

NEWBURYPORT CLEAN ENERGY ROADMAP

Prepared for the City of Newburyport, Massachusetts

January 1, 2015



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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 Massachusetts 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:

- 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 Newburyport Clean Energy Working Group. Composed of 18 local leaders – and led by Newburyport Mayor Donna Holaday and Newburyport Sustainability Director Molly Ettenborough – the Working Group collaborated with businesses, residents, and non-profit leaders across the city. 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 community. The Working Group also collaborated with technical experts to assess and refine the clean energy strategies in this roadmap.

Through this process, Newburyport stakeholders set a goal to become a zero net energy community by 2050. Achieving this goal will require significant energy use reductions in municipal, residential, and commercial building and transportation sectors. It will additionally require the development of new renewable energy resources to provide clean energy generation to Newburyport.

The following strategies, further detailed in Section 3, were identified by Newburyport 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. Newburyport's 14 clean energy strategies include:

Energy Efficiency Strategies

- [Strategy 1.](#) Launch A Grassroots Energy Efficiency Marketing Campaign
- [Strategy 2.](#) Educate Stakeholders On Energy Savings From Tree Shading
- [Strategy 3.](#) Demonstrate Potential of Green Roof Installations
- [Strategy 4.](#) Support Demonstration Of Deep Energy Retrofits In Residential Buildings

Clean Energy Strategies

- [Strategy 5.](#) Create A Community-Wide Electricity Aggregation Program For Renewable Energy
- [Strategy 6.](#) Streamline Local Regulations To Accelerate Renewable Energy Development
- [Strategy 7.](#) Develop a One-Stop Shop For Clean Energy
- [Strategy 8.](#) Procure Solar To Reduce Municipal Energy Costs
- [Strategy 9.](#) Develop Solar Canopies In Newburyport Parking Lots
- [Strategy 10.](#) Develop Sustainable Infrastructure Along The Waterfront
- [Strategy 11.](#) Assess Regional Anaerobic Digestion Project Opportunities

Sustainable Transportation Strategies

- [Strategy 12.](#) Develop A Bike Sharing Plan
- [Strategy 13.](#) Increase Access to Electric Vehicle Charging Stations
- [Strategy 14.](#) Create A Sustainable Boating Program

As described in the following pages, Newburyport has a history of successful clean energy planning and project development; however, a continued focus will be needed to achieve Newburyport's long-term clean energy goals. By implementing these strategies, Newburyport can take concrete steps to achieving its zero net energy vision while also positioning itself as a clean leader in 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 Newburyport Clean Energy Roadmap benefited from the active leadership and engagement of the Newburyport Clean Energy Working Group. Led by Newburyport Mayor Donna Holaday and Newburyport Sustainability Director Molly Ettenborough, the Working Group guided and supported the implementation of Newburyport's Community Energy Strategies process and the resulting *Clean Energy Roadmap*. Members of the Newburyport Clean Energy Working Group include:

- *Molly Ettenborough*, City of Newburyport
- *Eric Gregorie*, City of Amesbury
- *Linda Guthrie*, City of Newburyport
- *David Hall*, Hall and Moskow Real Estate
- *Lauren Healey*, Newburyport High School
- *Donna Holaday*, Mayor, City of Newburyport
- *Steve Johnson*, Solais Lighting
- *Peter Lombardi*, City of Newburyport
- *Ron Martino*, Resident of Newburyport
- *Jill Murphy*, Newburyport Clean Tech Center
- *Ann Ormond*, Greater Newburyport Chamber of Commerce
- *Andy Port*, City of Newburyport
- *Manfred Raschke*, International Strategic Information Services
- *Christian Scorzoni*, City Councilor, City of Amesbury
- *Michael Strauss*, Newburyport Energy Advisory Committee
- *Christin Walth*, Toward Zero Waste Newburyport
- *Steve Wiehe*, Newburyport Energy Advisory Committee
- *Jonathan Woodman*, Woodman Associates Architects

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

Newburyport has a history of success in implementing clean energy projects, with a strong commitment to innovation and a track record of robust community engagement. Among its many successes, the City of Newburyport is home to several megawatts of solar photovoltaic (PV) installations on its schools, businesses, and residences. It supports cleantech innovators through the Newburyport Clean Tech Center, which provides business development services and office space to emerging innovation companies. In 2008, the City was one of the founding members of the Newburyport EcoCollaborative, an organization created to foster collaboration and support city planning for sustainability initiatives. It is also an active member of the Merrimack Valley Planning Commission (MVPC), where it regularly collaborates with MVPC cities and towns on clean energy projects and programs.

Building on these and other clean energy accomplishments, Newburyport stakeholders have proposed a long-term vision to become a zero net energy community by 2050. Newburyport has defined this goal to mean that the City will significantly reduce energy use in the governmental, residential, and commercial building and transportation sectors via energy efficiency and energy conservation measures and additionally provide the balance of energy needs from renewable energy resources. To the extent possible, Newburyport will also generate renewable energy from local projects. Through the Community Energy Strategies Program (CESP), Newburyport developed this long-term vision and has pledged to create a five-year action plan to support its implementation.

PAST ACCOMPLISHMENTS

The City of Newburyport has a track record of implementing successful sustainability and clean energy projects. Chief among these is Newburyport's designation as a Massachusetts Green Community, for which the City worked with the Massachusetts Department of Energy Resources (MassDOER) to fulfill a series of clean energy requirements that encourage energy efficiency and renewable energy development. The following section provides an overview of Newburyport's previous clean energy accomplishments:

Energy Efficiency

- Newburyport has committed to significant energy efficiency improvements at many city-owned facilities. For example, the City of Newburyport utilized federal Energy Efficiency Conservation Block Grant funding administered by MassDOER for efficiency improvements at the Kelley Youth Center. This included HVAC system upgrades, insulation improvements, updated thermostats, and improved air and steam systems.
- Newburyport used grant funding from the MassDOER Green Communities program to fund energy efficiency improvements for its police station and public library.

- ⦿ The City has recently approved multi-million dollar school improvement projects for Molin Upper Elementary School and Nock Middle School, both of which will improve HVAC, electric and plumbing systems and fund energy efficiency improvements.

Renewable Energy

- ⦿ During 2012, the City of Newburyport participated in MassCEC's Solarize Mass program. The Solarize Mass program helps communities increase adoption of small-scale solar electricity systems through a grassroots educational campaign, driven mainly by local volunteers, and a tiered pricing structure that increases the savings for everyone as more home and business owners in a community sign up. As a result of the five-month program, Newburyport realized a six-fold increase in its installed solar capacity.
- ⦿ In 2009, the City of Newburyport permitted and approved a 600 kilowatt (kW) wind turbine at Mark Richey Woodworking.
- ⦿ The Mark Richey Woodworking facility has additionally installed a biomass furnace for heating, which is fueled by scraps from the manufacturing process.
- ⦿ Newburyport has municipally owned or leased solar systems throughout the City. It is party to a 20-year agreement to purchase low-cost electricity from a 2,000 panel solar PV installation on the rooftops of Rupert Nock Middle School, Edward G. Molin Upper Elementary School and the Department of Public Works building. The City's wastewater treatment facility additionally hosts a 26.88 kW solar PV system.
- ⦿ Newburyport permitted one of the first tracking solar PV systems in the state at the Tannery Marketplace, which hosts a 125 kW installation in downtown Newburyport.

Energy Policy and Planning

- ⦿ The Newburyport *Energy Reduction Plan*, adopted as a part of the Massachusetts Green Communities program, outlines City projects and policies that reduce energy use.
- ⦿ Newburyport was designated a Green Community in 2010 and has achieved one of the initial goals of reducing energy use by 20% within five years.
- ⦿ The Energy Advisory Committee (EAC), a voluntary committee that supports City officials (described below), recently formed a street lighting sub-committee, which will focus on the planning and implementation of more efficient street lighting in the City.

Community Education and Engagement

- ⦿ The Energy Advisory Committee has provided community input and technical expertise to Newburyport public officials since 2007. The EAC helps to advise public officials on policies and programs that enable energy policy and planning initiatives across the City.
- ⦿ The Nock Molin Middle School, which hosts a solar PV installation (described above), uses the rooftop solar array in its lessons plans, helping students understand the role of solar PV in local energy use.
- ⦿ The Newburyport Clean Tech Center provides office space to eight cleantech companies. It additionally offers business development, education, and other support services to assist entrepreneurs launching their businesses.

SECTION 2: METHODOLOGY

NEWBURYPORT CLEAN ENERGY WORKING GROUP

The Newburyport 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 the City of Newburyport, MassCEC, MassDOER, Meister Consultants Group, and Stone Environmental. Composed of 18 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 Newburyport 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 *Newburyport 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 101 COMMUNITY FORUM

The Clean Energy 101 Community Forum was a public meeting held in June 2013 that brought together local officials and stakeholders, to learn about the CESP process, discuss Newburyport's clean energy goals with working group members, and proposed potential clean energy projects that could be implemented in the city.

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 *Newburyport Clean Energy Roadmap*. From this list, the Working Group identified 14 strategies that could best achieve Newburyport's 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 201 COMMUNITY FORUM

The Clean Energy 201 Community Forum was a public meeting held in September 2013 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 four potential strategies for community stakeholders to review with experts at the 201 Forum.

- **Local Marketing for Energy Efficiency:** Utility representatives discussed the potential to employ local marketing to increase energy efficiency adoption.
- **Anaerobic Digestion Development in Newburyport:** MassCEC discussed the opportunities and challenges of anaerobic digestion technology.
- **Solar canopies in Newburyport Parking Lots:** A developer described the potential for developing solar canopies in parking lots across the city.
- **Piloting Development of Electric Vehicle Charging Infrastructure:** MassDOER discussed the potential to leverage state grants to develop electric vehicle charging stations throughout the city.

