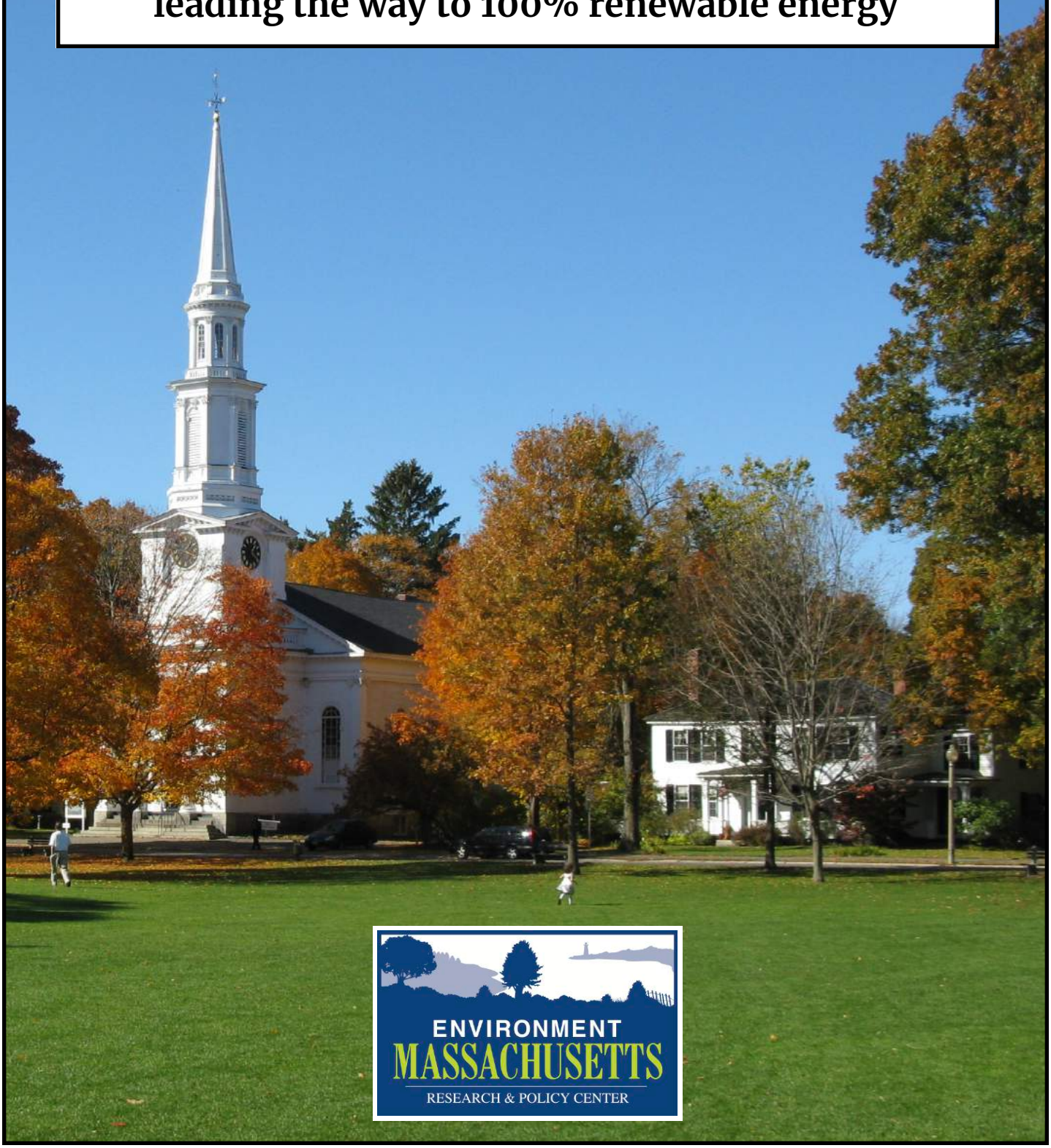
Renewable Communities 2019

Massachusetts cities and towns leading the way to 100% renewable energy



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Renewable Communities 2019

Massachusetts cities and towns leading the way to 100% renewable energy

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Environment Massachusetts Research & Policy Center
August 2019

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Environment Massachusetts Research & Policy Center thanks the Forest Foundation and the John Merck Fund for helping to make this report possible. The authors bear responsibility for any factual errors. The recommendations are those of Environment Massachusetts Research & Policy Center. The views expressed in this report are those of the authors and do not necessarily reflect the views of our funders or those who provided review.

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Introduction

Across Massachusetts, cities and towns are leading the way to a future powered entirely by clean, renewable energy. Municipal officials and staff — working together with citizen activists, volunteers, nonprofit organizations, and businesses — are taking ambitious steps to reduce fossil fuel consumption and increase the use of renewable energy.

Municipal action on clean energy has a long history in Massachusetts. With the support of state initiatives like the Green Communities program, many cities and towns have made their municipal buildings more energy-efficient, encouraged residents and businesses to install rooftop solar panels, and taken other steps to increase renewable electricity generation and reduce energy waste. The first edition of *Renewable Communities*, released in 2016, described many of those efforts.

But in recent years, the pace of clean energy progress on the municipal level seems to have accelerated. Local leaders across the Commonwealth have adopted innovative programs for energy efficiency, renewable electricity, clean heating and transportation, and energy storage.

Familiar policies, such as municipal aggregation, have been expanded and reimagined to accelerate the deployment of clean energy. Technologies that once seemed far-fetched — like microgrids, net zero energy buildings, and electric transit buses — are becoming increasingly commonplace.

