PIONEER VALLEY CLEAN ENERGY ROADMAP

Prepared for the Pioneer Valley Planning Commission (PVPC) with participating PVPC communities:

Amherst, Easthampton, Holyoke, and Hadley

June 2014

MEISTER CONSULTANTS GROUP

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EXECUTIVE SUMMARY

The wide variety of financial and technical assistance programs administered by the Massachusetts Clean Energy Center (MassCEC) and the Department of Energy Resources (MassDOER) have helped to greatly increase installed renewable energy generation capacity and broadened the application of energy efficiency measures statewide. Nonetheless, additional efforts are required to fully enable the Commonwealth's clean energy potential. The Community Energy Strategies Program (CESP), delivered in partnership with local officials and community volunteers, was created to help communities identify and develop strategies for implementing the mix of clean energy projects and incentives best suited to address local interests, needs, and opportunities for clean energy development across all sectors. The goals of the CESP are to:

- Increase the use of renewable energy and renewable heating and cooling technologies, building energy efficiency, and sustainable transportation.
- Assist communities and Regional Planning Authorities (RPA) to leverage multiple existing programs to achieve common clean energy goals.

Three communities and RPAs (partnered with four of their member communities), were selected to participate in this pilot program that began in April 2013. Under the program, each community received grants of services provided by specialized firms under contract to MassCEC. Participating towns and RPAs were led through a planning process to (1) develop a clean energy working group, (2) establish local clean energy goals, (3) review an inventory of potential clean energy projects and strategies, and (4) select clean energy projects and strategies for inclusion into this final report, the Clean Energy Roadmap.

The Clean Energy Roadmap outlines a set of detailed, actionable steps to implementing a project, program, or policy that will increase the use of renewable energy generation, renewable heating and cooling, building energy efficiency, and sustainable transportation. It incorporates information gathered through consultations with municipal and RPA staff, meetings with the clean energy working group, and public forums. As such, it serves both as a record of the CESP process while also establishing a viable path for communities to achieve their clean energy goals.

The *Roadmap's* goals and supporting strategies were created under the leadership of the Pioneer Valley Clean Energy Working Group. Composed of 13 local leaders from all four participating communities – and led by Catherine Ratte and David Elvin of the Pioneer Valley Planning Commission (PVPC) – the Working Group collaborated with businesses, residents, and non-profit leaders across the region. Together, they discussed clean energy project objectives, potential development concerns, as well as opportunities and resources that could be leveraged to support clean energy projects in the region. The Working Group also collaborated with technical experts to assess and refine the clean energy strategies in this roadmap.

Through this process, regional stakeholders supported goals established in the previous Pioneer Valley Climate Action and Clean Energy Plan 2013 Update to encourage regional energy independence by significantly reducing or eliminating the use of fossil fuels. Deploying energy efficiency and renewable energy technologies was identified as essential to achieving independence from the high economic, environmental, and political costs of fossil fuels. In addition, CESP stakeholders emphasized the potential to create local jobs and wealth by developing clean energy projects locally. Achieving these goals will require significant energy use reductions in

governmental, residential, and commercial building and transportation sectors. It will additionally require the development of new renewable energy resources to provide clean energy generation to the Pioneer Valley.

The following strategies, further detailed in Section 3, were identified by PVPC stakeholders as pathways to achieve these goals. Each strategy provides a summary of key information including relevant background objectives, benefits, potential risks, project costs economics, next steps, and potential contacts. The Pioneer Valley's 10 clean energy strategies include:

As described in the following pages, the Pioneer Valley communities have a history of successful clean energy planning and project development; however, a continued focus will be needed to achieve the Pioneer Valley's long-term clean energy goals. By implementing these strategies, Pioneer Valley communities can take concrete steps to achieving energy independence while also positioning themselves as clean energy leaders in the Commonwealth and across the United States.

ACKNOWLEDGEMENTS

The Massachusetts Clean Energy Center (MassCEC) is dedicated to accelerating the success of clean energy technologies, companies, and projects in the Commonwealth – while creating high-quality jobs and long-term economic growth for the people of Massachusetts. Since it began operating in 2009, MassCEC has helped clean energy companies grow, supported municipal clean energy projects, and invested in residential and commercial renewable energy installations creating a robust marketplace for innovative clean technology companies and service providers.

The Massachusetts Department of Energy Resources (MassDOER) Green Communities Division strives to help all 351 Massachusetts cities and towns find clean energy solutions that reduce long-term energy costs and strengthen local economies. The division provides technical assistance and financial support for municipal initiatives to improve energy efficiency and increase the use of renewable energy in public buildings, facilities, and schools.

The *Pioneer Valley Clean Energy Roadmap* benefited from the active leadership and engagement of the **PVPC Clean Energy Working Group**. Led by PVPC Executive Director Timothy Brennan, Principal Planner Catherine Ratte', and Senior Planner David Elvin, the Working Group guided and supported the implementation of PVPC's Community Energy Strategies process and the resulting *Clean Energy Roadmap*. Members of the PVPC Clean Energy Working Group include:

- *Jessica Allan,* City of Easthampton
- *Brian Beauregard,* Holyoke Gas and Electric
- *Lynn Benander,* Co-op Power
- *Stephanie Ciccarello,* Town of Amherst
- *David Elvin,* PVPC
- *Gary Girouard,* Town of Hadley
- *Marin Goldstein,* Center for EcoTechnology
- *Jim Maksimoski,* Town of Hadley
- *Marcos Marrero,* City of Holyoke
- *Chuck Murphy-Romboletti,* City of Holyoke
- *Catherine Ratte',* PVPC
- *Claire Ricker,* City of Holyoke
- *Ezra Small,* UMass Amherst

Meister Consultants Group (MCG) was hired by MassCEC to design and implement the community dialogue that supported community leaders in creating the Clean Energy Roadmaps. MCG is a Boston-based sustainability consulting firm that uses innovative problem solving approaches to advise clients on clean energy strategy development, stakeholder dialogue, and program implementation. MCG has an active clean energy practice, with deep expertise in creating and implementing policies and programs for local jurisdictions.

Stone Environmental conducted GIS analysis of clean energy resources, and infrastructure to aid community understanding of existing clean energy opportunities. Additionally, Stone created the companion maps illustrating communities' clean energy strategies by sector. Stone is a Vermont-based GIS consulting firm specializing in collaborative, creative geospatial and web mapping solutions for government and business with a focus on renewable energy and environmental stewardship.

SECTION 1: INTRODUCTION

The Pioneer Valley Planning Commission (PVPC) has a strong track record of planning and implementing clean energy initiatives, with a commitment to regional collaboration and community engagement. In 2008, PVPC developed its first regional clean energy plan, which was subsequently updated in 2013 as part of the *Pioneer Valley Climate Action and Clean Energy Plan*. Both the 2008 and 2013 plans establish clean energy and climate action targets for the Pioneer Valley. Chief among these are:

- Reduce energy consumption 15% below 2000 levels by 2020,
- Reduce GHG emissions 80% below 2000 levels by 2050, and
- Generate a total 754 million kilowatt-hours per year of renewable energy by 2020.

Through the Community Energy Strategies Program (CESP), PVPC collaborated with four communities in its service region – Amherst, Easthampton, Holyoke, and Hadley – to develop implementation pathways for clean energy projects that support the region's energy and climate targets.

PAST ACCOMPLISHMENTS

The four PVPC communities that participated in the CESP program – Amherst, Easthampton, Holyoke, and Hadley – have a history of success implementing and acting as host communities to clean energy projects, which provides a strong foundation for the clean energy roadmap. In addition, three of these communities are designated as Massachusetts Green Communities (Amherst, Holyoke, and Easthampton), which they achieved by working with the Massachusetts Department of Energy Resources (MassDOER) to meet five criteria that encourage energy efficiency and renewable energy development.

The following section provides an overview of previous clean energy accomplishments in the four participating Pioneer Valley communities:

- In Hadley, several local farms have invested in energy efficiency projects. Hartsbrook Farm, for example, has added temperature controls to its milking operations to increase energy savings.
- Holyoke is incorporating major energy efficiency upgrades as part of the renovation process for its public library.
- Holyoke Gas and Electric (HG&E) uses its extensive hydroelectric resources to supply 50% of the city's power needs.
- During a 2012 renovation, the Holyoke Senior Center installed ground source heat pumps (GSHPs) to provide heating and cooling for building residents.

- In 2012, the Town of Amherst signed a long-term power purchase agreement (PPA) to source solar power from a landfill solar plant. Amherst is also home to numerous residential solar installations as well as a 16.45 kW ground mounted solar array at the UMass Amherst research farm.
- In Easthampton, a 2.2 megawatt solar farm was installed atop a former city landfill in 2011.
- Barstow and Mapeline Farms in Hadley and Parson Farm in Easthampton have both invested in and received incentive funds for small-scale anaerobic digesters, providing renewable energy to support farm operations.
- In 2009, Easthampton amended its zoning code to clarify permitting requirements and procedures for both building integrated solar energy systems and freestanding solar facilities. Wind energy projects are allowed as residential accessory structures, which expedites the permitting process.
- The Amherst Sustainability Committee organizes an annual sustainability fair in April and maintains a website with information for the public.

SECTION 2: METHODOLOGY

PVPC CLEAN ENERGY WORKING GROUP

The PVPC Clean Energy Working Group guided implementation of the CESP. The Working Group was supported by a project team made up of local officials and technical experts from PVPC, MassCEC, MassDOER, Meister Consultants Group, and Stone Environmental. Composed of 13 local leaders – representing a diversity of local perspectives – Working Group members included representatives from local government, businesses, nonprofit groups, major building or facility owners, community groups, and other key stakeholders (see Acknowledgements for the full list of PVPC Working Group members). Working Group members provided the following support over the course of the program:

- **Outreach and Mobilization:** Working Group members actively communicated with their colleagues, peers, and local stakeholders to ensure broad outreach took place. They mobilized local networks to recruit community member participation at the Community Energy Forums.
- **Working Group Meetings:** The Working Group met at key points in the CESP process to inform development of the roadmap, reviewing inputs, discussing potential outcomes, and making concrete recommendations. In particular, Working Group members identified local community concerns and goals that guided development of the *Pioneer Valley Clean Energy Roadmap*. They additionally reviewed and approved clean energy strategies.
- **Community Clean Energy Forums:** Members participated in the planning, development, and implementation of public events and meetings, especially Community Energy 101 and 201 Forums.
- **Project Representation:** Members served as program ambassadors, representing the program at community events and reaching out to local stakeholders to encourage active participation in the development of the community clean energy roadmap.

CLEAN ENERGY 101COMMUNITY FORUM

The Clean Energy 101 Community Forum was a public meeting that brought together local officials and stakeholders, to learn about the CESP process, discuss the Pioneer Valley's clean energy goals with Working Group members, and propose potential clean energy projects that could be implemented in the region.