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 would 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 *Newburyport Clean Energy Roadmap*. Local and state officials and Newburyport Working Group members provided critical feedback on the draft Roadmap. The project team integrated edits and submitted a final draft of the *Newburyport Clean Energy Roadmap*, which was reviewed and approved by Working Group members as well as MassCEC and MassDOER.

ENERGY EFFICIENCY

COMMUNITY ENERGY STRATEGIES FOR NEWBURYPORT



STRATEGY 1. LAUNCH A GRASSROOTS ENERGY EFFICIENCY MARKETING CAMPAIGN

Energy efficiency (EE) is one of the most cost-effective clean energy measures. Innovative, community-based marketing strategies can increase EE adoption by residents and businesses, creating significant cost saving for the community.

OBJECTIVES

	Increase awareness of utility EE programs in Newburyport and support creation of a local EE market.
	Reduce GHG emissions and increase energy cost savings in the community.

BACKGROUND & STRATEGY DESCRIPTION

Within Newburyport, there are significant opportunities to increase energy efficiency adoption among residents and businesses. For example, within the commercial sector, only 70 out of 1,500 businesses have taken advantage of utility energy efficiency programs. Similarly, Newburyport's residential sector could also save money and energy by increasing participation in utility EE programs.

A number of Massachusetts' cities and towns have developed and implemented community engagement strategies, oftentimes in collaboration with utility energy efficiency vendors, to increase adoption of energy efficiency. A grassroots energy efficiency marketing and engagement campaign in Newburyport could increase participation in utility EE programs. Such an initiative would support stakeholders expressed the need to launch an education and outreach initiative that fosters a "cultural shift" in the community, motivating individuals to implement energy efficiency measures in homes and businesses.

This strategy proposes to develop a comprehensive customer outreach, marketing, and education program in order to increase awareness of energy efficiency options in Newburyport. The strategy would target residential and commercial customers through community-based outreach. Where possible, it is recommended that Newburyport coordinate closely with MassCEC, MassDOER, as well as the utility energy efficiency program administrators in order to leverage existing resources and outreach efforts. It was additionally proposed that the City hire a part-time energy efficiency coordinator, who could help coordinate outreach efforts among non-profits, volunteers, businesses, and residents in Newburyport. Key features of the proposed community-based outreach program may include some or all of the initiatives described in Table 1.

Table 1- Potential community energy efficiency marketing program elements

Energy Efficiency Marketing	Description
Online Energy Efficiency Platform	Develop an online platform that informs and educates residential and commercial customers about energy efficiency options; develop testimonial and case studies from local residents; connect residents and businesses to no-cost energy efficiency assessments from utility providers as well as other resources
Workshops with Technical Experts	Implement a series of workshops for Newburyport residents and business owners about specific energy efficiency technologies. Potential topics could include: • Residential energy efficiency 101: the MassSAVE program • Advanced home energy efficiency • Renewable heating and cooling opportunities • Commercial property energy efficiency incentives and opportunities
Face-to-Face Engagement	The most successful EE outreach and engagement happens face-to-face, wherein residents and businesses teach one another about EE opportunities; create a network of volunteers that host dinners, cocktails, or other events in order to recruit friends, neighbors, and colleagues to participate in the utility energy efficiency programs.
Media Outreach	Develop a monthly newspaper column, distribute fliers, and distribute other media in order to educate community members about energy efficiency options.
Progress Tracking	Create a community energy audit and/or retrofit goal and work with utility vendors to measure and track progress towards that goal
Neighborhood-based Competition	Create neighbor-to-neighbor energy efficiency audit and/or retrofit challenges in order to drive friendly competition within the community
Energy Efficiency Coordinator	Explore finding resources to support a part-time position to coordinate Newburyport energy efficiency outreach efforts and to provide hand-holding support for individuals who may need extra support.
Contractor Workshops	In coordination with other interested stakeholders, conduct contractor trainings related to energy efficiency retrofits, deep energy retrofit strategies, proper HVAC sizing and installation and other key home performance strategies.

BENEFITS

	By increasing community awareness of opportunities for energy efficiency savings, Newburyport can leverage state and private sector funds to assist residents and businesses reduce energy use, achieve significant cost-savings, and reduce community-wide GHG emissions.
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RISKS

	It will be important to ensure that community marketing is effective in increasing the number of energy efficiency retrofits over time. 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 communications strategy.
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PROJECT COSTS & ECONOMICS

Costs associated with a community energy efficiency marketing campaign can vary depending upon the scope, scale, and staffing for the program. The following describes potential project costs to implement a grassroots energy efficiency marketing campaign in Newburyport.

Table 2 – Community Energy Efficiency Marketing Campaign Study Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	Staff salary and overhead for a part-time energy efficiency coordinator represent the largest potential costs, though some staff costs may be mitigated by developing a network of volunteers. In addition, Newburyport may wish to reserve a modest budget (approximately \$5,000 to \$10,000) to design and develop a website and online campaign.	Not applicable.
Financial Benefits of Strategy	By driving outreach for EE retrofits, Newburyport may also increase the number of EE retrofits in public buildings. This could represent significant cost savings and/or offset all of the costs for hiring an EE coordinator.	Long-term financial benefits from energy cost-savings from completed projects.

Table 3 - Available Resources

Organization	Type of assistance	Description
Massachusetts Utilities	Financial	MassSAVE: MassSave 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/

NEXT STEPS

Task Description	Task Lead
1. Identify and task staffing resources to coordinate energy efficiency marketing services on behalf of the community. Apply for community marketing grants with the utility and hire energy efficiency coordinator, if necessary.	Newburyport Sustainability Director
2. Identify volunteers, regional non-profits, businesses, and other potential project partners that share common goals to implement energy efficiency marketing program.	Newburyport Sustainability Director
3. Reach out to utility energy efficiency representatives and/or contractors about outreach and marketing efforts. Develop community-based outreach and marketing plan.	Newburyport Sustainability Director and EE coordinator
4. Work with volunteers to implement plan. Start development of website/online marketing platform, if necessary, as well as community based events.	Newburyport Sustainability Director, EE coordinator, and project partners
5. Track performance metrics (e.g. # of events, # of website hits, # of energy assessment performed)	Newburyport Sustainability Director, EE coordinator and project partners

CONTACTS

Organization	Name	Position	Email
City of Newburyport	Molly Ettenborough	Sustainability Director	mettenborough@cityofNewburyport.com
City of Newburyport	Linda Guthrie	EE Coordinator	lgguthrie@comcast.net
Next Step Living	Suzanne Snyder	Regional Outreach Coordinator	Suzanne.snyder@nextstepliving.com

MORE INFORMATION

- Cambridge Energy Alliance:** The Cambridge Energy Alliance (CEA) is a part of City government and helps Cambridge residents and businesses identify and arrange financing for all cost-effective energy efficiency improvements for their homes and businesses. CEA works with organizations that provide energy auditing capability, construction expertise, and financial resources. It serves as a case study that can inform Newburyport of options for implementing a city run energy efficiency program. <http://cambridgeenergyalliance.org/>
- Renew Boston:** Renew Boston is a network of energy efficiency providers helping to assist qualified Boston tenants, homeowners, and landlords in making energy improvements to their homes and properties. The City and its partner Mass Save provide eligible Bostonians with no-cost home energy assessments and incentives for energy efficiency upgrades including insulation, air sealing, water saving devices, and high-efficiency light bulbs. It serves as a case study that can inform Newburyport of options for implementing a city run energy efficiency program. <http://www.renewboston.org>

STRATEGY 2. EDUCATE STAKEHOLDERS ON ENERGY SAVINGS FROM TREE SHADING

By strategically planting trees around public buildings, Newburyport can achieve significant building energy cost savings while also improving community aesthetics.

OBJECTIVES

★	Educate Newburyport stakeholders on the building energy benefits of tree planting.
★	Reduce building energy use and community greenhouse gas emissions.

BACKGROUND & STRATEGY DESCRIPTION

Tree planting is a proven and effective strategy to reduce building energy use. Trees provide shading to cool the environment in the summertime. Since cool air settles near the ground, while warm air rises, air temperatures directly under trees can be as much as 25°F (14°C) cooler than air temperatures above nearby blacktop.¹ In addition, well-placed trees can provide a windbreak, protecting buildings from wind in the wintertime and reducing energy bills. According to the U.S. Department of Energy, well-positioned trees around a house can save up to 25% of heating and cooling energy consumption, making a significant contribution to building energy savings.²

This strategy proposes to expand Newburyport's tree planting initiative and increase outreach regarding the energy savings benefits of tree planting. A number of stakeholders could be engaged to support this initiative. This includes the City's Tree Warden, the Newburyport Tree Commission, school leaders and students, among other interested stakeholders. Working closely with the Tree Warden, stakeholders would identify buildings that could benefit from strategically placed trees and focus plantings around those buildings in order to reduce building energy consumption.

BENEFITS

+	Residents and businesses would be more aware of the potential for building energy cost savings, increasing the likelihood that community members could achieve significant energy cost reductions in summer and winter due to strategic tree plantings.
+	Residents would benefit from aesthetic value associated with increased tree cover in the community.
+	Trees increase the soil, water, and air quality of the community. Trees protect the soil from erosion and additionally provide modest air quality improvements, reducing solid and gaseous particulates from the air. ³

¹ U.S. Department of Energy, (1995) Landscaping for Energy Efficiency. Retrieved from: <http://www1.eere.energy.gov/library/pdfs/16632.pdf>

² Ibid.

³ U.S. Department of Agriculture, Forest Service- Northeastern Areas State & Private Forestry. (n.d.) Values of Urban Trees. Retrieved from: <http://www.na.fs.fed.us/spfo/pubs/uf/techguide/values.htm>

PROJECT COSTS & ECONOMICS

Table 4 – Trees and Building Energy Strategy Implementation Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	The cost of the project would likely be modest. The Newburyport Tree Commission, a volunteer group and the primary authority on tree-related education in Newburyport, would manage the project, providing the majority of investment of time required for the project.	Not applicable.
Financial Benefits of Strategy	Modest financial benefits from decreased energy costs at municipal facilities selected for plantings.	Minor financial benefits from decreased energy costs at sites selected for plantings.

