Climate Action Adaptation *and* Resilience Plan

June 2021

TOWN OF
AMHERST
MASSACHUSETTS

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Letter from the Town Manager

June 14, 2021

Dear Town Council and Members of the Amherst Community,

I am very pleased to present the Climate Action, Adaptation, and Resilience Plan to the Town Council and the broader community.

The plan is the product of hundreds of hours of visioning, planning, discussion, review, and collaboration by members of the Energy and Climate Action Committee, Town staff, consultant team, Town residents, and business owners.

The work started with listening... listening to members of the community; listening to the people who have been and will be most negatively impacted by climate change. It included heeding the call from advocates for reducing carbon emissions. And it is built on collaboration and participation by Town staff and others who will be responsible for its implementation.

The plan recognizes the ways in which climate change disproportionately impacts certain members of our commuinty -- especially those who live in multi-family housing as renters. The plan sets the direction for taking responsibility and action to enact change to support the most vulnerable in our community.

We are on the precipice of a very important time in history in which the decisions and actions we take now will determine the world we leave to our children in the future. We must acknowledge that our collective attempts at change have been inadequate to withstand the repercussions from delayed global action.

This is an ambitious plan. There is a lot of work to do. I am excited that Amherst has the opportunity to show leadership in making real change through bold action. Every member of our community has a role to play. I look forward to working under the guidance of the Town Council to oversee its implementation.

Sincerely,

Paul Bockelman
Town Manager

Letter from the Energy and Climate Action Committee

Dear Neighbors,

We find ourselves at a pivotal moment in history. The actions we take today and over the course of the next 30 years will profoundly impact the wellbeing of our planet and species. There is much work to be done, and yet, momentous work is being accomplished every single day. We owe a debt of gratitude to the scientists, activists, artists, community members, and concerned citizens that have paved the way for this work. Building on decades of action in Amherst, the 2021 plan serves as a roadmap, outlining specific actions we must take in order to reach our goal of carbon neutrality by 2050.

CLIMATE ACTION AS PART OF A LARGER SOCIAL MOVEMENT

It is vital that all climate strategies prioritize the equity and well-being of our most vulnerable neighbors here and around the world. While the plan has many technical aspects, its success hinges on the ability to ground climate action in human relationships and reparation. We know those most adversely affected by climate change, are those who have contributed to it the least. We must put people at the forefront of our decisions, while simultaneously diversifying the people making those decisions. This can only be accomplished by removing systems that exclude **BIPOC** from governance and economic power structures.

POLITICAL ENGAGEMENT AT ALL LEVELS

Solving the problem of climate change requires collective action and consistent accountability. Advocating for continued changes in state and federal systems will lay the groundwork and required resources for bold and creative action here in Amherst. It is this creative and collective action that excites us. An opportunity to unify the town around a common goal, as we navigate cultural and behavioral shifts in the way we live, work and think.

COMMITMENT TO ACTION

As the Energy and Climate Action Committee (ECAC), we commit ourselves to the success of this plan. We will lend our passion and expertise across all sectors of town, ensuring climate action, equity and resilience remain at the center of all municipal decisions. The road ahead is marked with big changes - from our buildings and roads, to the way we eat and the air we breathe. When successful, we will do more than reduce our carbon emissions. We will see reduced utility costs for homes, businesses, and government; Healthier, more comfortable and cost-conscious homes; Improved air quality, public health, and overall quality of life.

WHAT'S NEXT?

Our town has committed to reduce carbon emissions 25% by 2025, on the way to carbon neutrality by 2050. We all have a role – businesses, landlords, residents, institutes, and the Town. We want to hear from you and support this work moving ahead. We will continue to network and collaborate with the other committees and Town staff as they take on these challenges The ECAC has identified ***FIVE INITIATIVES*** for our committee to focus on in the next four years (right).

As fellow neighbors, we ask that you join us in envisioning an Amherst where all members of the community are able to participate in town governance and help shape public policy. An Amherst that invests in the holistic well-being and safety of its residents. An Amherst where we take care of one another, the earth, and its inhabitants. Please join us, as we continue to build a climate-forward Amherst. **WE CAN DO IT TOGETHER!**

Thank You,

Dwayne Breger, Laura Draucker (chair), Darcy Dumont (councilor), Sarah Durr, Ashwin Ravikumar, Steve Roof, Andra Rose (vice chair), Jesse Selman

P.S. We are a volunteer committee that only meets for a few hours per week. We are deeply grateful to the fulltime efforts of the town staff, particularly the town's Sustainability Coordinator, Stephanie Ciccarello, and our consultant team: Lauren de la Parra, Jim Newman, and Gazit Chaya Nkosi of Linnean Solutions. In a year filled with challenges they have worked tirelessly to deliver this plan.

1. Education

Continue public outreach and visioning to support carbon reductions by all.

2. Financing

Develop new and innovative financing options, and raise awareness of existing financing opportunities to help property owners increase building energy efficiency and reduce emissions.

3. Local Energy

Working with Pelham and Northampton, Amherst will soon be able to offer greener electricity options that benefit our local economy and support further carbon reductions.

4. Buildings

Starting with rental buildings, establish a rating system, improvement plans, and pilot energy retrofits followed by energy benchmarking for commercial buildings and energy disclosures for residential buildings at time of sale.

5. Municipal Policy

Work with the Town Manager to integrate greenhouse gas reduction strategies into all aspects of town operations, epecially procurement, facilities operation, maintenance, and vehicle fleets.

Statement of the Indigenous Heritage of the Land

We humbly acknowledge that we stand on Nonotuck land, acknowledging also our neighboring Indigenous nations: the Nipmuc and the Wampanoag to the East, the Mohegan and Pequot to the South, the Mohican to the West, and the Abenaki to the North.

Acknowledgment of the Contributions of African Americans

by Lauren Mills
Amherst resident, community leader, and Task Group participant

Amherst recognizes the generations of African Americans that have contributed to the development of agriculture and historical academic preservation from the past to the present. We also recognize the rich spiritual culture, artistic contribution, and pursuits of justice that have enriched the communities in which African Americans have lived, worked, persevered, and achieved.

Puffer's Pond
Photo credit: D. Dillon

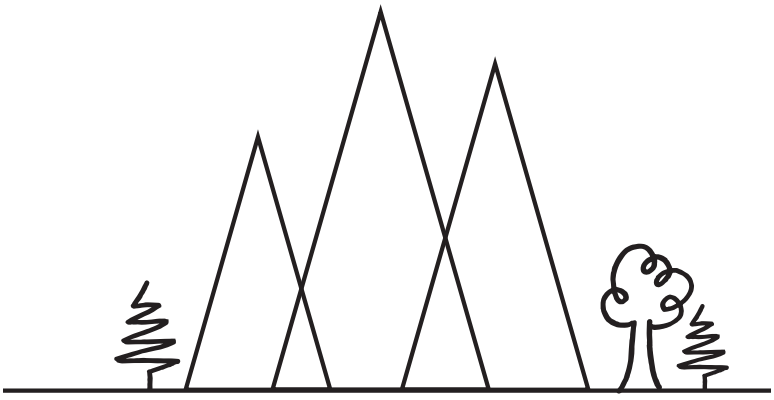
Contributor Acknowledgments

The Town of Amherst and the consultant team would like to acknowledge the perseverance and hard work of the following people and organizations in developing this Climate Action, Adaptation, and Resilience Plan:

Gazit Chaya Nkosi, Community Liaison; All of the members of the Task Groups who put their time and effort into creating the principles and strategies that form the core of the plan; Rossana Salazar, Laura Rojo MacLeod, and Lindsey Dunn for interpretation during meetings; Dr. Demetria Shabazz for facilitation; Daniel Dillon for photography; Keith Zalzberg-Drezdahl and the Regenerative Design Group for soil carbon expertise; Isabel Kaubisch and Nitsch Engineering for stormwater and infrastructure expertise; Sarah Durr for her unparalleled graphic expertise; the many Town staff who put countless hours into attending meetings, reviewing drafts, and providing information; and the many other people who put time and effort into the work of building a resilient and low carbon community of Amherst.

We would especially like to acknowledge the ongoing hard work of Stephanie Ciccarello, Amherst Sustainability Coordinator and the Amherst Energy and Climate Action Committee: Dwayne Breger, Laura Draucker, Darcy Dumont, Sarah Durr, Ashwin Ravikumar, Steve Roof, Andra Rose, and Jesse Selman.

Table of Contents



Amherst History Mural
Photo credit: D. Dillon

Introduction

Background

Amherst has been proactive in its approach to sustainability and climate mitigation across many sectors, including Buildings, Renewable Energy, Land Use and Natural Systems, and Transportation and Infrastructure. The Town was an early adopter of the state's Building Energy Stretch Code in 2011, and has been working to increase building energy efficiency and develop renewable energy steadily over the past decade. Amherst became a Green Community in 2012, and has been an active member of the New England Municipal Sustainability (NEMS) Network since its formation. In 2017, the Town decided to re-conduct and update its 2001 **greenhouse gas emissions** inventory, which was based on 1997 levels, with 2016 as the new baseline from which to track progress on **climate mitigation**.

In 2019, the Energy and Climate Action Committee (ECAC) was established with a charge of developing ambitious, realistic, and achievable climate goals for the Town, and overseeing the development of planning to meet them. The ECAC conducted a series of community meetings and workshops that same year to understand the interests of the Amherst community in taking climate action. These gatherings and their outputs became guiding documents for developing the purpose and goals of this Plan.

The Town of Amherst launched a community process to develop a Climate Action, Adaptation, and Resiliency Plan (CAARP) in the summer of 2020. In the midst of a global pandemic and a national reckoning with racism and police violence, and public meetings shifted entirely online, the process helped to establish new norms for the Town and deliberately elevated historically excluded voices including those of renters, youth, people with disabilities, and people of color. Led by consultants Linnean Solutions, the Plan develops pathways to achieve

Amherst's ambitious climate goals set by the ECAC – 25% emissions reductions from 2016 levels by 2025, 50% by 2030, and carbon neutrality by 2050 – in ways that support **equity**, **climate justice**, economic prosperity, and community resilience.

Climate Change in Amherst

Amherst received funding in 2019 from the state Municipal Vulnerability Preparedness (MVP) program to identify and prioritize local climate hazards, strengths, and vulnerabilities across the town's infrastructural, societal, and environmental systems. Top **climate hazards** in Amherst included increased heat, increased precipitation, drought, and extreme weather events like heavy rainfall, hurricanes, and snowstorms. These hazards create climate risks like increased flooding, power outages, transit interruptions, and damage to trees and infrastructure. Amherst's key strengths that were highlighted included existing renewable energy development, strong community networks and organizations, excellent municipal resources, and a culture of climate activism. Key vulnerabilities named were related to potential impacts of climate change on Amherst's water supply, wastewater system, and aging housing stock, in addition to communication barriers and uneven access to resources among residents.

Climate measurements and projections for Massachusetts and the Northeastern US show increasing average temperatures, longer and more frequent heat waves, and increased average precipitation, but with more of it falling as rain and less as snow. The growing season is already 10 days longer on average than it was in the 1960s[1], meaning winters are getting shorter as well as warmer – conditions that tend to increase populations of pests and invasive species. These changes all have important implications for the Amherst community, from agricultural production and infrastructure maintenance, to food security and public health, that are interwoven throughout this Plan.

1 https://climateactiontool.org/content/temperature-changes

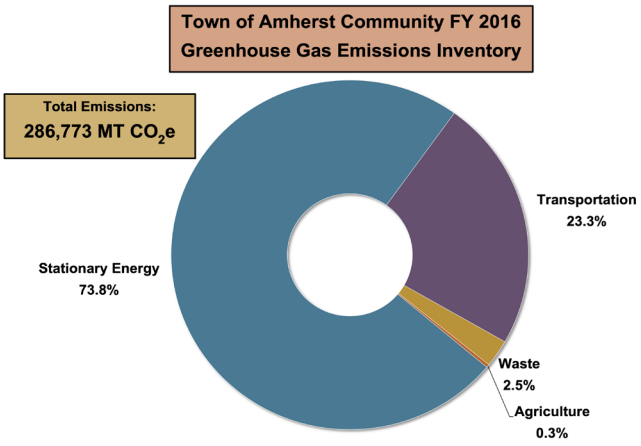
Amherst's Climate Goals

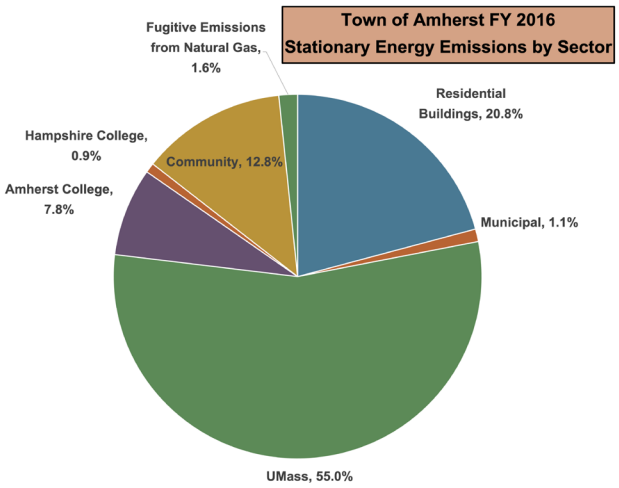
The Amherst Town Council adopted the climate mitigation goals recommended by the ECAC in 2019. They are:

- **25% reduction in Town-wide emissions below baseline* by Fiscal Year (FY) 2025;**
- **50% reduction in Town-wide carbon equivalent emissions below baseline* by FY 2030;**
- **Town-wide carbon neutrality by 2050.**

*Baseline = FY 2016

These ambitious goals will take persistent coordinated action across all levels of government and society to be fully achievable. Amherst undertook a greenhouse gas emissions inventory in 2017 to understand its emissions profile and begin the process of planning for **carbon mitigation**. Amherst's inventory includes all Scope 1 and Scope 2 emissions applicable within the town's geographic boundaries – all emissions from direct fuel consumption in its buildings and vehicles, and electricity use – as well as some **Scope 3 emissions** associated with waste that is generated in Amherst but processed elsewhere.