During the 101 Forum, stakeholders proposed over 50 potential clean energy projects, which could be implemented in the community. These projects formed the Clean Energy Inventory, which served as the starting point for assessing potential strategies that could be integrated into the *PVPC Clean Energy Roadmap*.

From this list, the Working Group identified 10 strategies that could best achieve clean energy goals in the near to medium term. These projects served as the starting point for the clean energy strategies developed in this roadmap (see Section 3).

CLEAN ENERGY 201COMMUNITY FORUM

The Clean Energy 201 Community Forum was a public meeting where local officials and stakeholders engaged technical experts to discuss benefits, drawbacks, and development options for potential clean energy strategies. The Working Group identified the following three potential strategies for community stakeholders to review with experts at the 201 Forum.

- **Renewable Heating and Cooling Opportunities:** Representatives from MassCEC described the potential for renewable heating and cooling technologies in the Pioneer Valley, including high efficiency biomass heating, solar hot water, and advanced air-source and ground-source heat pumps.
- **Anaerobic Digestion Development in the Pioneer Valley:** Officials from MassCEC discussed the benefits and drawbacks of anaerobic digestion projects in the region.
- **Energy Efficiency for Landlords:** National experts described energy efficiency policies and programs and discussed energy efficiency opportunities, market barriers, and best practices that could be implemented to improve energy performance of buildings for residential and commercial renters.

TECHNICAL ANALYSIS

Throughout the process, the project team conducted technical analysis to assess strategy development pathways and increase the likelihood that the proposed clean energy strategies will be implemented in the future. For example, where appropriate, Stone Environmental conducted mapping (GIS) analysis to identify sites that could support clean energy development and that additionally addressed local community concerns. Additionally, Meister Consultants Group worked with local and state officials – among other resource providers – to identify potential funding sources or technical resources that could support project development.

CLEAN ENERGY ROADMAP

Taking into account findings from the Working Group, community members, and technical experts, the project team drafted the *Pioneer Valley Clean Energy Roadmap*. Local and state officials and PVPC Working Group members provided critical feedback on the draft roadmap. The project team integrated edits and submitted a final draft of the *Pioneer Valley Clean Energy Roadmap*, which was reviewed and approved by Working Group members as well as MassCEC and MassDOER.

COMMUNITY ENERGY STRATEGIES FOR THE PIONEER VALLEY

STRATEGY 1. IMPLEMENT A RENEWABLE THERMAL ENERGY COMMUNITY MARKETING CAMPAIGN

By implementing a community-based marketing program that increases regional awareness of renewable heating and cooling technologies, the Pioneer Valley can support businesses and residents in reducing heating and cooling costs, GHG emissions, and the impacts of fossil fuel price volatility.

OBJECTIVES

★	Reduce fossil fuel consumption and GHG emissions related to building heating and cooling.
★	Reduce heating and cooling costs for residential and commercial customers in the Pioneer Valley.

BACKGROUND & STRATEGY DESCRIPTION

Massachusetts is emerging as a national leader in renewable heating and cooling (RH&C), developing a variety of state policies and programs to support market development. RH&C includes a variety of technologies (see Table 1), which can reduce annual heating expenditures, the harmful impacts of fossil fuel price volatility, as well as GHG emissions associated with heating and cooling. Despite the potential benefits of RH&C, stakeholders across the Pioneer Valley report that they are largely unaware of the opportunities for installing these technologies.

RH&C technologies are particularly well suited for regions like the Pioneer Valley that use expensive fossil fuels such as fuel oil, propane, or electricity to heat or cool buildings. For example, within the four participating CESP communities in the Pioneer Valley, between 52 percent and 71 percent of households use fuel oil, propane, or electricity to heat their homes. By switching to RH&C technologies, residents, businesses, and institutions could significantly reduce annual heating costs and additionally decrease emissions of harmful GHG and other pollutants.

This strategy proposes to develop a comprehensive customer outreach, marketing, and education program in order to increase awareness of RH&C in the Pioneer Valley. The strategy will target residential and commercial customers through community-based outreach. Where possible, it is recommended that PVPC coordinate closely with MassCEC, MassDOER, as well as Mass SAVE in order to leverage existing resources and outreach efforts. Key features of the proposed community-based outreach program may include some or all of the initiatives described in Table 2.

Table 1 - Renewable Heating and Cooling Technologies

RH&C Technology	Description
Solar Hot Water (SHW)	SHW systems capture heat from sunlight, circulating the heat to building hot water tanks. SHW systems reduce the usage of traditional water heating fuels and thereby reduce monthly fuel costs for customers. SHW systems do not fully replace conventional water heaters, but can provide up to 80% of a building's total hot water needs. **Applications:** domestic hot water (DHW), space heating, process heating
Cold Climate Air Source Heat Pumps (ASHP)	ASHPs heat buildings by extracting and compressing heat from the winter air and distributing it in a building. They cool buildings by extracting heat from indoor air and ejecting it outside.[1] **Applications:** space heating and cooling
Ground Source Heat Pumps (GSHP)	GSHPs heat buildings by extracting and compressing heat from the ground, which maintains a nearly constant temperature between 50 to 60 degrees Fahrenheit. They cool buildings by extracting heat from indoor air and ejecting it outside. **Applications:** DHW, space heating and cooling
High Efficiency Biomass Heating	High efficiency biomass heating technologies use wood, pellets, and chips (among other organic sources) to produce heat for homes and businesses. Compared to oil, biomass heating can produce the same amount of heat, while achieving significant cost savings and reducing GHG emissions. Oil and biomass heating are comparable for other emissions (e.g. particulate matter).[2] **Applications:** DHW, space heating, process heating

[1] National Renewable Energy Lab. (June 2001). About Air Source Heat Pumps. DOE/GO-102001-1113. Retrieved from: www.nrel.gov/docs/fy01osti/28037.pdf

[2] Massachusetts Clean Energy Center (MassCEC). (n.d.). About Biomass Heating. Retrieved from: www.masscec.com/technology/biomass-heating

Table 2 - Proposed Community Renewable Heating and Cooling Marketing Initiatives

Renewable Thermal Marketing	Description
Online Energy Engagement Platform	Develop an online platform that informs and educates residential and commercial customers about RH&C and energy efficiency technologies; develop testimonials and case studies from local residents and businesses; connect residents and businesses to no-cost energy efficiency assessments as well as reputable RH&C installers.
"Approved" Installer List	Work with MassCEC to vet and approve selected RH&C developers to finance and install RH&C technologies for customers; market RH&C services and link Pioneer Valley residents and businesses with approved vendors. http://www.masscec.com/content/solar-hot-water-installers
Face-to-Face Engagement	The most successful outreach and engagement happens face-to-face, wherein residents and businesses teach one another about RH&C and energy efficiency opportunities. Create a network of volunteers that host dinners, workshops, or other events in order to recruit friends, neighbors, and colleagues to participate in RH&C programs; focus in particular on reaching out to public agencies to encourage installation of RH&C technologies.
Workshops with Technical Experts	Implement a series of workshops for regional residents and business owners about specific renewable thermal technologies. Potential topics could include: • Renewable Thermal 101: Overview of technologies • Solar hot water meet-up (with installers and site hosts) • Biomass thermal meet-up (with installers and site hosts) • Advanced heat pump meet-up (with installers and site hosts)
Demonstration Projects in Schools	MassDOER provides funding and technical support to promote RH&C upgrades in public schools and state public housing across the Commonwealth. Install RH&C demonstration projects and educate students about the benefits and opportunities or RH&C.
Neighborhood-based Competition	Create neighbor-to-neighbor renewable thermal retrofit challenges in order to drive friendly competition within the community

BENEFITS

+	By increasing customer awareness of RH&C technologies, PVPC can help residents and businesses reduce fuel costs, improve regional energy security, and increase use of renewable energy.
+	Increased installation of RH&C technologies will help the Pioneer Valley reduce fossil fuel consumption and achieve GHG emission reduction goals.
+	Lower household heating and cooling costs reduce the amount of money going out of the region to purchase fossil fuels.

RISKS

There are no known risks associated with the community-based RH&C marketing campaign. Pre- and post-campaign awareness surveys can serve as a benchmarking tool to gauge the effectiveness of the program at reaching residents, and will allow stakeholders to make appropriate adjustments to the marketing strategy.

PROJECT COSTS & ECONOMICS

Table 3 – Community RH&C Marketing Campaign Implementation Costs and Benefits

	To **PVPC**	To the **Community**
Financial Costs of Strategy	**Staff time** to develop and coordinate program development as well as implementation of the program over time. A modest $5,000 to $15,000 for web development and in-person events.	Not applicable.
Financial Benefits of Strategy	Not applicable.	**Long-term financial benefits** from energy cost-savings from completed projects. Project economics for RH&C installations are generally good if they displace high cost fossil fuels like fuel oil, propane or electricity. Though the return on investment will vary based on technology and site conditions, many RH&C installations can achieve payback in less than five years.

Table 4 - Available Resources

Organization	Type of Assistance	Description
Mass CEC	Financial	• **SHW rebates** for residential and commercial installations, which cover up to 25 percent of installed costs for residential and commercial systems and 35 percent of costs for public projects. The SHW program also offers funding for feasibility studies for commercial scale projects, including those for municipalities. • **Incentives for commercial-scale renewable thermal systems** that help municipalities, schools, non-profits, and greenhouses evaluate and install commercial-scale renewable thermal systems, including high efficiency biomass for central heating, ground-source heat pumps, and district energy systems. • **Residential heat pump pilot programs** for both air source and ground source heat pumps.
Mass SAVE	Financial	• The utilities provide **no-cost energy assessments** to homeowners and businesses across the Commonwealth. During the assessment, an energy specialist evaluates the building's energy use and provides a custom list of energy-saving recommendations. This is a recommended first step for any customer interested in installing RH&C technologies. Many RH&C technologies are eligible for utility rebates. • The **HEAT Loan** is applicable to many RH&C technologies including SHW, GSHPs, and ASHP installations. The HEAT loan provides zero percent financing for up to $25,000 over seven years, for eligible energy efficiency upgrades.