Renewable Communities 2019 chronicles some of the most innovative and exciting clean energy efforts in cities and towns over the last few years. Our report includes 19 case studies profiling 21 communities as well as three regional initiatives. The communities featured in our report range from Massachusetts' most populous municipality, Boston, to its smallest, Gosnold — and across the Commonwealth, from the Berkshires to Martha's Vineyard.

While not an exhaustive survey of municipal clean energy policies, these case studies illustrate ways in which forward-thinking cities and towns can accelerate clean energy progress in all sectors. We hope this report will inspire more communities to follow the example of the cities and towns featured here, accelerating Massachusetts' progress toward obtaining 100% of our energy from clean, renewable resources.

Case studies

Amherst: The Net Zero Buildings Bylaw requires new and renovated municipal buildings to be powered and heated entirely with renewable energy.

Boston: The Carbon Free Boston report identifies pathways to reach the city's goal of carbon neutrality by 2050.

Cambridge: The Cycling Safety Ordinance requires streets undergoing significant roadwork to include protected bike lanes in their design if they are part of the city's priority bicycle route network.

Cape Light Compact: The Cape Light Compact offers energy efficiency and renewable electricity programs to residents, businesses, and municipalities on Cape Cod and Martha's Vineyard.

Concord, Amherst, and Cambridge: A pilot program demonstrated the viability of electric school buses to transport students to and from school without harmful emissions.

Everett and Arlington: Bus-only lanes on major roads have decreased travel time and delays for transit riders, encouraging residents to commute by bus instead of driving.

Gosnold: A solar microgrid, one of the first community-scale microgrids in the United States, is providing more than 50% of the electricity used on the island of Cuttyhunk during the peak summer season.

Lexington: Two new school buildings will be powered entirely with solar panels and heated with air source heat pumps and a geothermal system.

Lincoln, Sudbury, and Wayland: During a Solarize Mass Plus campaign, dozens of residents installed solar photovoltaic and solar hot water systems to provide their homes with renewable electricity and heating.

Martha's Vineyard Transit Authority: The Martha's Vineyard Transit Authority has introduced 12 electric buses into its fleet and plans to replace its remaining diesel buses with electric models.

New Bedford: More than 25% of the city's passenger fleet has been converted to electric vehicles, believed to be the highest percentage of electric vehicles in any municipal fleet in Massachusetts.

Newton: The Newton Power Choice program offers residents and businesses a default level of 60% renewable electricity, higher than any other municipal aggregation program in the Commonwealth.

Northampton, Amherst, and Pelham: Local leaders are exploring a Community Choice Energy PLUS program that would provide residents and businesses with a higher percentage of renewable electricity while investing in local projects to reduce emissions.

Pioneer Valley: The ValleyBike Share program offers an affordable and green alternative transportation network, with more than 500 bicycles available in six communities.

Pittsfield: Leaders are studying the implementation of a microgrid in the downtown business district, which could combine solar installations with battery storage units and energy management systems.

Somerville: The Climate Forward plan lays out a series of actions that can be implemented over the next 5–10 years to curb emissions from buildings, transportation, and electricity.

Sterling and Ashburnham: Municipal utilities have installed battery storage systems to reduce energy costs, provide backup power to critical facilities, and facilitate the installation of more solar electricity generation.

Watertown: An ordinance requires new commercial buildings greater than 10,000 square feet or residential buildings with more than 10 units to be built with rooftop solar panels.

Worcester: An 8.1-megawatt municipal solar installation on a capped landfill generates enough electricity to power 1,340 homes annually.

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Amherst: Zero Energy Town Buildings Bylaw

A zero energy or net zero building is one that produces enough renewable energy to meet its annual energy consumption.[1] In November 2017, Amherst town meeting approved a bylaw requiring all new municipal building projects to meet net zero energy standards.[2] A revised bylaw, named the Zero Energy Town Buildings Bylaw, was passed with the support of climate change activists and town officials the following May.[3]

The Zero Energy Town Buildings Bylaw will require all municipal building projects with an expected cost of over $2 million to be powered and heated entirely with renewable energy. Town officials will have some flexibility in determining how to achieve this standard.[4]

Amherst's most recent municipal building project, the town's police department, was completed in 1990. Town officials have identified at least $160 million in necessary municipal construction projects. The top priorities include a new fire department and public works building, renovation and expansion of the library, and replacements for the Wildwood and Fort River elementary schools.[5] The Zero Energy Town Buildings Bylaw will likely cover these building projects.

As town leaders consider how to implement the net zero requirement for new municipal buildings, they can look to several examples of sustainable building design in the community. The Kern Center at Hampshire College and the Hitchcock Center for the Environment have been certified as living buildings, the highest sustainability standard for buildings in the world.[6] At UMass Amherst, the university's Old Chapel has undergone significant renovations to reduce its energy consumption, while new science facilities are slated to meet LEED standards.[7] Closer to town hall, the South Congregational Church in Amherst has pursued sustainability since 2006, when it pledged to achieve net zero energy usage. The congregation raised funds to repair and insulate their church, from the basement to the steeple, and installed solar panels on the roof. Together, these measures reduced the church's electricity bill to just 8 cents in the first year after solar panels were installed.[8]

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Boston: Carbon Free Boston study

In November 2016, Boston and the 13 neighboring cities and towns that make up the Metropolitan Mayors Coalition committed to a target of net zero carbon emissions by 2050.[1]