Amherst's Climate Goals

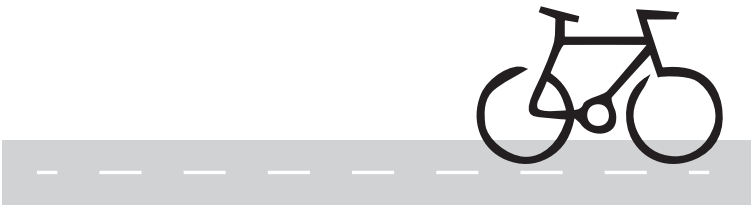
Future inventories can expand upon this foundation to consider other sources of emissions (see e.g. Strategy TI1.3), as well as accounting for the impacts of policies such as the Town's recently-adopted Zero Energy Town Buildings bylaw (see Beyond 2025: Buildings).

The inventory's results show that non-campus residential, municipal, and commercial buildings account for 73,400 MT CO_2e, or 25.6%, of emissions, while transportation accounts for 66.944 MT CO_2e, or 23.3%. These proportions are reflected in the distribution of Strategies across the sectors of this Plan. The three institutions of higher education (Hampshire College, Amherst College, and the University of Massachusetts, Amherst) together account for another 134,860 MT CO_2e, or 47% of total town-wide emissions. This situation suggests that, on the one hand, working partnerships and shared accountability with the institutions will be important in reducing Town-wide emission. On the other hand, strategies that can support and positively influence individual actions and decisions will also be important in meeting the Town of Amherst's ambitious emissions reductions goals. Actions at the state and federal levels are also needed to make achieving these goals possible (see State and Federal Advocacy and Collaboration).

Hampshire College and Amherst College have both made commitments to reach **carbon neutrality** – Hampshire by 2022, and Amherst by 2030. UMass Amherst has developed a Carbon Mitigation Plan to demonstrate the technical feasibility of achieving a carbon neutral campus by 2032, and is exploring opportunities for implementation. The higher education institutions' progress toward reaching their own emissions reduction goals will be essential to Amherst's overall success, but are considered separately in the emissions estimates attached to the Roadmap to 2025 section of this Plan.

How to Use This Plan

This Plan is intended to be useful to multiple audiences – community leaders, Town staff, policymakers, business owners, and other local and regional stakeholders. The Roadmap to 2025 will guide readers through stakeholder-defined priority Strategies for reaching 25% emissions reductions from 2016 levels and enhancing community resilience within this time-frame (see About the Process). Each Roadmap sector provides a snapshot of the key context for the Strategies presented, and outlines short-term actions that span from individual to town-wide efforts. Beyond 2025: Preparing for Long-Term Action highlights policies and possibilities that Amherst can begin working towards that have longer-term implications, or that are on the horizon but not fully feasible yet. State and Federal Advocacy and Collaboration outlines some of the key issue areas that are important to this Plan where municipal, nonprofit, industry, and citizen advocacy can play an essential role in moving the needle toward carbon neutrality. **Key Terms and Definitions (bolded throughout this Plan)**, along with emissions calculations and other resources, can be found in the Appendices.



Mill River
Photo credit: D. Dillon

Developing the Plan

About the Process

This Plan aims to support Amherst in reducing **greenhouse gas emissions** in ways that meet the needs of the community's most vulnerable residents first, so that everyone can thrive in the face of a changing world. The Plan outlines effective, efficient, and sufficient actions to meet emission reduction goals in the short and long term while building community resilience. The Town of Amherst received a Municipal Vulnerability Preparedness (MVP) Action Grant to support a process that included hiring a Community Liaison who supported the engagement of Community Leaders with lived experience that is often excluded from the perspectives expressed in local planning and participation, including those of people of color, youth, non-English speakers, people with disabilities, and renters.

The community process centered around four Task Groups, each one focused on a specific climate-related sector: Buildings; Renewable Energy; Land Use and Natural Systems; and Transportation and Infrastructure. Task Groups were co-chaired by two members of the Energy and Climate Action Committee, and participants included community members, Town staff and volunteers, and local advocates with a variety of different areas of interest, priorities, and expertise. It is important to note that the COVID-19 pandemic response stopped all in-person meetings just as this project got started. Each Task Group met virtually three times over the course of the summer and fall of 2020. New challenges arose in the virtual environment, and Task Group members rose to meet them, contributing their thoughts, hopes, and visions for Amherst's potential to the DNA of this Plan.

This plan was developed during a pivotal moment in history. Amherst community members have brought to the forefront a movement for racial justice that has grown stronger in the wake of the murder of George Floyd in May of 2020. This movement has had a large impact on Amherst, and will continue to be important as the community moves forward. The simultaneous COVID-19 pandemic highlighted disparities in housing, school support, transportation, and other municipal services for Amherst residents. Many members of the Amherst community were put in difficult situations due to loss of work, loss of in-person schooling, changes in transportation services, and the virus itself. Police actions against Black, Indigenous, and people of color around the US and the resulting protests and community attention to structural racism also heightened the role that a climate action and adaptation plan needed to play in undoing structural racism and supporting the most vulnerable members of the community first.

Plan implementation has already begun. A number of actions and initiatives were already underway at the start of the planning process, such as the development of the inter-municipal Community Choice Aggregation (see Strategy RE1.1); other important actions were started right away (see e.g. Strategy B1.2). However, many of the actions outlined in the plan will take ongoing collective action and community capacity-building to succeed. The project team hopes that the partnerships and relationships that will make these actions possible have been strengthened through this process.

Aerial view of Amherst
Photo credit: Lion Hirth

What is Equity?

Equity is the foundation of climate justice. Equity centers the ways that the past continues to impact the present, and recognizes that the decisions of today shape the future. Its four pillars are:

Procedural

The people who are most affected by decisions are an integral part of making them.

Distributional

All members of the community receive a fair share of the benefits and experience a fair share of the impacts from a decision or action.

Structural

Processes recognize the historical and lived inequities that community members face, and provide support for all members of the community to engage as fully and with as few barriers as possible.

Intergenerational

Processes, decisions, and actions aim to fulfill the needs of current generations while ensuring that future generations can do so too.

Plan Principles

Amherst's climate mitigation and adaptation actions will be guided by four key principles developed and refined over the course of the Task Group process. These principles are: **Equity, Accessibility, and Belonging; Racial and Climate Justice; Local Wealth Creation and Fair Distribution; and Community Involvement and Connections.**

Equity, Accessibility, and Belonging

Increasing equity in local planning requires addressing the underlying reasons why many of our residents do not – or cannot – currently participate. In many Massachusetts towns, local governance has long been dominated by white, affluent, able-bodied, native English-speaking homeowners who have the time, flexibility, and means to take on the unpaid part-time work of Board/Committee membership or local planning advocacy. To move toward true inclusion and representation, and cultivate an atmosphere where everyone belongs, Amherst can continue to implement practices that support ongoing equitable participation in local planning (see Strategy GC1.1, GC2.1).

Racial and Climate Justice

Climate justice is the understanding that climate change is already having disproportionate impacts on populations around the globe that have contributed the least to its causes, and that this social and political injustice cannot persist for all of humanity to survive, let alone thrive, under future climate change conditions. As the COVID-19 pandemic has viscerally reinforced, all of life on Earth is interconnected, and injustice anywhere has ripple effects everywhere.

Climate justice is inclusive of, and explicit about, racial justice – as well as issues such as Indigenous and labor rights, environmental quality, and economic justice. Climate justice connects the climate crisis to peoples' quality of life, encouraging climate action, adaptation, and resiliency actions that put the safety and well-being of people who are already most affected or most vulnerable in the community at the forefront, because when this happens, it is far more likely that everyone's needs can be met equitably.

Local Wealth Creation and Fair Distribution

Local job creation, convenient and affordable transportation options, and equitable distribution of the benefits and costs associated with climate change investments were recurring themes that Task Group participants prioritized when considering how actions and strategies could be implemented, and what are some of the common barriers to achieving desired outcomes. Economic inequality was frequently referenced as a major barrier to health, wealth, and the climate resilience and mitigation potential that are correlated with them. Participants emphasized the importance of investing in local businesses, using incentives and disincentives strategically to encourage good stewardship of land and resources, and promoting a broader understanding of intergenerational equity as it relates to wealth.

Community Involvement and Connections

The Amherst community is the inspiration and the driving force behind current and prior local climate planning efforts, and community involvement and climate leadership will continue to be essential. Community leaders have shaped this plan, and will continue to play important roles throughout the processes of decarbonization, climate adaptation, and community resilience building laid out here. Part of effective climate action includes strengthening community connections to sustain and enhance a local culture of collaboration and mutual aid.

Ways to Get Involved

- Apply to serve on a Town Board or Committee involved plan implementation, such as the Energy and Climate Action Committee, Transportation Advisory Committee, Affordable Housing Trust Fund, or Conservation Commission.
- Apply to serve on the CCA Community Advisory Committee (see Strategy RE1.1).
- Get to know the local chapter of a climate action-focused organization that inspires you.
- Volunteer with community-based organizations that are helping to build resilience in Amherst.
- Run for elected office.
- Talk to your friends, family, neighbors, colleagues, and others about climate change and about this plan! Help spread the word about ways to learn, get involved, take action, and connect!

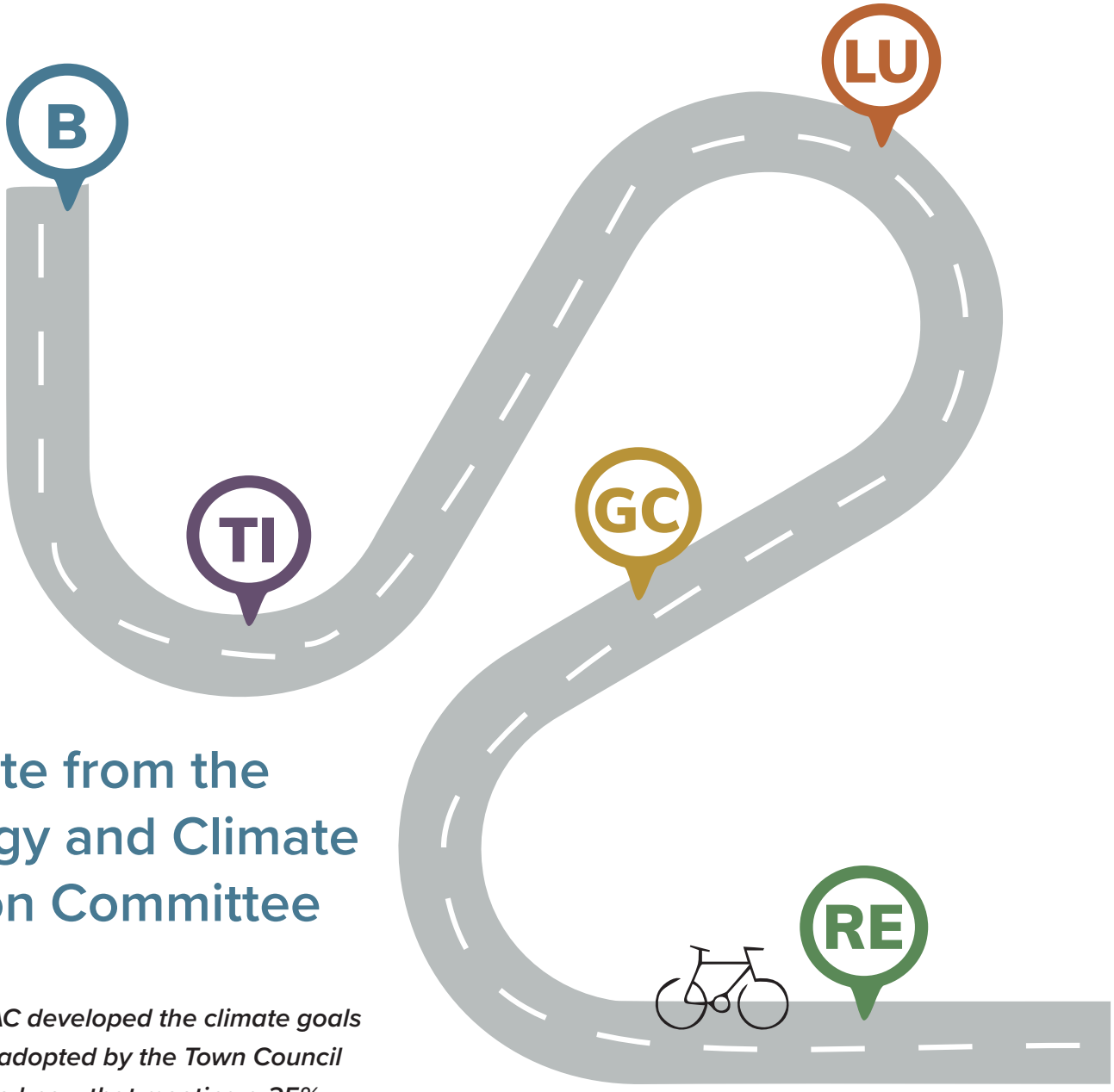
Evaluating Strategies for Action

A set of cross-cutting priorities were used to evaluate strategies based on the Town's existing climate goals and community values. Each Strategy in this Plan considers potential costs and benefits including **greenhouse gas emissions** reductions, resilience-building potential, and opportunities to uphold the Principles articulated in the process (see Plan Principles). Costs were estimated on a scale of one to four dollar signs ($ to $$$$) corresponding to a range from minimal cost to large capital expenditures; emissions estimates reflect the significance of the applicable sector in Amherst's overall emissions profile (see Amherst's Climate Goals) and the readiness of the actions that make up each Strategy – that is, how easy they are to do and how prepared Amherst is to do them. Equity-enhancing and resilience-building potential, including community relationship-building, local job creation, anti-racism, and resilience to physical hazards, are considered in how each Strategy is crafted and framed.

At the end of each Sector is a summary of the key Town Leaders and implementation Partners, and Existing Resources that provide important context for new projects and initiatives.

Investments are outlined to inform big-picture thinking about funding, budgeting, and capital planning, and Potential Metrics and Milestones support a framework of accountability and initiative that characterize Amherst's ongoing climate action efforts. Climate action, including mitigation to meet our goals and adaptation to reduce vulnerabilities, is already integral to a wide range of jobs and responsibilities; Town staff continue to expand sustainability efforts and capacity, and a climate lens is frequently applied in decision-making. Nonetheless, opportunities exist to integrate climate change into departmental procedures, such as purchasing, hiring, and training. Integrating sustainability and climate justice into job descriptions for existing and future staff positions can further this aim, as can hiring more sustainability- and climate-focused staff, as much as possible (see Strategy GC1.3).