NEXT STEPS

Task Description	Task Lead
1. Identify internal staffing and financial resources to develop RH&C marketing and outreach program concept. Identify potential funding sources to support ongoing program.	PVPC Sustainability Planner
2. Identify volunteers, non-profits, vendors, retailers and other potential collaborators to provide local outreach and marketing support for the program.	PVPC Sustainability Planner
3. Reach out to utility representatives, MassCEC, MassDOER, and/or contractors and discuss proposed outreach and marketing efforts. Develop outreach and marketing plan.	PVPC Sustainability Planner
4. Develop marketing and outreach program proposal, if necessary, and secure funding to implement program.	PVPC Sustainability Planner
5. Hire clean energy marketing and education coordinator, if necessary, to run program.	PVPC Sustainability Planner
6. Work with volunteers and others identified in Task 2 to implement program and launch website / online marketing platform.	PVPC Sustainability Planner
7. Track performance metrics (e.g. # of events, # of website hits, # of energy assessment performed). Evaluate program performance annually and make recommendations for next steps.	PVPC Sustainability Planner

CONTACTS

Agency	Name	Position	Email
MassCEC	Josh Kessler	Project Manager	jkessler@masscec.com
MassDOER	Bram Claeys	Deputy Director, Renewable and Alternative Energy Division	bram.claeys@state.ma.us
PVPC	David Elvin	Senior Planner	delvin@pvpc.org

MORE INFORMATION

- **MassDOER Commonwealth Accelerated Renewable Thermal Strategy (CARTS):** The CARTS report advises MassDOER on which policies and programs the Commonwealth can deploy in order to grow the market for renewable heating and cooling appliances. It outlines the results from a thorough customer class analysis, energy modeling, and extensive stakeholder input throughout the summer of 2013. The benefits of investing in renewable heating and cooling (fuel savings, jobs, greenhouse gas reductions) are projected to be about 3 times higher than their costs, with renewable energy potentially reaching 30-32% of overall thermal energy use in the state by 2030.
  http://www.mass.gov/eea/docs/doer/renewables/thermal/carts-report.pdf

STRATEGY 2. CREATE A REGIONAL SOLAR PV GROUP PURCHASE DISCOUNT PROGRAM

Implement regional "Solarize-style" initiative to offer group purchase discounts for rooftop and small ground-mount solar photovoltaic (PV) systems in communities across the Pioneer Valley, where MassCEC's "Solarize Mass" program is not available.

OBJECTIVES

★	Develop a regional solar PV group-purchasing program to offer discounts to residents and small businesses in communities where MassCEC's Solarize Mass program is not available.
★	Reduce residential and business electricity costs and demand for fossil fuel generated electric power in the Pioneer Valley.
★	Reduce vulnerability to extended power outages due to extreme weather.

BACKGROUND & STRATEGY DESCRIPTION

Across the U.S., community-based group-purchasing programs have helped residents and small businesses install solar photovoltaic (PV) systems. Within Massachusetts, MassCEC runs a highly successful group-purchasing "Solarize" program for homeowners in partnership with local municipalities. Through a competitive bidding process, the participating communities select an installer that offers lower than market prices to install solar PV systems to groups of residents buying in bulk. The cost of solar PV systems decreases as more people sign up, encouraging community members to recruit their neighbors in order to get lower prices for each solar PV system installed.

Residents and businesses in the Pioneer Valley expressed interest in taking a regional approach to the solar group-purchasing program model. This approach will target small communities, which may require additional assistance in managing program development and outreach, as well as property owners in communities that are not eligible for the MassCEC Solarize program (e.g. this may include communities with municipal lighting plants, many of which are ineligible for MassCEC funding). A regional solar PV group-purchase program could help further increase access to solar PV systems for many property owners in the Pioneer Valley.

This strategy proposes development of a regional "Solarize-style" program in the Pioneer Valley. By collaborating with MassCEC, PVPC's member communities, and other project partners, PVPC could design and implement a group-purchasing program for communities in the region that are not participating in the Solarize Mass program. Key features of the proposed PVPC regional Solarize program will include the following:

- **Develop partnerships with experienced group-purchasing program providers:** It is recommended that PVPC develop this program in partnership with MassCEC to the greatest extent possible. Leveraging MassCEC's expertise and resources – including procurement, marketing, and outreach documents, among others – will be important to create an effective program. Additional project partners include local towns and municipalities in the Pioneer Valley or additional resource providers like the U.S. DOE SunShot SolarOps Program, among others.
- **Identify experienced local solar developers and installers:** It will be important for PVPC and its project partners to implement a procurement process to vet solar developers who can install solar at an agreed-upon price. Installers should have extensive experience in solar development with a proven track record to

fulfill the volume of installations expected. If possible, preference should be given to Massachusetts-based companies.

- **Develop a tiered pricing structure:** The success of the program will depend upon a tiered pricing structure that lowers solar PV installation costs as more participants sign up. This will increase the savings to property owners and help drive word-of-mouth outreach that boosts participation. In addition, PVPC may require that solar contractors offer the option for a solar power purchase agreement (PPA) in order to reduce or eliminate upfront costs to customers. With a PPA, customers will still receive a tiered pricing benefit as more participants sign up, usually in the form of a one-time rebate check paid by the installer to the customer.
- **Annual or bi-annual enrollment period:** It will be important to limit the enrollment period, as is done with Solarize Mass, to focus the outreach efforts, provide predictability to competing solar PV installers, and allow for cost-effective administration by staff.
- **Implement a community-driven marketing campaign:** The program will be most effective if it uses a community-driven marketing process, during which neighbors encourage other neighbors to sign-up for solar. PVPC and its partners should support community marketing by designating a local staff person or volunteer who can organize community outreach events and knowledgably answer questions for potential customers.

BENEFITS

+	By creating a regional Solarize program, PVPC will increase property owners' access to solar PV, especially in small, rural communities, by reducing installation costs.
+	By increasing installation of solar PV systems throughout the region, PVPC will help individual communities and the region as a whole to reduce household electricity costs, mitigate fossil fuel use, and encourage local economic development.

RISKS

⚠	**Low or limited participation:** Good participation to achieve sufficiently attractive discounts for consumers requires excellent planning, preparation, consumer education, and outreach. This will require close collaboration between the installer(s), PVPC, MassCEC, and community volunteers.
⚠	**Inadequate installer expertise:** Installers should be prepared from an operational and staffing perspective to manage the intake and management of an extremely large volume of leads at the onset (and through the duration) of the program.
⚠	**Poor solar pricing:** Solarize programs are designed to drive down installation costs and increase solar adoption. As a result, it is essential to ensure that customers receive competitive pricing from reputable installers. Therefore, Solarize program managers must have the expertise to evaluate installer bids and ensure participants get the most competitive pricing available on the market.

PROJECT COSTS & ECONOMICS

Table 5 – Regional Solar PV Program Implementation Costs and Benefits

	To the **Towns of PVPC**	To the **Communities**
Costs of Strategy	**PVPC staff time** to develop and initiate the program could be funded through direct local technical assistance (DLTA) funds. Financial support for the ongoing administration of the program must also be identified. A modest $5,000 event budget should also be reserved to cover costs of printing, refreshments, etc. at up to 10 outreach events.	Not applicable.
Benefits of Strategy	Not applicable.	Participants will benefit from lower electricity bills, though the financial benefit will depend upon the number of participants and the final cost of system installation as well as the financing options offered by installers.

Table 6 - Available Resources

Organization	Type of assistance	Description
MassCEC	Technical	Through Solarize Mass, MassCEC can offer communities expertise and resources in administering and running the program, including providing outreach materials, explaining the differences between third party and direct ownership, recommending installers, and reviewing installer bids. www.masscec.com/solarizemass
U.S. DOE Solar Outreach Partnership (SolarOPs)	Financial & Technical	The Solar Outreach Partnership (SolarOPs) is designed to help accelerate solar energy adoption on the local level by providing timely and actionable information to local governments. A team of consultants that work nationally provide outreach, best practices, and technical support for local governments across the nation. Communities can apply for free technical assistance from SolarOPs online. http://solaroutreach.org/ta/

NEXT STEPS

Task Description	Task Lead
1. Identify PVPC project manager, who will lead program and coordinate implementation efforts. Reach out to MassCEC to discuss opportunities for collaboration and coordinate efforts.	PVPC Sustainability Planner
2. Reach out to DOE SolarOPs and/or other technical and financial resource providers. Identify resources available to support implementation of a regional program.	PVPC Sustainability Planner
3. Identify potential local collaborators to implement program outreach. This should include local town officials, community groups, and local volunteers, among others, to lead outreach efforts. Develop marketing and outreach plan.	PVPC Sustainability Planner
4. Identify technical consultants or experts to assist in developing solar installer procurement documents and evaluating responses. Publish and promote the installer RFP.	PVPC Sustainability Planner and Consultant
5. Interview finalists, select vendor, and confirm tiered pricing structure.	PVPC Sustainability Planner and Consultant
6. Review outreach plan with selected vendor and integrate vendor resources into outreach and marketing activities.	Consultant, PVPC Sustainability Planner
7. Implement outreach plan, sign up participants, and begin installations.	Consultant, Volunteers
8. Selected vendor conducts site assessments, signs contracts with participants, and performs installations.	Solar Installer(s)

CONTACTS

Agency	Name	Position	Email
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MassCEC	Elizabeth Kennedy	Program Director, Solar	ekennedy@masscec.com

STRATEGY 3. PROVIDE ENERGY PLANNING SERVICES FOR MUNICIPALITIES

By making energy planning and management services available to small and rural towns in the region, PVPC can support municipalities that have historically lacked energy planning capacity and resources to cost-effectively address clean energy planning and implementation needs.

OBJECTIVES

✪	Provide a "shared energy manager" to support small and rural communities in cost-effective planning and implementation of clean energy and energy efficiency programs and projects.
✪	Increase development of clean energy projects, streamline energy planning services and administration, and disseminate best practices across the region.

BACKGROUND & STRATEGY DESCRIPTION

Massachusetts towns and cities benefit from a wide variety of utility and state programs, which enable them to deploy energy efficiency and renewable energy projects. For example, MassDOER's Green Communities Program, utility energy efficiency programs, and MassCEC's technical assistance programs all support development of local clean energy projects. To drive municipal projects forward, many towns and cities have hired energy managers whose responsibility is to deploy these and other clean energy resources in the community. However, a number of Pioneer Valley municipalities report that they lack adequate staff capacity to fully leverage state resources and drive forward clean energy at the local level.

The Pioneer Valley is home to a number of small towns and communities, which face a number of administrative and financial challenges that prevent them from hiring full-time energy managers over the long-term. To address this issue, community leaders have expressed interest in sharing energy management services on a regional basis in order to cost-effectively support the development and implementation of their municipal energy reduction plans. This model has been successfully implemented by a number of regional planning agencies in the Commonwealth, including the Metropolitan Area Planning Council (MAPC) and the Merrimack Valley Planning Commission (MVPC), among others.

This strategy proposes development of a "regional clean energy planning" program managed by the Pioneer Valley Planning Commission (PVPC), which will provide municipal energy services on a fee-for-service basis to support small and rural towns in implementing clean energy programs. By providing a "shared energy manager" across communities, it is expected that the region will benefit from increased deployment of municipal clean energy projects, streamlined energy services and administration, and greater dissemination of best practices across the region. Key features of the proposed program could include:

- **Green Communities reporting:** Designated Green Communities in Massachusetts are required to develop five-year energy reduction plans and submit annual reports, including energy monitoring and verification requirements using Mass Energy Insight. PVPC is already performing these services and could deliver them cost-effectively to more communities across the region.
- **Permitting, inspection, and regulatory services:** As described in Strategy 8, many communities require assistance training local inspectors and officials on clean energy zoning, permitting, and installation

requirements. PVPC could provide technical assistance to help regional towns and municipalities streamline – and train local officials on – zoning and permitting requirements.