Following this commitment, the Green Ribbon Commission, a group of business and civic leaders in Boston, worked with the Institute for Sustainable Energy at Boston University to produce the Carbon Free Boston report. The report, released in January 2019, identifies pathways to reach the goal of carbon neutrality by 2050.[2]

As the report shows, dramatically reducing the amount of energy consumed in Boston's buildings is a critical step toward achieving carbon neutrality. The report envisions requiring new buildings to be net zero carbon no later than 2030, and possibly as soon as 2023. Additionally, existing buildings would be retrofitted to reduce energy waste, with 2,000 – 3,000 deep energy retrofits required per year. Finally, gas or oil heating systems would be replaced with clean technologies like heat pumps.[3] The city is also considering requiring new and retrofitted buildings to include solar panels and energy storage systems.[4]

Transportation is another major source of carbon emissions in Boston. The report estimates that 20–30% of trips that are currently taken by car can be shifted to other modes of transportation, including transit, walking, and biking.[5] To increase transit ridership, designated bus lanes could be deployed to speed trips. Another option to cut pollution from transportation is to assess congestion fees on drivers entering the downtown area, encouraging commuters to use different modes of transportation.[6]

Finally, the city's electricity supply should be shifted to 100% renewable or zero-carbon sources within the next 10 years to reach the city's interim emissions target for 2030. Rooftop solar panels within city limits could generate up to 15% of the electricity consumed in Boston, and the remainder could be supplied by offshore wind farms and other zero-carbon sources in New England.[7]

Following the release of the report, officials in Mayor Marty Walsh's administration convened a working group to draft Boston's next climate action plan, which is expected to be released in the fall of 2019.[8] Officials have not yet decided which of the report's recommendations will be adopted and prioritized in the city's climate plan.

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Cambridge: Cycling Safety Ordinance

Cambridge has long been at the cutting edge of municipal efforts to fight climate change and protect the environment. In 2015, the city released a plan to reach net zero emissions, targeting a 70% reduction in greenhouse gas pollution by 2040. The plan includes a detailed timeline for incentivizing highly efficient net zero construction in new buildings, requiring existing buildings to reduce their use of energy, and increasing the percentage of renewable electricity supplied to residents and businesses. Since releasing the plan, city officials have moved toward implementation, including working with stakeholders to propose updates to the city's Building Energy Use Disclosure Ordinance.[1]

The Net Zero Action Plan focuses primarily on reducing carbon emissions from the heating and electricity used in buildings.[2] Transportation is also a significant source of emissions and city officials have begun to take steps to reduce fossil fuel consumption from vehicles, including encouraging residents to travel by bicycle instead of by car.

In 2015, municipal officials worked with residents and other stakeholders to create the Cambridge Bicycle Plan. The plan identifies a network of priority routes, including existing off-street paths and bike lanes as well as new infrastructure required to make traveling by bike safer.[3]

In April 2019, the city council passed an ordinance requiring streets undergoing significant roadwork to include protected bike lanes in their design if they are part of the 20-mile network of priority bicycle routes. This new law, known as the Cycling Safety Ordinance, is believed to be the first such requirement in the United States.[4]

While standard bike lanes require bikers to ride adjacent to automobile traffic, protected bike lanes separate riders from drivers. In some protected bike lanes, the edge of the lane is marked with cones or flex-posts, while in others, the lane is separated from traffic by a row of parked cars.[5] Protected bike lanes greatly improve rider safety, making it a more appealing form of commuting.[6]

Advocates and city officials expect that the ordinance will help speed the development of bike infrastructure by making protected bike lanes a default element of major road projects. The policy will still allow for community input on the design of specific projects. In rare circumstances, the city manager could allow exceptions to this requirement if physical or financial constraints make it impossible to install protected bike lanes.[7]

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Cape Light Compact: Regional energy efficiency and clean energy programs

The Cape Light Compact (CLC) is a utility provider that has served communities on Cape Cod and Martha's Vineyard since 1997, working to make energy efficiency and renewable electricity programs more accessible.

CLC offers free energy audits for residents and businesses.[1] After receiving an audit, customers can take advantage of a number of incentives and rebate programs to install technologies like heat pump water heaters, solar hot water systems, air source heat pumps, and efficient ENERGYSTAR appliances.[2]

The Compact also works closely with municipalities to reduce energy consumption. CLC has helped convert more than 15,000 street lights to efficient LEDs, which use 70% less energy than the previous fixtures.[3] In Wellfleet, CLC provided incentives and guidance to make the new police and fire department buildings more efficient. The fire and rescue facility includes window shading, efficient insulation, and a solar hot water installation, which help reduce annual energy costs by approximately $13,000.[4]

CLC has also worked to increase renewable electricity generation in the communities it serves. In June 2017, CLC announced its first low-income solar grant program. Grant recipients had 100% of the equipment and installation costs for their solar arrays covered.[5]

CLC's Local Green Power package allows customers to choose to choose 50% or 100% Class I renewable electricity for their homes and businesses. The renewable electricity for this program comes from New England facilities, including solar installations on Cape Cod.[6]

In October 2018, CLC filed a proposal with the Massachusetts Department of Public Utilities (DPU) for its next three-year energy efficiency plan.[7] CLC proposed to cover the cost for 700 customers to install battery storage systems, and provide increased incentives to install solar panels and heat pumps alongside energy storage. While the DPU rejected these programs, CLC will continue to offer special incentives for certain categories of customers to improve the efficiency of their homes and businesses.[8]

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Concord, Amherst, and Cambridge: Electric school buses

Bright yellow school buses are a common sight in cities and towns across Massachusetts. Electric school buses offer a cleaner alternative to the standard diesel models.