Town staff continue to expand sustainability efforts and capacity, and a climate lens is frequently applied in decision-making. Further opportunities exist to integrate climate change into departmental procedures, such as purchasing, hiring, and training.



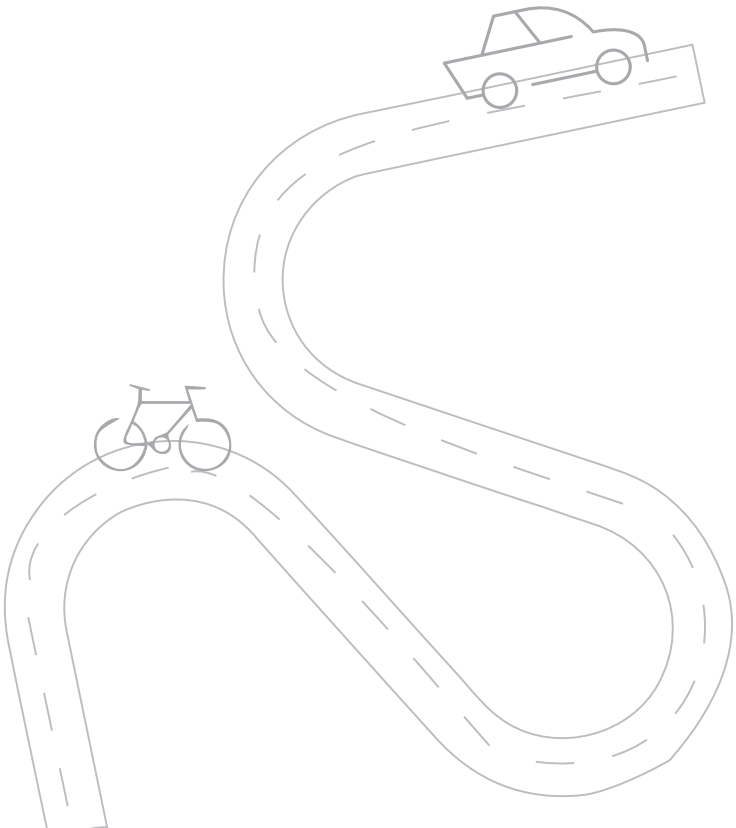
A Note from the Energy and Climate Action Committee

When ECAC developed the climate goals that were adopted by the Town Council in 2019, we knew that meeting a 25% reduction target by 2025 would be difficult. However, we felt it was an important milestone to ensure the town takes near-term actions towards our 2030 and 2050 goals. The "Roadmap to 2025" outlines several strategies that the Town of Amherst can take to help us make progress towards 25% by 2025. These strategies also lay the necessary groundwork - without these actions and the state and federal advocacy outlined later in this Plan, we will not be able to meet our longer-term goals. In addition to ensuring these actions are taken at the town level, ECAC will work to catalyze additional actions at the individual, state, and federal level to drive more reductions consistent with our 2025 goals and the principles laid out in this plan. These include, but are not limited to, state and federal advocacy on policies and funding to support town and individual level actions and educational campaigns to support access of those funds to adopt technologies like electric vehicles and fossil-fuel free home heating systems.

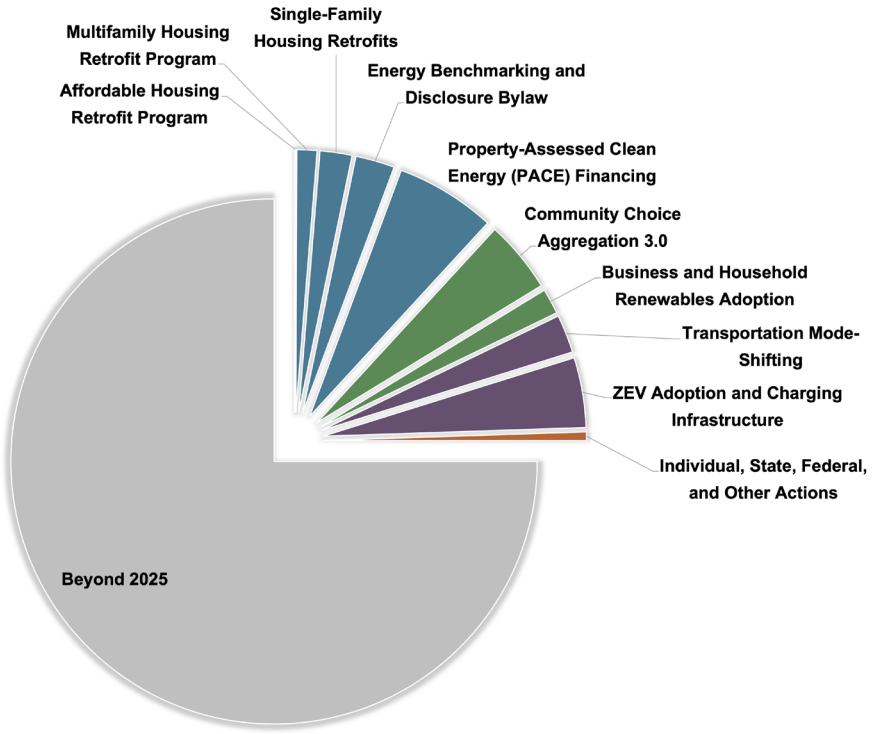
Roadmap to 2025

Overview

The primary emphasis of this Plan is on the next five years – how Amherst can reduce **greenhouse gas emissions** dramatically and enhance climate resilience in alignment with the community's most pressing needs and important values in the immediate term. The Roadmap presented here draws upon ongoing, promising, and high-priority strategies from Amherst's previous local planning processes, and adds to them. Priorities identified during sector-specific Task Group conversations, as well as emerging best practices in municipal climate change policy and planning, were integrated into a robust process of evaluating strategies through the lenses offered by the Plan Principles (see About the Process). Strategies are organized by sectors, which include Buildings, Renewable Energy, Land Use and Natural Systems, and Transportation and Infrastructure. A section on Governance and Communications frames the Roadmap, and its Strategies are noted as recurring themes throughout the different sector Task Groups. Each section of the Roadmap starts with a brief overview of key context for the 2025 Strategies; for more information about each sector, see Beyond 2025: Preparing for Long-Term Action.



CO2E REDUCTION FROM NON-COLLEGE & UNIVERSITY EMISSIONS (MTCO2E)



The goal of reducing emission by 25% below 2016 emissions levels is a community wide goal for the Town of Amherst. The strategies presented in the first chart above are estimated to help the town achieve this goal if the baseline emissions exclude colleagues and universities ("Non-C&U emissions").

By factoring college and university emission into the baseline, these strategies will likely achieve a 14% reduction from 2016 levels. This exemplifies the importance of building on the strong relationship between the local colleges and universities with the Town of Amherst as all parties continue to make progress towards implementing their climate action goals.

Roadmap to 2025 Strategies

Climate Action	CO2e reduction from Non-C&U Emissions	% of Non-C&U Emissions
Total 2016 Emissions (baseline)	147908	100%
Affordable Housing Retrofit Program	102	0.07%
Multifamily Housing Retrofit Program	1818	1.23%
Single-Family Housing Retrofits	2899.6	1.96%
Energy Benchmarking and Disclosure Bylaw	3552	2.40%
Property-Assessed Clean Energy (PACE) Financing	9115	6.16%
Community Choice Aggregation 3.0	6562	4.44%
Business and Household Renewables Adoption	2315	1.57%
Transportation Mode-Shifting	3470	2.35%
ZEV Adoption and Charging Infrastructure	6361	4.30%
Individual, State, Federal, and Other Actions	783	0.53%
Total Reduction	36977.75	25.00%

Community planning that centers the voices of community members who are already experiencing the impacts of the climate crisis most acutely can elevate broader community needs, avoid tokenism, foster innovative solutions, and reinforce Amherst's ongoing commitment to **racial equity** and inclusion.

22%

of Amherst residents speak a language other than English at home.

Roadmap to 2025

Governance and Communications

Ongoing community outreach and collaboration are central aspects of Amherst's approach to tackling the climate crisis. Many committed organizations, institutions, and individuals are already doing fantastic work in Amherst and surrounding areas, and this plan seeks to elevate, reinforce, and build upon that work. Town planning processes to address **climate justice** mean that community members who have been historically excluded from local planning and decision-making need to be positioned to help lead the visioning, planning, and mobilization necessary to achieve Amherst's climate goals. As an example, 59% of all housing units in Amherst are renter-occupied, yet renters are often absent from decision-making processes (see the Plan Principles section for more information).

One important area of climate vulnerability raised during the Town's MVP Planning workshop (see About the Process) is a lack of multilingual emergency services and communications. Non-English speaking residents and residents without phone or internet access, particularly those living in apartment complexes without direct public access to individual units, are currently underserved by the Town's routine and emergency communication strategies, which can impact climate and community resilience (see also Strategy GC2.2, Support Universal Broadband Internet Access). According to the U.S. Census Bureau, 22.3% of Amherst residents speak a language other than English at home, with Spanish, Mandarin, and Portuguese among the top languages spoken. The Town of Amherst is committed to ensuring that all members of the community have access to critical information and resources that can assist them during emergencies and keep them informed about important local issues, including climate-related ones.

Center Equity in Planning and Decision-Making

Institutionalize equitable, inclusive, and accessible Town governance and decision-making structures and processes.

How?

Create an official, compensated, BIPOC-led Committee of the Town tasked with overseeing planning and policy review and developing a Racial Equity Action Plan.

Many excellent models now exist, including the City of Providence, RI's Racial Equity and Justice Committee (see sidebar, right).

Develop a transparent process for appointing Town Board and Committee members.

Ensure that it explicitly supports the equitable participation of renters, low-income residents, people with disabilities, and Black, Indigenous, and people of color.

Provide cultural sensitivity and anti-racism training for all Town Board and Committee members.

Develop resources to help Board and Committee members structure public meetings in a manner sensitive to cultural context, learning styles, and engagement preferences.

Engage student groups in municipal planning processes.

Amherst's large student population has shaped development patterns, transportation infrastructure, local business community, and

Strategy Impact

E Supporting strategy – potentially large effects on long-term emissions reductions via increased community participation in climate action.

$ Cost: **$$** (Staff time, training, expanded accessibility, childcare).

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

many other aspects of life in town. Proactively engaging students in local planning efforts can continue to strengthen community connections and encourage Town-gown collaboration on project implementation.

Develop a community vision and action plan for increasing equity in local planning.

Actions recommended by the Task Groups include:

- Make American Sign Language and spoken language interpretation available for all public meetings.
- Hold all public meetings in locations that are fully accessible for people with disabilities and well-connected by public transportation.
- Ensure that closed captioning is available for meetings held virtually.
- Provide childcare during in-person meetings, and food if meetings take place during mealtimes.
- Schedule meetings thoughtfully to support greater participation. Evenings are generally best.
- Incorporate more channels for remote participation, such as online or paper comment submissions, and relay that feedback to the whole community.

Racial Equity and Justice in Providence, RI

The City of Providence, Environmental Justice League of Rhode Island, and Groundwork Rhode Island worked together to bring a **racial equity** lens to the City's sustainability work. This initiative included establishing a Racial and Environmental Justice Committee (REJC) to 1) identify key concerns, issues, and needs for communities of color related to environmental sustainability in Providence; and 2) Recommend a long-term process and structure for collaboration between communities of color and the Office of Sustainability. The REJC established the "Just Providence Framework," a tool to guide policy development in the City in ways that ensure climate justice, and conducted outreach around **energy democracy** with **frontline communities** to build community capacity to engage in climate action. The REJC co-designed and led the community engagement process for the City of Providence's Climate Justice Plan, released in 2017.

Execute Multilingual Municipal Communications

Make routine and emergency Town communications accessible in multiple languages spoken in Amherst.

How?

Create multilingual resources about how to access services during an emergency.

Work toward making all Town communications available in multiple languages spoken in Amherst. Advocate for and seeking funding support where possible.

Tailor outreach strategies to reach target groups, i.e. Non-English speaking residents and residents without phone or internet access.

This approach can be combined with ideas outlined in Strategy GC2.1. For instance, seeking out residents who speak languages other than English to be Community Captains can reduce barriers to communication between Town staff and non-English speaking residents. Similarly, Community Captains can play an important role in reaching residents without internet or phone access.

Strategy Impact

E — Supporting strategy – potentially large effects on long-term emissions reductions via increased community participation in climate action.

$ — Cost: **$$** (Staff time, translation and interpretation).

Plan Principles

- Equity, Accessibility, and Belonging
- Community Involvement & Connections

Support Climate Action Outreach and Collaboration

Continue to support community participation and coalition-building around climate action through outreach and engagement.

Strategy Impact

E — Supporting strategy. Potentially large effects on long-term emissions reductions via increased community participation in climate action.

$ — Cost: **$** (Staff time, web resources).

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

How?

Expand sustainability staff capacity within the Town.
Integrate sustainability and climate action into existing job descriptions and responsibilities. Hire new staff where necessary and feasible to support implementation of this Plan.

Partner with public schools, colleges, advocacy organizations, and other climate allies to host events that foster shared learning about climate justice and gather support for local, regional, state, and national initiatives.

Integrate climate justice resources and networking activities into existing Town activities and events.

These can include the annual Sustainability Festival, Farmer's Market, Mobile Market, and others.

Expand the Town's online climate action resource hub.

Promote events, resources, and information about local climate change issues, projects, campaigns, partnerships, and ways to get involved.

Seek external funding in partnership with local/regional stakeholders to support the expansion of local climate justice coalition-building.

Implementation

Making it Happen

Leaders

- Town Manager and Town Council
- Communications Manager
- Community Participation Officers
- Sustainability Coordinator
- Disability Access Advisory Committee
- Racial Equity Task Force (Town staff working group)
- Energy and Climate Action Committee

Partners

- Fire Department
- Health Department
- Racial Equity Task Force (community-based coalition)
- Sunrise Amherst
- Mothers Out Front

Investments

- Staff time
- Partner compensation
- Board/Committee training
- Translation and interpretation
- Childcare and food

Existing Resources

- Amherst ADA Transition Plan
- Amherst Municipal Vulnerability Preparedness (MVP) Summary of Findings Report
- Spectrum from Community Engagement to Ownership (see Appendix C)

Potential Metrics for Success

- Rates of participation in local governance among renters, low-income residents, residents with disabilities, and residents of color.
- Rates of participation in local governance among students/youth.
- Rates of participation in local governance among non-English speakers, residents without phone or internet access, and residents of apartment complexes.
- Emergency preparedness and awareness of emergency resources and procedures among residents, with special attention to equity.
- Community satisfaction with local governance and participation processes and their outcomes.
- Resident engagement and familiarity with local climate change issues.
- Collaboration and community organizing around climate justice issues.

