopted the “Stretch Code” found public outreach to the building community on the key requirements played an important role in its passage. A model article and bylaw as well as public outreach materials are provided in the links below.

LINKS TO MORE INFORMATION

FOR MORE INFORMATION ON THE STRETCH CODE, VISIT THE MASSACHUSETTS GREEN COMMUNITIES GRANT PROGRAM:
http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/

SAMPLE WARRANT ARTICLE

STRETCH CODE MODEL GENERAL BYLAW (CITY)

STRETCH CODE MODEL GENERAL BYLAW (TOWN)

STRETCH CODE REQUIREMENTS FACT SHEET

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UNDERSTANDING

Solar Photovoltaic System Zoning

PURPOSE

To promote the production of clean, renewable power with solar energy systems while ensuring that they are properly sited, installed and maintained.

HOW IT WORKS

Photovoltaic (PV) systems use one or more panels to generate renewable energy by converting sunlight into electricity. PV Systems lower fossil fuel use and pollution, and increases energy independence.

These systems can be sized at different scales, from a few panels that aid a home's consumption to a utility-scale solar array meant to sell energy to electric utilities. While Massachusetts General Law Chapter 184, Section 23C states that municipalities cannot "forbid or unreasonably restrict" solar energy systems, cities and towns are free to create bylaws and ordinances that address environmental, design and safety standards to ensure PV systems are properly installed and sighted to avoid potentially negative impacts on neighbors.

In general, these municipal ordinances or bylaws are designed with standards that address different scales of PV installations, placing higher standards on large-scale, ground-mounted photovoltaic systems, since they have the potential to use a significant amount of land and therefore have a broader impact on the public. These bylaws cover issues such as: land clearing, landscaping, setbacks, lighting, signage, utility connections, emergency services, maintenance and decommissioning of the systems once it has reached the end of its useful life. Complying with these standards requires at a minimum Site Plan Approval and in some cases a Special Permit.

On the other hand, small-scale or building-mounted photovoltaic installations are often held to lower standards since their potential for public impacts is so low. These smaller systems, which are usually meant to provide electricity on-site rather than for the wholesale energy markets, are generally permitted as long as they comply with the building code and obtain a municipal building permit.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Several Pioneer Valley municipalities, including Chesterfield, Easthampton, Holland, Holyoke, Monson, Middlefield and Palmer, and a handful of others throughout the state, have already adopted zoning ordinances or bylaws that allow photovoltaic systems in their jurisdiction.

The Massachusetts Green Communities Office, under the Department of Energy Resources, has developed a model bylaw for large-scale, ground-mounted solar photovoltaic systems. The bylaw allows these systems to be installed by-right as long as they meet the requirements it outlines and passes site plan review. The Town of Middlefield used this state model to allow large photovoltaic systems in their town, adding height limits, soil permeability and site shading requirements. Other towns, such as Chesterfield, Palmer, Monson and Holland have also used this state model to develop their own bylaws.

The Town of Hadley took a slightly different approach. The town's planning board worked on a bylaw that establishes clear guidelines for solar energy system permitting at all scales. The bylaw allows building integrated systems with only a building permit, allows small ground-mounted systems with planning board review, and requires a special permit for utility-scale installations.

LINKS TO MODEL BYLAWS OR MORE INFORMATION

U.S. DEPARTMENT OF ENERGY, DIVISION OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
http://www.energysavers.gov/your_home/electricity/index.cfm/mytopic=10710

THE MASSACHUSETTS DEPARTMENT OF ENERGY RESOURCES HAS DEVELOPED A MODEL BYLAW FOR ALLOWING AS-OF-RIGHT USE OF LARGE-SCALE GROUND-MOUNTED SOLAR PHOTOVOLTAIC INSTALLATIONS. THIS MODEL CAN BE FOUND AT:
http://www.mass.gov/eea/docs/doer/green-communities/grant-program/model-solar-bylaw-rev-dec-2010.doc

PALMER PHOTOVOLTAIC BYLAW:
http://www.townofpalmer.com/Pages/PalmerMA_TCOrdinances/Ordinance%202011-02%20Photovoltaic%20Ordinance?textPage=1

MASSACHUSETTS GREEN COMMUNITIES THAT HAVE ADOPTED BY-RIGHT RENEWABLE ENERGY BYLAWS:
http://www.mass.gov/eea/docs/doer/green-communities/grant-program/adopted-as-of-right-siting-through-re-generation.pdf

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UNDERSTANDING

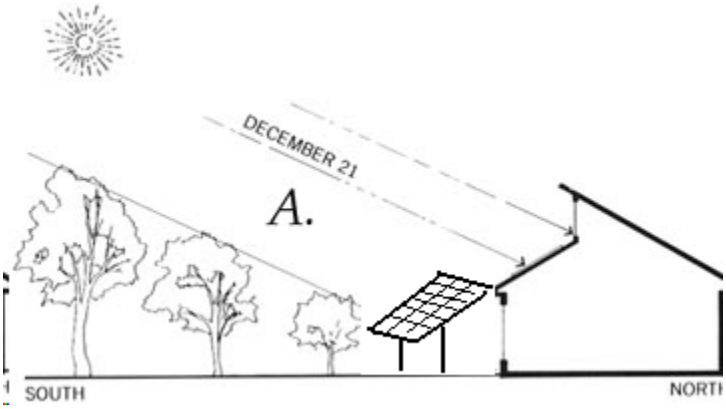
Solar Access Zoning

PURPOSE

To protect access to sunlight for all properties, and restrict shade due to structures and vegetation. Solar access zoning preserves the economic value of solar radiation falling on structures, investments in solar energy systems, and options for future uses of solar energy.