- **Project management and implementation support:** Many towns or communities require project management support on an ad-hoc basis to coordinate clean energy projects or grant programs. PVPC could provide these services on a contract basis, assisting local staff to ensure projects are completed on time and on budget.
- **Clean energy solicitation and procurement services:** Municipalities across the Commonwealth have recently collaborated to procure local renewable energy at rates below conventional energy generation. PVPC could help towns aggregate energy load and coordinate efforts in order to procure local renewable energy to serve their municipal loads.
- **Shared best practices:** Municipal staff in Pioneer Valley communities could benefit from sharing clean energy best practices. By serving as a clean energy clearinghouse for all towns, the PVPC shared energy manager could help strengthen the regional network, convening stakeholders to share lessons learned and leverage regional best practices. The shared energy manager could additionally connect local stakeholders with state, regional, or federal resources for clean energy projects.

BENEFITS

+	By leveraging energy planning services across multiple towns and cities in the region, PVPC can provide clean energy expertise cost-effectively to communities in which procurement or availability of these services would not likely be possible otherwise.
+	The regional energy planning services program will likely increase collaboration across communities, facilitating the sharing of best practices and lessons learned.
+	By increasing local project management and planning capacity, it is anticipated that the regional energy planning services program will increase deployment of clean energy projects.

RISKS

No risks associated with the regional energy planning services program have been identified.

PROJECT COSTS & ECONOMICS

Table 7 – Regional Energy Planning Services Implementation Costs and Benefits

	To **PVPC**	To the **Community**
Financial Costs of Strategy	**Staff time** to develop and coordinate program development as well as implementation of the program over time. Additional costs may include the use of outside consultants or experts.	**Subscription or contractual fees** to retain the shared energy manager.
Financial Benefits of Strategy	**New revenue** from operating the shared energy manager program on behalf of local towns and cities.	**Financial benefits and energy cost savings** from implementing clean energy projects in municipal buildings.

NEXT STEPS

Task Description	Task Lead
1. Identify Pioneer Valley communities interested in collaborating on a pilot for the regional energy planning services program.	PVPC Sustainability Planner
2. Conduct interviews with participating community leaders to identify energy planning needs and potential program services.	PVPC Sustainability Planner
3. Develop scope of work for Year 1. Identify program staff and consultants, project milestones and timelines, and project budget.	PVPC Sustainability Planner, Participating Municipalities
4. Secure financial commitment and enter into contracts with participating communities and/or outside funders.	PVPC Sustainability Planner
5. Launch pilot program and deliver energy planning services.	PVPC Sustainability Planner, Consultant(s)
6. Evaluate program performance and create recommendations for next steps.	PVPC, Funders

CONTACTS

Agency	Name	Position	Email
PVPC	David Elvin	Senior Planner	delvin@pvpc.org

STRATEGY 4. DEVELOP AN ENERGY COACHES PROGRAM FOR LANDLORDS AND TENANTS

By providing energy planning technical assistance through an "Energy Coaches" program, PVPC can help its member communities address barriers that inhibit energy efficiency investments in commercial rental properties.

OBJECTIVES

✪	Address split-incentive issues for landlords and tenants and increase access to utility energy efficiency incentives.
✪	Increase opportunities for commercial customers to save money from cost-effective energy efficiency retrofits.
✪	Support creation of a local energy efficiency market and local economic development opportunities.

STRATEGY DESCRIPTION

Massachusetts has one of the best energy efficiency programs in the nation, which provides significant financial incentives to residents and businesses. However, rental properties have not benefited as much from the state's energy efficiency programs as those that are owner-occupied. In Pioneer Valley communities like Holyoke and Amherst, where more than 50 percent of residents are renters, this is an especially important issue.[3] By addressing barriers to energy efficiency in rental properties, PVPC could help local residents and businesses better access utility incentives, increase energy cost savings, and reduce GHG emissions.

It is challenging to finance energy efficiency in rental properties due to misaligned incentives (i.e. split incentives) between landlords and tenants, among a variety of other barriers. Split incentives occur when those making the capital investment in energy efficiency are not the same as those who pay for energy bills. For example, because landlords typically do not pay monthly energy or heating bills in properties, they have little or no incentive to invest in energy conservation measures. On the other hand, tenants will typically not make energy efficiency investments in a property because they either lack the authority or do not expect to stay at the property long enough to warrant the investment. Overcoming such barriers is essential to integrate energy efficiency into rental properties across the Pioneer Valley.

This strategy proposes development of an Energy Coaches program in the Pioneer Valley, which will provide technical assistance to tenants, landlords, and other critical stakeholders in order to drive forward energy efficiency retrofits in rental properties. Due to the complexity and challenges involved in overcoming barriers to energy efficiency in rental properties, regional experts, and stakeholders propose that PVPC develop the following program features as part of the proposed Energy Coaches program:

- **Focus on commercial rental properties:** To start the program, it is recommended that PVPC initially focus on the commercial sector. While it will be important to address both residential and commercial customers over time, it is anticipated that PVPC could achieve greater energy savings, have greater impact, and

[3] By contrast, 36.8 percent of residents across the Commonwealth of Massachusetts are renters.

implement the program at lower cost by initially focusing on the commercial sector, where tenants and/or owners may have a greater interest in reducing energy costs as part of a business bottom line.

- **Engage all critical stakeholders:** Overcoming landlord-tenant challenges to energy efficiency is a complex process, which requires collaboration among several important actors, especially local electric and/or gas utilities, landlords, and tenants. It will be necessary for the program managers to get buy-in from these stakeholders – among others – in order to successfully implement energy efficiency measures in commercial rental properties.
- **Partner with experienced energy efficiency vendors:** Implementing energy efficiency programs for landlords and tenants requires detailed knowledge of utility energy efficiency programs, incentives, technologies, and measures. A variety of experienced vendors in Massachusetts have been working with utilities to implement these types programs. For example, the Center for EcoTechnology (CET) has administered landlord-tenant energy efficiency programs with Northampton and Columbia Gas, among other organizations across the state. Leveraging the expertise of CET among other energy efficiency vendors will be important for PVPC to create a program that can have positive impacts within the short to medium term.

BENEFITS

+	By working together, landlords and tenants can both benefit from energy efficiency investments. For example, in many cases, energy efficiency enhances the value of property for landlords and saves tenants money on their energy bill.
+	Energy efficiency projects in rental properties will achieve GHG emission reductions for the community. Since landlords have previously had little or no incentives to make efficiency investments, there are significant GHG savings potential latent in rental properties.
+	Energy efficiency investments can yield increases in property values, which will benefit landlords and the municipal tax base. Research suggests that it can additionally increase tenant retention rates in rental properties.
+	By integrating energy efficiency into rental buildings, landlords, tenants, and the broader community will benefit from the broad array of financial incentives provided by utility energy efficiency programs. This will increase local investment into the community, contributing to regional economic development.

RISKS

⚠	Addressing landlord-tenant energy efficiency barriers is challenging. The Energy Coaches could potentially yield limited or inadequate results. In this case, the investment of time and money into the program would be wasted.

PROJECT COSTS & ECONOMICS

Table 8 – Energy Coaches Program Implementation Costs and Benefits

	To **PVPC**	To the **Community**
Financial Costs of Strategy	**Staff time** to develop the program, coordinate, administer, and provide technical assistance will be the major cost driver to PVPC and/or its partners for this strategy. This can range significantly depending upon the size and scope of the project as well as the role of potential project partners. It is estimated that PVPC will need to identify at least **$30,000 in funding** for part-time staff or consultants to administer the Energy Coaches' project.	Financial costs of implementing the strategy for community members – including landlords and tenants – will likely be related to the cost of the energy efficiency measures. Energy efficiency projects can vary significantly based upon the measures installed (basement, roof, walls, mechanical systems) as well as expenses associated with "unforeseen circumstances." It is anticipated that energy efficiency projects will be financed using third parties and only projects that provide energy cost savings will be implemented.
Financial Benefits of Strategy	Not applicable.	Financial benefits to the community of this strategy include increased investment from the private sector as well as utility incentive programs into the community as well as long-term energy cost savings.

Table 9 – Available Resources

Organization	Type of assistance	Description
Massachusetts Utilities	Financial	**Mass SAVE** is an initiative sponsored by Massachusetts gas and electric utilities and energy efficiency service providers, that provide a wide range of services, incentives, trainings, and information promoting energy efficiency that help residents and businesses manage energy use and related costs. http://www.masssave.com/
Center for EcoTechnology (CET)	Technical	**CET** has administered landlord-tenant programs across the state. The organization has close connections with utilities and deep expertise in utility incentive programs, energy efficiency measures, landlord-tenant concerns, as well as community engagement methods. http://www.cetonline.org

PROJECT TASKS

Task Description	Task Lead
1. Identify potential collaborators to implement program. This may include the Center for EcoTechnology, Columbia Gas, WMECO, MassCEC, MassDOER, and progressive commercial landlords, among others.	PVPC Sustainability Planner
2. Conduct kick-off meeting(s) to discuss scope of work with critical stakeholders.	PVPC
3. Develop program concept and define roles and responsibilities. Identify funding sources for program and submit formal proposal with project milestones.	PVPC, Collaborators
4. Launch "Energy Coaches" program in close collaboration with landlords, utilities, and other critical stakeholders. Implement energy agreements, finance energy efficiency measures, and install energy efficiency measures.	PVPC, Collaborators, Consultant(s)
5. Track performance metrics (e.g. # of energy assessment performed, energy contracts developed, total project costs, cost-savings, GHG emission reductions, etc.), and evaluate program performance. Create recommendations for next steps.	PVPC, Collaborators

CONTACTS

Agency	Name	Position	Email
Center for EcoTechnology	Marin Goldstein	Outreach and Education Manager	marin.goldstein@cetonline.org
PVPC	David Elvin	Senior Planner	delvin@pvpc.org

STRATEGY 5. DEVELOP A REGIONAL BIKE SHARING SYSTEM

PVPC can increase transportation options for residents by partnering with reputable vendors to develop and implement a regional bike sharing program.

OBJECTIVES

★	Reduce vehicle use and increase access to alternative transportation modes.
★	Develop bike-share initiative that encourages exercise and healthy living.
★	Integrate bike sharing system into regional public transit system to extend travel range of transit customers.

BACKGROUND & STRATEGY DESCRIPTION

Bike sharing programs are emerging as a popular option to increase mobility in cities such as Boston, New York, London and Paris. A bike sharing program provides a rentable fleet of bikes, which can obtained from and returned to docking stations around communities, often for a relatively small fee. The service is akin to car-sharing services like Zip Car.