Amherst Town Hall
Photo credit: Town of Amherst

We spend the vast majority of our lives inside buildings - our homes, schools, libraries, and places of work. Existing buildings are the largest users of energy both in Amherst and at the national level, accounting for approximately 74% of **greenhouse gas emissions** in Amherst and approximately 40% nationwide.

74%

of Amherst's emissions come from Buildings.

Roadmap to 2025

Buildings

The buildings sector represents approximately 74% of carbon emissions in Amherst. Buildings are also a key resource in the work to adapt to climate change. The strategies in this plan focus on Amherst buildings that are not part of a college or university. This includes municipally-owned buildings such as schools or Town Hall, private residences such as single-family homes and townhouses, multifamily buildings, institutional buildings such as the Dickinson Museum[1] or the Carle Museum, and commercial/mixed-use buildings. Resilience of buildings to the effects of climate change is a well-developed field that embraces adapting buildings to keep people and businesses safe in the face of more intense storms, as well as adapting to warmer temperatures and changes in rain patterns.

The main goals of adapting buildings to be more resilient are to enhance residents' quality of life, especially in the face of climate changes, and to ensure habitability, comfort, and safety of buildings into the future.

Amherst's built environment is heavily influenced by its large student population, high percentage of residents living in multifamily housing, and high proportion of renters. Affordability is a major concern: rents in Amherst are 9% higher than the Hampshire County average, while houses cost 23% more on average to buy. In 2010, approximately 53% of renting households and 18% of homeowner households were financially strained by housing costs, meaning that over 30% of their monthly income went toward housing. Further, a 2015 study of the Amherst housing market found modest-income, non-student renters were the most vulnerable to

1 While technically owned by Amherst College, the Dickinson Museum is independently operated and its greenhouse gas emissions are not included in the College's overall footprint.

displacement due to unmet affordable housing demand. Climate change tends to multiply the threats associated with vulnerabilities that people already experience, including a lack of access to affordable housing .

Multifamily housing represents a big opportunity in Amherst's buildings sector for major efficiency gains, in terms of energy, costs, and implementation timelines. State-level incentives exist for multifamily properties, and Amherst's many aging multifamily buildings and apartment complexes are prime candidates for beneficial electrification and/or energy efficiency retrofits. Residents of apartment complexes played an important role in the Task Groups that helped develop this Plan (see Developing the Plan), and they elevated the importance of focusing on apartment complexes because many are home to higher proportions of renters, low-income residents, and residents of color, as well as climate-vulnerable populations like seniors and families with young children. Amherst is home to approximately 29 privately-owned apartment complexes encompassing 3,015 individual units , in addition to extensive complex housing owned and operated by the University and Colleges. This report focuses exclusively on non-college/university-owned units, acknowledging that the higher education institutions have their own ambitious plans to decarbonize their buildings (see Introduction).

Envisioning Amherst's Climate Future: Buildings

When Amherst meets its climate goals, buildings will serve the needs of all community members. Existing buildings will be updated so they can be efficiently heated, cooled, and powered by renewable electricity instead of fossil fuels. New buildings will be designed without fossil fuels or materials that contribute significantly to climate change. All construction will consider how to address growing climate hazards like flooding and power outages. All buildings will be comfortable, safe, and accessible. Residential and public buildings will support a diverse community, with adequate affordable housing inclusive of energy costs. Residents and resident representatives, along with building owners, managers, developers, regulators, policy advocates and others, will be key players and partners in the development of a coalition that drives forward building-related strategies.

Hitchcock Center for the Environment,
a Certified Living Building
Photo credit: D.Dillon

Continue to Lead on Affordable Housing

Accelerate the development and decarbonization of sustainable affordable housing throughout Amherst.

How?

Facilitate dialogues between affordable housing stakeholder groups

Including tenants, owners, property managers, and advocates, with the goal of developing solutions that eliminate barriers to good maintenance and beneficial upgrades.

Work to build relationships of mutual respect and understanding, and create opportunities to improve quality of life, save money, and reduce emissions.

*Landlords and tenants often face **split incentives** around **clean energy**. Landlords who pay their own electricity bills have an incentive to upgrade their buildings, but these costs then get passed on directly to tenants in the form of rent increases, while the landlord enjoys the long-term savings on energy costs. On the other hand, landlords who don't pay for electricity do not have the same incentive to upgrade their buildings, since tenants are bearing the additional costs of inefficiencies, which are likely to increase over time. Resolving this tension can decrease energy costs for tenants and support better upkeep of properties, with associated benefits to resilience*[1,2].

1 Vosper, Y. (n.d.). "Better Buildings NY: For Health, Jobs, & Climate Justice" (webpage). WEACT for Environmental Justice. Retrieved from https://www.weact.org/campaigns/better-buildings-ny/.

2 Bergöö, B. (2020, June 30). "We Must Invest in Climate-Ready Affordable Housing Now." Expert Blog, Natural Resources Defense Council. Retrieved from https://www.nrdc.org/experts/bettina-bergoo/we-must-invest-climate-ready-affordable-housing-now.

Strategy Impact

E Estimated emissions reduction by **2025 = 102 MT CO_2e or 0.07%** of Amherst's 2016 emissions. (See Appendix B for calculations).

$ Cost: **$**. Staff time, grant and program support

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections

Pilot deep energy retrofit projects in partnership with the Amherst Housing Authority or other affordable housing owner.

Explore funding through the Low-Income Energy Affordability Network (LEAN) Multifamily program (part of Mass Save) and/or Property-Assessed Clean Energy (PACE) program (see Strategy B1.5).

Support the development and implementation of a Sustainable Capital Improvement Plan to decarbonize and climate-proof the Amherst Housing Authority's building portfolio.

The Commonwealth Green Low-Income Housing Coalition (website) provides technical, advocacy, and educational support to Housing Authorities and other agencies looking to reduce costs and increase energy efficiency in affordable housing. They have helped over 14 agencies and 33 sites to plan for energy efficiency and renewable energy adoption.

The state-funded Capital Improvement and Preservation Fund program provides grants for the preservation of expiring use properties or for properties with expiring project-based rental assistance contracts. Additional funding may be available through the Massachusetts Affordable Housing Trust Fund and/or the Massachusetts Clean Energy Center.

Affordable Housing in Amherst

Affordable housing has long been a priority in Amherst, and the Town continues to support new affordable housing development that also advances sustainability principles. The Amherst Housing Authority owns and operates 148 units across 7 larger apartment buildings/complexes and another 22 duplex units scattered across 5 sites in town. The Amherst Municipal Affordable Housing Trust Fund was created in 2016, and continues to play a vital role in the acquisition and development of new affordable housing projects in town.

The Amherst Affordable Housing Advocacy Coalition grew out of these efforts, and officially formed as an advocacy and community organizing group in 2019. As Amherst looks ahead toward pandemic recovery and climate resilience, achieving and enforcing evidence-based affordable housing targets can support the work of the Housing Trust, Advocacy Coalition, and the Town to advance housing stability and economic resilience for all residents.

Prioritize Multifamily Building Energy Retrofits

Implement a town-wide building energy retrofit program focused on multifamily housing units.

How?

Develop a building energy retrofit outreach and engagement campaign in partnership with Mass Save and the Community Choice Aggregation (see Strategy RE1.1).

Target medium and large privately-owned apartment buildings and complexes. Collaborate with owners and property managers to execute bulk energy efficiency upgrades and air source heat pump installations, and explore grid interactivity where feasible.

Engage with local housing advocates (see Strategy B1.1) to ensure tenants are represented in negotiating how retrofits are planned, scheduled, and prioritized.

Promote and encourage the use of Low-Income Energy Affordability Network (LEAN) and Property-Assessed Clean Energy (PACE) financing (see Strategy B1.5).

Encourage landlords and property managers to consider coupling efficiency upgrades with compatible quality of life and resilience improvements, such as accessibility, lighting, ventilation, community space, and green space.

Establish policies that enable tenants to receive financial benefits from energy efficiency savings by ensuring that tenants' overall costs do not increase along with energy efficiency upgrades.

This means that financing options and incentives must be aligned with this target outcome. See the State and Federal Advocacy and Collaboration section of this plan for more.

Strategy Impact

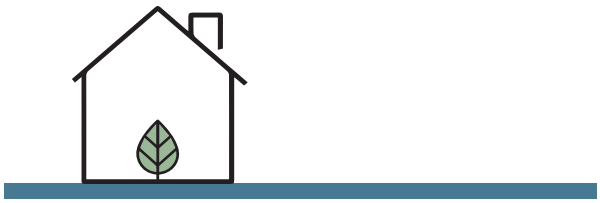
E Estimated emissions reduction by **2025** = **1,818 MT CO_2e or 1.23%** of Amherst's 2016 emissions. (See Appendix B for calculations).

$ Cost: **$**. Staff time, grant and program support.

Plan Principles

- Equity, Accessibility, and Belonging
- Local Wealth Creation and Fair Distribution
- Community Involvement & Connections

Promote Single-Family Deep Energy Retrofits



Develop a building energy retrofit program and campaign focused on single-family residential properties

That brings together property owners, service providers, incentives, and funding sources to drive forward building decarbonization.

Encourage widespread adoption of efficient electric air-source heat pumps through outreach and incentives.

Apply to participate in the Massachusetts Clean Energy Center (MassCEC)'s HeatSmart Program or other state/federal bulk purchasing initiatives.

The HeatSmart program is co-sponsored by the MA Department of Energy Resources, and aims to facilitate group purchasing and adoption of clean heating and cooling technologies through support for community-based outreach, education, and vetted contracting.

Develop educational strategies and resources to increase understanding of the long-term potential for savings and environmental gains that can result from beneficial electrification, and connect potential adopters to incentives and vetted, experienced installers.

Expand clean energy outreach and engagement to homeowners in partnership with Mass Save and the upcoming Community Choice Aggregation (see Strategy RE1.1). Target neighborhood associations and landlords of small (four or fewer units) properties.

Mass Save currently provides free home energy audits, rebates on efficient appliances and smart thermostats, weatherization, and renewable energy installation, and incentives for fuel switching (e.g. from oil to electric heat pump heating), among other financial and technical assistance incentives.

Strategy Impact

E Estimated emissions reduction by **2025** = **2,900 MT CO^2e or 1.96%** of Amherst's 2016 emissions. (See Appendix B for calculations).

$ Cost: **$ to $$**. Staff time, seed funding for program development.

Plan Principles

- Community Involvement & Connections

Institute Building Energy Benchmarking

Adopt a local energy benchmarking bylaw that requires reporting of energy use, water use, energy use intensity, and renewable energy generation for all large buildings and apartment complexes in town.

Building energy benchmarking refers to the process of tracking and reporting on the energy use of buildings over time. It allows many different stakeholders to have a clearer picture of a building's overall performance, and empowers building owners and managers to make strategic decisions about their building portfolios. This can increase efficiency and sustainability in cost-effective ways, and help regulators to design policy that can drive down emissions, support a thriving local real estate market, and stimulate the local green building sector. Critically, requiring owners to disclose building energy characteristics allows potential tenants to better estimate the full costs of a given unit before deciding whether to rent, and creates a market incentive for owners to make clean energy investments.

Many free and reliable building portfolio management tools are now widely available (for example, ENERGY STAR® Portfolio Manager) to help building owners and managers measure and track building performance over time. Benchmarking establishes a foundation for future building energy performance standards (see Strategy B2.3).

How?

Adopt a local building energy benchmarking and disclosure bylaw.
Require all municipal buildings, and commercial and multifamily residential buildings to track and report publicly on their annual energy use, water use, energy use intensity, and on-site renewable energy generation (if applicable).

Ensure that affected stakeholders are at the table during the processes of bylaw design. Relevant stakeholders include tenants, property owners and managers, real estate sector representatives, building industry professionals, and others.

Identify common local building operational energy profiles using Building Energy Benchmarking data and outline potential decarbonization pathways for each.

Delineate potential capital investments, associated costs and timelines, and available incentives and financing for each pathway[1].

1 The Massachusetts 2050 Decarbonization Roadmap provides a valuable example of this type of analysis at the state level.

Use these pathways as models for decarbonizing buildings town-wide. Work with stakeholders to integrate results from this analysis into outreach and education, grant applications, Master Planning, local zoning, and regulatory standards.

Explore the potential for residential energy performance disclosure policies at the local level that encompass all housing in Amherst. See the State and Federal Advocacy and Collaboration section of this plan for further discussion of potential mechanisms.

Strategy Impact

E Estimated emissions reduction by **2025** = **3,552 MT CO_2e or 2.4%** of Amherst's 2016 emissions. (See Appendix B for calculations).

$ Cost: **$$**. Staff time - enhanced tracking and enforcement.

Plan Principles

- Local Wealth Creation and Fair Distribution
- Community Involvement & Connections

Examples from Other Communities

Portland, ME[1]

Building Types Affected	Size	Compliance Deadline
Non-Residential	Greater Than or Equal To 20,000 Sq. Feet	2018-05-01
Multi-Family	Greater Than or Equal To 50 Dwellings	2018-05-01
Public/Government	Greater Than or Equal To 5,000 Sq. Feet	2017-05-01

1 https://www.buildingrating.org/jurisdiction/Portland,%20ME

Cambridge, MA[2]

Building Types Affected	Size	Compliance Deadline
Public/Government	Greater Than or Equal To 10,000 Sq. Feet	2014-12-31
Non-Residential	Greater Than or Equal To 50,000 Sq. Feet	2015-05-01
Non-Residential	Greater Than or Equal To 25,000 Sq. Feet	2016-05-01
Multi-Family	Greater Than or Equal To 50 Dwellings	2015-05-01

2 https://www.buildingrating.org/jurisdiction/Cambridge

Adopt Property-Assessed Clean Energy (PACE)

Property-Assessed Clean Energy is a financing program that facilitates renewable energy and energy efficiency improvements in commercial and industrial buildings. Massachusetts launched its PACE program in July 2020, enabling municipalities to opt into the program by authorization of the appropriate body, which in Amherst's case is the Town Council. Owners of commercial and industrial buildings, multifamily properties with five or more units, and nonprofit/religious properties are eligible for PACE financing.