HOW IT WORKS

Solar access zoning preserves the economic value of solar radiation falling on structures, investments in solar energy systems, and options for future uses of solar energy. This is particularly important for the latter two; since their value is dependent on solar access and their installation require significant investment.



In Massachusetts, the state's Zoning Act, in Chapter 40A, Section 9B, provides that local zoning may protect solar access by regulation of the orientation of streets, lots and buildings, maximum building heights, minimum building setback requirements, limitations on vegetation, and other provisions. These height and setback requirements can be placed as a precondition for a permit by requiring a shadow analysis on the structure to be erected to make sure it does not block solar radiation on neighboring properties.

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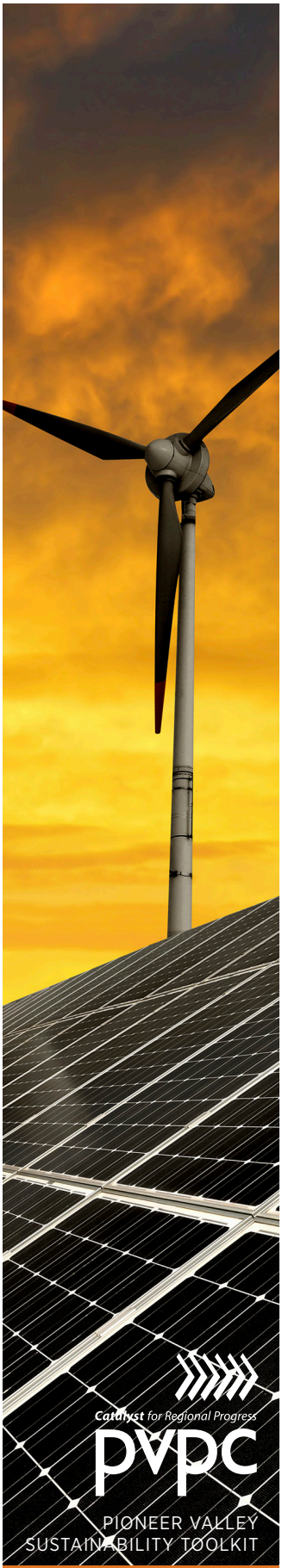

Catalyst for Regional Progress
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PIONEER VALLEY SUSTAINABILITY TOOLKIT

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

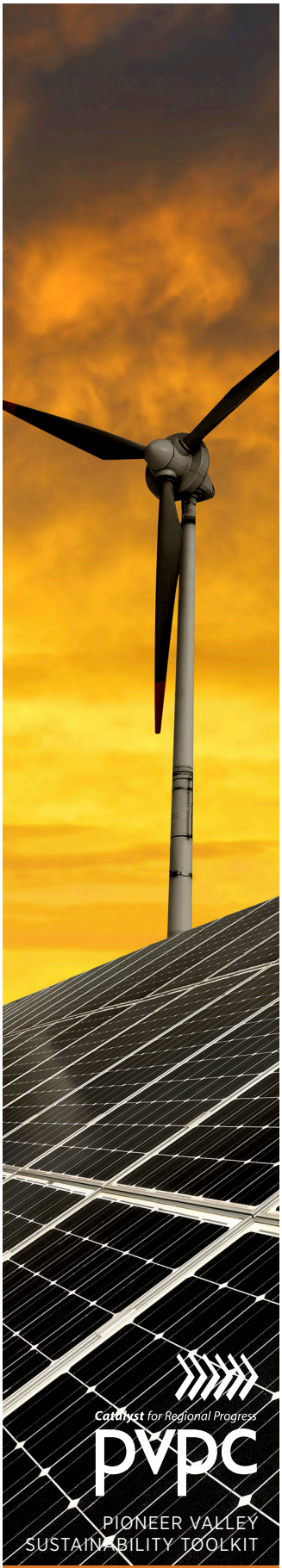
In the Town of Cornwall, Connecticut, developers are "urged to consider solar access in the layout of features on the site plan" and are prohibited from locating buildings where they would cast shadows on the buildable part of an adjacent lot between the hours of 9 a.m. and 3 p.m. on December 21 of any year.

Boulder, Colorado protects solar access by delineating a 12 foot or 25 foot hypothetical "solar fence" on the property lines of the protected buildings. The ordinance is designed to protect access for a four hour period on December 21st. Under most circumstances, new structures are not allowed to shade adjacent lots to a greater extent than the applicable solar fence.

In Oregon, Eugene, Clackamas County and Ashland have adopted solar access zoning, which requires building setbacks to ensure that shadows are no greater than a specified maximum at property lines.