Though most common in large cities, bike sharing programs are beginning to be implemented in smaller municipalities, such as Boulder, Colo.,[4] Salem, Mass.,[5] and Madison, Wis.[6] A potentially promising model uses "smart bikes," which are equipped with GPS technology to help monitor and manage the program, instead of more traditional bike share stations. Such an approach may be more suitable for municipalities in the Pioneer Valley, as it provides greater flexibility for a regional approach. In fact, in collaboration with several regional municipalities, PVPC is currently implementing a feasibility study to assess these issues in addition to regional bike sharing models, customer demand, financial feasibility, and capital funding requirements (and sources), among other issues.

This strategy proposes to create a regional bike-sharing program in the Pioneer Valley that will help interconnect the region's bike and pedestrian paths with Amtrak passenger rail service, which is being realigned to serve stations in downtown Holyoke and Northampton, as well as the existing station in Springfield. PVPC could conduct a feasibility analysis, and based on its findings, subsequently develop a request for proposals (RFP) to procure a vendor to design and implement the regional bike-sharing concept. In response to the RFP, vendors will be expected to:

- Describe their proposed business model and services, including risks, benefits, and key considerations;
- Describe proposed bike sharing routes, locations for bike stations, and target audience for the Pioneer Valley region; and

[4] Boulder B Cycle. (n.d.). Retrieved from: https://boulder.bcycle.com/default.aspx
[5] Salem City Hall. (n.d.). Salem Spins Bike Share Program. Retrieved from: www.salem.com/pages/salemma_webdocs/spins?textPage=1
[6] Christensen, M. (September 2013). Bike Share Finds Success in Small Cities. Momentum Mag. Retrieved from: http://momentummag.com/features/bike-share-finds-success-in-small-cities/

- Describe funding and capital requirements as well as expected operational costs and revenues, with the aim to make the program self-sustainable over time.

BENEFITS

+	By collaborating with a successful bike-sharing vendor, PVPC will continue developing a more resilient transportation network that is less reliant on fossil fuels.
+	The bike sharing program will provide travelers with more alternatives to auto travel for commuting, shopping, errands and visits—thereby improving the interconnectedness of the region's transportation network.

RISKS

	There is a risk that there will be an insufficient number of qualified program vendors willing to respond to the RFP. PVPC should assess whether there are enough bike sharing program vendors that will be willing to respond to the RFP with sufficient experience and expertise to run a program on a regional scale.
	Profitability has historically been a challenge for bike share programs, and in a number of cases municipalities have had trouble securing sufficient funds to operate the system. It is essential that bike sharing program providers can provide evidence in their proposals that they can operate a financially stable program at a regional scale.

PROJECT COSTS & ECONOMICS

Table 10 – Regional Bike Sharing System Implementation Costs and Benefits

	To the **PVPC**	To the **Community**
Financial Costs of Strategy	**Staff time** to develop and coordinate the RFP and evaluate responses. Additional costs may include the use of outside consultants, lawyers, or experts to assist in the development of procurement documents or evaluate proposals.	Not applicable.
Financial Benefits of Strategy	**Financial benefits** if bike-share program can offset need for additional transportation options of fleet purchases.	**Financial benefits** if bike-share program can offset need for additional transportation options.

Table 11 - Available Resources

Organization	Type of assistance	Description
MassDOT Bicycle Transportation	Technical Assistance	Mass Department of Transportation provides a number of resources to assist Massachusetts regions improve biking infrastructure. http://www.massdot.state.ma.us/GreenDOT/BikeandPedCoordinators.aspx

NEXT STEPS

Task Description	Task Lead
1. Review results of the PVPC "bike sharing feasibility study" and determine whether to proceed. Conduct preliminary interviews with bike sharing program vendors, as appropriate, and identify key questions and requirements for a successful bike sharing program in PVPC.	PVPC Bike/Ped Planner
2. Identify appropriate procurement pathways, including whether to procure under an RFQ or RFP.	PVPC Bike/Ped Planner
3. Develop and publish procurement documents.	PVPC Bike/Ped Planner
4. Collect and evaluate responses.	PVPC Bike/Ped Planner
5. Select winning bid (if any) and proceed with project implementation.	PVPC Bike/Ped Planner

CONTACTS

Agency	Name	Position	Email
Massachusetts Department of Transportation	Daryl Amaral	Bike/Pedestrian Coordinator	daryl.amaral@dot.state.ma.us
PVPC	Josiah Neiderbach	Bike/Pedestrian Planner	jneiderbach@pvpc.org

MORE INFORMATION

- **Social Bicycles (bike sharing vendor):** Social Bicycles offers affordable and scalable bike share technology, equipped with a GPS-enabled lock that works with regular bike racks. http://www.socialbicycles.com
- **Alta (bike sharing vendor):** Alta designs, deploys, and manages bicycle sharing systems. They provide solutions for all aspects of bike share, from location assessment and business modeling to system maintenance and expansion. http://www.altabicycleshare.com
- **PVPC Bike Share Program Report:** The 2015 Bike Share Program Report provides an overview of the history, implementation, funding, and bike sharing models. http://www.pvpc.org/content/regional-bike-share-pioneer-valley

STRATEGY 6. INCREASE ACCESS TO ELECTRIC VEHICLE CHARGING STATIONS

Increased awareness of existing electric vehicle infrastructure and improved availability of charging stations will help spur adoption of electric vehicles, driving further emissions reductions and fossil fuel independence.

OBJECTIVES

★	Reduce oil consumption, tail-pipe emissions, and GHG emissions by encouraging electric vehicle deployment.
★	Provide adequate infrastructure to support electric automobiles.
★	Reduce transportation costs by shifting some vehicles away from petroleum-based fuels.

BACKGROUND & STRATEGY DESCRIPTION

Throughout Massachusetts, electric vehicles are emerging as a viable clean transportation option, but cities and towns across the state lack access to charging stations, limiting opportunities to use electric vehicles. Expanding charging infrastructure represents a paradigm shift for consumers to fuel vehicles. Unlike traditional gas stations, drivers of electric vehicles may charge at home, work or at public charging stations. Experts estimate that approximately 80 percent of charging occurs at residences. In order for electric vehicles adoption to expand, communities and businesses will need to establish infrastructure to enable charging for the remaining 20 percent of the time.

Presently, three major types of charging stations exist: Level 1, Level 2, and DC fast charging stations.[7] As described in Table 12, Level 1 units are best suited for overnight charging at homes. Level 2 and DC fast charging stations can be deployed in public areas across the community.

This strategy proposes to identify opportunities to install charging stations at key locations – such as multi-unit buildings, downtown parking lots, on-street spaces, businesses, or at highway stops – in order to develop a robust charging network across the Pioneer Valley. These highly used and visible areas will also serve to increase public awareness of EV technologies. Other highly visible sites could include municipal buildings, major hospitals or malls. There is also potential to integrate solar and other clean energy technologies into the EV charging stations.

To successfully implement this program, PVPC will work directly with local towns and municipalities, providing technical assistance to help municipalities identify viable sites, purchase plug-in vehicles when replacing municipally-owned vehicles, and manage the procurement process. PVPC could additionally help local municipalities access state funds. The Massachusetts Electric Vehicle Incentive Program (MassEVIP), for example, currently provides grant funding to local governments interested in both purchasing plug-in vehicles and installing charging stations.

[7] WXY Architecture + Urban Design. (2012). Siting and Design Guidelines for Electric Vehicle Supply Equipment. Prepared for the New York State Energy Research and Development Authority and the Transportation and Climate Initiative. Retrieved from: www.transportationandclimate.org/

Table 12 - Charging Station Types, Characteristics, and Charge Times[8]

Type	Description	Typical Charge Time
Level 1 120 VAC	• Uses a common residential grounded receptacle (standard outlet) to charge the vehicle's on-board charger. • Level 1 chargers are typically used for overnight vehicle charging at homes.	8-30 hour charge time; larger batteries (like Tesla Model S) require one to two days
Level 2 240 VAC	• Requires a dedicated 40 amp circuit from power source to vehicle's on-board charger. • A freestanding or hanging charging station unit mediates the connection between power outlets and vehicles and contains network communications, utility communications and monitoring, payment interface, and sometimes advertising screens (or other "user information opportunities"). • Level 2 chargers are well suited for "public" charging stations, where cars park for only several hours at a time.	3-8 hour charge time
DC fast charge	• Provides direct current up to 400 amps from off-board charger (electrical conversion occurs in charging unit, not in the vehicle's on-board charger). • DC fast chargers are high profile, free standing units, which draw large amounts of electrical current and typically require utility upgrades and dedicated circuits. They also contain network communications, utility communications and monitoring, payment interface, and sometimes advertising screens (or other "user information opportunities"). • DC fast chargers are beneficial in heavy-use transit corridors or highly trafficked public fueling stations.	15-30 minutes

BENEFITS

+	By providing technical assistance and supporting local governments in accessing financial resources, the Pioneer Valley will likely benefit from reduced tailpipe emissions and progress towards local and regional greenhouse gas targets.
+	Increased community awareness and access to electric vehicle infrastructure can lead to more informed purchasing decisions, increasing the likelihood that residents and municipal governments across the region will invest in more electric vehicles over time.
+	Residents and businesses will benefit from reduced vulnerability to shifting fuel prices through expanded access to charging stations and a more supportive environment for electric vehicle adoption.

[8] WXY Architecture + Urban Design. (2012). Siting and Design Guidelines for Electric Vehicle Supply Equipment. Prepared for the New York State Energy Research and Development Authority and the Transportation and Climate Initiative. Retrieved from: www.transportationandclimate.org/

RISKS

	Electric vehicle charging stations are an emerging technology with rapidly evolving standards and best practices. PVPC should ensure that manufacturers and installers use the most up-to-date standards.[9] Today, most EVs use the Society of Automotive Engineers (SAE) J1772 connector and receptacle that is standard for both Level 1 and 2 charging equipment.[10] Looking ahead, advances in wireless charging, which are now only in early stages of technology development, could transform charging station technology again in the future.
	Installers may have limited experience managing EV stations. Community leaders should carefully vet EV charging manufacturers and installers to ensure they have sufficient experience and flexibility to install, manage, or maintain EV charging stations over time.
	Battery electric vehicles (BEVs) do have limited ranges and may not be appropriate for all purposes. Any purchase of BEVs should evaluate potential issues related to battery range. This is not an issue for plug-in hybrid electric vehicles (PHEVs), as these vehicles can operate on standard gasoline when the vehicle's battery has been fully discharged.
	Risks related to battery integrity in the event of an accident create concerns for first responders. Given this potential issue, the state has developed an electric vehicle license plate. This plate is intended to ensure that first responders take appropriate precautions when working around damaged electric vehicles.

PROJECT COSTS & ECONOMICS

Table 13 – Electric Vehicle Charging Stations Implementation Costs and Benefits

	To the **PVPC Municipalities and Towns**	To the **Community**
Financial Costs of Strategy	**Staff time** to research suitable installation sites and technologies as well as infrastructure and operational costs related to actual installation and maintenance of the site. Total installation costs for Level 2 EV charging stations can vary considerably, with estimates ranging from $12,000 to $27,000.[11]	Not applicable.
Financial Benefits of Strategy	**Moderate financial benefits** if the price/charge is below gasoline fueling costs for cars in municipal fleets. **Minor financial benefits** from property tax payments by developer.	**Moderate financial benefits** if the price/charge is below gasoline fueling costs for cars in the region.