A 2016 pilot program through the Massachusetts Department of Energy Resources (DOER) allowed three school districts — Amherst–Pelham, Concord–Carlisle, and Cambridge — to purchase and test an electric bus.[1] In Amherst, the electric bus was projected to save the district $96,000 in fuel costs and a further $14,000 in repairs over the course of 10 years.[2]

The buses offer a number of health benefits for drivers and riders. With zero tailpipe emissions, electric school buses protect students from diesel exhaust, improve air quality, and produce less noise while operating.[3]

The range of an electric school bus depends on the size of its battery pack. For each of the school districts participating in the pilot program, the range of their electric school bus well exceeded the bus's average daily miles traveled.[4]

Electric buses could function as energy storage systems, feeding power back into the grid at times of peak demand or providing backup electricity in the event of an outage.[5] Although a "vehicle-to-building" (V2B) electricity exchange was not tested during the pilot, DOER estimated that V2B could save a school nearly $4,800 in energy costs in a year.[6]

The school districts encountered some challenges in operating electric school buses, in part because the districts did not have access to on-the ground technical assistance. Emissions from the buses were considerably lower than those from diesel buses, but the energy cost savings were less than expected. According to a report from DOER, school districts can realize greater energy and cost savings from electric buses through managed charging of their batteries.[9]

The buses in Cambridge, Amherst, and Concord were supplied by Lion, a Canadian firm. Thomas Built Buses, Blue Bird, and IC — three of the largest school bus manufacturers — have also developed electric models, signaling a growing interest in the technology.[11]

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Everett and Arlington: Bus-only lanes

Up to 5 million vehicles pass through Massachusetts each day, consuming roughly 3.2 billion gallons of gas on an annual basis.[1] Shifting more people from single-occupant cars into public transit would reduce fossil fuel consumption in the transportation sector while alleviating congestion and speeding up commutes.

With faster and more frequent service, public transit ridership could increase. One major obstacle to improving service, particularly for buses, is traffic. Because buses have to share the road with cars and trucks, bus service can be erratic and subject to frequent delays.

Some communities are taking steps to improve the performance of MBTA buses during peak commuting times by establishing bus-only lanes. In Everett, a bus-only lane on Broadway Street, a major thoroughfare, was introduced as a pilot project in December 2016.[2] City officials used traffic cones to transform a stretch of curbside parking spots into a bus corridor from 5–9 AM on weekday mornings. The program, which resulted in an estimated 20% decrease in travel times, was implemented on a permanent basis in September 2017.[3]

Other cities and towns have followed in Everett's footsteps. The town of Arlington ran its own month-long designated bus lane pilot in the fall of 2018. Town officials made other adjustments to speed up buses, including relocating one stop and providing traffic signal priority to buses at a key intersection.[4] The average bus trip between Arlington Center and Porter Square in Cambridge decreased by six minutes during the pilot.[5] After reviewing the data and interviewing residents, the Arlington Select Board voted unanimously to make the bus lane permanent.[6]

Cambridge and Watertown ran a similar pilot program on Mt. Auburn Street, the results of which are currently under review.[7] Boston recently installed bus-only lanes on Brighton Avenue in Allston and on Washington Street in Roslindale.[8]

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Gosnold: Solar + storage microgrid

The town of Gosnold, comprising the Elizabeth Islands off of Cape Cod, has the smallest population of any municipality in Massachusetts. Most of its 75 year-round residents live on Cuttyhunk, the outermost island and a popular vacation destination in the summer months.

Many island communities face challenges in providing energy to their residents. Often, it is uneconomical to run an underwater transmission line to an island with a small population, leaving residents dependent on generators powered by expensive, dirty fuels that have to be brought in by boat. Until recently, Gosnold relied exclusively on diesel-powered generators to provide electricity.[1]

In 2012, the town received a $2.15 million grant from the U.S. Department of Agriculture to begin development of a microgrid, which went into operation in January 2017.[2] A microgrid is a localized energy grid which can be connected or disconnected from the traditional grid. Because it contains a source of electricity generation, a microgrid can keep communities powered during a grid outage. Some microgrids use a combination of energy storage and renewable energy resources, like solar panels, to provide a pollution-free and reliable supply of electricity.[3]

Gosnold's solar microgrid is one of the first community-scale microgrids in the United States. The system will save 30,000 gallons of diesel per year, reduce air pollution, and avoid the cost of purchasing and transporting fuel to the island.[4]

The Cuttyhunk Light and Power Company, the town's utility, worked with the Massachusetts-based firm Solar Design Associates to install solar panels on a plot of land leased from a private owner.[5] The 351-kilowatt solar array feeds into a 1.25-megawatt-hour lithium ion battery. At times when the solar panels are generating more electricity than is consumed, the excess electricity is stored in the batteries for later use. This system enables the community to be powered by clean electricity even when the sun is not shining.[6]

During the summer, the solar panels provide more than 50% of Cuttyhunk's electricity consumption, with the remainder coming from diesel generators. As seasonal residents move back to the mainland for the winter, it is expected that the solar microgrid could cover up to 80% of the island's electricity demand.[7]

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Lexington: 100% renewable schools

Lexington has made significant progress on initiatives to reduce carbon pollution, particularly when it comes to solar energy.