Ambitious jurisdictions can also protect solar access by requiring developers to consider solar access in entire subdivision lay outs. Already subdivisions in such widely disparate locations as Drake Landing, Alberta, and Davis, California, are being designed so that each lot receives maximum solar exposure. Fort Collins, Colorado, and Multnomah, Oregon have enacted regulations requiring that a specified percentage of lots in new subdivisions — 20 to 30 percent — must be oriented to take advantage of sunlight.

The City of Vancouver has developed and approved two passive solar design toolkits detailing ways to reduce energy use in new buildings, which are a major source of greenhouse gas emissions in Vancouver. The toolkits provide best practices for homes and larger buildings for passive design elements such as layout, orientation, insulation, landscaping and ventilation.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

COMMUNITY SOLAR ACCESS INFORMATION FROM THE U.S. DEPARTMENT OF ENERGY. INCLUDES LINK TO A DOWNLOAD WITH EXAMPLES OF ADOPTED BYLAWS FROM AROUND THE COUNTRY.
http://www4.eere.energy.gov/solar/sunshot/resource_center/ask/question/question_6

A COMPREHENSIVE REVIEW OF SOLAR ACCESS LAW IN THE UNITED STATES:
http://www.solarabcs.org/about/publications/reports/solar-access/

FREQUENTLY ASKED QUESTIONS ABOUT PLANNING AND ZONING FOR SOLAR ACCESS, AMERICAN PLANNING ASSOCIATION
https://www.planning.org/research/solar/faq.htm

BOULDER, CO SOLAR ACCESS ORDINANCE:
http://www.smartcommunities.ncat.org/codes/boldera1_gb.shtml

CITY OF ASHLAND, OR SOLAR ACCESS ORDINANCE:
http://www.ashland.or.us/Page.asp?NavID=2788

CITY OF VANCOUVER PASSIVE DESIGN TOOLKIT:
http://vancouver.ca/sustainability/documents/PassiveDesignToolKit.pdf

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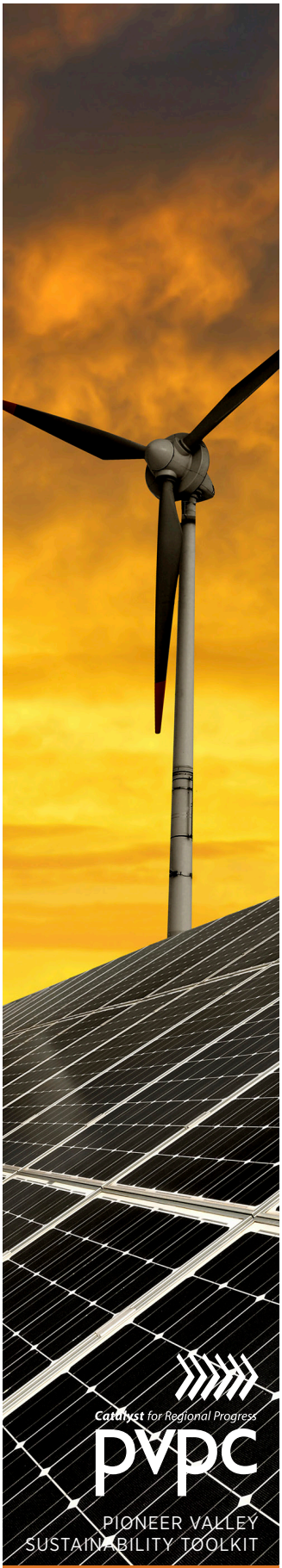
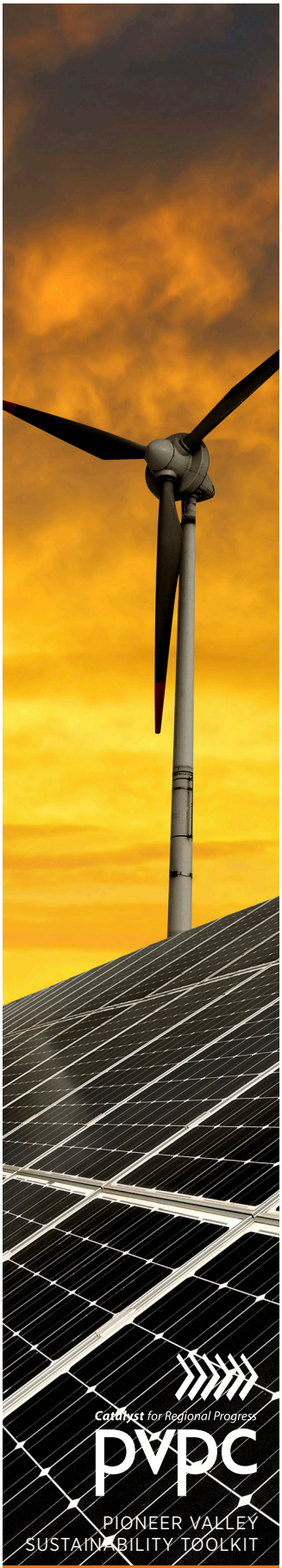


UNDERSTANDING

Urban Forest Overlay Districts

climate & energy



PURPOSE

To mitigate climate change, reduce greenhouse gas, and absorb carbon dioxide through the use of zoning bylaws dedicated to creating a healthy tree canopy within an urban area.