NEXT STEPS

Task Description	Task Lead
1. Identify and task staffing resources from the Tree Commission and/or relevant City Departments to design and implement the educational process. Identify grant funding to support the project. Explore potential to also expand strategy to also support development of green roofs in the community.	Newburyport Department of Public Service (DPS) and the Tree Commission
2. Identify and analyze public buildings that would benefit from strategically placed tree plantings. Additionally, assess potential for implementing volunteer efforts to plant small-scale green roof pilot projects on community structures (e.g. the baseball dugouts at Pioneer field or the Chamber Information Center).	Tree Commission
3. Plant trees and/or implement small-scale green roof projects.	Newburyport DPS and Tree Commission
4. Develop educational materials and exhibits describing the tree plantings and green roof benefits and articulating benefits to building owners and the community	Tree Commission
5. Host educational events with local Newburyport schools, integrating educational material into school curricula where possible	Tree Commission, School Green Teams, School Curriculum Director and/or Department Heads

CONTACTS

Organization	Name	Position	Email
Tree Commission	Ed Taylor	Chairman	dps@cityofnewburyport.com
Newburyport Dept of Public Service	Andrew Lafferty	Deputy Director of Public Services	alafferty@cityofnewburyport.com

STRATEGY 3. DEMONSTRATE POTENTIAL OF GREEN ROOF INSTALLATIONS

Newburyport could support local building owners demonstrate the viability of green roofs in the community.

OBJECTIVES

★	Finance, design, and build green roof at local school in order to provide energy, environmental, and quality of life benefits to students and teachers.
★	Reduce energy consumption and costs associated with heating and cooling buildings.
★	Reduce pollution and negative impacts associated with storm water runoff.
★	Reduce urban heat island effect and associated energy, pollution, and health costs.

BACKGROUND & STRATEGY DESCRIPTION

A green roof is a roof on which vegetation is planted in order to reduce energy consumption in buildings, reduce storm water runoff, and address large-scale urban challenges like the Urban Heat Island Effect.⁴ Green roofs are commonly constructed in European countries, with a number of cities establishing green roof policies in support of broad sustainability goals.⁵ London, for example, mandates that green roofs shall be established on all new construction.⁶ Similarly, Copenhagen is increasingly integrating green roofs into local infrastructure, having established a goal of 350,000 meters of green roofs by 2015.⁷

Within the U.S., green roofs have been less popular, in part because they typically do not meet building owners' short-term energy cost-effectiveness requirements. Where green roofs are developed, though, they are usually considered part of an integrated sustainability strategy, which addresses a variety of economic and environmental concerns.

This strategy describes options for demonstrating green roofs. Newburyport already has some experience developing green roofs in the community, having worked with local students to design and install a green roof on the shed at the Newburyport Recycling Center. Leveraging this past experience, there is interest among some progressive building owners to install green roofs on one or more multi-family residential buildings, creating residential green space that can improve quality of life for residents and provide the building with important energy, water, and sustainability benefits.

⁴ The Urban Heat Island Effect occurs in metropolitan areas, which are significantly hotter than surrounding rural areas due to increased surface area of buildings, road, and other dry and impermeable structures. See U.S. Environmental Protection Agency (EPA). (2013). What is an Urban Heat Island? Retrieved from www.epa.gov/hiri/about/index.htm.

⁵ Green Roofs for Healthy Cities. (n.d.). About Green Roofs. Retrieved from www.greenroofs.org/index.php/about/aboutgreenroofs.

⁶ Vestvik, M. (2012). Green Roofs. CORPUS The SCP Knowledge Hub. Retrieved from <http://www.scp-knowledge.eu/sites/default/files/Vestvik%202012%20Green%20Roofs.pdf>

⁷ Ibid.

BENEFITS

+	Buildings with green roof installations benefit from reduced heating and cooling loads and reduce temperature fluctuations, thus improving building comfort and energy savings.
+	The community benefits from enhanced storm water management, as green roofs absorb water on rooftops and reduce runoff. The U.S. EPA estimates green roofs can capture up to 50-90 percent of rainwater.
+	Green roofs enhance quality of life and provide additional park space for building residents and community members.

RISKS

	The risk of building damage from water leakage or structural overloading is real and can occur in poorly constructed green roofs. In worst case scenarios, improperly installed or maintained roofs could result in failure to deliver environmental benefits to building, building mold, or roof collapse. ⁸ As a result, building owners should carefully vet green roof designers and contractors.
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PROJECT COSTS & ECONOMICS

Project costs for green roofs can vary significantly, depending upon roof conditions and the type of plants selected for the green roof. The following describes potential program costs and economics.

Table 5 – Green Roofing Implementation Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	Installation costs for green roofs range from \$10 to \$25 per square foot. Maintenance costs can vary significantly.	Not applicable.
Financial Benefits of Strategy	Financial benefits of green roofs include reduced energy costs of the building.	Not applicable.

⁸ White, G. (2009). Mitigating Risks When Building Green Roofs. Green Building Risk Management. Retrieved from www.greenrealestatelaw.com/2009/05/mitigating-risks-when-building-green-roofs/.

Table 6 - Available Resources

Organization	Type of assistance	Description
U.S. Environmental Protection Agency	Financial	EPA Water Grants & Funding: The EPA provides a variety of grants to protect water, human health and the environment. The Targeted Watersheds Grants Program is one of several grant programs that supports approaches to protect and restore the nation's watersheds. http://water.epa.gov/grants_funding/
U.S. Environmental Protection Agency	Technical	Reducing Urban Heat Islands: Compendium of Strategies, Green Roofs: the U.S. EPA developed this guide to assist stakeholder consider issues and options related to green roof development in order to reduce the impacts of the Urban Heat Island Effect. It provides helpful background on a number of design and development issues. http://www.epa.gov/hiri/resources/pdf/GreenRoofsCompendium.pdf

NEXT STEPS

Task Description	Task Lead
1. Identify multi-family, residential property owners who are interested in implementing a green roof project. Offer to provide zoning, outreach, and grant application assistance from the City.	Newburyport Sustainability Director
2. Identify potential grants and other funding sources to support project. In particular, reach out to EPA and Mass DEP representatives to discuss grant opportunities.	Newburyport Sustainability Director and Residential Facility Owner
3. Interview green roof contractors to explore design options and get high level estimates for green roof project.	Residential Facility Owner
4. Apply for state or federal grant resources to support feasibility study and construction of demonstration project.	Facility owner with assistance from Newburyport Sustainability Director
5. Get three bids for design and construction from experienced and reputable contractors. Review bids and select best offer.	Residential Facility Owner
6. Start construction	Residential Facility Owner

CONTACTS

Organization	Name	Position	Email
City of Newburyport	Molly Ettenborough	Sustainability Director	mettenborough@cityofNewburyport.com
Hall and Moskow	David Hall	Owner	ddh@hallandmoskow.com

STRATEGY 4. SUPPORT DEMONSTRATION OF DEEP ENERGY RETROFITS IN RESIDENTIAL BUILDINGS

By conducting deep energy retrofits (DERs) during renovation or new construction of residential buildings, Newburyport can explore the opportunities and challenges related to achieving significant energy savings

OBJECTIVES

★	Demonstrate potential for deep energy efficiency retrofits to achieve net zero energy goals.
★	Reduce GHG emissions and energy use in buildings.

BACKGROUND & STRATEGY DESCRIPTION

A deep energy retrofit (DER) is the modification of a building's enclosure and systems, which can significantly reduce the heating and cooling requirements and lower operational costs. DER projects exceed typical building construction code standards and rival high-performance new construction. Recent studies show that DERs can achieve energy savings of 50 percent or more in residential buildings.

The best time to complete a DER is during major repairs or renovation of buildings, when the budget and resources have already been allocated for major building maintenance or repairs – such as re-roofing, re-siding, or finishing basement and attic spaces (oftentimes to meet non-energy needs). At such times, the benefits of DERs can usually be achieved at relatively small *incremental* costs.⁹ In addition, DERs can be scaled depending upon building characteristics, owners' preferences, and construction budget. In fact, most DER projects address only one or two major components of a building enclosure, such as the roof or walls. DER projects also typically integrate high efficiency heating, cooling, and water heating equipment.¹⁰

This strategy proposes to support demonstration of DERs in residential buildings in Newburyport. To implement this strategy, the City would work with private sector building owners to identify residential buildings in need of significant repair or renovation. To the greatest extent possible, the City would provide technical support to assist building owners implement DERs. By demonstrating the potential DERs on a small number of pilot projects, Newburyport can identify opportunities and challenges related to the implementation of DERs.

⁹ Building Science Corporation. (2013). Mass Save Deep Energy Retrofit Builder Guide. Prepared for Mass Save and its Sponsors. Retrieved from www1.nationalgridus.com/Files/AddedPDF/POA/DER_Guide_final_lores.pdf.

¹⁰ According to Building Science Corporation (BSC), DER buildings achieve performance targets that are commonly expressed as “1.5-5-10-20-40-60” where 5 refers to the target R-value for windows and doors; 10, the target R-value for slabs; 20, the target R-value for foundation wall assemblies; 40, the target R-value for wall assemblies; 60, the target R-value of the attic/roof assembly; and, 1.5, the target air tightness of the building enclosure system measured in terms of air changes per hour at 50 Pascals (ACH50). These targets provide a framework for identifying high performance enclosures. Building Science Corporation. (2013). Mass Save Deep Energy Retrofit Builder Guide. Prepared for Mass Save and its Sponsors. Retrieved from www1.nationalgridus.com/Files/AddedPDF/POA/DER_Guide_final_lores.pdf.