PACE works by providing loans to for up-front costs associated with energy improvements, which are then repaid over time through a voluntary property tax assessment. This makes it possible to have longer-term financing, competitive interest rates, and to transfer the loan repayment obligations if the property is sold. With PACE funding, major investments with longer payback periods and greater emissions reductions, such as deep energy retrofits, make economic sense.

How?

Opt-in to PACE Massachusetts by majority vote of the Town Council.

Actively encourage property owner participation in the program.

Develop targeted marketing campaigns for each of the program's eligible property types (Commercial and Industrial, Multifamily (5+ unit), and Nonprofit/Religious).

Connect building owners and managers to analysis and planning tools, resources, technical assistance, and other potential financing streams.

Convene stakeholders to establish targets and develop best practices specific to commercial and mixed-use buildings in Amherst.

Strategy Impact

E Estimated emissions reduction by **2025** = **9,115 MT CO_2e or 6.16%** of Amherst's 2016 emissions. (See Appendix B for calculations).

$ Cost: **$**. Staff time, program support.

Plan Principles

- Local Wealth Creation and Fair Distribution
- Community Involvement & Connections

Strengthen the Regional Economy and Workforce Development

Connect building owners and property managers to regional high-performance building construction, renovation, and renewable energy installation service providers through trusted channels.

Promote the Northeast Sustainable Energy Association (NESEA)'s existing Business Member Directory, a "referral resource for consumers and professionals looking for high-performance building and renewable energy professionals in the Northeast,"[1] to encourage local and regional businesses to register, and customers to engage with local/regional businesses.

Develop partnerships with local green building and clean energy professionals to share best practices and highlight current projects happening in Amherst.

Co-sponsor and develop a state-run Passive House and high-performance building training program in partnership with the Massachusetts Clean Energy Center (MassCEC) and the inter-municipal Community Choice Aggregation (see also Strategy RE1.1).

Update zoning to require building contractors to have members with training in high-performance building construction, renovation, and renewable energy installation on their project teams.

The 2021 bill passed by the Massachusetts Legislature, An Act creating a next-generation roadmap for Massachusetts climate policy, puts $12 million dollars toward workforce development through MassCEC, with a focus on minority- and women-owned small businesses, environmental justice communities, and fossil fuel workers.

Strategy Impact

E — Supporting strategy. Potentially large effects on long-term emissions via carbon-negative economic development.

$ — Cost: **$ to $$** (Staff time and potential seed funding support).

Plan Principles

- Racial and Climate Justice
- Local Wealth Creation and Fair Distribution

1 https://nesea.org/nesea-business-member-directory

Implementation

Making it Happen

Leaders

- Inspectional Services
- Planning Department
- Economic Development Department Energy and Climate Action Committee
- Sustainability Coordinator
- Community Resources Committee
- Amherst Municipal Affordable Housing Trust Fund
- Town Council

Partners

- Amherst Affordable Housing Advocacy Coalition
- Amherst Housing Authority
- Pioneer Valley Habitat for Humanity
- Amherst Community Land Trust
- Valley Community Development
- Massachusetts Clean Energy Center (MassCEC)
- Commonwealth Green Low-Income Housing Coalition

Investments

- Staff time
- Consulting services
- Event support
- Outreach materials
- Translation and interpretation
- Direct costs for meetings (childcare, food, supplies, etc.).

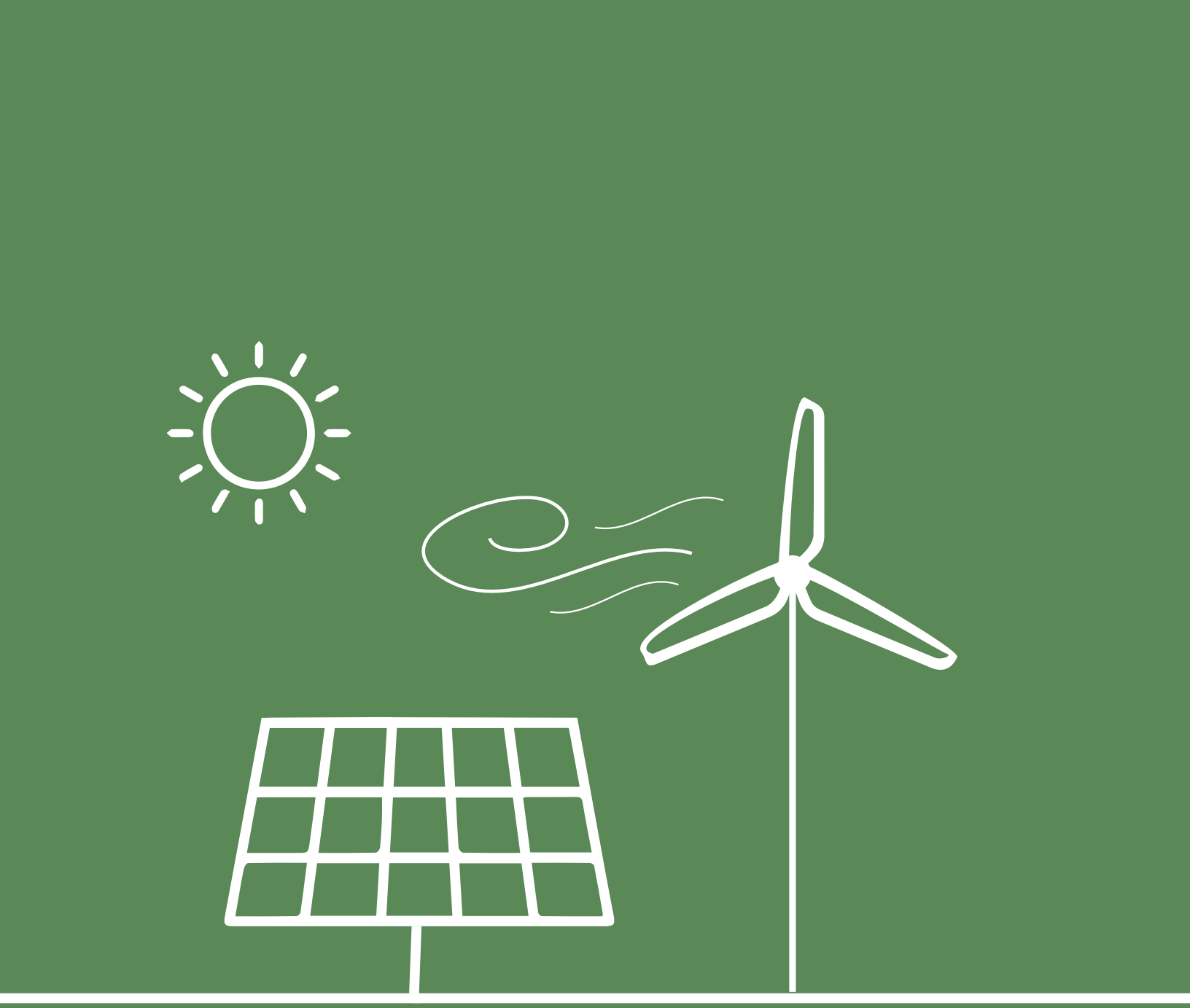
Existing Resources

- Amherst Comprehensive Housing Policy
- Amherst ADA Transition Plan
- Amherst Economic Development Plan
- Amherst Zoning Bylaw
- Amherst Zero Energy Municipal Buildings Bylaw

Potential Metrics for Success

- Percentage of housing stock that is considered affordable.
- Percentage of affordable housing stock that meets high-performance building standards (e.g. LEED, Living Building Challenge, Passive House, etc.).
- Percentage of overall housing stock that meets high-performance building standards (e.g. LEED, Living Building Challenge, Passive House, etc.).
- Percentage of commercial square footage that meets high-performance building standards (e.g. LEED, Living Building Challenge, Passive House, etc.).

Emily Dickinson Museum
Photo credit: D.Dillon



Amherst, Northampton and Pelham have partnered in creating an inter-municipal Community Choice Aggregation (CCA) that has the potential to reduce carbon emissions and advance equity, inclusion, and energy democracy. See page **51** for more information about how Community Choice Aggregation works.

21%

of Amherst's stationary energy emissions come from electricity.

Roadmap to 2025

Renewable Energy

Amherst, Northampton and Pelham have partnered in creating an inter-municipal Community Choice Aggregation (CCA) that has the potential to reduce carbon emissions and advance equity, inclusion, and **energy democracy**. CCA plans are legally required to lay out targeted, equity-focused customer engagement strategies and educational tools; as discussed in Strategy GC1.1, ensuring that outreach efforts are inclusive of community members of different abilities, cultural and linguistic backgrounds, and levels of familiarity with the issues is a critical first step. Community participation is essential to effective democratic governance, and the CCA can provide equitable pathways to participation through outreach and education.

The Amherst-Northampton-Pelham CCA will be governed by a Board of Directors appointed by the municipalities, per state regulatory requirements, and intends to create broad-based structures that support community participation in CCA governance. A proposed Community Advisory Committee would play a crucial role in advancing the principles of **energy democracy** and holding the Board of Directors accountable to CCA customers. Such a body could focus on grassroots engagement, reflecting and elevating the voices of historically excluded community members and advising the Board of Directors on policy measures to ensure that community priorities are reflected in the planning and actions of the CCA. Ensuring robust customer retention is also critical to the success of the CCA; data from existing CCAs tells us that on average, aggregations that launch with higher customer rates than the utility's Basic Service tend to see far more people opt-out than aggregations that launch with prices that are the same or lower than Basic Service.

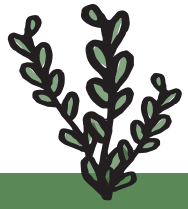
Renewable Energy

Approximately 41% of Amherst's municipal emissions come from electricity, which is its largest single source of emissions[1], and the ongoing push toward widespread electrification will likely increase municipal demand in the coming years. This does not have to lead to increased emissions, however. The Town recently completed a preliminary solar site suitability analysis which identifies areas of exclusion and suitable development for ground-mounted, canopy, and rooftop solar on municipal and affordable housing sites; businesses and private residences are likely to represent significantly more solar potential (see sidebar). Further analysis and prioritization coupled with robust community participation can ensure that decisions are made equitably and with the full range of co-benefits in mind.

1 Briglio, T. (2017). Town of Amherst Greenhouse Gas Inventory Report. Town of Amherst, Massachusetts.

The Cities of Portland and South Portland, Maine, commissioned a study in 2020 to estimate their combined maximum capacity for rooftop solar generation, using specific physical and economic parameters for what counts as a viable rooftop solar array. The study found that together, the cities could accommodate 375 MW of rooftop solar, or 599,492 MWh of annual generation—enough to meet 29% of their combined electricity demand, even with all-electric buildings! In reality, this maximum build-out would be very difficult to meet due to real-world constraints; even so, this example points to the important role that local rooftop solar can play in meeting local energy needs[2].

2 Cities of Portland and South Portland, Maine. (2021). One Climate Future. https://www.oneclimatefuture.org/



Envisioning Amherst's Climate Future: Renewable Energy

When Amherst achieves its climate goals, nearly all energy consumed locally will come from ecologically sustainable and renewable sources. Most of Amherst's energy needs will be met by locally-produced energy, including abundant solar on rooftops, parking lots, and other developed or managed areas with high potential for multiple uses, such as agricultural solar. Many affordable avenues to renewable energy ownership will be readily available to all residents, regardless of homeownership status. Air quality will have improved dramatically, resulting in better public health, and the local clean energy economy will be thriving thanks to investments in training and local job creation.

South Pleasant Street
Photo credit: Town of Amherst

What is Community Choice Aggregation?

Community Choice Aggregation (CCA) is a legal framework that enables municipalities to assume some of the responsibilities of a utility by aggregating (bundling) electricity accounts in their geographic jurisdiction and negotiating rates and services on behalf of customers[1]*. CCAs typically achieve stable and competitive rates compared to the utility's Basic Service, while allocating a portion of revenues to procuring renewable energy. They also have the potential to be a significant source of* ***greenhouse gas emissions*** *reductions for communities with ambitious* ***climate mitigation*** *goals. The current renewable energy content of utility Basic Service in Massachusetts is 18% (it was 16% in the 2016 base year), and will go up to 30% by 2025 per the state's* ***Renewable Portfolio Standard****. The CCA Standard rate typically includes a higher percentage of renewable energy; many CCAs also provide an "opt-up" to 100% renewable electricity for an additional fee.*

The strength of the CCA model in Massachusetts is that it is "opt-out," so that all customers currently on utility Basic Service are automatically enrolled in the Standard "green" offer unless they actively withdraw. This includes customers on income-eligible rates, who can participate without any impact on their subsidies. Municipalities are required to inform all eligible customers of their automatic enrollment and right to opt-out without penalty at any time before the CCA can begin operating.

1 See Massachusetts General Laws, Title XXII, Chapter 164, Section 134.

Transform Local Energy Through Community Choice Aggregation

Implement the ongoing inter-municipal Community Choice Aggregation effort in partnership with the City of Northampton and the Town of Pelham.

See page 51 for more background on this effort.

How?

Create equitable and inclusive community participation and decision-making frameworks within the CCA.

Institutionalize a commitment to appointing, supporting, and cultivating a diverse Board of Directors that is reflective of the entire community.

Codify this commitment in the Aggregation Plan, along with requirements for a transparent appointment process that reports publicly on how and why appointees were chosen.

Ensure that hiring processes for potential staff are transparent, equitable, and actively recruit and retain **BIPOC** employees.

Launch ongoing outreach and educational programs in the Amherst-Northampton-Pelham community.

Actively cultivate prospective members of the CCA's Community Advisory Committee.

Expand citizen participation in the development of the CCA Business Plan, with a focus on co-developing effective, targeted consumer outreach and education strategies and materials.

Ensure that all outreach and education efforts align with principles for accessible communications, including multiple formats and languages, and are adapted to different cultural backgrounds and levels of familiarity.

Offer a tiered rate structure that addresses different customer priorities and needs.