Healthy urban forests have positive impacts on both the natural environment and human health. Trees absorb carbon dioxide and other pollutants, remove greenhouse gas, and improve air quality for nearby residents. Tree cover and the resulting shade limit the rise in temperature associated with urban heat island effect. Importantly, tree branches, leaves and root systems absorb rain water and thus limit the intensity and volume of stormwater runoff. This can have major watershed benefits, including reductions in particulate matter, nonpoint source pollution, and the temperature of water bodies. Full, healthy tree canopies also reduce noise and improve the natural beauty of an area.

In a variety of ways, the more trees there are in a community, the more beneficial those trees become. The root systems of multiple trees are able to more effectively stabilize soil from stormwater inundation. Wildlife is provided with a better habitat in which to live by having a continuous tree canopy. The aesthetics of a tree-lined road are more desirable than individual, spread-out trees. Finally, because greenhouse gas is being emitted at a high rate, the planting of many trees allows for much more effective mitigation.

Municipalities can protect and increase the number of trees to create urban forests through the use of zoning overlay districts. Overlays are incorporated into a zoning ordinance and place special land use regulations on top of existing zoning districts, such as requiring new development to include a certain number of trees. The requirements also often regulate permitted tree species, maintenance procedures, and the planting of other vegetation.

HOW IT WORKS

The first step in implementing an urban forest overlay district is to conduct a community tree inventory. The inventory will provide information about the number, type, and location of trees that already exist, as well as help inform the discussion about where the overlay district should be located. When conducted with the help of volunteers, the inventory can also be a way of facilitating community involvement.

After the inventory is complete, the results can be reviewed at a public meeting. This meeting can include a discussion and determination of specific areas in the community where more trees are needed. After these areas have been identified, the specific requirements of the overlay district can be discussed, which will help develop the language amended to the zoning code. The specific language for the zoning overlay district should include the following:

- **Purpose and intent of the overlay district**
- **Defined boundaries of the district with identification of specific streets and lots**
- **List of size and species of trees recommended or required as part of new development**
- **Minimum number of trees required per specific lot area**
- **Maximum and minimum spacing distances between trees**
- **Amount or percentage of lot area that must be under tree canopy**

The specific requirements for each of these items will depend on the particular context of the community. The resources and examples listed below can provide more information.

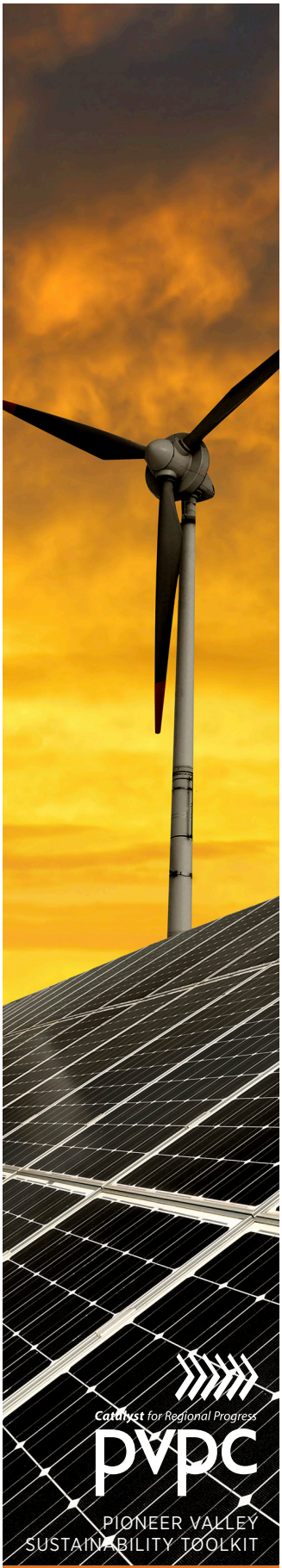
Important decision-makers to include in the discussion include the general public, the zoning board of appeals, planning board, planning department, and public works department. Once the specific requirements have been agreed upon and the language for the ordinance developed, it can be passed as an amendment to the zoning code, following the municipality's established procedures.

As an alternative to an urban forest overlay district, tree preservation and planting requirements can also be adopted in general ordinances and bylaws or in subdivision regulations. The Town of Granby, MA is an example of a community in which tree standards were incorporated into the subdivision regulations.

EXAMPLES OF COMMUNITY IMPLEMENTATION

Salem, Virginia

The purpose of the Salem Urban Forest Overlay District is to increase the quantity of trees present in new developments along seven designated corridors. New developments are required to have at least one tree per acre and at least one tree per 100 feet of street frontage. A list of specific trees is provided that are recommended for new developments. These trees are selected for their ability to grow to at least 20 feet tall, filter out particulate matter, and absorb ozone. The inclusion of these recommendations encourages the development of a healthy urban forest, with trees that are suitable to



local weather conditions and trees that will provide a large tree canopy.

Washington, D.C.