BENEFITS

+	A well-managed DER improves building durability, comfort, and indoor air quality. By demonstrating the value of these projects in residential buildings, Newburyport can improve energy efficiency and standard of living for its residents.
+	In addition to EE and standard of living improvements, DER projects also result in very low building energy use. The demonstration projects can illustrate the significant operational costs savings to building owners and residents, which can additionally reduce the impact of energy price volatility associated with fluctuating heating and cooling costs.
+	DER projects also can increase the usable space and amenities of a building. Retrofitting the thermal enclosure of attic or basement spaces in demonstration projects, for example, can help to show residents how they can expand the finished living area of the building. ¹¹

RISKS

	DER 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 DER projects will impact the building. A list of National Grid approved DER contractors is available online. ¹²
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PROJECT COSTS & ECONOMICS

Table 7 - Strategy Implementation Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	Minor costs related to providing technical assistance and marketing for events at demonstration site.	Financial costs for DER projects can vary significantly based upon the measures installed (basement, roof, walls, mechanical, etc.) as well as expenses from "unforeseen conditions." ¹³
Financial Benefits of Strategy	Not applicable	Financial benefits for DER projects can vary significantly based upon the measures installed. The most cost-effective DER projects are those that are performed on buildings undergoing planned renovations or major repairs, which can oftentimes be implemented for minimal <i>incremental</i> costs.

¹¹ Building Science Corporation. (2013). Mass Save Deep Energy Retrofit Builder Guide. Prepared for Mass Save and its Sponsors. Retrieved from www1.nationalgridus.com/Files/AddedPDF/POA/DER_Guide_final_lores.pdf.

¹² For list of approved contractors, see www1.nationalgridus.com/Files/AddedPDF/POA/DERList_2013-06-07.pdf

¹³ For example, a recent assessment of four wood frame single-family DER projects in Utica, NY ranged in cost from \$98,000 to \$144,000. These costs include comprehensive building renovations – including upgrades to the buildings' walls, basements, roofs, attics, in addition to deferred maintenance costs. The DER measures achieved 47 to 62 percent reductions in building energy use. See Pedrick, G. et al. (2010). NYSEDA Deep Energy Retrofit Contractor Training. Retrieved from www.nyserda.gov. It is important to note that these are representative costs only and included work for major building renovation. Retrofit costs for specific measures will vary based on site conditions as well as the full building renovation budget.

Table 8 - Available Resources

Organization	Type of assistance	Description
National Grid	DER Rebate Program	National Grid offers incentives for DER measures in existing single and multi-family homes (one to four family buildings). The Deep Energy Retrofit program provides homeowners with base incentives that range from \$2.00 to \$3.50 per square foot of treated area. An additional performance incentive of \$1.75 for reductions achieved is also available.
Mass Save	Financing	The Massachusetts HEAT loan provides 0% interest financing up to \$25,000 with terms up to seven years.

NEXT STEPS

Task Description	Task Lead
1. Identify and task staffing resources to support DER project development in Newburyport	Newburyport Sustainability Director
2. Identify a one-to-four-family residential building slated for renovations or significant repairs, which could serve as demonstration projects in the city. Engage building owner and gauge interest in participating in DER program.	Newburyport Sustainability Director
3. Support building owner reach out to utility DER representatives and/or approved contractors to discuss potential DER measures and cost estimates for selected sites.	Newburyport Sustainability Director and Facility Owner
4. Solicit formal bids from approved DER contractors to complete DER projects at selected sites. Enter into contract with winning contractor.	Facility owner with assistance from Newburyport Sustainability Director
5. Start construction and monitor progress of work.	Residential Facility Owner
6. Track performance of DER retrofit, develop case studies, and host open houses to demonstrate project viability for Newburyport residents	Residential Facility Owner

CONTACTS

Organization	Name	Position	Email
City of Newburyport	Molly Ettenborough	Sustainability Director	mettenborough@cityofNewburyport.com
Hall and Moskow	David Hall	Owner	ddh@hallandmoskow.com

CLEAN ENERGY

COMMUNITY ENERGY STRATEGIES FOR NEWBURYPORT



STRATEGY 5. CREATE A COMMUNITY-WIDE ELECTRICITY AGGREGATION PROGRAM FOR RENEWABLE ENERGY

Newburyport could supply a large portion of the community's residential electricity supply from renewable resources through its forthcoming community electricity aggregation program.

OBJECTIVES

★	Increase share of renewable energy in the community's electricity supply.
★	Encourage regional collaboration and reduce electricity costs for local residents.

BACKGROUND & STRATEGY DESCRIPTION

In Massachusetts, municipalities can work with community electric aggregators to purchase bulk power for residents and businesses at the most competitive rates available. Over the past year, Newburyport has started the process for developing a community electricity aggregation program, working with the Merrimack Valley Planning Commission, Colonial Power Group,¹⁴ and neighboring communities in order to obtain advantageous pricing for electricity from competitive retail electricity suppliers. As Newburyport moves forward with this community aggregation program, it could explore potential to procure a significant portion (20% or more) of its electric supply from renewable energy sources for the public, residential, and commercial sectors.

Procuring renewable energy via its forthcoming community aggregation program raises a number of questions for Newburyport. For example, the City would need to evaluate the quality, vintage, geographic source, resource mix, and certification of green power purchases. These options can significantly impact the cost, environmental, and social impacts of the Newburyport's community aggregation program.

This strategy proposes that Newburyport research options and engage community members in order to evaluate potential for integrating green power into the community aggregation program. To assess options, it is recommended that the City of Newburyport do the following:

- **Collaborate with Community Aggregation Program Technical Experts.** The City of Newburyport could engage a technical expert – like Colonial Power – to research program economics and design options for renewable energy and develop a series of program scenarios for Newburyport community members to consider.
- **Engage Community Members.** To ensure the success of the program, Newburyport could conduct a community-wide stakeholder engagement process in order to solicit feedback from businesses and residents regarding renewable energy program options. During the process, community members should consider Newburyport's clean energy goals as well as potential electric costs, savings, and community impacts of the program.

¹⁴ Working with local and state government, Colonial Power Group helps communities facilitate the purchase of bulk electricity at a rate lower than Basic Service rates. For more, see www.colonialpowergroup.com/.

-  **Integrate Green Power into the Community Aggregation Program.** Based upon community feedback and research, the City Council and Mayor would review options and integrate renewable energy into the community aggregation program at the appropriate level. It is anticipated that the program would support local clean energy development as well as zero net energy community goals.

BENEFITS

	By purchasing renewable energy through its community aggregation program, Newburyport could take large steps forward in achieving its net zero energy community goal. By researching renewable energy power options and engaging the broader community members to review issues and options, Newburyport can design a program that helps it achieve its clean energy goals, while also being responsive to community needs and concerns.
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RISKS

	Requiring residents and businesses to potentially pay more for electricity from renewable energy could be controversial. For the renewable energy purchase program to be successful, it will be important to engage stakeholders across the community, ensuring broad support for the initiative.
	When selecting renewable energy projects to for the renewable energy purchase program, it will be important to ensure high quality projects are selected. Renewable energy quality can vary, depending upon resource, location, vintage of RECs, and a variety of other factors. The City should ensure that all renewable energy purchased is certified by a recognized third-party standard and that it meets all marketing claims and environmental expectations. Investment or power procurement from local projects support should be reviewed by experienced energy professionals.

PROJECT COSTS & ECONOMICS

Table 9 - Strategy Implementation Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	Staff time to coordinate community outreach and evaluate research results would be the major cost driver to Newburyport. In addition, the City would likely incur some costs for consultants or experts, who oversee the research process on behalf of Newburyport. This can range depending upon the size and scope of the project; however, it is anticipated that this work could be completed for under \$20,000.	Not applicable.
Financial Benefits of Strategy	Potential for good return on investment if the City invests in local renewable energy projects to support its green power program.	Minor financial benefits due to anticipated reduction in electricity costs from community aggregation program as well as support for local renewable energy projects and/or jobs.

Table 10 - Available Resources

Organization	Type of assistance	Description
U.S. DOE Green Power Network (GPN)	Technical Resources	The GPN provides news and information on green power markets and related activities. The site provides up-to-date information on green power providers, product offerings, consumer protection issues, and policies affecting green power markets. It also includes a reference library of relevant papers, articles and reports. http://apps3.eere.energy.gov/greenpower/
MassDOER	Resources	MassDOER has developed the "Guide to Municipal Electric Aggregation in Massachusetts," which provides important information to help municipalities understand the issues, options, and risks related to developing a community aggregation programs. http://www.mass.gov/eea/docs/doer/electric-deregulation/agg-guid.pdf

NEXT STEPS

Task Description	Task Lead
1. Launch the community electricity aggregation process with MVPC, Colonial Power, and other partners (ongoing)	Newburyport Sustainability Director
2. Work with Colonial Power to research green power options for Newburyport's community aggregation program, develop green power scenarios, and describe opportunities and challenges. This should include cost estimates to the community for sourcing share (10%, 20%, 30%, etc.) of power from a range of renewable resources (voluntary RECs, local projects, etc.).	Newburyport Sustainability Director with Newburyport EAC
3. Engage city council and community members to review options and/or identify community concerns for clean energy program.	Newburyport Director of Policy and Administration, Newburyport Sustainability Director, and Newburyport EAC
4. During community electricity aggregation process, solicit bids from retail power providers that include a range of acceptable green power pricing options.	Colonial Power
5. Select green power pricing option and/or local clean energy investment option that is most appropriate.	Newburyport Director of Policy and Administration, Newburyport Sustainability Director, and Newburyport EAC with City Council approval

CONTACTS

Organization	Name	Position	Email
Newburyport Energy Advisory Committee	Mike Strauss	Chairman	mstrauss@alum.mit.edu
City of Newburyport	Molly Ettenborough	Sustainability Director	mettenborough@cityofNewburyport.com
City of Newburyport	Peter Lombardi	Directory of Policy and Administration	plombardi@cityofnewburyport.com

STRATEGY 6. STREAMLINE LOCAL REGULATIONS TO ACCELERATE RENEWABLE ENERGY DEVELOPMENT

Newburyport can encourage greater development of renewable energy projects by streamlining zoning, permitting, and regulatory processes.