In May 2017, a solar project at the Lexington Composting Facility was completed, consisting of a 1.4-megawatt ground-mounted installation and two 400-kilowatt solar canopies. The energy generated by this project is projected to match 45% of municipal electricity use, saving the town $19 million in energy costs and creating an additional $8 million in associated health benefits from emissions reductions over the lifetime of the project.[1] Town officials have also installed solar panels on the roofs of five school buildings and the library. A real-time monitoring system of the solar installations' output allows members of the public to witness the impact of their investment in solar infrastructure.[2]

Residents and local leaders are continuing to move Lexington closer to 100% renewable energy. The town's Getting to Net Zero task force is charged with developing plans to reduce emissions from residential, commercial, and municipal buildings, and increase the percentage of the town's electricity from renewable resources.[3]

In Lexington, 66% of greenhouse gas emissions come from buildings, many of which use far more energy than necessary.[4] Town officials have decided to lead by example in the construction of two highly efficient school buildings powered by solar panels.

In 2017, the Board of Selectmen approved the construction of the Lexington Children's Place and the Hastings School. The Hastings School, a 110,000-square-foot school serving 645 students, will be heated and cooled with a geothermal system. A solar installation combined with energy storage will meet the school's electricity demand. The Lexington Children's Place, a smaller facility, will also include on-site solar panels, along with air source heat pumps for heating and cooling and an energy storage system.[5] Construction has begun, with the Lexington Children's Place slated for completion in 2019 and the Hastings School in 2020.[6]

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Lincoln, Sudbury, and Wayland: Solarize Mass Plus

In 2012, the towns of Lincoln, Sudbury, and Wayland participated in the Solarize Mass program, with 137 residential solar photovoltaic system contracts signed.[1] The success of the program spurred town leaders to join together again to launch a Solarize Mass Plus program in the summer of 2017.[2]

Solarize Mass is a program sponsored by the Massachusetts Clean Energy Center (MassCEC) and the Green Communities Division of the Massachusetts Department of Energy Resources (DOER). Since 2011, Solarize Mass has helped communities give residents and small businesses the opportunity to install solar panels at a lower cost. The program reduces the cost of going solar by selecting installers through a competitive solicitation process, while using grassroots educational campaigns to identify potential solar customers.[3]

Solarize Mass Plus, launched as a pilot program in 2017, allows communities to offer other clean technologies, such as air source heat pumps, solar hot water, and electric vehicles, alongside solar photovoltaic panels.[4] Sudbury, Lincoln, and Wayland chose solar hot water as the second technology for their Solarize Mass Plus program.[5]

While solar photovoltaic panels convert sunlight to electricity, solar hot water installations use the energy of the sun to heat water, reducing the need for oil or gas boilers. Solar hot water systems require less direct sunlight than solar photovoltaic panels to function, so they are a compelling renewable energy option for homeowners with roofs that are not ideal for solar power generation.[6]

During the 2017-18 Solarize Mass Plus campaign, residents of Lincoln, Sudbury, and Wayland installed 53 solar photovoltaic systems totaling 407 kilowatts of capacity. Additionally, 27 solar hot water systems were installed in the three towns. The amount of carbon emissions avoided through these solar photovoltaic and solar hot water installations is equivalent to keeping nearly 100 cars off the road.[7]

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Martha's Vineyard Transit Authority: Electric transit buses

Well-known as a summer vacation destination, Martha's Vineyard is also home to 17,000 year-round residents. Residents and visitors alike are served by the Martha's Vineyard Transit Authority (VTA), with a fleet of 33 buses running in all four seasons.[1] The VTA runs 12 year-round routes, and served 1.35 million riders between July 2017 – June 2018.[2]

In 2017, the VTA announced that it had placed an order for electric buses. The first six buses entered into service beginning in the summer of 2018.[3] An additional six electric buses were set to be added to the VTA fleet in the summer of 2019. The VTA plans to transition to an all-electric fleet in the coming years, replacing its remaining diesel-fueled buses with electric buses as they reach the end of their operational lifespan.[4]

Part of the VTA's Clean Energy Transportation Plan is the development of a cutting-edge charging infrastructure. Chargers at the VTA's garage will be connected to a microgrid consisting of solar panels and battery storage. In normal operation, the solar panels and battery will help the VTA reduce its consumption of electricity during peak hours. In the event of a power outage, the system can disconnect from the larger electric grid and continue to provide power, in tandem with backup diesel generators.[5]

The agency is also installing wireless induction chargers at a few key stops around the island. When a bus pulls over to discharge passengers at one of these stops, its battery will receive enough power from the charger to reach the next charging station, extending the range of the buses to be practically unlimited.[6]

The VTA's bus service connects ferry terminals, beaches, and most major attractions on the island, making it possible for visitors to leave their cars on the mainland rather than pay an extra fee to have them ferried over.[7] As the VTA introduces more electric buses into its fleet, residents and visitors alike will benefit from reduced noise, improved service, and cleaner air.

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New Bedford: Electric vehicles in the municipal fleet

Under the leadership of Mayor Jon Mitchell, New Bedford has emerged as a leader in municipal clean energy action. The city has installed 16 megawatts of distributed renewable electricity generation, including 14.25 megawatts of solar and 2 megawatts of wind, saving taxpayers approximately $1 million per year in avoided energy costs.[1] New Bedford is positioned to become the hub of Massachusetts' offshore wind industry, with the first project, Vineyard Wind, scheduled to begin construction soon.[2]

New Bedford has also led the way in reducing fossil fuel use for transportation, the largest source of greenhouse gas emissions in Massachusetts.[3] One strategy to reduce transportation emissions is to replace gas-powered vehicles with electric vehicles. As the electric grid is increasingly powered with renewable resources, emissions from electric vehicles will decline even further.