The Forest Hills Tree and Slope Protection Overlay District, effective in the city since 2007, was enacted to preserve the park-like character of several of its neighborhoods. The overlay helps to preserve natural topography and mature trees by restricting the maximum ground coverage allowed for new construction. The overlay is mapped over low-density residential zoning districts and restricts maximum lot occupancy to 30 percent, minimum lot size to 9,500 square feet, and requires side yards between 8 to 24 feet. Other density controls, such as maximum building height, remain controlled by the underlying zoning district.

Manassass, Virginia

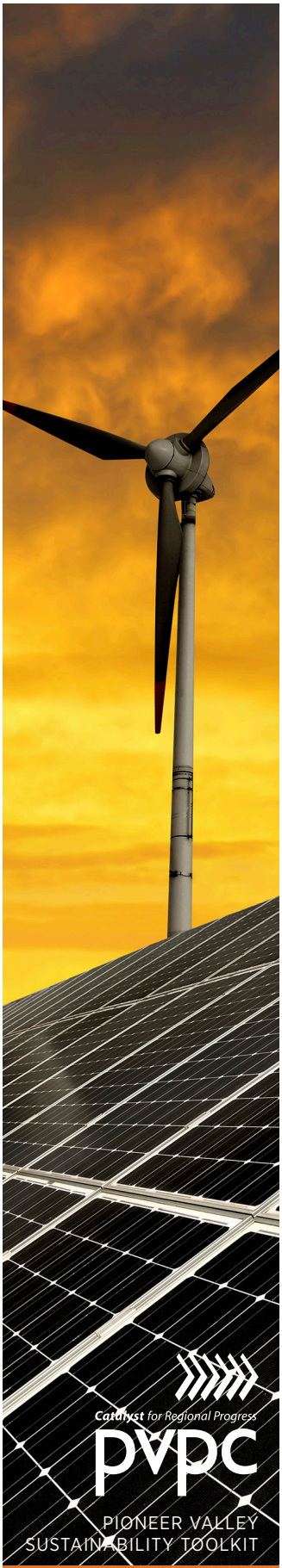
Manassass' Tree Canopy Requirements article of the City's Zoning Ordinance provides for the long term preservation and development of a mature tree canopy. The article defines "tree canopy/tree cover" as "the aggregate area of coverage by plant material exceeding five feet in height and measured at the drip line. The article requires site plans applied for in low density zones to have 20 percent of the total lot area covered by tree canopy, moderate density zones to have 15%, and higher density apartments and condos to have a minimum of 10 percent. The City's design and construction standards manual, which also includes standards for tree preservation, size, and replacement guidelines, also references the Tree Canopy Requirement.

Granby, Massachusetts

An amendment to the subdivision regulations of the Town of Granby was drafted and passed in 2005. The code calls for the preservation of existing trees to the greatest extent possible, the planting of trees for new developments along the right of way at a minimum of 30 foot intervals, and that 35% of individual lots be shaded, excluding the building footprint and driveway.

Lawrence, Massachusetts

A zoning amendment was passed by the Town of Lawrence and includes requirements for two shade trees or three ornamental trees for every ten spaces in new or expanded parking lots. Multi-family developments requiring Site Plan Review are also subject to the regulations. The code also outlines guidelines for tree preservation during construction, maintenance procedures, and an 8-foot minimum height for tree plantings.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

SOMERVILLE, MA TREE INVENTORY:
http://www.somervillema.gov/departments/ospcd/parks-and-open-space/ urban-forest/inventory

MA DEPARTMENT OF CONSERVATION AND RECREATION,
URBAN FORESTRY SECTION:
http://www.mass.gov/dcr/stewardship/forestry/urban/urbanFAQs.htm