OBJECTIVES

★	Encourage economic development, job creation, and renewable energy project development.
★	Protect Newburyport's local heritage and natural resources.

BACKGROUND & STRATEGY DESCRIPTION

According to several recent studies, soft costs make up 64 percent of the installation costs for small-scale solar projects.¹⁵ Soft costs encompass a variety of factors, including costs associated with permitting, zoning, and inspections, among others. Reducing soft costs for solar and other clean energy technologies will be important to encourage clean energy development in Newburyport.

When streamlining the clean energy regulatory process, it is important to also consider potential community impacts. Newburyport stakeholders indicated that streamlining clean energy policies should balance the need for developing efficient regulatory processes while also protecting Newburyport's maritime heritage, encouraging economic development, safeguarding the community's common pasture and other natural resources, and as well as residents' health and safety.

Taking these factors into account, this strategy proposes a process to update Newburyport's clean energy permitting and zoning regulations. In particular, there are three areas where the City of Newburyport could potentially streamline clean energy regulations. These include:

- **Permitting requirements:** to encourage local development, it is important that projects are safely installed, meeting building code and other requirements; however, in many cases, local permitting authorities are unfamiliar with solar or other clean energy development requirements, making the permitting process unnecessarily cumbersome, time-consuming, and costly.
- **Zoning and land use regulations:** local governments in Massachusetts may adopt local laws that establish what local land uses, like large-scale renewable energy generation, may take place in their communities.¹⁶ Development zones can also be created to address community historical, environmental, and health concerns.

¹⁵ Friedman et. al. (2013). Benchmarking Non-Hardware Balance of System Costs for U.S. Photovoltaic Systems Using a Bottom-Up Approach and Installer Survey- Second Edition. National Renewable Energy Laboratory. Retrieved from: <http://www.nrel.gov/docs/fy14osti/60412.pdf> and Feldman, D., Friedman, B. and Margolis, R. (2013). Financing, Overhead and Profit: An In-Depth Discussion of Costs Associated with Third-Party Financing of Residential and Commercial Photovoltaic Systems. Retrieved from: <http://www.nrel.gov/docs/fy14osti/60401.pdf>

¹⁶ 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. National Association of Regulatory Utility Commissioners. (2012). Wind Energy Siting and Zoning Best Practices and Guidance for States. Retrieved from: http://www.naruc.org/Publications/FINAL%20FINAL%20NRRI_Wind_Siting_Jan12-03.pdf

- Local property taxes:** local governments collect tax assessments on buildings and property in the community. In many cases, renewable energy facilities will increase the tax burden for residents and businesses. Communities may create property tax exemptions or credits for renewable energy technologies they wish to encourage.¹⁷

To streamline the clean energy regulatory process, there are a number of best practices that Newburyport could deploy. Table below provides a brief overview of the types of clean energy zoning, permitting, and tax best practices that the City could implement.

Table 11 - 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 permitting fees entirely 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, which 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 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.
Develop Local Tax Incentives	Create incentives that encourage renewable energy project development via the local property tax. This may include tax exemptions, abatements, credits, or special assessments that mitigate the increase in the assessed value of property (for tax purposes) attributable to renewable energy systems. This provides an economic incentive to building owners and developers to construct projects in the community.

¹⁷ Under current Massachusetts law, solar, wind and some hydropower facilities are exempt from local property tax for a 20-year period. Hydropower facilities must enter into an agreement with the city or town to make a payment (in lieu of taxes) of at least 5% of its gross income. For more, see DSIRE. (2013). Renewable Energy Property Tax Exemption. Retrieved from www.dsireusea.org.

¹⁸ Permitting Best Practices Make Installing Solar Easier: <http://www.nrel.gov/docs/fy13osti/57104.pdf>

BENEFITS

+	Streamlined regulatory processes can significantly reduce project soft costs for renewable energy project developers.
+	By considering renewable energy development goals and requirements upfront (before being approached by developers), community leaders can oftentimes mitigate or eliminate local opposition to projects.

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 or regulatory requirements, especially for clean energy technologies with which they may not be familiar.
	Creating “preferred RE development zones” can cause controversy among the general public, especially if citizens are concerned with how new development affect their property values, local heritage or other issues. It will be important to ensure that a comprehensive stakeholder engagement process is in place that enables stakeholders the opportunity to shape new regulations.
	Developing a streamlined regulatory process will require significant investment of time from city 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

Table 12 - Strategy Implementation Costs and Benefits

	To the City of Newburyport	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 projects, resulting in cheaper clean energy projects.

Table 13 - 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 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. www.mass.gov/eea/energy-utilities-clean-tech/green-communities/gc-grant-program/criterion-1.html

NEXT STEPS

Task Description	Task Lead
1. Identify project lead and collaborators at the City, including representatives from the building department, the sustainability coordinator, as well as the EAC	Newburyport Planning Director
2. Review current status of regulatory best practices in Newburyport. Prioritize which best practices should be implemented next to streamline local clean energy regulatory process.	Newburyport Planning Director
3. Develop straw man proposal and review with key city official and other local experts. Engage technical or legal consultants, as necessary. Revise best practices based upon feedback.	Newburyport Planning Director
4. Conduct public meeting(s) and solicit feedback from interested stakeholders. Revise proposal as appropriate.	Newburyport Planning Director
5. Develop final proposal for streamlined regulatory best practice and submit to City Council for approval.	Newburyport Planning Director
6. Implement best practices and conduct trainings with city inspectors and officials, as relevant.	Newburyport Planning Director

CONTACTS

Organization	Name	Position	Email
City of Newburyport	Andy Port	Planning Director	aport@cityofnewburyport.com
Newburyport Planning Board and Zoning Board of Appeals	Kathryn Newhall-Smith	Planner	KNewhallSmith@CityofNewburyport.com

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

By creating an online, educational platform for residents to learn about solar, other technologies and third party financing options, Newburyport can help residents and businesses efficiently evaluate their options to finance and install clean energy.

OBJECTIVES

	Increase community awareness of clean energy technologies and development options.
	Develop an online portal to simplify the process for customers to assess their clean energy options, compare installer quotes, and install clean energy technologies.

BACKGROUND & STRATEGY DESCRIPTION

Newburyport stakeholders report that they face challenges learning about clean energy technologies suitable for them. They additionally face challenges connecting with reputable and experienced clean energy developers. Creating a marketing and outreach platform that increases awareness of clean energy opportunities and supports customers connecting with reputable installers is a priority for stakeholders in the region.

This strategy proposes development of a One-Stop Shop for clean energy, which provides targeted marketing and project development services to help residents install solar and other clean energy technologies. To cost-effectively implement this project, Newburyport could work with a variety of partners. For example, companies such as EnergySage¹⁹ or 1BOG²⁰ have established online platforms that provide most of the features described above and additionally help residents or businesses evaluate 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. These companies have additionally expressed interest in partnering with local communities in order to develop a community-based marketing program.

BENEFITS

	Increase community awareness, education and adoption of clean energy technologies by providing a comprehensive source of reliable and local information online for community members.
	Simplify 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
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¹⁹ Energy Sage Company Website. (2014). Retrieved from: <https://www.energysage.com>

²⁰ 1 Block off The Grid Organization Website. (2014). Retrieved from: <http://1bog.org>

actively updates it over time.

PROJECT COSTS & ECONOMICS

Table 14 - Strategy Implementation Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	Staff time to develop and coordinate program development as well as implementation of the program over time.	Not applicable.
Financial Benefits of Strategy	Not applicable	Financial benefits to the community include reduce 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 EnergySage, 1BOG, among other vendors. Conduct interviews with company representatives and assess the range of services, technologies served, community marketing options, program costs and fee structure, among other program development options.	Newburyport Sustainability Director
2. Develop program concept and define roles and responsibilities. Identify funding sources for program and create program proposal including project milestones.	Program vendor
3. Implement One Stop Shop program	Program vendor
4. Track performance over time (e.g. # of project developed, # of website hits, # of community events, etc.) and evaluate program performance. Create recommendations for next steps.	Newburyport Sustainability Director and Program vendor

CONTACTS

Organization	Name	Position	Email
City of Newburyport	Molly Ettenborough	Sustainability Director	mettenborough@cityofNewburyport.com

STRATEGY 8. PROCURE SOLAR TO REDUCE MUNICIPAL ENERGY COSTS

State and federal policies have created opportunities for municipalities to enter long-term contracts for low cost renewable energy.

OBJECTIVES

	Invest in and develop renewable energy projects.
	Reduce municipal energy costs.

BACKGROUND & STRATEGY DESCRIPTION

Municipalities across Massachusetts have been able to procure renewable energy at a lower cost than grid power, thanks to declining renewable energy installation costs, federal incentives, and favorable state policies like the solar carve-out, solar renewable energy credits (SRECs), net metering and virtual net metering.

The City of Newburyport is currently working with the Merrimack Valley Planning Commission (MVPC) to procure solar energy (via virtual net metering) from a developer with a potential solar array located in Haverhill and Lawrence, Mass. Under the terms of that deal, Newburyport would be able to purchase solar energy at a lower cost than grid power, achieving energy savings of ten to 30 percent or more. This strategy describes the potential for the City to procure renewable energy under long-term contracts to serve its municipal energy load.

BENEFITS

	Renewable energy procurement will allow the municipality to save on energy bills and take advantage of state solar incentives they currently contribute to as Massachusetts's utility ratepayers. This can be done at little to no upfront cost to the City of Newburyport.
	By entering into long-term contracts for renewable power, the municipality can insulate itself from energy price volatility, mitigating some of the long-term risk associated with fluctuating (increasing) energy costs.