[9] Center for Climate and Energy Solutions. (n.d.). Public Policy and Electric Vehicles. Retrieved from: www.c2es.org/pev-action-tool/common-concerns-issue-brief

[10] WXY Architecture + Urban Design. (2012). Siting and Design Guidelines for Electric Vehicle Supply Equipment. Prepared for the New York State Energy Research and Development Authority and the Transportation and Climate Initiative. Retrieved from: www.transportationandclimate.org

[11] Infrastructure and material costs are estimated to be within the $4,000 to $9,000. An additional mark up for installation and labor brings total installation costs up. For more, see: MassEVIP. (May 2013). Vendors and Electric Vehicle Supply Station (Level 2 Charging Station) on State Contract RFR-2011-ENE-008. Retrieved from: www.mass.gov/eea/docs/dep/air/community/massevipcsv.pdf

Table 14 - Available Resources

Organization	Type of Assistance	Description
Massachusetts DEP	Financial	**Massachusetts Electric Vehicle Incentive Program (MassEVIP):** Mass EVIP helps Massachusetts cities and towns acquire electric vehicles and charging stations by offsetting the higher initial cost of these advanced technologies. It is a competitive solicitation that offers up to $15,000 to install Level 2 duel charging stations (which can charge two vehicles at the same time) when a municipality purchases at least one battery-electric vehicle. http://www.mass.gov/eea/agencies/massdep/air/grants/massevip.html
NYSERDA and Transportation and Climate Initiative	Technical	**Siting and Design Guidelines for Electric Vehicle Supply Equipment:** This report provides design guidelines and best practices to help local governments, businesses, homeowners, developers, and other interested parties identify and diagram key siting and design issues for electric vehicle charging equipment. http://www.transportationandclimate.org/siting-and-design-guidelines-electric-vehicle-supply-equipment
Center for Climate and Energy Solutions	Technical	**Plug-in Electric Vehicle Action Tool:** The Center for Climate and Energy Solutions provides a resource for learning about PEVs and best practices. Although state DOTs are the primary audience, many of the suggested actions and resources in the tool are applicable to other public entities such as local governments and other state agencies. http://www.c2es.org/pev-action-tool

SITE ANALYSIS

While every site for electric vehicle charging infrastructure is unique and will require an individual analysis, the following elements must usually be considered at every EV charging site:

☑	**Connection to power:** Level 2 and DC fast charging stations often require a dedicated circuit, which may also require new conduit. This will affect the cost of the system: costs rise as cable length increases due to the installation costs of construction and trenching. While the load from Level 2 charging is comparable to other household appliances like clothes dryers, the continuous nature of the load can burden the system. Thus, installation of dedicated branch circuits/new panels may reduce safety risk and assist with peak load management.[12]
☑	**Networks and communications:** Public charging stations usually contain advanced metering systems and require network links to track usage, bill customers, and manage electrical loads. This generally requires access to telecommunications networks using Wi-Fi, Ethernet, or a cellular connection. Potential installation sites should be assessed for the ability to connect to communication networks.[13]
☑	**Existing infrastructure:** Surrounding infrastructure elements like landscaping, walkways, curb cuts, and other structural elements should be considered when installing a charging station. Infrastructure and construction costs are the major drivers of unexpected expenses when installing charging stations. When possible, consider trenching through landscaping, though charging units should always be mounted on a concrete pad or other hard surface.[14]

In addition to the broad-based factors described above, more detailed site design elements governing installation, access, and operation of the charging station should be considered. Interested readers should consult the *Additional Resources* section for detailed guidance on site design issues. Sites should be fully vetted and further discussions should be conducted with all interested stakeholders to ensure these sites are appropriate for electric vehicle infrastructure development.

[12] WXY Architecture + Urban Design. (2012). Siting and Design Guidelines for Electric Vehicle Supply Equipment. Prepared for the New York State Energy Research and Development Authority and the Transportation and Climate Initiative. Retrieved from: www.transportationandclimate.org
[13] Ibid.
[14] Ibid.

NEXT STEPS

Task Description	Task Lead
1. Identify and task staffing resources to manage technical assistance process.	PVPC Transportation
2. Reach out to municipal staff in the region about planned procurement. Departments could include: public works, transportation, legal staff, and environment/sustainability staff, among others.	PVPC Transportation, MassDOT Dist 2
3. Alert MassDOER Alternative Transportation Program Coordinator of interest in installation of electric vehicle charging stations and discuss latest industry and program developments. Additionally, coordinate efforts with MassDOT's GreenDOT planners.	PVPC Transportation, MassDOER, MassDOT Dist 2
4. Identify electric vehicle sites in the region that are appropriate for electric vehicle infrastructure based on criteria outlined above.	PVPC Transportation, PVPC GIS, Municipal DPWs, Energy Committees
5. Work with MassDEP to allocate financial grant resources to support local installation of charging stations. Issue an RFP for experienced developers and review responses.	PVPC Transportation, MassDOT Dist 2
6. Negotiate a final electric vehicle charging station installation, maintenance, and/or management agreement contract.	MassDOT Dist 2 Electric Utilities, Participating Municipalities,

CONTACTS

Agency	Name	Position	Email
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MassDOER	Stephen Russell	Alternative Transportation Coordinator	stephen.russell@state.ma.us

STRATEGY 7. DEVELOP A ONE-STOP SHOP FOR CLEAN ENERGY

Create a regional information resource service for clean energy and energy efficiency technologies, development practices, and financial incentives to help residents and business owners quickly identify options that are available locally to improve their homes and facilities.

OBJECTIVES

✪	Increase community awareness of locally available clean energy technologies and development options.
✪	Develop an online portal to simplify the process for customers in assessing their clean energy technology and financing options, comparing installer quotes, and working with a contractor to install clean energy technologies.

BACKGROUND & STRATEGY DESCRIPTION

Pioneer Valley stakeholders report that they face challenges learning about clean energy projects suitable for their needs and identifying reputable and experienced clean energy providers. Creating a marketing and outreach platform that increases awareness of clean energy opportunities, lists locally available incentives, and supports customers seeking reputable installers was identified as a priority for stakeholders in the region.

This strategy proposes development of a regional One-Stop Shop for clean energy information that provides targeted marketing, information and project development services to help residents, businesses, and municipalities install solar photovoltaic, solar thermal hot water, and other clean energy technologies. To create a One-Stop Shop, it is recommended that PVPC support the implementation of a regional online outreach and marketing platform, which provides regional stakeholders with user-friendly descriptions and case studies of clean energy projects and helps them connect with regional reputable installers.

To cost-effectively implement this project, PVPC could work with a variety of partners. For example, companies such as EnergySage[15] or 1BOG[16] have established online platforms that provide most of the features described above and also help residents or businesses get bids from local contractors. Billed as the "Expedia of solar," these online platforms are designed to help customers assess clean energy options, compare quotes from installers, and purchase solar or other clean energy technologies quickly and efficiently. In addition, these companies have expressed interest in partnering with local communities and regional organizations like PVPC in order to develop a community-based marketing program.

[15] For more, see: www.energysage.com
[16] For more, see: http://1bog.org

BENEFITS

+	PVPC will increase community awareness, education, and adoption of clean energy technologies by providing a comprehensive source of reliable and local information online for community members.
+	The One-Stop-Shop will simplify the process for customers to assess their clean energy options, compare installer quotes, and install clean energy technologies.

RISKS

	As with all online resources, information can become quickly outdated as technologies, costs, and incentives change. It is thus important that the organization managing the online tool actively updates it over time.

PROJECT COSTS & ECONOMICS

Table 15 – Information Resource Service Implementation Costs and Benefits

	To **PVPC**	To the **Community**
Financial Costs of Strategy	**Staff time** to develop and coordinate program development and implementation over time.	Not applicable.
Financial Benefits of Strategy	Not applicable.	Reduced installation costs due to increased competition among clean energy contractors.

NEXT STEPS

Task Description	Task Lead
1. Identify potential collaborators to implement the "One-Stop Shop." This may include Center for Eco Technology, EnergySage, 1BOG, other vendors.	PVPC Sustainability Planner
2. Conduct interviews with company representatives and assess the range of services, technologies served, community marketing options, and program costs and fee structures, among other program development options.	PVPC Sustainability Planner, Collaborator(s)
3. Develop program concept, define roles and responsibilities, identify funding sources. Create program proposal including project milestones.	PVPC Sustainability Planner, Collaborator(s)
4. Solicit bids from vendors to develop and implement the "One-Stop Shop."	PVPC Sustainability Planner
5. Select contractor and implement program.	PVPC Sustainability Planner
6. Track performance over time (e.g. # of project developed, # of website hits) and evaluate program performance. Create next step recommendations.	PVPC Sustainability Planner, Contractor

CONTACTS

Agency	Name	Position	Email
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STRATEGY 8. ASSIST LOCAL JURISDICTIONS IN STREAMLINING CLEAN ENERGY REGULATIONS

Municipalities in the region can increase development of energy conservation and renewable energy projects by streamlining zoning, permitting, and regulatory processes for property owners and developers.

OBJECTIVES

★	Provide technical assistance to help communities streamline clean energy permitting and zoning application processes.
★	Control and improve the predictability of the soft costs associated with clean energy development in the Pioneer Valley.

BACKGROUND & STRATEGY DESCRIPTION

Pioneer Valley stakeholders indicate that there is a need to streamline the local permitting and inspection processes, especially in many of the smaller jurisdictions in the region. For example, PVPC recently assisted the Town of Hatfield in streamlining its zoning and permitting process for solar PV. Going forward, PVPC could partner with more local jurisdictions to streamline or improve the local clean energy regulatory process and encourage greater development of clean energy in the region.

This strategy proposes the creation of a program through which PVPC will provide technical assistance to help its region's towns and municipalities streamline zoning and permitting requirements. In particular, there are three areas where PVPC could work with local jurisdictions to potentially streamline clean energy regulations. These include:

- **Permitting requirements:** To encourage local development, it is important that projects are safely installed to meet building codes; however, in many cases, local permitting authorities are unfamiliar with solar requirements, making the permitting process cumbersome and time-consuming.
- **Zoning and land use regulations:** Local governments in Massachusetts may adopt local laws that establish what land uses, like large-scale renewable energy generation, may occur.[17] Development zones can be developed to address community historical, environmental, and health concerns. PVPC has helped several communities already define appropriate districts for large-scale solar PV by right.
- **Local property taxes:** Local governments collect tax assessments on buildings and property in the community. In many cases, due to high capital costs, renewable energy facilities increase the tax burden for residents and businesses. Communities may create property tax exemptions or credits for renewable energy technologies they wish to encourage. In the case of solar PV, large projects are increasingly turning to long-term payment in lieu of taxes (PILOT) models for municipal property taxes. Understanding the various PILOT agreements that are now in place in PVPC cities and towns will be important in providing predictability to future large-scale solar PV and other clean energy developers.