SALEM:
http://www.rvarc.org/utc/SalemUrbanForestOverlayDistrict.pdf

GRANBY:
http://www.mass.gov/dcr/stewardship/forestry/urban/docs/ordgran.pdf

LAWRENCE:
http://www.mass.gov/dcr/stewardship/forestry/urban/docs/ordlaw.pdf

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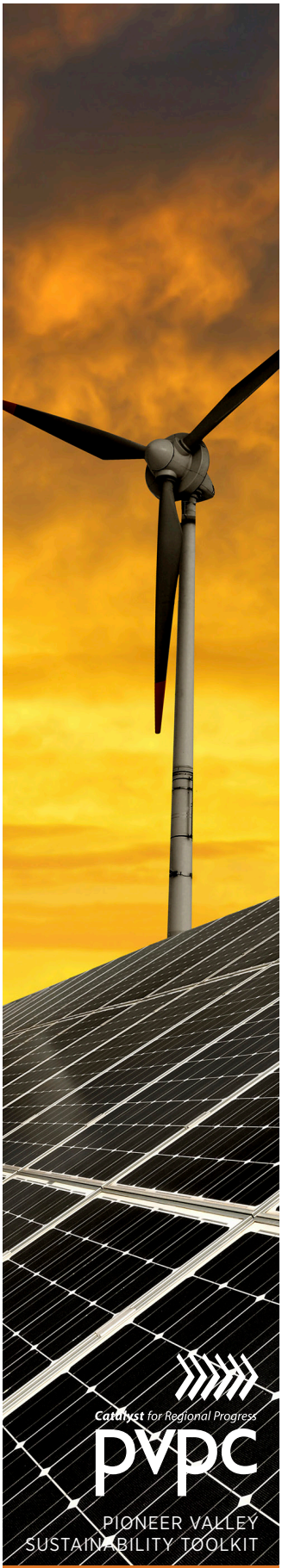
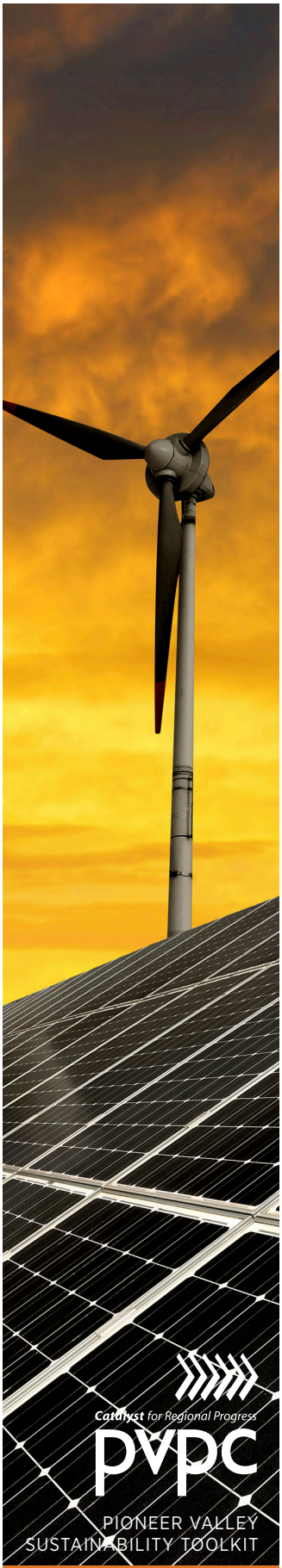


UNDERSTANDING

Wind Energy System Zoning

climate & energy



PURPOSE

To promote the production of clean, renewable power with wind energy systems while ensuring that they are properly sited, installed and maintained.

HOW IT WORKS

Wind is a renewable energy resource which lowers fossil fuel use and associated pollution, and increases energy independence. Wind energy systems use the kinetic energy in the natural motion of the wind and convert it into electricity. This is usually accomplished by fan-like structures that spin an electric generator as they are swept by the wind.

The scale of a wind energy installation can vary, from small-scale residential wind turbines as the height of a utility pole to large-scale commercial turbines a few hundred feet tall. Cities and towns can adopt bylaws and ordinances that address environmental, design and safety standards to ensure that any wind energy system is properly installed and sited to avoid potentially negative impacts on neighbors and the environment.

Zoning bylaws that regulate wind energy systems generally specify requirements for: lot size, type of tower, supporting foundations, tower height, setbacks, visual impact, color, lighting, signage, noise and measurement of any shadow or flickering effects, utility connections, emergency services, maintenance and decommissioning of the systems once it has reached the end of its useful life.

EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

Over 30 Massachusetts' towns have adopted wind energy bylaws, including Chester, Dennis, Middlefield, Nantucket, Plymouth, Revere, Spencer, Wenham and Worcester.

The Massachusetts Green Communities Office, under the Department of Energy Resources, has developed a model bylaw for large-scale wind energy systems. This model has been used by Kingston, Milton, Revere and Wenham to allow by-right installation of wind towers as long as they meet the requirements outlined in the bylaw and that projects comply with site plan review.

The Town of Plymouth allows wind turbines of up to 350 feet in height to be located in their jurisdiction as long as they meet all the requirements for a special permit, such as those related to setbacks, noise, utility connections and others described above. Similar in requirements, the town of Chester in the Pioneer Valley region allows for large-scale wind turbines up to 420 feet.

Also in the Pioneer Valley, the Town of Middlefield allows only small-scale wind energy systems in their jurisdiction by special permit, which is defined as any system under 130 feet in height and with a capacity equal to or less than 60 kilowatts (kW).

LINKS TO MODEL BYLAWS OR MORE INFORMATION:

THE MASSACHUSETTS DEPARTMENT OF ENERGY RESOURCES HAS DEVELOPED A MODEL BYLAW WIND ENERGY INSTALLATIONS. THIS MODEL CAN BE FOUND AT:
http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/wind/wind-energy-model-zoning-by-law.html

TOWN OF CHESTER WIND BYLAW:
http://townofchester.net/sitebuildercontent/sitebuilderfiles/windenergyconversionfacilitiesbylawfinal.doc

TOWN OF DENNIS ZONING BYLAWS – SECTION 11:
http://www.town.dennis.ma.us/Pages/DennisMA_Building/bylaw.pdf

TOWN OF LUDLOW SMALL WIND ENERGY BYLAW – SECTION 6.19:
http://www.ludlow.ma.us/reports/planning/bylaws/zoning-bylaw-text.pdf

CAPE AND ISLANDS SELF-RELIANCE
http://www.reliance.org/wind.asp

MASSACHUSETTS GREEN COMMUNITIES THAT HAVE ADOPTED BY-RIGHT RENEWABLE ENERGY BYLAWS:
http://www.mass.gov/eea/docs/doer/green-communities/grant-program/adopted-as-of-right-siting-through-re-generation.pdf