Electric vehicles are becoming increasingly common in Massachusetts. Improvements in battery life and efficiency technologies have made EVs more cost-competitive with their fossil-fuel driven counterparts, contributing to a 37% increase in EV ownership in Massachusetts in 2017 alone.[4] By introducing electric vehicles into the municipal fleet, cities and towns can reduce emissions, cut operating costs, and set a positive example for residents and businesses in the community to follow.

With the help of the Massachusetts Electric Vehicle Incentive Program, city officials in New Bedford have signed long-term lease agreements for 23 electric vehicles, replacing older fossil fuel vehicles.[5]

New Bedford has now converted more than 25% of its municipal passenger vehicles to EVs. The city is believed to have a higher percentage of electric vehicles in its municipal passenger fleet than any other community in Massachusetts.[6]

City leaders have also made it easier for residents to charge their electric vehicles, introducing 10 public electric vehicle charging stations.[7] Some may even be used free of charge by drivers of particular models of electric cars.[8]

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Newton: Green municipal aggregation

In 2017, the Newton City Council voted to pursue a municipal electricity aggregation program.[1]

Through municipal aggregation, a city or town can choose to purchase electricity from a competitive supplier on behalf of its residents and businesses. More than 100 cities and towns across the Commonwealth have adopted a municipal aggregation program.[2] Although local governments often pursue aggregation with the goal of reducing energy costs, an increasing number of cities and towns are using municipal aggregation to increase the amount of renewable electricity provided to community members.[3]

As part of Newton's municipal aggregation program, local officials aimed to incorporate a significantly higher percentage of renewable energy than the minimum required by state law, which stands at 14% renewable electricity as of 2019. Newton Power Choice officially launched in March 2019 with a default level of 60% renewable electricity, higher than any other municipal aggregation program in Massachusetts.[4]

Under state law, municipal aggregation programs must allow customers to switch back to the standard electricity package offered by Eversource. Newton residents can also choose to "opt up" into a 100% renewable electricity package.[5] Activists in Newton and Brookline are competing to see which community can get the highest number of residents to choose 100% renewable electricity.[6]

As part of the aggregation plan, the city chose to source its renewable electricity from wind and solar farms in New England, which are designated as Class I renewable energy sources under Massachusetts law.[7]

At the time that the program was launched, Newton customers paid less for their electricity than the default rates offered by Eversource, even with a significantly higher level of renewable electricity.[8] The relative cost of the electricity offered by Newton Power Choice in comparison to standard electric rates will vary over time, but a survey by the local organization Green Newton has shown that cost savings are not the only factor behind public support for the program, with 86% of respondents saying they were willing to pay more for electricity from renewable sources.[9]

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Northampton, Amherst, and Pelham: Community Choice Energy PLUS

Communities in the Pioneer Valley have made some of the most ambitious commitments to clean energy in the Commonwealth, with Amherst and Northampton both pledging to achieve 100% renewable energy.[1] Officials and activists in Amherst and Northampton, along with nearby Pelham, have joined forces to explore a municipal electricity aggregation program as a way to bring their communities closer to 100% renewable energy.

Through municipal aggregation, a city or town can choose to purchase electricity from a competitive supplier on behalf of its residents and businesses. More than 100 cities and towns across the Commonwealth have adopted a municipal aggregation program.[2] Although local governments often pursue aggregation with the goal of reducing energy costs, an increasing number of cities and towns are using municipal aggregation to increase the amount of renewable electricity provided to community members.[3]

While the municipal aggregation program pursued by Amherst, Northampton, and Pelham is still in the planning stages, the communities are considering a "Community Choice Energy PLUS" model for their aggregation program. In addition to providing residents and businesses with a higher percentage of renewable electricity, a CCE Plus program would invest in local projects to reduce greenhouse gas emissions and increase renewable electricity generation. These projects could include solar installations and battery storage in the participating communities, as well as incentives for customers to reduce their energy consumption at times of peak demand.[4]

In December 2018, Northampton received a $75,000 grant from the Urban Sustainability Directors Network to evaluate the potential for a CCE Plus program. The feasibility study funded by the grant is expected to take a year to complete.[5] Local activists in Northampton, Amherst, and Pelham are asking municipal officials to adopt an aggregation program that includes as much renewable electricity as possible, adds local solar and wind generation to the grid, and provides targeted energy efficiency services.[6]

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Pioneer Valley: ValleyBike Share

Launched in 2018, the ValleyBike Share program connects Western Massachusetts communities with an affordable and green alternative transportation network.[1]

ValleyBike was created through a partnership between Northampton, Springfield, Amherst, Holyoke, and South Hadley.[2] With help from the Pioneer Valley Planning Commission (PVPC) and the Massachusetts Department of Transportation, these cities and towns secured a $1.3 million federal grant.[3]

ValleyBike was officially launched in the summer of 2018. Between June and September 2018, the program allowed residents to travel more than 36,000 miles throughout their communities.[4] By November, at the end of its first full season, ValleyBike's bicycles had covered 84,000 miles over 43,000 trips.[5]

The program's bicycles are available at an affordable rate, with different tiers of membership. A pay-per-ride pass costs $2, while monthly and annual plans allow frequent users to save money.[6]

ValleyBike operates more than 500 bicycles spread out between 54 docking stations.[7] Each bike is equipped with a GPS system to allow users to easily check availability and to facilitate the recovery of missing bicycles.[8] The stations are situated conveniently at areas of high traffic in the communities they serve, including the campuses of UMass Amherst and Smith College.[9]