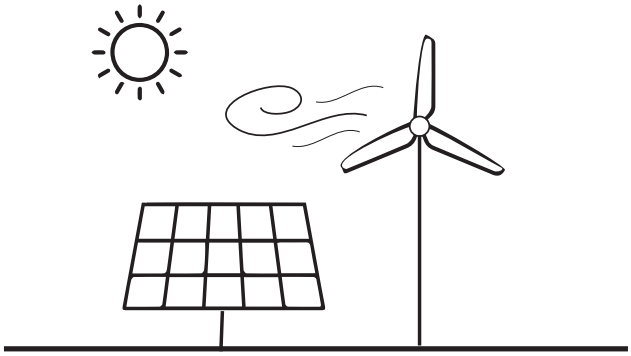
These include maintaining affordability while advancing energy democracy and maximizing the potential for greenhouse gas emissions reductions. The following is a common tiered

CCA rate structure[1] that addresses these concerns:

- **Standard Green:** utility-competitive rate. Includes an increased percentage of renewables in the mix, typically 5-10% (though some municipalities have far exceeded that – the Town of Brookline's Standard rate includes 30% more renewable energy than the RPS minimum requirement, while the City of Newton's includes 46% more. Cambridge and Somerville's Standard rates both include 10% more renewable energy than the RPS minimum).

- **Basic:** below-utility rate. Includes the same percentage of renewables as the utility Basic Service, which is equal to the RPS minimum requirement. This rate encourages retention among low-income residents who cannot afford their bills to increase, but who want to invest in renewable energy through the CCA.

- **Premium:** above-utility rate. Includes a higher percentage of renewables than the Standard rate, up to 100%. Boston, Brookline, Cambridge, Newton, and Somerville all currently offer a 100% opt-up option.



Strategy Impact

E Estimated emissions reduction by **2025** = **6,562 MT CO_2e or 4.44%** of Amherst's 2016 emissions. (See Appendix B for calculations).

$ Cost: **$**. Staff time.

Plan Principles

- Equity, Accessibility, and Belonging
- Local Wealth Creation and Fair Distribution
- Community Involvement & Connections

1 Local Power, LLC, and Peregrine Energy Group. (2020). Community Choice Aggregation 3.0: Reducing Greenhouse Gas Emissions.

Encourage Responsible Local Solar Development

Grow and develop the local solar energy sector through strategic outreach and investments.

How?

Conduct a Solar Resource Assessment for the town that can guide municipal and private solar development efforts.

Conduct a community process in collaboration with the CCA to clarify local preferences and goals for solar and battery storage.

Develop a list of priority and potential sites based on the results of this process, as well as geographic and economic feasibility analysis.

Adopt a targeted town-wide solar zoning bylaw that guides development to favorable locations and balances ecological, economic, social, cultural, and other values of the community's abundant natural lands with the need for renewable energy.

Developing a solar project can take years from concept to operation, and a municipal solar bylaw can help to expedite this process by streamlining permitting, encouraging responsible siting, and incentivizing best practices.

This can ensure the protection of "**highest and best use**" values of natural lands while facilitating emissions reduction and retaining co-benefits. Some of the ecosystem service values that a well-crafted solar zoning bylaw can protect include drought resilience, wildlife habitat, agricultural productivity, flood storage capacity, carbon sequestration, and more.

As of spring 2021, ground-mounted solar energy facilities are allowable by Special Permit only in all zoning districts except the Commercial, Light Industrial, and Flood-Prone Conservancy Districts, where they undergo Site Plan Review instead. Special Permits can be rejected, whereas Site Plan Review allows the Town to set parameters around development but not to reject it entirely, so long as it is within the allowable uses of the site.

Support and encourage private investment in local renewable energy resources.

In addition to expanding renewable energy access and ownership through the CCA (see Strategy RE1.1), the Town and partners can promote existing models and incentives including:

SMART program incentives: The Commonwealth's Solar Massachusetts Renewable Target (SMART) program provides sustainable long-term incentives for solar developments of up to 5MW. Projects that incorporate features such as energy storage or community solar (see below), or that are sited in high-priority locations, are eligible for additional incentives. The program's goal is to support 1,600 MW of new solar generating capacity in MA[1].

Community Solar: Customers buy or lease a portion of the solar panels in a local array, and then receive a credit on their electricity bill equivalent to the electricity generated by their share of the community solar system. This model expands solar access to renters, homeowners with unsuitable rooftops, and folks for whom traditional financing is not an option. Multifamily community solar that directly serves occupants is an exciting instance of this model that has clear logistical and resilience benefits.

1 Eversource, National Grid, Unitil, and MA Department of Energy Resources. "Solar Massachusetts Renewable Target (SMART) Program." (webpage). Retrieved from https://masmartsolar.com/.

Strategy Impact

E Estimated emissions reduction by **2025** = **2,315 MT CO_2e or 1.57%** of Amherst's 2016 emissions. (See Appendix B for calculations).

$ Cost: **$$ to $$$**. Staff time and program support.

Plan Principles

- Local Wealth Creation and Fair Distribution
- Community Involvement & Connections

Support local businesses and regional workforce development through partnerships, promotions, and networking opportunities.

Coordinate with the University, Colleges, local unions, and trade associations to encourage clean energy workforce development and local business growth through professional development, internship and work placements, and outreach and networking events.

Establish partnerships with trusted and vetted local installers and contractors to facilitate customer engagement and encourage local economic growth.

Implementation

Making it Happen

Leaders

- Amherst-Northampton-Pelham Inter-Municipal Community Choice Aggregation
- Town of Amherst

Partners

- City of Northampton
- Town of Pelham
- MA SMART program (solar)

Investments

- Staff time
- Technical consulting services
- Compensation for members of the Board of Directors and Community Advisory Committee.

Existing Resources

- Amherst CCA Inter-Municipal Task Force Report
- Amherst Zoning Bylaw
- Amherst Zero Energy Municipal Buildings Bylaw
- Preliminary solar site suitability analyses
- PACE financing (see Strategy B1.5)

Potential Metrics for Success

- MW of solar energy installed (tracked regularly over time).
- Peak energy and average/total electricity demand.
- Percentage of suitable rooftops and parking lots in town that have solar panels.

Hitchcock Center for the Environment, a Certified Living Building
Photo credit: D.Dillon

Land use and natural systems play an important role in Amherst's cultural identity, resident quality of life, and climate mitigation and resilience strategies. Forests, farmlands, recreational and open spaces are vital to community health and provision of **ecosystem services**.

30%

of Amherst's total land area is permanently protected open space

Roadmap to 2025

Land Use and Natural Systems

In the midst of a global pandemic that has kept so many people confined indoors, either by choice or by necessity, access to green space has been one of the few safe respites from the oftentimes cramped and stressful conditions that many people have been dealing with at home. For folks with low mobility, including people with disabilities, elderly residents, and parents with young children, immediate proximity to green space is even more critical. Access to things like nature walks, playgrounds, and community gardens can encourage intergenerational relationship-building and enhance household and neighborhood resilience.

Amherst residents are interested in rethinking what it means to expand access to green space. Task Group members expressed a strong desire to bring nature to where people are, effectively reframing how we think about habitat for human beings. Situating parks, trails, and community gardens within easy walking or cycling distance of population centers brings the benefits of those spaces into everyday experience, eliminating transportation-related barriers that are often inequitably distributed. This can have dramatic impacts on health and well-being; many Task Group members even spoke to the value of feeling a spiritual connection with their natural surroundings.

To address these community needs during pandemic recovery and on an ongoing basis, we can think of our “micro-environments” – our neighborhoods and streetscapes – as canvases for community-based greening at the hyper-local level. This approach can have multiple climate benefits. For instance, planting trees near residences can help residents stay cool on hot days,

reduce household heating and cooling costs by providing shade in the summer and windbreaks in the winter, increase stormwater infiltration, and recharge groundwater, all while enhancing the natural beauty of the immediate micro-environment for its residents.

What is Smart Growth?

Smart Growth is an approach to sustainable development that promotes:

- *A mix of land uses;*
- *Compact development;*
- *Affordable housing and housing diversity;*
- *Walkable neighborhoods;*
- *Proximity to public transit;*
- *Protection of open space and natural resources;*
- *Distinctive community character and sense of place.*

Envisioning Amherst's Climate Future: Land Use and Natural Systems

When Amherst achieves its climate goals, the town's lands will be used in ways that support a healthy and thriving community. Compact, mixed-use village center hubs will support walkable neighborhoods, and residents will continue to benefit from the ecosystem services provided by Amherst's natural and working lands. Food deserts will be a thing of the past, and all residents will have convenient access to fresh, healthy food year-round, with much of that food grown locally or regionally within New England. Neighborhood tree cover will be increased to help keep cool as temperatures warm, manage stormwater, enhance habitat, and improve microenvironments for folks with low mobility, enhancing connections to nature in the process.

Amherst Farmers' Market
Photo credit: Town of Amherst

Increase Access to Green Space, Recreation, and Community Gardens

Increase community access to green space and recreation as a holistic pandemic recovery and relief strategy. Plan and design for micro-environments that support resilience and access to green space, emphasizing access for residents with limited mobility.

How?

Develop the former Hickory Ridge Golf Course as a multi-use community space, including green space, recreational amenities, and community gardens.

Ensure that the full range of community voices and needs is included in the site planning process.

The Town signed a buy-sell agreement with the former owners of this 149-acre site in South Amherst in 2019. The site is close to several large apartment complexes along E Hadley Rd, and the Orchard Valley neighborhoods.

This presents a unique opportunity to connect Pomeroy Village Center to the Crocker Farm School by trail through conservation land.

Other ideas for the site include a 26-acre solar project with battery storage, recreational facilities for children and families, community gardens, and a working farm.

Collaborate with apartment complexes to develop a pilot Community Greening program.

Work with residents to evaluate potential locations for pocket parks, playgrounds, community gardens, tree planting, and other forms of greening as applicable on complex-owned property. Create policies and incentives to facilitate and encourage desired types of greening based on community input.

Continue to deepen community participation in open space and recreation planning.

Ensure that people of different socioeconomic, racial, ethnic, and linguistic backgrounds, people of different abilities, and people with different kinds of community expertise are involved as equal collaborators in decision-making.

Produce and distribute accessible, multi-lingual information and publications about publicly-accessible recreational and open spaces in Amherst.

Highlight the alternative transportation options that connect them (public transit, the Valley Bike Share and bike paths, walking trails, etc.).

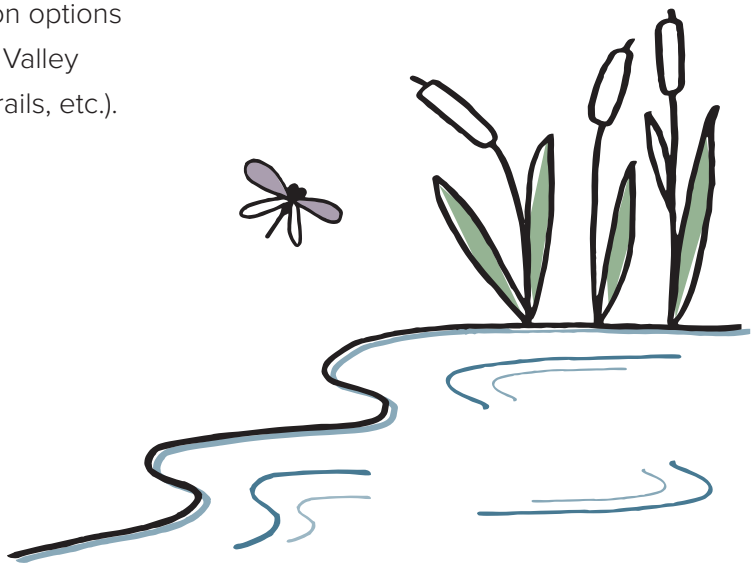
Strategy Impact

E Supporting strategy with important climate and community resilience benefits.

$ Cost: **$$ to $$$** (Staff time, program support, translation and interpretation).

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Local Wealth Creation and Fair Distribution
- Community Involvement & Connections



Expand the Mobile Market and Local Food Access

Continue to support the growth and expansion of the Amherst Mobile Market, and the development of other innovative ways to increase local access to healthy food.

How?

Expand the Mobile Market to new locations and extend the operating season.

Continue to hire local community members as additional capacity is needed, and plan with farm partners and customers to expand availability of culturally appropriate foods for residents of diverse backgrounds[1].

Encourage intercultural community-building through Mobile Market-led activities and initiatives such as recipe swaps, home composting workshops, and other opportunities for residents to connect over shared food and learning.

Use the Mobile Market as a strategic platform for distributing information about free and affordable food resources in Amherst[2].

The Mobile Market's cross-town reach and direct interface with residents potentially experiencing food insecurity make it a perfect vehicle (pun intended) for getting information to the people who need it most.

1 Satin-Hernandez, E., & Robinson, L. (2015). A community engagement case study of The Somerville Mobile Farmers' Market. Journal of Agriculture, Food Systems, and Community Development, 5(4), 95–98. http://dx.doi.org/10.5304/jafscd.2015.054.015.

2 Healthy Hampshire. (2019). Amherst Food Justice Report and Action Plan. Town of Amherst, MA.

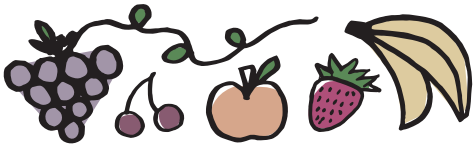
Strategy Impact

E Supporting strategy with important climate and community resilience benefits.

$ Cost: **$$.** Staff time.

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections



Develop a sustainable long-term funding model for the Amherst Mobile Market.

At present, the Mobile Market is temporarily funded through a mix of grants, sponsorships, and individual donations.
The Somerville Mobile Farmer's Market model sustains its work through a combination of wholesale purchasing, a flexible payment structure where full-priced purchases support a match program for low-income customers, and ongoing fundraising.

Work with the Pioneer Valley Transit Authority to establish a Local Food Bus Route that travels between population centers and farms, farmer's markets, and farm stands that accept SNAP (food stamps).

Explore additional possibilities for increasing year-round access to fresh healthy food through partnerships between farmers and local small businesses, such as corner stores, cafes, and restaurants. Facilitate the development of sustainable local supply chains.