CAPE COD COMMISSION MODEL BYLAW FOR WIND ENERGY CONVERSION FACILITIES:
http://www.capecodcommission.org/resources/bylaws/ModelWindBylaw.pdf

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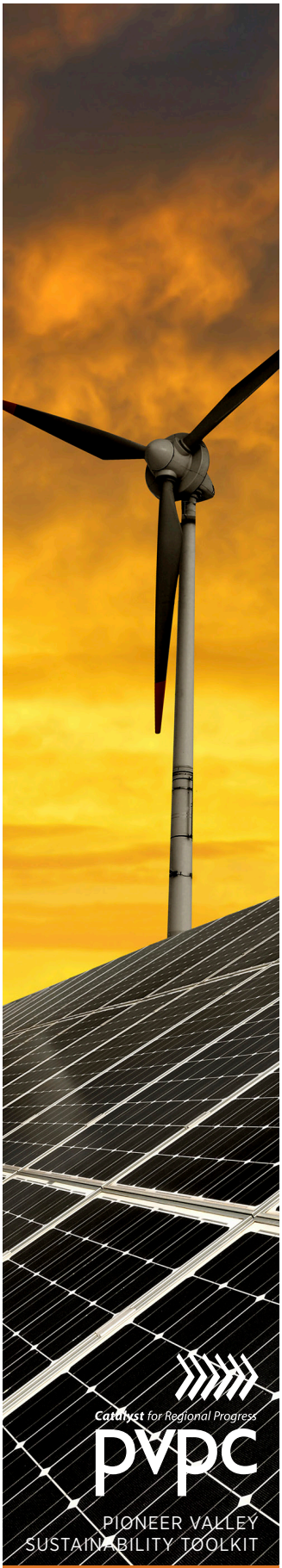


UNDERSTANDING

Clean Energy Financing Program

PURPOSE

To help property owners finance energy retrofits or clean energy systems in order to help municipalities achieve their greenhouse gas reduction goals, create more jobs, lower utility costs for property owners and reduce air pollution from fossil fuel sources.

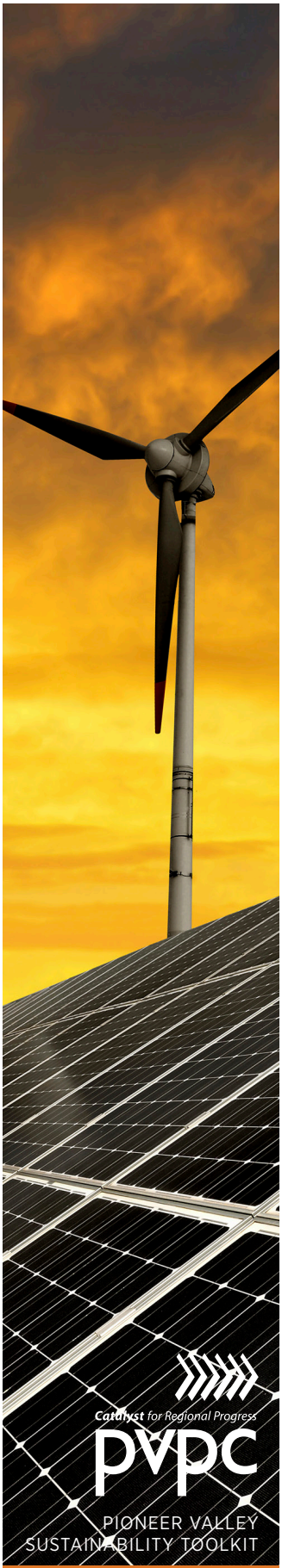
A clean energy financing program sets up a revolving loan fund where property owners can borrow to improve their home or business' energy performance and value.

HOW IT WORKS

A clean energy financing program helps property owners borrow money to improve their home or business's energy performance and value. Often the property owner will not experience an increase in total monthly costs because reduced utility costs will offset the cost of the loan payment.

Municipalities can create a revolving loan fund and receive payment from program participants over an extended period of time. Some communities choose to enact a PACE Program which ties the loan to the a lien on the deed—rather than to the owner of the property (see box about PACE Program below). This encourages property owners to make long-term investments in energy efficiency; it frees them from worrying about whether their investment will be paid back within the period of their ownership.

Other clean energy financing programs are provided by municipal or privately-owned utilities. In some instances, the utility pays for a substantial part of the clean energy improvements. In other instances, the utility provides financing with low or no interest.