The bicycles have proven to be a reliable transportation option. While the bicycles weigh in at a sturdy 75 pounds, they are equipped with electric assist (e-assist) technology to help commuters tackle the hilly terrain in the Pioneer Valley. The e-assist technology helps to increase the average distance riders cover per trip.[10]

The ValleyBike Share network is slated to expand, with service arriving in Easthampton in the summer of 2019.[11] PVPC has also taken other steps to encourage bicycle travel in the Pioneer Valley, including a partnership with Holyoke to develop a bike network plan targeted at improving the city's bicycle-friendly infrastructure.[12]

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Pittsfield: Microgrid feasibility study

In 2018, Pittsfield became one of 14 Massachusetts communities — including Boston's Chinatown, the Charlestown Navy Yard, and the town of Melrose — to receive funding from the Massachusetts Clean Energy Center to conduct a feasibility study for a community microgrid.[1]

A microgrid is a localized energy grid which can be connected or disconnected from the traditional grid. Because it contains a source of electricity generation, a microgrid can keep communities powered during a grid outage. Some microgrids use a combination of energy storage and renewable energy resources, like solar panels, to provide a pollution-free, reliable supply of electricity.[2]

The city received $75,000 to explore the implementation of a microgrid in the downtown business district.[3] The microgrid would connect key buildings, including the fire department, Berkshire Medical Center, and city hall, keeping them online in the event of a prolonged power outage. The microgrid would also connect to the city's senior center and public housing units, protecting the most vulnerable populations during periods of extreme weather or other emergencies.[4]

In addition to ensuring a reliable supply of power to critical facilities during natural disasters, the construction of a downtown microgrid would also provide an opportunity to install more clean energy technologies. Solar arrays could be installed on a downtown parking garage to form one component of the microgrid.[5] The study will consider the potential to combine solar installations with battery storage units and energy management systems.[6]

Pittsfield is taking other steps to reduce fossil fuel consumption and increase the generation of renewable electricity. In 2017, the city opened a 2.9-megawatt solar installation on a capped landfill. The system is projected to save Pittsfield $140,000 annually.[7] Additionally, energy management systems installed at City Hall have reduced energy consumption, saving the city around $13,000 each year.[8]

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Somerville: Climate Forward plan

Somerville is vulnerable to coastal flooding due to its proximity to the Mystic River, which separates the city from nearby Medford and Everett.[1] This vulnerability, along with other climate-related risks, prompted Mayor Joe Curtatone and other officials to assemble the city's first comprehensive plan to address climate change.[2] Somerville Climate Forward, released in November 2018, lays out a series of actions that can be implemented over the next 5–10 years to reduce the threat of global warming.[3]

After conducting a greenhouse gas inventory in 2016, city officials, activists, and community leaders joined together to lay the foundation for the current plan. Through working groups, 75 residents and stakeholders identified 13 priority areas of action, each including action steps.[4]

As a largely residential city, 65% of Somerville's greenhouse gas emissions come from the energy used to provide heating and electricity to buildings.[5] The plan identifies two avenues to reduce emissions from buildings: incentivizing new buildings to be built to highly efficient net zero standards, and improving the efficiency of existing buildings. In the short term, the plan proposes to use the city's zoning authority to encourage the use of passive design elements (such as increased insulation, shading, and the orientation of windows) to reduce energy demand in new buildings. These features would also help to keep the building comfortable for occupants in the event of climate-related natural disasters that could cut off energy supplies.[6]

Additionally, the plan envisions the creation of a rental energy disclosure requirement, which would provide information on the energy efficiency performance of an apartment before tenants sign a lease. A policy like this could encourage landlords to improve the energy efficiency of their properties to make them more appealing to potential tenants, an important step in a city where the majority of residents are renters.[8]

Somerville Climate Forward aims to shift residents away from fossil fuel transportation. Switching to electric vehicles will play a role, but the plan also calls for getting more residents to travel by public transportation, walking, or biking rather than driving.[9]

Finally, the plan calls for a transition toward 100% renewable electricity by continuing and improving the city's municipal aggregation program and advocating for stronger clean energy policies at the state level.[10]

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Sterling and Ashburnham: Battery storage

The town of Sterling, with a population just under 8,000, has become a global leader in energy storage. Government officials and utility operators from Germany, Japan, Taiwan, and Norway have visited the 2-megawatt, 3.9-megawatt-hour lithium ion battery storage system installed by the Sterling Municipal Light Department (SMLD). The first of its kind in Massachusetts, this utility-scale battery went online in 2016.[1]

The system allows SMLD to store energy produced by the town's solar arrays and release it back into the grid during hours of peak demand. In addition to cutting back on greenhouse gas emissions, the battery is projected to save SMLD customers over $400,000 on their electricity bills every year.[2] The storage system also provides a reliable supply of electricity to critical facilities in the event of a natural disaster. SMLD's battery stores enough energy to power the Sterling police station and dispatch center for up to 12 days, preserving local first responders' ability to protect their community during a power outage.[3]

In 2018, Sterling installed a second energy storage project. The new 1-megawatt, 2-megawatt-hour battery storage system is paired with a 1-megawatt rooftop solar array. This "solar + storage" system is expected to produce enough electricity to power 228 homes each year.[4] Residents of Sterling can choose to purchase electricity from the solar panels at a predictable, fixed rate for 25 years.[5]

Another Central Massachusetts community, Ashburnham, is also an early adopter of energy storage technology. Ranked sixth in the United States for solar capacity per customer, the Ashburnham Municipal Light Plant (AMLP) received a $600,000 grant from the Advancing Commonwealth Energy Storage Initiative in 2017.[6] The 3-megawatt, 5-megawatt-hour system went online in January 2019, and is expected to reduce capacity and transmission costs for electric customers.[7] The completion of this project allowed AMLP to lift a moratorium on new solar energy development in town, since the battery system can be used to store excess solar energy produced at times when the generation of solar power is higher than the demand for electricity on the local grid.[8]