[17] There are some exceptions. For example, siting requirements for large-scale wind (over 100 MW) is overseen by the state-level Energy Facilities Siting Board. For more, see: NARUC. (January 2012). Wind Energy & Wind Park Siting and Zoning Best Practices and Guidance for States. Retrieved from: www.naruc.org/

There are a number of best practices that PVPC could deploy to assist communities in improving the local clean energy regulatory process. Table 16 below provides a brief overview of the types of clean energy zoning, permitting, and tax best practices that PVPC could use to assist local towns and cities in the Pioneer Valley.

Table 16 - Best Practices for Permitting, Zoning and Local Property Taxes

Best Practice	Description
Develop Permitting Checklists & Pre-submission Consultation	Create a step-by-step guide that leads installers, businesses, and homeowners through the permitting process for selected renewable energy technologies. This will reduce errors and inefficiencies in permit submissions and improve response times from permitting offices, thereby lowering costs for government authorities and contractors. Where appropriate, applicants should also be able to meet with the responsible authorities before submitting documents in order to ensure they have a clear understanding of all the permits and approvals needed.
Standardize Permitting Forms Online	Develop standard permitting forms in order to efficiently collect all necessary information from installers, businesses, and homeowners. This will minimize confusion and improve response times, thereby reducing soft costs. Where possible, local authorities should also build a website that enables stakeholders to access resources, templates, and additionally submit, review, and print permits online.
Create Inspection Time Windows	Require inspections in local jurisdictions to occur within a specific timeframe (e.g. within 7 days), thus reducing permitting costs, time, and frustration.
Reduce Permitting Fees	Cap, reduce or eliminate entirely permitting fees for selected renewable energy technologies. This can reduce the oftentimes significant cost of permitting. At a minimum, it should create an easily understood permitting fee structure that reflects the amount of time it takes for local governments to expedite the permit.[18]
Create Preferred RE Development Zones	Use GIS tools to identify and map preferred renewable energy (RE) development zones, taking into account community exclusion and avoidance criteria. Make maps available to the community and solicit feedback during community meetings. This will enable the community to clearly delineate preferred RE development zones, potentially reducing local opposition to projects.
Implement As-of-Right Zoning	Allow renewable energy projects in designated zones to proceed without a special permit, variance, amendment, waiver, or other discretionary approval. Communities specify where large-scale wind or solar facilities may be sited as-of-right. Establishment of designated locations for renewable energy generation facilities, as described above, is a key part of the process of adopting an As-of-Right Zoning bylaw. By determining appropriate areas for development, communities can significantly reduce the time, expense, and opposition to developing renewable energy projects.[19]
Consider Local Tax Incentives	Present information about possible incentives that could encourage renewable energy project development related to local property taxes. This may include payment in lieu of taxes (PILOT) agreements, tax exemptions, abatements, credits, or special assessments that provide predictability for all parties and mitigate possible increases in the assessed value of property attributable to renewable energy systems.

[18] National Renewable Energy Lab. (January 2013). Permitting Best Practices Make Installing Solar Easier. NREL/FS-7A30-57104. Retrieved from: http://www.nrel.gov/docs/fy13osti/57104.pdf

[19] As-of-right siting for renewable/alternative energy generation, research and development, or manufacturing facilities is required for all Green Communities in Massachusetts.

BENEFITS

+	By providing regional services to streamline regulatory processes, PVPC could help communities improve the predictability of zoning and permitting processes related to clean energy projects.
+	By considering renewable energy development goals and requirements upfront (before being approached by developers), community leaders can help establish a better understanding of the potential contributions that renewable energy can make to their respective municipal tax bases.

RISKS

⚠	Changing local regulatory processes can create confusion among local inspectors and permitting authorities. It is important to provide training to ensure that city officials are fully up to speed on new regulatory requirements, especially for clean energy technologies with which they may not be familiar. Municipal staff must be involved early on in changes to permitting processes.
⚠	Developing a streamlined regulatory process will require significant investment of time from local municipal staff. Even with a well-designed and researched process, there is no way of knowing whether the final regulations will be passed.

PROJECT COSTS & ECONOMICS

Projects costs for streamlining clean energy regulations can vary depending upon the best practices implemented and the level of stakeholder engagement required for the community. It is expected that staff time will make up the majority of project costs. Additionally, depending upon the level of research and review required, PVPC may wish to engage legal or technical consultants to review documents.

Table 17 – Streamlined Clean Energy Regulations Implementation Costs and Benefits

	To **PVPC**	To the **Community**
Financial Costs of Strategy	Staff time to research options and engage community members. This may be minimal or substantial depending on scope of the project. It may additionally require support from legal or technical consultants to evaluate options and review documents.	Not applicable.
Financial Benefits of Strategy	Simpler, more effective regulatory process that reduces staff time.	Reduced soft costs for renewable energy, resulting in cheaper clean energy projects.

Table 18 - Available Resources

Organization	Type of assistance	Description
MassDOER	Technical Assistance	**Massachusetts Model As-of-Right Zoning Bylaws:** The Model Bylaws have been prepared by the Massachusetts Department of Energy Resources (MassDOER) to assist cities and towns in establishing reasonable standards to facilitate the development of large-scale ground-mounted solar photovoltaic or wind installations. The bylaw was developed as a model and is not intended for adoption without specific review by municipal counsel. http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/gc-grant-program/criterion-1.html
PVPC	Technical Assistance	PVPC has adapted the MassDOER model bylaws for local adoption in the region. PVPC has also assisted with district siting considerations and developed criteria for the assessment of local zoning bylaws with respect to sustainability and clean energy criteria. Additionally, through the pilot project with the Town of Hatfield, PVPC developed recommended local permitting processes and a guidebook for solar PV permitting, which can be adapted and expanded to other municipalities and other types of clean energy.

NEXT STEPS

Task Description	Task Lead
1. Identify funding sources to support potential program. This may include local Green Community funds, regional planning funds, direct local technical assistance from DHCD, or local technical assistance from municipal assessments.	PVPC Sustainability Planner
2. Reach out to PVPC communities and identify jurisdictions that are seeking assistance to streamline clean energy regulatory processes. As necessary, educate community members regarding the benefits of clean energy development and streamlined regulatory processes.	PVPC Sustainability Planner
3. Review current status of regulatory best practices in selected Pioneer Valley communities. Prioritize which best practices should be implemented next in order to streamline local clean energy regulatory processes in participating municipalities.	PVPC Sustainability Planner
4. Identify project leads in local jurisdictions as well as local collaborators in each municipality. Provide technical assistance as needed.	PVPC Sustainability Planner

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STRATEGY 9. IMPLEMENT AN ORGANICS-TO-ENERGY ENGAGEMENT PROCESS

By assessing opportunities for and promoting public understanding of anaerobic digestion, PVPC can help regional communities identify opportunities for generating renewable energy from organic feedstock.

OBJECTIVES

✪	Reduce GHG emissions, increase renewable energy production, and reduce disposal of organic waste in landfills.
✪	Support local farmers by managing manure and creating soil amendments that can improve soil health or productivity.

BACKGROUND & STRATEGY DESCRIPTION

Organics-to-energy technologies take organic waste – including materials such as food, animal manure, and yard waste – and convert it to electricity and heat. An anaerobic digester is a type of organics-to-energy technology that breaks down organic matter in a chamber where no oxygen is present (hence, "anaerobic" digestion). This process produces biogas, which can be combusted to produce electricity or, alternatively, refined and used as natural gas. Heat generated during the anaerobic digestion process can also be used for a variety of applications, including space heating for residences, process heat for industrial applications, and the heating of greenhouses. Anaerobic digestion can also provide several other benefits, including the diversion of organic waste from landfills or incinerators, which reduces dependence on other fuels and creates soil amendments that can be used to improve soil health or productivity.

A number of circumstances have recently increased interest in anaerobic digestion as an energy and waste management strategy in Massachusetts. In July 2014, the Massachusetts Department of Environmental Protection (DEP) will implement a commercial organics waste ban. Under the ban, the disposal of commercial organic material – defined as food material and vegetative material from any entity that disposes of one ton or more of those materials for solid waste disposal per week – will be prohibited. Residences will be excluded from the new regulations; however, supermarkets, colleges and universities, large secondary schools, large restaurants and hotels, food manufacturers and processors, and hospitals and nursing homes will be expected to comply.[20] Furthermore, in addition, to the existing federal tax incentives, a number of new state incentive programs have emerged that improve the economics for anaerobic digestion projects. This includes rebates from MassCEC, which can cover up to 25 percent of project costs for project construction or up to 25 percent of costs for pilot projects that advance the field of organics-to-energy in Massachusetts.[21] Anaerobic digestion projects are also eligible for net metering electricity credits in Massachusetts.

As a result of changing regulations and new incentives, anaerobic digestion could be an attractive option for communities in the Pioneer Valley. In fact, Massachusetts Clean Energy Center (MassCEC) has recently completed anaerobic digester feasibility studies in Amherst and Easthampton**.** However, it is important to note

[20] Massachusetts Department of Environmental Protection (MassDEP). (n.d.). Commercial Organic Materials Waste Ban Guidance for Businesses, Institutions, and Haulers. Retrieved from: www.mass.gov/eea/docs/dep/service/regulations/proposed/orgguid13.pdf

[21] Massachusetts Clean Energy Center (MassCEC). (September 2013). Commonwealth Organics-to-Energy Grants for Construction Projects and Pilot Projects. Solicitation No. 2014-COTE-CP2. Retrieved from: www.masscec.com/

that anaerobic digestion projects are complex and the design, installation, and operation of facilities will vary from site to site. As such, PVPC could support regional communities interested in pursuing anaerobic digestion by developing a public engagement process to identify organics processing options that are compatible with community needs. PVPC could establish regional anaerobic digestion groups that are at similar stages in exploring anaerobic digestion and organic processing options. For example, Easthampton and Amherst could form one group, whereas Hampshire, Holyoke, and Hadley could form another group.

PVPC could work with a number of project partners, including surrounding communities and technical experts, to design a comprehensive engagement process. A well-designed stakeholder engagement process will work with stakeholders to identify project goals, potential development pathways, potential project benefits, and community impacts. The stakeholder engagement process should include key community members such as dairy farms and feedstock providers (e.g. restaurants, breweries, food processors, etc.), permitting and health officials, abutting residents and businesses, and project developers, among others. It will be essential to build broad stakeholder support for projects, and therefore the process should also focus on specific project sites, considering the technology options, feedstock sources (collection and transportation), energy production, and project economics.