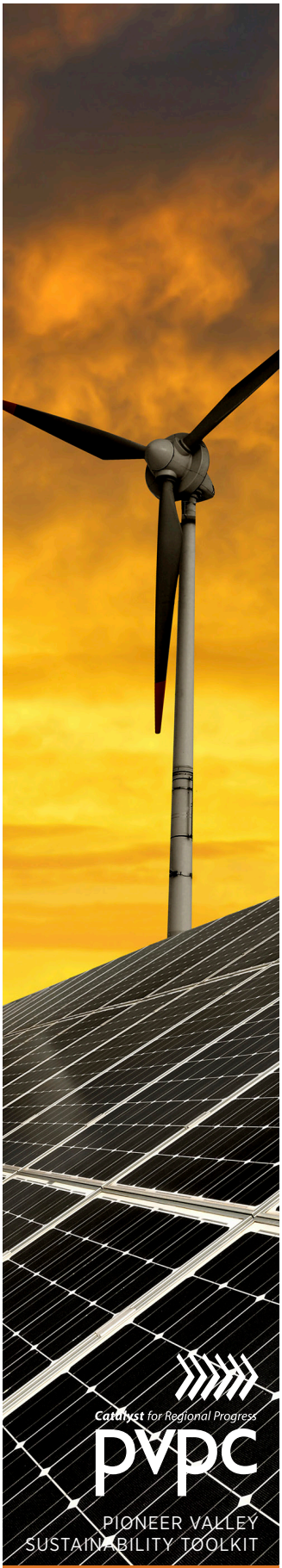


What's a PACE Program?

A PACE program is a mechanism which allows loans to be tied to the property owner through a lien on the deed. Therefore, if a home or business owner sells their property before having paid off the clean energy loan, the next owner will be responsible for continuing to repay the loan as they enjoy the benefits of the property's clean energy. PACE financing is allowed in under Massachusetts General Laws Chapter 44, Section 53E ¾ and requires municipal action to be enacted at the local level.

Program participation in clean energy financing programs may be open to everyone, or limited based on income level, energy use as determined by an energy audit, geography or some combination thereof. The program's first step is usually to conduct an energy audit of the residence or business, analyze the results and recommend the energy retrofits with the best monetary payback and positive environmental impact.

Thermal image of a house in the Pioneer Valley. Such imaging software helps auditors identify heat leaks to perform comprehensive energy retrofits.



After improvements have been performed, program costs can be recouped through periodic loan repayments by participants, or other innovative methods. For example, program costs may be partially repaid by utility subsidies, a monthly surcharge may be added to the utility bill of the customer, or the loan can be paid through a Property Assessed Clean Energy (PACE) financing mechanism.

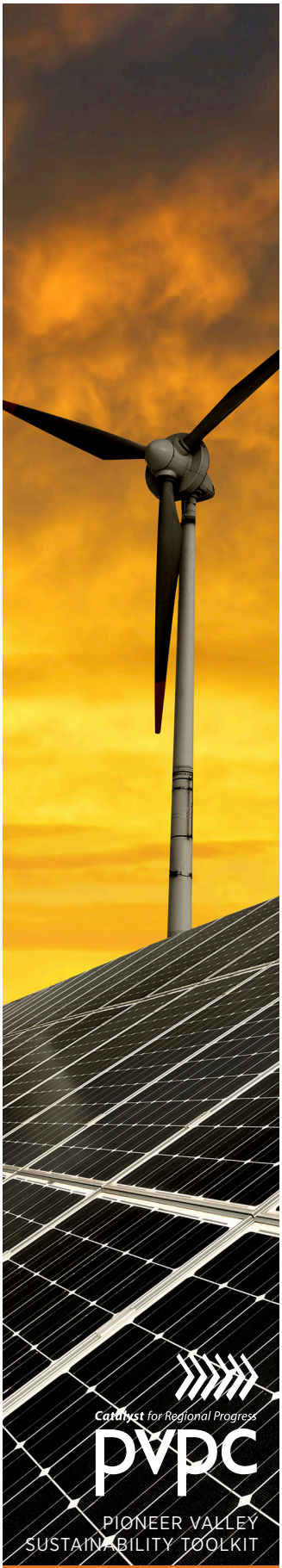
EXAMPLES OF WHERE STRATEGY HAS BEEN ADOPTED

The City of Holyoke's Municipal Gas and Electric Company assists residential customers with loans to help make energy saving improvements on their homes. The loan provides 0% interest assistance of up to $5,000 for single-family homes, or $10,000 for multi-family homes with 4 or fewer units. Customers are required to pay a $100 administrative fee in order to participate in this program. The loan is repayable over up to 5 years and charged to the customer's monthly HG&E bill.

Throughout Western Massachusetts, Columbia Gas will cover up to 75% of the cost to weatherize homes, up to $2,000. Columbia Gas performs an energy audit and reports energy-saving measures that qualify for incentives. Energy saving measures eligible for the rebate include: attic, wall, and heating pipe/duct insulation and thermostats. When needed, water heater tank wrap, low-flow showerheads, and faucet aerators are installed at no cost.

The City of Northampton adopted a PACE program in 2011 for commercial and multifamily properties, whereby owners will be able to borrow money from the City and repay the loan via a special assessment on their property taxes over a period of years (up to 20 years).

The City of Berkeley, California was the first to offer financial support for residential renewable energy systems, specifically for solar energy sources in a pilot district. They now offer this assistance through the City's PACE financing program.



LINKS TO MODEL BYLAWS OR MORE INFORMATION

HG&E PROGRAM
http://www.hged.com/html/incentive_programs.html#RECProgram

COLUMBIA GAS PROGRAM:
https://www.columbiagasma.com/en/ways-to-save

PACE FINANCING INFORMATION:
http://pacefinancing.org/

NORTHAMPTON PACE ORDINANCE:
http://www.northamptonma.gov/1051/PACE-Ordinance

BERKELEY RENEWABLES FINANCING:
http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=26580

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