Amherst Mobile Market

*The Amherst Mobile Market is the culmination of ongoing multi-stakeholder efforts to address **food security** and **food access** in the area. In 2017, Healthy Hampshire did a county-wide food access study that revealed significant challenges to healthy food access in Amherst. The study also showed that these challenges disproportionately affected families of color. Six of the town's seven census tracts are considered **food deserts**, meaning that a significant proportion of residents are low-income and live more than a mile away from a grocery store. Limited local availability and/or lack of transportation options were the most frequently-cited barriers to healthy food access, as well as underlying structural issues like racism and a lack of access to quality jobs. It was clear from stakeholder conversations that solutions needed to support local employment and agriculture, and be a vehicle for community empowerment.*

The market is guided by a diverse multi-stakeholder committee called the Amherst Mobile Market Planning Committee, which is convened and facilitated by Healthy Hampshire. Representatives from the Town of Amherst sit on the committee. The Amherst Mobile Market had its first season in 2020, and quickly became an essential community resource providing access to fresh local produce in areas where it is otherwise limited, during a time when going to the grocery store potentially felt like risking one's health. Operated by the local Many Hands Farm Corps, the Mobile Market employs community members from the neighborhoods the market serves as Market Managers, and sources its produce from local farms. It can be found in four different environmental justice neighborhoods during warmer months, and the Amherst Mobile Market Planning Committee would like to expand the Market to more locations over a longer season in the future.

Balance Smart Growth and Conservation

Use Amherst's zoning bylaw and regulations to encourage smart growth and compact development that protects resilient natural areas and benefits local communities.

How?

Update the Town's zoning bylaw and the Site Plan Review process to require the integration of green space and nature-based solutions that mitigate urban heat, infiltrate stormwater, and protect soil health.

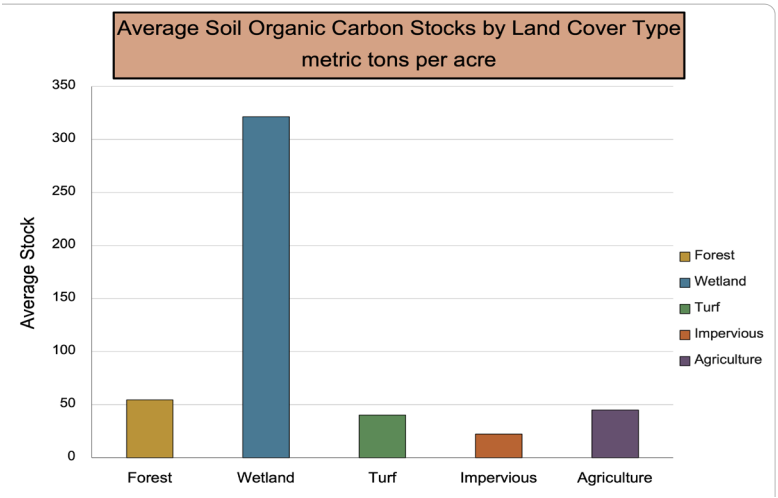
For example, the City of Somerville uses a points-based "Green Score" system whereby developers must achieve a minimum number of points for project approval. Points are awarded based on the integration of **green stormwater infrastructure** and other nature-based climate resilience strategies. Higher-impact strategies receive more points.

Green stormwater infrastructure approaches include the integration of vegetated bioswales (ditches), green roofs, street trees, permeable surfaces, constructed stormwater wetlands, and other strategies that allow for increased stormwater infiltration on-site, rather than relying on storm drains to carry water away. This adds to increased water quality and also reduces the need for pumping and water treatment, reducing costs, energy use, and emissions.

Conduct a town-wide analysis of existing soil health, soil function, and soil carbon sequestration.

Include Town-owned watershed lands outside of Amherst's borders. Use this analysis as a climate-informed basis for land use/land management planning, and participation in ecosystem services and carbon markets (see Strategy LU2.3).

To protect soil health, Amherst can strengthen soil protection requirements in the Town's landscape development standards to retain native soils and vegetation during construction, or restore soils appropriately after disturbance (e.g. through storage and reapplication of original soils removed during construction, or the addition of organic amendments post-construction to achieve minimum soil organic content).



Strategy Impact

E — Supporting strategy. Enhances resilience and avoids emissions by sustaining carbon sequestration in forests and soils.

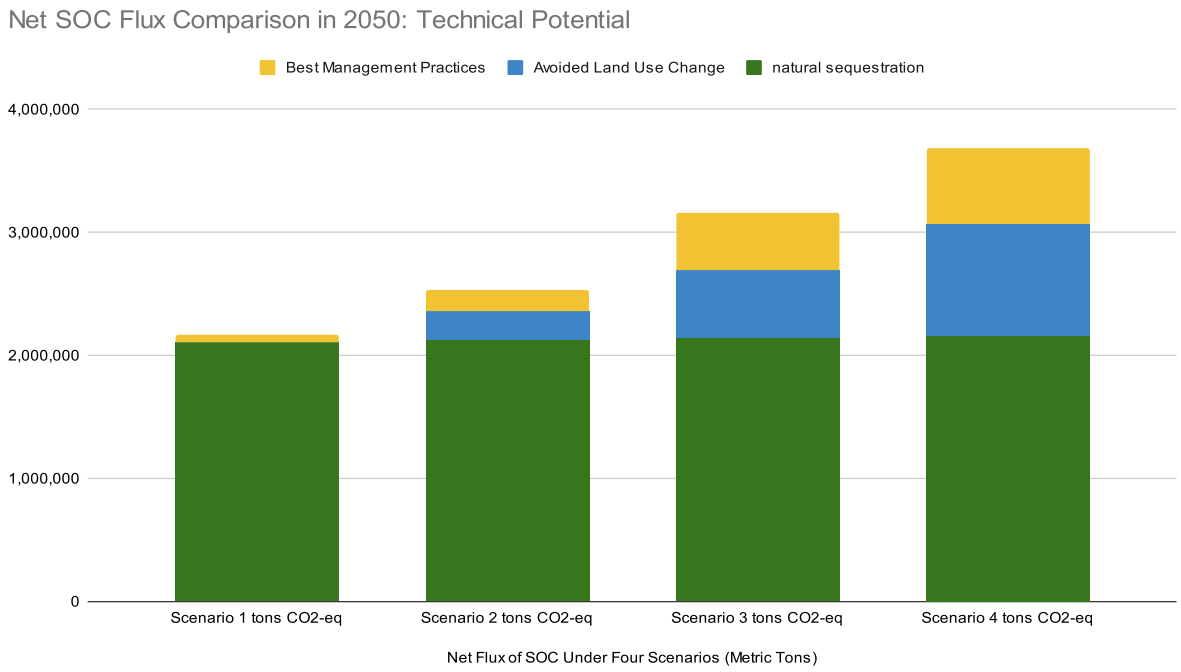
$ — Cost: **$$.** Staff time.

Plan Principles

- Equity, Accessibility, and Belonging
- Local Wealth Creation and Fair Distribution

(above) Average soil organic carbon stock for different land covers across Massachusetts. MA HSAP (2021).

(below) Massachusetts statewide net soil organic carbon (SOC) flux in 2050 under four different scenarios. Scenario 1 assumes no change from current land use and land management trends; Scenario 4 assumes widespread adoption of regenerative policies and practices in agriculture, forestry, wetland protection and restoration, turf management, and ornamental landscaping, and 50% avoided development over Business-as-Usual. Scenarios 2 and 3 assume modest and ambitious changes to these parameters, respectively. MA Healthy Soils Action Plan (2021).



Implementation

Making it Happen

Leaders

- Conservation Department
- Amherst Mobile Market Planning Committee
- Planning Department
- Facilities Department
- Conservation Commission
- Planning Board
- Design Review Board
- Public Shade Tree Committee

Partners

- Amherst Recreation
- Healthy Hampshire
- Family Outreach of Amherst
- Grow Food Amherst
- local Community-Support Agriculture (CSA) farms
- Amherst Survival Center
- Amherst Farmers' Market
- Kestrel Land Trust
- Multifamily property owners and managers

Investments

- Staff time
- Mobile Market operations
- Land acquisition
- Technical consulting services
- Landscape design, planting, and maintenance.

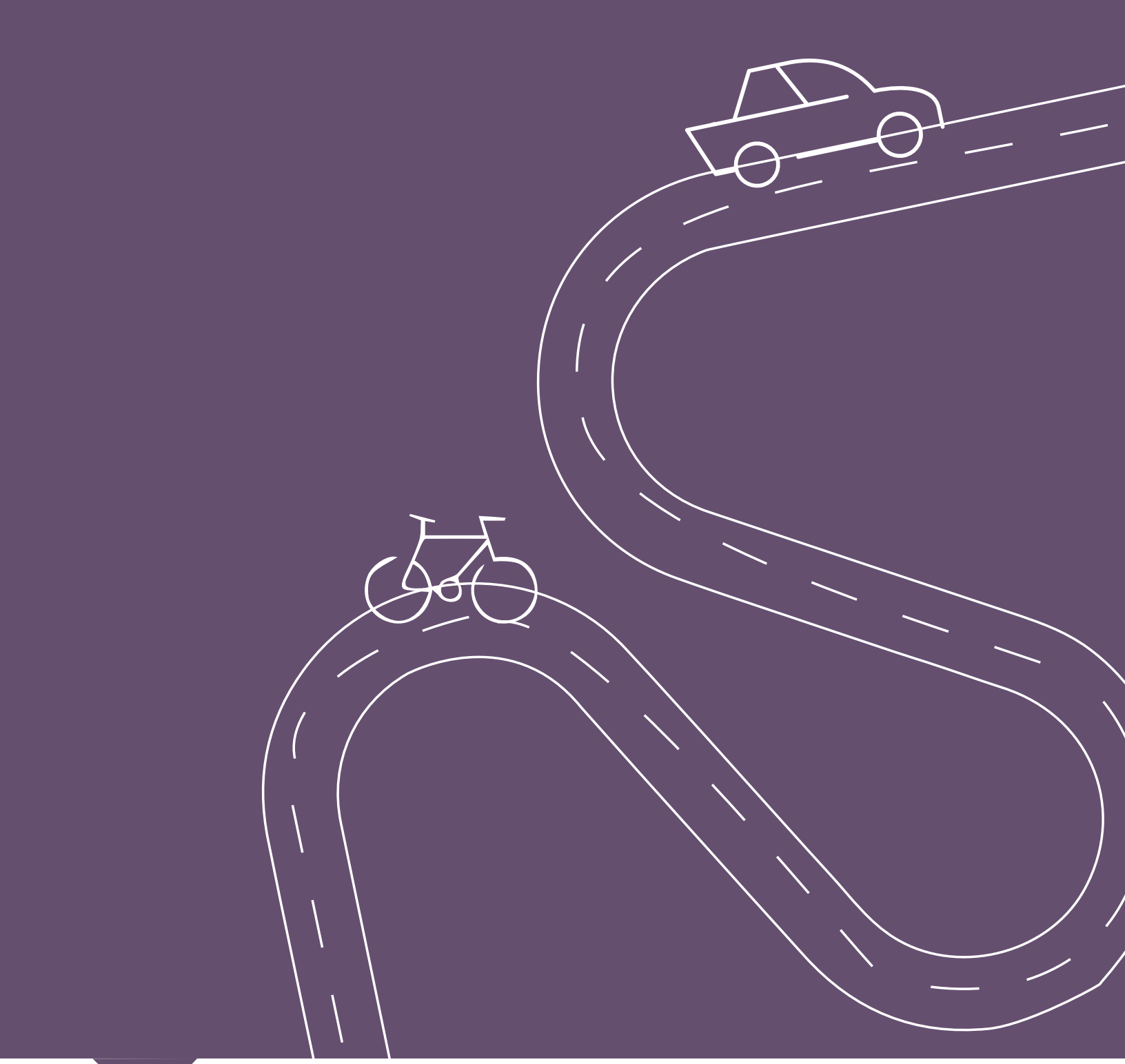
Existing Resources

- Amherst Master Plan
- Amherst Open Space and Recreation Plan
- Amherst Food Justice Plan
- Amherst Stormwater Management Plan

Potential Metrics for Success

- Connectivity of protected open space.
- Severity of urban heat island effect.
- Miles of ADA accessible trails on Town-owned conservation land.
- Percentage of parks and recreational facilities that are ADA accessible.
- Tree canopy coverage at apartment complexes.
- Number and proximity of community gardens to population centers, particularly renters.
- Number of residents served by the Mobile Market.
- Number of pounds of produce distributed through the Mobile Market.
- Number of locations and length of season of the Mobile Market.

Amherst Mobile Market at Olympia Oaks
Photo credit: Amherst Mobile Market / Healthy Hampshire



Amherst is an important transportation hub in the region, in large part due to the presence of UMass Amherst, Amherst College, and Hampshire College. The operations of the regional Pioneer Valley Transit Authority (PVTA) in town reflect this reality: routes and schedules tend to be geared toward the student population, with service decreasing markedly during the summer months.

49%

of Amherst residents drive alone to work.

Roadmap to 2025

Transportation and Infrastructure

Alternative Transportation

Equitable access to transportation, and the economic opportunity it affords, is a key principle of this plan. Amherst has increasingly invested in traffic-calming and pedestrian safety measures in areas with heavy foot traffic, and installed bike lanes along popular corridors, especially downtown and around the academic campuses. However, significant potential exists to expand accessibility and safety measures throughout the network, which can encourage travel by alternative modes in and between other areas of town and the region, and better meet the needs of the town's least affluent residents.

The focus of conversations during the Task Group process was the E Hadley Rd neighborhood of apartment complexes. Many area residents do not own cars, and the area faces persistent transit connectivity issues[1]. Currently, the safest and most direct route for residents to get to the shopping malls along Route 9 without driving is to take a dirt path through a nearby cornfield and then climb a fence onto the Norwottuck rail trail, which is managed by the MA Department of Conservation and Recreation (DCR). Otherwise, folks have to take Mill Valley Rd, a high-traffic road with no sidewalks or bike path.

There is no direct bus from the complexes to the malls, either; instead, residents must take a bus into the center of town and then transfer, which takes an average of 41 minutes each way. The Town has made repeated efforts in the past to work with DCR and the Town of Hadley on this issue, and remains

1 Town of Amherst. (2015). Amherst Health Survey Report. Healthy Hampshire / Collaborative for Educational Services. Amherst, MA.

committed to overcoming existing barriers (both literal and figurative).