BENEFITS

+	Pursuing anaerobic digestion projects will contribute to Pioneer Valley's mitigation goal of reducing landfill waste outlined in the 2013 Pioneer Valley Climate Action & Clean Energy Plan. Moreover, assessing anaerobic digestion potential, suitability, and impacts at a regional level, as compared to a town-by-town approach, uses financial resources more efficiently and offers a lower cost method.
+	By developing an educational and outreach program, PVPC and its partners can help mitigate community backlash for future anaerobic digestion projects.
+	The outreach and education program will additionally strengthen the regional agricultural economy, providing environmentally friendly disposal options for organic waste and supplying soil amendments to farmers.

RISKS

⚠	Misinformation can derail the project development process if community members are not engaged early in the development process to garner broad community support. It is essential to implement a well-designed and comprehensive process for the engagement program to succeed.
⚠	The engagement process could reveal that the public is not interested in pursuing anaerobic digestion projects or that there are no viable opportunities for such projects. In the event that this occurs, PVPC's investment in the study will not result in a future anaerobic digestion project.

Table 19 – Organics-to-Energy Engagement Process Implementation Costs and Benefits

	To **PVPC**	To the **Community**
Financial Costs of Strategy	Financial costs of getting interested communities involved, "matching" communities that are at similar stages in exploring anaerobic digestion and organic processing options to form regional community groups, and applying for MassCEC funding.	Not applicable.
Financial Benefits of Strategy	No direct financial benefit from implementing the public engagement process.	Not applicable.

Table 20 - Available Resources

Organization	Type of assistance	Description
MassCEC	Grant funding	MassCEC provides **up to $60,000 in grant funding** to assist municipalities or other public entities assess opportunities for organics-to-energy projects within their jurisdiction.[22] This funding can be used to provide regional stakeholders with technical assistance to develop RFPs, assess developer proposals, develop a public engagement process with community members, or conduct a pre-feasibility study for particular sites. The PVPC communities will be required to provide at least a 5 percent match to the study costs.[23]
Massachusetts Department of Environmental Protection	Technical, Financial	MassDEP has developed a matrix of **financial and technical assistance programs**, which are available to Massachusetts stakeholders interested in developing anaerobic digestion projects. http://www.mass.gov/eea/agencies/massdep/climate-energy/energy/anaerobic-digestion/anaerobic-digestion-financing-and-technical.html

[22] Support can be used for: (a) technical assistance to develop requests for qualifications (RFQs) or requests for proposals (RFPs) and other owner's agent services; (b) public engagement processes to identify organics processing options that are compatible with community needs and objectives; and (c) pre-feasibility studies for particular sites, generator clusters, or technical approaches to manage organic waste streams. Cities are required to provide at least a 5% in matching funds. For more, see: http://www.masscec.com/solicitations/technical-services-public-entities-only

[23] Massachusetts Clean Energy Center. (n.d.) Technical Services (Public Entities Only). Retrieved from: http://www.masscec.com/solicitations/technical-services-public-entities-only

NEXT STEPS

Task Description	Task Lead
1. Identify and task staffing resources to manage pre-feasibility application process.	PVPC Sustainability Planner
2. Reach out to pertinent municipal staff about pre-feasibility study. Departments could include: public works, transportation, legal staff, and environment/sustainability staff, among others.	PVPC Sustainability Planner
3. Alert MassCEC Organics-to-Energy Program Manager.	PVPC Sustainability Planner
4. Interview three or more contractors who could perform study. Apply for pre-feasibility study funding.	PVPC Sustainability Planner
5. Work with selected contractors to identify appropriate sites based on criteria outlined above and conduct pre-feasibility study.	PVPC Sustainability Planner, PVPC GIS
6. Based on results of pre-feasibility study, review options and consider next steps.	PVPC Sustainability Planner

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STRATEGY 10. DEVELOP A ZERO NET ENERGY BUILDING (ZNEB) DEMONSTRATION PROJECT

Zero net energy buildings can serve as demonstration sites for major retrofits on historic structures and spur economic development.

OBJECTIVES

✪	Demonstrate potential of deep energy retrofits and clean energy technologies to provide all building energy needs and significantly reduce GHG emissions.
✪	Improve energy performance and support renovation of old and historic building stock in the Pioneer Valley.

BACKGROUND & STRATEGY DESCRIPTION

Massachusetts is working to transform energy use in buildings, moving toward super-efficiency and zero net energy building (ZNEB) renovation and construction in order to slow the harmful progress of climate change.[24] For example, the state recently launched the Pathways to Zero Net Energy Program, which will support deployment of demonstration projects that achieve or exceed a ZNEB goal in multiple sectors. Demonstrating the potential for super-efficient buildings and ZNEBs is especially important for Pioneer Valley communities, which are home to a number of aging and historic buildings (e.g. mill buildings) that will require significant investment in coming years for renovation and redevelopment.

This strategy proposes development of a ZNEB demonstration project in the Pioneer Valley region. The demonstration project will showcase the potential for deep energy efficiency retrofits as well as innovative renewable energy technologies to revitalize aging buildings and additionally increase stakeholders' understanding of decision-making criteria for ZNEBs. To implement this strategy, PVPC could provide technical support, assisting local communities in developing zero net energy task forces, identifying potential buildings for renovation, and engaging state and federal leaders to provide additional resources to develop ZNEB projects.

BENEFITS

✚	The pilot project will demonstrate the latest energy efficiency technologies and serve as a cutting edge education project, helping inform building owners and managers of ZNEB opportunities in the region.
✚	Zero net energy buildings can support the economic redevelopment strategy in the region, leveraging state funds to support building renovations, significantly improving the energy performance of buildings, and increasing comfort and appeal of real estate in the region.

[24] According to the zero net energy taskforce in Massachusetts, "a zero net energy building is one that is optimally efficient and, over the course of a year, generates energy onsite, using clean renewable resources, in a quantity equal to or greater than the total amount of energy consumed onsite." For more, see: Getting to Zero: Final Report of the Massachusetts Zero Net Energy Buildings Task Force. (2009). Retrieved from: www.mass.gov/eea/docs/eea/press/publications/zneb-taskforce-report.pdf

RISKS

	Zero net energy projects are complex, requiring significant changes to a building enclosure, which will have significant effects on the dynamics of water, air, vapor, and heat flow within the building. It is essential to work with an experienced contractor who is fully aware of how such major retrofits will affect the building.
	Developing zero net energy building or retrofits can be cost-prohibitive. Finance and funding sources for pilot buildings will need to be carefully considered. Research should be conducted early in the process to determine the feasibility of financing ZNEB retrofits as part of the building renovation.

PROJECT COSTS & ECONOMICS

Table 21 – Zero Net Energy Building Demonstration Project Implementation Costs and Benefits

	To **PVPC**	To the **Community**
Financial Costs of Strategy	Staff costs related to providing technical assistance as well as marketing for events at the demonstration site(s).	**Financial costs for ZNEB projects can vary significantly** based upon the measures installed (basement, roof, walls, mechanical systems, etc.) as well as expenses associated with unforeseen conditions.
Financial Benefits of Strategy	Not applicable.	**Financial benefits for ZNEB projects can vary significantly** based upon the measures installed. The most cost-effective deep energy retrofit projects are those that are performed on buildings undergoing planned renovations or major repairs, which can oftentimes be implemented for minimal *incremental* costs.

Table 22 - Available Resources

Organization	Type of assistance	Description
MassDOER	Financial and Technical	**Pathways to Zero Net Energy Buildings (ZNEB) Program:** This initiative, which will be refined based on feedback from the Massachusetts ZNEB Advisory Council, will support the deployment of demonstration projects that intend to achieve or exceed a ZNEB goal in multiple sectors. The program will coordinate workforce and market development initiatives to facilitate a transition to the next generation of high-performance buildings. http://www.mass.gov/eea/energy-utilities-clean-tech/energy-efficiency/zero-net-energy-bldgs/
Mass Save	Technical	**Mass Save Deep Energy Retrofit Builder Guide:** Provides useful guidance and examples of high performance retrofit techniques for the enclosure of wood frame residential buildings in cold climates. Produced by Building Science Corporation (BSC) on behalf of the Mass Save Energy Efficiency Program Administrators. http://www1.nationalgridus.com/Files/AddedPDF/POA/DER_Guide_final_lores.pdf

NEXT STEPS

Task Description	Task Lead
1. Create a Local ZNEB Task Force by identifying local leaders interested in developing a ZNEB demonstration project. This may include local policy-makers, economic development specialists, realtors, building owners and managers, as well as energy and building management experts.	PVPC Sustainability Planner, Local Champion TBD
2. Identify one or more potential buildings for ZNEB renovations. With Task Force, identify potential buildings that will make good candidates for ZNEB demonstration sites. Target historical structures or buildings in need of redevelopment, including mills and other locally significant buildings in the region.	PVPC Sustainability Planner, Local Champion TBD, PVPC GIS, Local Building Inspectors, Historical Commissions
3. Identify funding and incentives to support development. It will be important to identify state and private funding to finance renovations and retrofits. Discuss funding opportunities with MassDOER's "Pathways to Zero Net Energy" program manager. Additionally, explore potential to leverage local economic development funds, private sector investment, as well as resources from regional foundations and non-profits.	PVPC Sustainability Planner, Local Champion TBD, MassDOER
4. Develop ZNEB proposal for selected building in region.	Local Champion, PVPC Sustainability Planner

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MORE INFORMATION

- **Getting to Zero, Final Report of the Massachusetts Zero Net Energy Buildings Task Force:** The report describes recommendations of the Massachusetts Zero Net Energy Buildings Task Force to transform the building sector and create a pathway toward zero net energy buildings in the Commonwealth. www.mass.gov/eea/docs/eea/press/publications/zneb-taskforce-report.pdf

CONCLUSION AND OUTLOOK

After a year-long, community-wide engagement process, stakeholders in the Pioneer Valley have identified their top ten strategies for moving the region toward its clean energy vision. These strategies will not only help the Pioneer Valley reduce its dependence on fossil fuels and boost local economic development, but also foster regional collaboration, improve infrastructure, and take full advantage of the region's innovators in academia and business. The *Pioneer Valley Clean Energy Roadmap* serves as a strategic complement to the goal-setting which has taken place in the participating communities around energy consumption, GHG emissions, and renewable energy generation, as evidenced by the 2013 update of the *Pioneer Valley Climate Action and Clean Energy Plan*. By using this roadmap as a guide to set policy and planning priorities, and leveraging the resources highlighted throughout, Pioneer Valley has the opportunity to achieve its energy and emissions targets and enjoy the benefits of a clean energy economy.

The strategies outlined in this report were generated by dialogue within the PVPC Working Group and the Community Energy 101 and 201 Forums, where technical experts and community members alike had the chance to contribute to the visioning process. Successful implementation will require sustained public engagement to garner the support, expertise, and assistance of the broader community. While much remains to be done, this document and the process to produce it represent the willingness and enthusiasm of people within the Pioneer Valley to take action in mitigating and preparing for climate change. With this encouraging outlook, the PVPC and its communities can begin tackling the strategic Next Steps described in this roadmap to make its regional clean energy vision a reality.