RISKS

	The National Grid public net metering cap of 5% is currently over-subscribed, meaning that it will be necessary for the Massachusetts legislature to increase the public facility net metering cap in order for Newburyport and MVPC to complete the net metering credit deal described above. The Massachusetts legislature could choose not to extend the net metering cap, making Newburyport unable to take advantage of net metering programs or complete the deal already in progress.
	Selection of under-qualified developers could create risks in the procurement process. As with any contracting or procurement process, the City should carefully review the qualifications of developers and terms of the contract including: (a) fixed price, price with escalator or percentage discount; (b) performance guarantee terms; (c) developer experience; (d) developer financing; and (e) terms related to regulatory risk.

PROJECT COSTS & ECONOMICS

Table 15 - Strategy Implementation Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	Minor financial costs associated with technical assistance for procurement process to issue an RFP, select a qualified developer, and negotiate the power purchase agreement with the developer.	Not applicable.
Financial Benefits of Strategy	Moderate to significant annual energy savings , depending on project scale and details.	Not applicable.

Table 16 - Available Resources

Organization	Type of assistance	Description
Merrimack Valley Planning Commission	Technical Assistance	To advance renewable energy projects, the Merrimack Valley Renewable Energy Management Program was formed to help communities that want to construct renewable energy projects identify suitable sites, prepare RFQs for Power Development Companies, evaluate proposals and monitor implementation. An opportunity to collaborate on soliciting the purchase of solar net metering credits aggregation was identified in the Energy Plan and a joint RFP was issued, which will encourage the development of solar farms in the region and save those communities purchasing net metering credits ten to 30 percent on their energy bills.

NEXT STEPS

Task Description	Task Lead
1. Identify and task staffing resources to manage and continue collaborating with MVPC and their consultants on the regional procurement process.	Newburyport Sustainability Director and Newburyport EAC
2. Review contract language and offers from RFP respondents.	Newburyport Sustainability Director, Newburyport EAC, Newburyport Director of Planning and Administration, Mayor, and City Solicitor
3. Negotiate a final power purchase agreement contract	Newburyport Sustainability Director, Newburyport EAC, Newburyport Director of Planning and Administration, Mayor, and City Solicitor
4. Approve and sign contract with selected developer	Mayor, City Council, and City Solicitor

CONTACTS

Organization	Name	Position	Email
City of Newburyport	Molly Ettenborough	Sustainability Director	mettenborough@cityofNewburyport.com
City of Newburyport	Peter Lombardi	Director of Policy and Administration	plombardi@cityofnewburyport.com
City of Newburyport	Donna Holaday	Mayor	dholaday@cityofnewburyport.com

STRATEGY 9. DEVELOP SOLAR CANOPIES IN NEWBURYPORT PARKING LOTS

Solar parking canopies can help support Newburyport's development of renewable energy projects and increase the value of under-utilized space in the community.

OBJECTIVES

★	Identify credible solar canopy installers and sites.
★	Increase opportunities for local renewable energy development.
★	Invest in and develop local, innovative clean energy projects across city parking lots.

BACKGROUND & STRATEGY DESCRIPTION

Like many municipalities, Newburyport has already benefited from low-cost rooftop or ground-mounted solar power installations. Solar canopies, which are solar PV installations developed over parking lots, provide a good opportunity for Newburyport to develop larger-scale solar PV systems and put under-utilized space to greater use for the community.

Though installing solar canopies has historically been cost-prohibitive, developers report that falling installation costs and new incentives in Massachusetts have begun to make it a viable option. In addition, the use of power purchase agreements (PPAs) enables local governments to purchase discounted power from third-party owned solar PV systems, reducing up-front costs and avoiding municipal responsibility for ongoing maintenance and repairs.

This strategy describes the potential for Newburyport or local parking lot owners to develop a third party owned solar canopy. To implement this strategy, Newburyport would identify viable sites for solar canopies in the community and contract with a developer, who would finance, own, operate and manage all aspects of the project.

BENEFITS

+	Depending upon the site and available financing, solar canopies can generate renewable power that results in substantial cost savings for the host customer with little to no upfront capital investment.
+	Stormwater collection technologies (e.g. rain barrels, swales, etc.) can be integrated into solar canopies, which can reduce pollution and run-off from paved surfaces and decrease loads on municipal wastewater infrastructure.
+	Canopies can additionally decrease snow build up and removal requirements in the wintertime and provide shading for parked cars in the summertime.

RISKS

	Community members have expressed concerns regarding the visual impacts of solar canopies. This should be kept in mind during the site selection process.
	Zoning restrictions may prevent large ground-mounted PV arrays in certain areas of the City. This should be further investigated and, if an issue, changes to zoning and/or variances could be required to overcome this issue.
	As with any contracting or procurement process, the site owner should carefully review the qualifications of developers and terms of the contract.

PROJECT COSTS & ECONOMICS

Table 17 - Strategy Implementation Costs and Benefits

	To the City of Newburyport (or local parking lot owner)	To the Community
Financial Costs of Strategy	Staff time to evaluate solar canopy procurement strategies and potential contracting models. A typical system would require participation of an outside investor, who would build, own, maintain and decommission the system. Other costs may include those associated with hiring a firm to conduct site feasibility studies	Not applicable.
Financial Benefits of Strategy	Solar projects on municipal properties will generate a number of new revenue streams for the City including savings from discounted power purchases, increased property tax payments and potential lease revenues.	Minor financial benefits from reduced air conditioning in vehicles after parking under shaded lots.

Table 18 - Available Resources

Organization	Type of assistance	Description
MassDOER Guide to EMS Procurement	Guidance and model documents	Document to help municipalities and school departments understand how to improve the energy efficiency of public buildings through Energy Management Services (EMS). This document provides a guideline for implementing an EMS project. ²¹

²¹ Massachusetts Department of Energy Resources. (n.d.). Energy Management Services Guide V.2.1. Retrieved from www.mass.gov/eea/docs/doer/green-communities/pubs-reports/ems-guide.pdf.

SITE ANALYSIS

Appropriate solar canopy sites have the following characteristics:

☒	Limited shading from trees or other obstructions.
☒	A minimum of 30 car spaces over which the solar canopy can be developed (preferably more).
☒	An area without visual impact concerns and which is zoned to permit development of large solar arrays.
☒	A nearby grid interconnection point that can support integration of the solar array.

Table 19: Potential Solar Canopy Development Sites in Newburyport

Facility	Facility Owner
Rupert A. Nock Middle School	Newburyport Public School
F.T. Bresnahan Elementary School	Newburyport Public School
Newburyport Commuter Rail Station	MBTA
Maudslay State Park	Mass. Dept. of Conservation and Recreation
Newburyport Park and Ride Station	Mass DOT
The Tannery Marketplace	Privately held
Anna Jacques Hospital	Privately held

NEXT STEPS

Task Description	Task Lead
1. Identify and task staffing resources to manage procurement process	City Engineer and Newburyport EAC
2. Reach out to municipal staff about the planned procurement. Departments could include: public works, transportation, legal staff, and environment/sustainability staff, among others.	City Engineer and Newburyport Sustainability Director
3. Alert MassDOER EMS staff of interest in solar canopy PPA procurement and discuss latest developments in municipal solar procurement	City Engineer
4. Identify an appropriate site based on criteria outlined above	City Engineer
5. Conduct an RFP using one of several legal procurement pathways (i.e. 25a 11c/I – DOER or 30B)	City Engineer
6. Negotiate a final power purchase agreement contract	City Engineer and Newburyport EAC

CONTACTS

Organization	Name	Position	Email
City of Newburyport	Jon-Eric White	City Engineer	jewwhite@cityofnewburyport.com
Newburyport EAC	Mike Strauss	Chairman	mstrauss@alum.mit.edu
City of Newburyport	Molly Ettenborough	Sustainability Director	mettenborough@cityofnewburyport.com

STRATEGY 10. DEVELOP SUSTAINABLE INFRASTRUCTURE ALONG THE WATERFRONT

By renovating buildings along the waterfront, Newburyport could take steps to develop the most sustainable harbor in the state.

OBJECTIVES

	Increase energy efficiency and renewable energy use along Newburyport's waterfront and reduce greenhouse gas emissions and other pollutants in the community.
	Protect Newburyport's maritime history and natural resource by creating the greenest harbor in Massachusetts.

BACKGROUND & STRATEGY DESCRIPTION

The City of Newburyport has a historic and picturesque waterfront, which plays an important role in the community's local economy and social life. By integrating sustainability and clean energy technologies into its waterfront buildings and infrastructure, Newburyport could develop the greenest harbor in the Commonwealth. This in turn would likely increase tourism in the community.

This strategy proposes to create a sustainable waterfront development program, which will integrate clean energy technologies into buildings and infrastructure along Newburyport's waterfront. To launch the program, Newburyport could integrate clean energy design and technologies into the City's harbormaster facility renovations. This could include installation of Energy Star equipment, new LED lighting with motion sensors along boat docks, double-pane energy efficient glass for all windows, rooftop solar, rain gardens, energy metering for individual dock tenants, and redesigned office spaces that take advantage of natural lighting, among other features.

BENEFITS

	The City of Newburyport would benefit by becoming a leader in greening waterfronts, which could attract development, consumer interest, and tourism along the Newburyport waterfront.
	The City would benefit from operational cost savings related to energy efficiency and renewable energy installations in waterfront facilities.

RISKS

	Significant energy efficiency and renewable energy renovations for buildings (like the Harbormaster Facility) can be complex, requiring significant changes to a building enclosure. It is essential to work with an experienced contractor who is fully aware of how retrofits affect the building.
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PROJECT COSTS & ECONOMICS

Table 20 – Sustainable Waterfront Development Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	Minor increase in design and capital costs to integrate sustainability features into Harbormaster and Visiting Boater Facility	Not applicable.
Financial Benefits of Strategy	Significant, long-term operational savings from Harbormaster and Visiting Boater Facility	Long-term economic development benefits from increased development, tourism, and consumer interest.