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Watertown: Rooftop solar policy

Since its designation as a Green Community in 2010, Watertown has reduced energy consumption for municipal facilities by 14% through energy efficiency measures. The town has converted all streetlights to efficient LED fixtures, saving more than $105,000 per year. Local officials have installed solar panels on the roofs of the public works building, police station, and high school, reducing energy costs by $30,000 per year.[1]

Watertown is home to 231 solar installations, mostly on residential buildings.[2] Town officials recognized an opportunity to tap into more of Watertown's solar energy potential by installing solar panels on the roofs of commercial buildings.

In 2018, the town council unanimously passed an ordinance requiring all new commercial buildings greater than 10,000 square feet or residential buildings with more than 10 units to be built with solar panels on at least 50 percent of the roof area. Additionally, parking structures must have solar panels covering 90 percent of their top surface.[3] The ordinance also requires existing buildings that are undergoing renovation to install solar panels.[4] It allows for exemptions for buildings that do not have sufficient solar exposure on their roofs.[5]

Town officials expect that the rooftop solar requirement will not be an impediment to new development. Local leaders hope that the ordinance will help reduce pollution and support local solar energy businesses.[6]

A report by the Environment America Research & Policy Center and Frontier Group found that requiring rooftop solar panels on new homes built in Massachusetts between 2020 and 2045 would add more than 2,300 megawatts of solar capacity, equivalent to all of the solar that has been installed in the state so far. The electricity generated by these solar panels would reduce Massachusetts' global warming emissions by 1.9% from 2015 levels.[7] Extending this requirement to commercial buildings, similar to Watertown's ordinance, could lead to even greater benefits.

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Worcester: Municipal solar installations

Massachusetts has been a national leader in solar energy for years, and the Commonwealth's second largest city, Worcester, has set the pace for the rest of the state on municipal solar installations.

Between 2011 and 2017, Worcester built 15 municipal solar arrays, including eight installations at the city's public schools.[1] As part of this project, the roofs of six schools were coated with a white sealer, which extends the life of the roof while reducing the amount of energy needed to cool the building in the summer. Additionally, by reflecting more light, the white roofs increase the output of rooftop solar panels by 10 to 15%.[2]

Worcester's largest municipal solar installation went online in 2017.[3] Built on the capped Greenwood Street Landfill, the project covers 25 acres and includes more than 28,600 solar panels. The 8.1-megawatt installation generates enough electricity to power 1,340 homes annually and eliminate 7,475 metric tons of carbon per year, the equivalent of avoiding 18 million miles of driving.[4]

At the time of its construction, the Greenwood solar plant was the largest municipal solar installation in New England. The Greenwood solar installation is projected to recoup the city around $70 million dollars during its 30-year lifespan.[5]

In addition to these solar projects, city officials have taken steps to reduce energy consumption in municipal buildings. Worcester completed these projects through an energy savings performance contract, which enables a municipality to pay for the cost of energy efficiency improvements with the money saved from reductions in energy use.[6] Energy efficiency upgrades have included insulation, weather sealing, and energy management control systems. The city has also converted all 14,000 of its streetlights to efficient LED fixtures.[7]

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Resources for local clean energy action

Mass Power Forward

http://mapowerforward.com/100re

- Local Clean Energy Checklist: A resource to help activists identify which clean energy steps their community has already taken and how to target their next steps.
- Fact sheets on municipal policies for clean electricity, efficient buildings, and zero-emission transportation.
- A sample resolution for cities and towns to commit to a goal of 100% renewable energy.

Mass Climate Action Network

https://www.massclimateaction.org/

- Supporting local chapters to implement municipal-level projects to increase clean energy and reduce global warming pollution, including community choice energy and net zero planning.
- Working with residents and local officials in communities served by municipal light plants (MLPs) to increase the use of renewable electricity.

Sierra Club Local Climate Leadership Project

http://www.cleanenergymass.org/

- Working with local elected officials to take action in their communities for clean energy, climate justice, and a livable planet.

350 Mass for a Better Future

https://350mass.betterfutureproject.org/renewable_towns

- Volunteer chapters advocating for municipalities to commit to 100% renewable energy and take concrete steps to increase clean energy.

Green Energy Consumers Alliance

https://www.greenenergyconsumers.org/aggregation

- Information on green municipal aggregation, including a report documenting the positive impacts of aggregation programs.

Metropolitan Area Planning Council (MAPC)

https://www.mapc.org/net-zero/

- Case studies of municipal clean energy policies.
- A guide for municipalities to create plans to get to net zero emissions.

Northeast Energy Efficiency Partnerships (NEEP)

https://neep.org/

- Community Action Planning for Energy Efficiency (CAPEE): A tool to help communities prioritize actions to reduce carbon emissions and improve energy efficiency.
- Regional Operations & Maintenance Guide for High Performance Schools and Public Buildings in the Northeast and Mid-Atlantic

100% Renewable Boston: How Boston can accelerate the transition from fossil fuels to clean, renewable energy

Environment Massachusetts Research & Policy Center
https://environmentmassachusetts.org/reports/mac/100-renewable-boston

Ten Ways Your Community Can Go Solar

Environment America Research & Policy Center
https://environmentamerica.org/feature/ame/ten-ways-your-community-can-go-solar