NEXT STEPS

Task Description	Task Lead
1. Task staff to identify sustainability measures for Harbormaster facility renovation	Newburyport Sustainability Director and Georgie Vining
2. Identify sustainability measures (LED lighting, natural lighting, water management technologies, etc.) that could be integrated into renovations. Work with contractors and architects to integrate sustainability technologies.	Molly Ettenborough and Georgie Vining
3. Identify special sustainability RFPs (e.g. solar PV installation) that should be bid out separately	Georgie Vining
4. Issue RFPs, select contractors, and monitor development	Georgie Vining

CONTACTS

Organization	Name	Position	Email
City of Newburyport	Paul Hogg	Harbormaster	phogg@cityofnewburyport.com
City of Newburyport	Molly Ettenborough	Sustainability Director	mettenborough@cityofnewburyport.com
City of Newburyport	Georgie Vining	Senior Project Manager	gvining@cityofnewburyport.com

MORE INFORMATION

- 🔗 **The Sun Harbor Marina** website outlines some of the building's design features and ongoing sustainability policies and education projects which led to its LEED certification. The Sun Marina Harbor was the first LEED-certified marina in the world. <http://www.sun-harbor.com/leedcert.html>

STRATEGY 11. ASSESS REGIONAL ANAEROBIC DIGESTION PROJECT OPPORTUNITIES

Conducting an organic material-shed analysis in Newburyport and the surrounding region is necessary to evaluate the potential for constructing an anaerobic digester, which can generate renewable energy from organic feedstock.

OBJECTIVES

★	Increase local renewable energy production and reduce GHG emissions.
★	Reduce disposal of organic material 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 material – including materials such as food, animal (manure), or yard waste – and convert them to renewable electricity and heat. Anaerobic digesters, a specific type of organics-to-energy technology, break down organic matter in the absence of oxygen (i.e. anaerobic digestion), thus producing biogas, which can be combusted to produce electricity or refined and used as renewable natural gas. Heat generated during the process can also be used for a variety of applications, including space heating for residences, process heat for industrial applications, and heating for greenhouses, among others.

Newburyport could collaborate with MVPC and other North Shore communities to assess the feasibility of community-supported organics-to-energy projects within the region by completing a comprehensive, multi-community waste-shed analysis. This work can build on the ongoing organics collection projects in the region, such as the Town of Hamilton's MassCEC sponsored anaerobic digestion feasibility study, among others. Under this strategy, MVPC, Newburyport, and other communities would survey regional organic feedstock producers and haulers to identify the type and volume of organic feedstock, existing contractual requirements, the distance waste is hauled, location of potential AD sites for processing, and the suitability of organic feedstock for processing in AD systems.

BENEFITS

+	The Massachusetts Department of Environmental Protection (MassDEP) has established a solid material disposal ban that applies to businesses and institutions disposing of one ton or more of food material per week. The regional organic material-shed assessment will enable Newburyport to identify opportunities to divert organic material from landfills and potentially assist local businesses comply with the Massachusetts organic waste ban.
+	The project would support development of renewable energy generation from organic material, thus reducing GHG emissions in the region.
+	By identifying regional opportunities and feedstock to support the development of an anaerobic digestion facility, Newburyport would strengthen agriculture in the region by assisting farmers reduce the environmental impacts of manure disposal and by providing a sustainable supply options of organic soil amendments.

RISKS



The pre-feasibility study could reveal that there are no viable opportunities for anaerobic digestion in Newburyport or the surrounding region. In the event that this occurs, Newburyport's investment in the study would not result in a future AD project.

PROJECT COSTS & ECONOMICS

Table 21 - Strategy Implementation Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	Staff time to coordinate community outreach and evaluate research results would be a major cost driver of the assessment. In addition, the City would likely incur some costs for consultants or experts, who oversee the research process on behalf of Newburyport.	Not applicable.
Financial Benefits of Strategy	No direct financial benefits from implementing the feasibility study.	Not applicable.

Table 22 - Available Resources

Organization	Type of assistance	Description
MassCEC	Organics-to-Energy Grant funding	MassCEC provides up to \$60,000 in grant funding to assist municipalities or other public entities assess opportunities for an organics-to-energy feasibility study within their jurisdiction. A potential AD development site must be identified to use MassCEC Organics-to-Energy grant funding. ²²
Massachusetts Department of Environmental Protection	Technical, Financial	Financial & Technical Assistance for Anaerobic Digestion Projects: MassDEP has developed a matrix of financial and technical assistance programs, which are available to Massachusetts stakeholders interested in developing anaerobic digestion projects. ²³ In addition, DEP grants for organics capacity projects up to \$500,000 can be used for design and construction of an AD facility. ²⁴

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 material streams. Cities are required to provide at least a 5% in matching funds. For more information, see: <http://www.masscec.com/solicitations/technical-services-public-entities-only>.

²³ For more, see Energy and Environmental Affairs. (2014). Financial & Technical Assistance for Anaerobic Digestion Projects. Retrieved from www.mass.gov/.

²⁴ Massachusetts DEP. (n.d.) Sustainable Materials Recovery Program- Municipal Application, Grant Guidance. Retrieved from: <http://www.mass.gov/eea/docs/dep/recycle/smrpguid.pdf>

NEXT STEPS

Task Description	Task Lead
1. Identify and task staffing resources to develop concept and application process.	Newburyport Sustainability Director
2. Reach out to pertinent municipal staff at City of Newburyport, MVPC, and other regional communities about the assessment. Departments could include: public works, transportation, legal staff, and environment/sustainability staff, among others.	Newburyport Sustainability Director and Newburyport EAC
3. Identify funding source to hire contractors for the study. Potential funding sources may include MassCEC Organics-to-Energy funding. Contact MassCEC to discuss options and prepare and submit funding application.	MVPC
4. Develop scope of work for study. Interview three or more contractors who could perform study and solicit bids from contractors. Review bids and select contractor.	MVPC
5. Work with selected contractors to conduct assessment.	Newburyport Sustainability Director, MVPC, and other communities

CONTACTS

Organization	Name	Position	Email
City of Newburyport	Molly Ettenborough	Sustainability Director	mettenborough@cityofnewburyport.com
MassCEC	Amy Barad	Program Director, Organics-to-Energy	ABarad@masscec.com
MVPC	Dennis DiZoglio	Executive Director	DDiZoglio@mvpc.org

SUSTAINABLE TRANSPORTATION

COMMUNITY ENERGY STRATEGIES FOR NEWBURYPORT



STRATEGY 12. DEVELOP A BIKE SHARE PLAN

By creating a regional bike share plan, Newburyport and its neighboring communities can develop a more resilient transportation network that is less reliant on fossil fuels.

OBJECTIVES

★	Analyze and develop options for a bike sharing program and an accompanying initiative which would encourage exercise and healthy living.
★	Develop a local working group to design a comprehensive strategy which will lead to an integrated regional biking initiative.
★	Reduce vehicle use and increase transit options.

BACKGROUND & STRATEGY DESCRIPTION

Bike share programs have been an emerging, popular option to increase mobility in cities such as Boston, New York, London and Paris. A bike share program provides a rentable fleet of bikes, which can be removed from and returned to docking stations around communities, often for a small fee. The service is akin to car-sharing services, such as ZipCar.

Bike share programs are beginning to be implemented by smaller governments as well, such as Boulder, Colo.,²⁵ Salem, Mass.,²⁶ Madison, Wis.²⁷ One potentially promising model uses “smart bikes” equipped with GPS technology, in place of more traditional bike share stations. Such an approach may be more suitable for the Newburyport and the surrounding region as it can be deployed at a smaller scale and provides users with more flexibility.

This strategy describes the process to create a regional bike share program plan, which could integrate with the local public transit system by placing bike stations at key transit access points in Newburyport and in surrounding towns. This strategy will require coordination with partners across the region to develop an appropriate interconnected bicycle transit network, and identify an appropriate program design.

BENEFITS

+	By developing a bike share plan, Newburyport will set the stage for developing a more resilient transportation network, which is less reliant on fossil fuels. In other words, through smart planning, residents and businesses could gain access to increased transportation options and decreased automobile traffic congestion.
+	By developing a regional bike share plan, the City of Newburyport and surrounding communities would benefit by increasing connections between their communities. A bike sharing system could, for example, more closely connect the downtown and waterfront activities taking place across the communities.

²⁵ Boulder Bcycle Website. (2014). Retrieved from: <https://boulder.bcycle.com/default.aspx>

²⁶ Salem City Hall (n.d.) Salem Spins Bike Share Program. Retrieved from: http://www.salem.com/pages/salemma_webdocs/spins?textPage=1

²⁷ Christensen, M. (2013). Bike Share Finds Success in Small Cities. Momentum Magazine. Retrieved from: <http://momentummag.com/features/bike-share-finds-success-in-small-cities/>

+	Bike share programs introduce bicycling to many residents that do not own or prefer not to maintain their own bicycles. Research shows that once residents start, they tend to use bicycles frequently. As a result, bike share programs offer significant opportunities for residents to increase their level of exercise and improve their health on an ongoing basis. ²⁸
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RISKS

	There is limited experience with bike share programs in smaller jurisdictions. Bike share programs are well established in larger municipalities with significant populations however business models for smaller, less dense population centers are newer and less established. Existing bike share business models may need to be modified to accommodate for differences in scale.
	Increased traffic from bicycles can cause traffic complexities. Bike share programs encourage and often significantly increase the amount of biker traffic on roads. New bikers and drivers will need education on sharing roads safely before a program is launched and throughout implementation.

PROJECT COSTS & ECONOMICS

Bike share program costs will be highly dependent on the business model for the regional program. Potential revenue streams for a bike share program could include membership and use fees, advertising revenue, and contributions from participating institutions and local governments. Full-time staff members are a requirement for any successful bike share program as well as active bike re-distributions along the network.

Thus researching these options as part of the bike share planning process will be essential to developing a robust bike share program. Costs associated with assessing the feasibility of the bike sharing programs in Newburyport should be relatively modest.

Table 23 – Bike-Sharing Feasibility Study Implementation Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	Staff costs to manage working group and develop RFP are estimated at approximately \$10,000	Not applicable
Financial Benefits of Strategy	Financial benefits if the bike share program can offset need for additional transportation options or fleet purchases.	Financial benefits if bike-share program can offset need for additional transportation options.

²⁸ New York City Department of City Planning. (n.d.) 02 The Case for Bike Share. Retrieved from: http://www.nyc.gov/html/dcp/pdf/transportation/bike_share_part2.pdf

NEXT STEPS

Task Description	Task Lead
1. Reach out to potential bike share partners (City of Newburyport, Pedal the Port, MVPC) and establish a formal working group to study options for a regional bike share and trail program	Newburyport Sustainability Director, Newburyport EAC, and the Parks Department
2. Working group develops key questions related to potential regional bike share program and publishes Request for Information for program vendors	Newburyport Sustainability Director, Newburyport EAC, and the Parks Department
3. Working group compiles RFI responses and develops bike share program plan that includes business model, procurement strategy, review of risks and benefits, project success factors and other relevant key project elements	Newburyport Sustainability Director, Newburyport EAC, and the Parks Department
4. Invites regional stakeholders and bike share experts to comment on proposed strategy	Newburyport Sustainability Director, Newburyport EAC, the Parks Department, and Youth Services
5. Revise and formalize bike share implementation strategy based on stakeholder feedback and assess next steps.	Newburyport Sustainability Director, Newburyport EAC, and the Parks Department

CONTACTS

Organization	Name	Position	Email
Massachusetts Department of Transportation	Daryl Amaral	District 2 Bike/Pedestrian Coordinator	Daryl.Amaral@dot.state.ma.us
City of Newburyport	Lise Reid	Parks Director	lreid@cityofnewburyport.com
City of Newburyport	Andrea Egmont	Director of Youth and Recreation Services	aegmont@cityofnewburyport.com
City of Newburyport	Molly Ettenborough	Sustainability Director	mettenborough@cityofnewburyport.com
City of Newburyport	Mike Strauss	Chairman	mstrauss@alum.mit.edu

STRATEGY 13. INCREASE ACCESS TO ELECTRIC VEHICLE CHARGING STATIONS

Increased awareness and availability of electric vehicle infrastructure will help spur adoption of electric vehicles and reduce GHG emissions in Newburyport.

OBJECTIVES

	Install electric vehicle (EV) charging stations and increase awareness of EV technologies in the community.
	Reduce oil consumption, tail-pipe emissions, and GHG emissions by encouraging EV deployment.

BACKGROUND & STRATEGY DESCRIPTION

Throughout Massachusetts, electric vehicles are emerging as a viable clean transportation option; however, 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.²⁹ As described in Table 23 below, 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.

²⁹ 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 24 - Charging Station Types, Characteristics, and Charge Times (Source: WXY Architecture + Urban Design, 2012)

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 upgrade 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 publicly fueling stations	15-30 minutes

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 in Newburyport. These highly used and visible areas will also serve to increase public awareness of EV technologies. Other highly visible sites could include the Newburyport Senior Center parking lot as well as privately owned parking lots. Additionally, other clean technologies, such as solar canopies, could be integrated into the proposed EV charging stations (See Strategy 9).

BENEFITS

+	By increasing residents' and businesses' access to EV charging infrastructure, Newburyport would likely benefit from reduced tailpipe emissions and progress towards local and regional greenhouse gas targets.
+	Increased community awareness and access to EV infrastructure can lead to more informed purchasing decisions, increasing the likelihood that residents and the municipal government would 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.

RISKS

	Electric vehicle charging stations are an emerging technology with rapidly evolving standards and best practices. Newburyport should ensure that manufacturers and installers use most up-to-date standards. ³⁰ 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. ³¹ 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 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 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 are a concern 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. ³²

PROJECT COSTS & ECONOMICS

Table 25 - Strategy Implementation Costs and Benefits

	To the City of Newburyport	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. ³³	Not applicable.
Financial Benefits of Strategy	Moderate financial benefits if the price/charge is below gasoline fueling costs for cars in the City fleet. 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.

³⁰ 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

³¹ 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.

³² Massachusetts Departments of Energy and Environmental Affairs. (2012). Patrick-Murray Administration Unveils New Electric Vehicle License Plates. Retrieved from: <http://www.mass.gov/eea/pr-2012/120424-pr-ev-plates.html>

³³ Infrastructure and equipment costs are estimated 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 26 - 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 dual 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/sites/default/files/EV_Siting_and_Design_Guidelines.pdf
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.cres.org/pev-action-tool

SITE ANALYSIS

☒	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 continue 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. ³⁴
☒	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. ³⁵
☒	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 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. ³⁶

³⁴ 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.

³⁵ Ibid.

³⁶ 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.

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 “Available Resources” table for detailed guidance on site design issues.

NEXT STEPS

Task Description	Task Lead
1. Identify and task staffing resources to manage technical assistance process.	City Electrician and Newburyport EAC
2. Reach out to regional municipal staff about planned procurement. Departments could include: public works, transportation, legal staff, environment/sustainability staff, among others	City Electrician
3. Alert MassDOER Alternative Transportation Program Coordinator of interest in installation of EV charging stations and discuss latest industry and program developments	City Electrician
4. Identify EV sites in the region that are appropriate for EV infrastructure based on criteria outlined above	City Electrician, Newburyport EAC, Newburyport Director of Policy and Administration
5. Work with MassDOER to allocate financial grant resources to support local installation of charging stations. Issue an RFP for experienced developers and review responses	City Electrician
6. Negotiate a final EV charging station installation, maintenance, and/or management agreement contract	City Electrician, Newburyport EAC, Newburyport Director of Policy and Administration

CONTACTS

Organization	Name	Position	Email
City of Newburyport	David Zinck	City Electrician	dzinck@cityofnewburyport.com
City of Newburyport	Peter Lombardi	Director of Policy and Administration	PLombardi@CityofNewburyport.com
Newburyport EAC	Mike Strauss	Chairman	mstrauss@alum.mit.edu

STRATEGY 14. CREATE A SUSTAINABLE BOATING PROGRAM

By creating a sustainable boating program, Newburyport could reduce emissions from harbor craft and develop the most sustainable waterfront in the state.

OBJECTIVES

★	Increase awareness of sustainable boating practices.
★	Implement energy efficient and renewable energy technologies that reduce greenhouse gas emissions and other pollutants in Newburyport's harbor craft.
★	Protect Newburyport's maritime history and increase tourism by creating the greenest harbor in Massachusetts.

BACKGROUND & STRATEGY DESCRIPTION

The City of Newburyport is home to an active boating culture, which plays an important role in the community's local economy and social life. By integrating clean energy technologies into the City's harbor craft, Newburyport could create the greenest harbor in the Commonwealth. This would likely increase tourism to the community.

This strategy proposes to create a sustainable boating educational program, which would assist local boaters adopt clean energy technologies in their harbor craft. There are new opportunities for Newburyport boaters to integrate clean energy technologies in local harbor craft, including the use of energy efficient, low-emission engines; low-emission fuels like propane or biodiesel; hybrid-power boat engines that use diesel engines and electric motors; and demonstration projects like 100% solar electric boats. To launch the program, Newburyport could work with regional experts to assess current and best practices for clean energy boating in the region.

To identify which clean energy options are most appropriate for Newburyport boaters, the City could conduct an evaluation of the current types and operational practices of city-owned harbor craft in Newburyport and also assess best practices for clean energy boating technologies. Based on results of its analysis, the City could develop educational and technical support to integrate clean energy boating technologies into the City's harbor craft and also encourage residents and visitors to adopt best in class technologies for their own boats.

BENEFITS

+	Boaters in the region would benefit from the informational materials that enable them to evaluate opportunities for increased vehicle efficiency, cost-savings, and GHG emission reductions.
+	The City of Newburyport would benefit by becoming a leader in developing a sustainable harbor, which could attract development, consumer interest, and tourism along the Newburyport waterfront.

RISKS

	To ensure that a high value assessment of current and best practices for clean energy boating is conducted, the City should vet and contract with an experienced consultant, who has a demonstrated track record of completing emissions analyses, assessing clean energy technologies, and familiarity with the boating industry.
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PROJECT COSTS & ECONOMICS

Table 27 – Sustainable Boating and Waterfront Development Costs and Benefits

	To the City of Newburyport	To the Community
Financial Costs of Strategy	Project costs would depend upon the scope of the assessments. Consulting costs to complete an assessment of current and best practices for clean energy boating can vary significantly. Project costs may range from \$25,000 to \$100,000 or more.	Not applicable
Financial Benefits of Strategy	TBD for clean energy boating technology assessment	Long-term economic development benefits from increased development, tourism, and consumer interest.

NEXT STEPS

Task Description	Task Lead
1. Identify and reach out to relevant municipal staff as well as Coast Guard station in Newburyport to discuss scope of work for study.	Newburyport Sustainability Director, Harbormaster, and Harbor Commission
2. Identify funding source to complete the study. Develop scope of work and issue solicitation.	Newburyport Sustainability Director, Harbormaster, and Harbor Commission
3. Interview three or more contractors who could perform study to discuss scope of work.	TBD
4. Select contractors to conduct current and best practices for clean energy boating assessment.	TBD
5. Issue final report and develop plan to identify opportunities to implement report recommendations.	TBD

CONTACTS

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CONCLUSION AND OUTLOOK

Over the past several years, Newburyport has made significant progress in clean energy, developing projects in the residential, commercial and municipal sectors across the city. The City of Newburyport, for example, has achieved 20 percent energy reductions as part of the Massachusetts Green Communities Program. Newburyport schools have installed large solar arrays. Businesses have implemented energy efficiency and renewable energy projects. And residents across the community have expressed their support for clean energy.

With this *Newburyport Clean Energy Roadmap*, Newburyport has clarified its clean energy vision for the future. The strategies outlined in this roadmap represent the next step in the city's clean energy development process. By implementing these projects, Newburyport can take concrete steps to achieving its zero net energy vision while also positioning itself as a clean leader in Commonwealth and across the United States.