Electric Vehicles

Electric battery-powered **zero-emission vehicles (ZEVs)** are becoming increasingly available and affordable over time. The Town of Amherst currently owns two electric vehicles: one is used by the Amherst-Pelham Regional Public Schools (ARPS), and the other is used by the Information Technology Department but also sees general Staff use. The Town has been committed to prioritizing fuel efficiency in its purchasing since 2002, and just received a grant to purchase a new ambulance with anti-idling technology this year. ARPS currently owns one electric school bus, and there is strong interest in acquiring more.

As of spring 2021, there were six municipally-owned public ZEV charging stations in Amherst:

- *One behind Town Hall;*
- *Two at the parking garage downtown;*
- *One at the Anne Whalen apartment complex;*
- *One in the Pray St parking lot; and*
- *One at the Amherst-Pelham Regional Middle School.*

All are dual-head, meaning two cars can charge at one station. The three academic campuses also have ZEV charging stations, including a fast-charge station at UMass. There is interest in adding charging stations at the elementary schools and high school in town, with the need to identify additional locations as part of ongoing multi-modal transit planning.

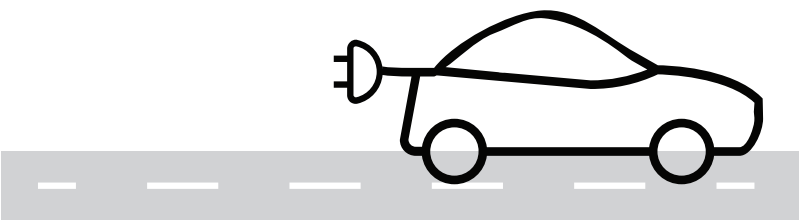
Waste

Amherst's 2016 Solid Waste Master Plan establishes the Town's intention to move toward a zero waste local economy. Action today will ensure that future changes are possible. What does this look like, and how can it be measured? The C40 Cities Climate Leadership Group's Advancing Towards Zero Waste Declaration outlines a series of commitments that member municipalities have made in pursuit of zero waste goals, as follows:

1. **Reduce the municipal solid waste generation per capita by at least 15% by 2030 compared to 2015;** and
2. **Reduce the amount of municipal solid waste disposed to landfill and incineration by at least 50% by 2030 compared to 2015**, and **increase the diversion rate away from landfill and incineration to at least 70% by 2030.**

The Zero Waste Declaration has been signed by 27 municipalities across the globe, including Boston, New York, Los Angeles, Philadelphia, and San Francisco.

Achieving a zero waste local economy will require advocacy and policy leadership on multiple levels. Many consumers face economic and transportation barriers that limit their choices in terms of food access. It was pointed out during the Task Groups that the more affordable grocery stores in the area tend to sell more heavily packaged products, putting an unfair waste burden on lower-income households. In addition, many of these stores are not located within Amherst's town boundaries, again pointing to the need for regional collaboration on climate and sustainability issues (see e.g. Strategy B1.5).



Envisioning Amherst's Climate Future: Transportation and Infrastructure

When Amherst achieves its climate goals, carbon-free transportation will be the universal norm. Amherst's neighborhoods and commercial hubs will be connected by safe, accessible, convenient, and easy-to-navigate networks of protected paths and trails that support alternative transportation options. Public transportation will be free and universally accessible, and buses will run on renewable energy. Zero-emission vehicles (ZEVs – which includes electric vehicles) will be the only ones on the road, with gas-powered engines having been all but phased out entirely. Air quality improvements, enhanced walkability, and expanded alternative transportation will lead to better public health and access to employment opportunities, as will achieving zero waste. In the process, Amherst will develop a circular economy that supports local wealth creation and fair distribution.

Prioritize Transportation Safety and Accessibility

Improve accessibility and safety of existing routes between neighborhoods and regional commercial and employment hubs.

How?

Work with the Pioneer Valley Transit Authority (PVTA) and private apartment complexes to pilot a shuttle bus connecting the E Hadley Rd neighborhood directly to Hadley's nearby commercial center on a convenient schedule.

Continue to work with DCR, the Town of Hadley, and local landowners to develop a plan for increasing safe passage for wheelchair users, cyclists, and pedestrians.

The Town has made repeated efforts to push this project forward in the past, and new momentum from this process combined with potential funding from a major federal Infrastructure Bill on the horizon create new possibilities.

Improve path and trail safety, accessibility, and maintenance.

Inventory and prioritize off-road paths for the addition of curb ramps as part of the implementation of the Town's ongoing ADA Transition Plan. Curb ramps increase safety and accessibility for cyclists and wheelchair users.

Expand path and trail lighting to increase safety and visibility at night. Consider solar-powered street lighting, which is now available at the commercial scale for municipalities[1], and may be eligible for grant funding from the Commonwealth.

Collaborate with DCR to institute partial snow plowing of the Norwottuck rail trail in winter to allow for cycling and walking in addition to cross-country skiing. (Currently the path is not plowed).

1 See e.g. https://solarlighting.com/businesses/municipalities/.

Strategy Impact

E Supporting strategy. Actions outlined lead to long-term emissions reductions through the creation of supporting infrastructure and services.

$ Cost: **$$$ to $$$$.** Staff time, infrastructure upgrades.

Plan Principles

- Equity, Accessibility, and Belonging
- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections

Transition Rapidly to Zero-Emission Vehicles

Grow and develop the local solar energy sector through strategic outreach and investments.

How?

Offer zoning and/or permitting incentives to developers to include charging stations in new or existing residential and commercial parking lots.

Eventually, as ZEV demand and infrastructure grows, require ZEV charging stations for all new development and major redevelopment. This would work like the Town's current provision that requires developments with 10 or more parking spaces to provide bike racks as well.

Offer ZEV and charging infrastructure financing support through the upcoming Inter-Municipal Community Choice Aggregation (see Strategy RE1.1)

Engage in collective contracting that subsidizes direct costs and offers discounted electricity rates for low- and moderate-income residents, in exchange for customer participation in a local **microgrid** or vehicle-to-grid program.

Enable community ownership of shared charging infrastructure.

Facilitate discounted individual market-rate ZEV purchases.

Partner with consumer advocacy organizations and platforms such as the Green Energy Consumers Alliance.

Develop a rolling five-year Zero-Emission Municipal Fleet Policy and Plan to transition municipal and school fleets to hybrid and electric vehicles.

Following Uxbridge's model (next page), Amherst can start by developing a zero-emission policy outlining the Town's long-term goals for vehicle procurement per available technology and appropriate usage. This will require a thorough understanding of the Town's current vehicle fleet, including full **life-cycle costs** (see Strategy GC2.3 for more).

Strategy TI1.2

The Town of Uxbridge, MA published its Municipal Vehicle Fleet Transition Plan in 2020, outlining a clear policy and rolling five-year plan for the replacement of Town vehicles. The plan covers Police, Fire, Management, Senior Center transport, Inspectors/Assessors, Facilities Management, and Department of Public Works light-duty cars and trucks. Their goal is to decarbonize their fleet while optimizing vehicle maintenance and management to extend useful lifespan, which will also reduce embodied carbon and help the Town to use its capital resources with maximum efficiency.

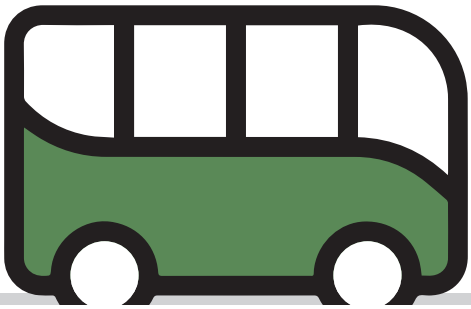
Strategy Impact

E — Estimated emissions reduction by **2025** = **6,361 MT CO_2e or 1.4%** of Amherst's 2016 emissions. (See Appendix B for calculations).

$ — Cost: **$$$ to $$$$.** Staff time, municipal ZEV procurement, investments in ZEV charging infrastructure.

Plan Principles

- Local Wealth Creation and Fair Distribution



Develop Evidence-Based Zero Waste Policy

Continue to advance Amherst's 2016 Solid Waste Master Plan by implementing policies that move the town closer to zero waste.

How?

Adopt a zero waste bylaw establishing targets and timelines to minimize local waste streams, reduce Scope 3 emissions (see sidebar, right), encourage materials re-use, and evolve a local circular economy.

Expand upon Amherst's existing plastic bag ban to eliminate the commercial use of environmentally harmful materials like single-use plastics in town.

Adopt and implement a zero waste policy for community events.

Require the development of a compliance and enforcement plan, including tracking systems.

Scope 3 emissions are the greenhouse gas emissions that result from the manufacturing and production of goods that are consumed in Amherst which are not produced locally. They are a meaningful measure of the impacts of producer supply chain management and consumer purchasing behavior. By measuring them, Amherst can understand the areas where interventions will have the biggest effects, and empower residents to advocate with businesses for more sustainable policies and practices.

Strategy TI1.3

Collaborate with regional organizations, institutions, and businesses to encourage and facilitate the move toward zero waste.

Partner with the University, Colleges, and Downtown Business Improvement District to increase purchasing power and institute town-wide affordable compostable ware for takeout.

Work with grocery stores in the area to understand barriers and opportunities for zero waste practices, advocating for formal commitments to zero waste goals and sustainable packaging.

Coordinate with higher education institutions on their plans for waste management, advancing collaborative strategies where feasible.

Strategy Impact

E — Supporting strategy. Actions outlined lead to long-term emissions reductions by planning for zero waste infrastructure, programs, and resources.

$ — Cost: **$-$$** Staff time.

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

(above)
South Pleasant Street
Photo credit: Town of Amherst

(below)
Norwottuck Rail Trail
Photo credit: D.Dillon


Welcome to the
Norwottuck Rail Trail
For the safety of all please stay alert, be courteous to other users, and follow these rules:
• Motorized vehicles and horses are prohibited.
• All users keep right. Do not block trail.
• Use audible signal when passing.
• Trail closed for recreation 10 p.m. to 5 a.m. (commuters use at own risk).
• Use lights after dusk.
• Keep off private property.
• Please keep dogs on short leash.
• No hunting, fishing, littering, fires, alcoholic beverages, or jumping from bridges—violators will be prosecuted.
Report problems to Mass.

Implementation

Making it Happen

Leaders

- Department of Public Works
- Planning Department
- Economic Development Department
- Sustainability Coordinator
- Energy and Climate Action Committee
- Transportation Advisory Committee
- Board of Health

Partners

- Amherst-Pelham Regional Public Schools
- Pioneer Valley Transit Authority
- MA Department of Conservation and Recreation
- Amherst Business Improvement District
- Amherst Chamber of Commerce
- Zero Waste Amherst
- Valley Bike Share
- Apartment complex owners/managers
- Higher education institutions

Investments

- Staff time
- Infrastructure investments
- Technical consulting services.

Existing Resources

- Amherst Transportation Plan
- Amherst Bicycle and Pedestrian Network Plan
- Amherst Complete Streets Policy
- Amherst Solid Waste Master Plan

Valley Bike in winter
Photo credit: D.Dillon

Potential Metrics for Success

- Percentage of residents who walk/bike to work.
- Existing path and trail network usage year-round.
- Number and locations of protected and on-road bike lanes.
- Number and locations of bike racks and covered bicycle storage.
- Number of trips taken on Valley Bike.
- Number of single-occupancy personal vehicle trips.
- Number and distribution of publicly-accessible charging stations in town.
- Percentage of municipal and school fleets that are zero-emission vehicles.

Amherst Town Common
Photo credit: John Phelan

Beyond 2025

Preparing for Long-Term Action

The Roadmap to 2025 section of this plan provides descriptions of strategies and suggested actions that residents, staff, and other experts determined crucial for immediate implementation in order to reach the Town's short term climate goals. Beyond 2025 looks further into the future, setting the stage for ongoing carbon emissions reductions, resilience building, and transformation of Town governance over the next twenty five years.

The three pillars of this plan are equity, decarbonization, and community resilience. This planning process has made clear that Amherst needs to pursue all three together. They all matter, are all the highest priorities. The strategies in this section support all three pillars, often together in single strategies.

It will be necessary for residents, Town staff, community organizations, businesses, institutions, and others to own these strategies and goals. The report is structured to show who the primary owners of each strategy might be, but success will be met when everyone takes ownership. Hopefully, the plan inspires this ownership into the future.

Beyond 2025

Governance and Communications

Throughout Amherst's ongoing climate planning and community engagement processes, the need for **equity** and **climate justice** has taken center stage. The principles from the Task Groups were explicit in connecting climate goals with the participation and leadership of the Amherst community, especially those members who have been excluded. Everyone needs to participate in the decisions that affect their health, safety, and quality of life, today and into the future. This focus on equity and participation also pointed to strategies that supported increased local participation in community activities (including schooling) with universal broadband internet access, and progressive Town procurement policies that support local, low carbon business and development.

Climate change is already impacting all areas of life in Amherst, and those impacts are not distributed equally across lines of class, race, gender, age, and physical ability. This is a reality that the Task Groups confronted as a community, suggesting engaged models of participation and planning that center the lived experiences and local expertise of residents, and work to dismantle systemic oppression in all forms. Because there is the potential to connect diverse stakeholders to address systemic change, inclusive Town governance and communications practices can create the conditions for community ownership in local decision-making and set in motion transformational change town-wide (see Appendix C).

1 e.g. Black, K. et al. (2013). Beyond Incentives for Involvement to Compensation for Consultants: Increasing Equity in CBPR Approaches. Progress in Community Health Partnerships. 2013 Fall; 7(3): 263-270. doi: 10.1353/cpr.2013.0040

2 Jacobs Center for Neighborhood Innovation. (2013). Resident Compensation for Participation in The Village at Market Creek. Learning Series. jacobscenter.org

3 See e.g. KConnect. (2018). Community Engagement Framework and Compensation Structure. Retrieved from https://www.k-connect.org/wp-content/uploads/2020/08/Community-Engagement-Framework-and-Compensation-Structure.pdf.

Sustain Investments in Equitable Community Participation

Provide equitable compensation and broaden definitions of expertise to allow for more representative and inclusive participation in Town governance processes.

Equitably compensating residents for their involvement in local governance is an essential mechanism for increasing community involvement. Removing financial barriers for individuals who would otherwise be unable to participate demonstrates a commitment to shifting the status quo and creating new possibilities for Amherst's future. Community-based participatory research studies[1] show that by redefining expert participation to include community expertise, and equitably compensating all residents for their contributions, local leaders can create a culture of respect and authentic inclusion in local governance.

According to the Jacobs Center for Neighborhood Innovation in San Diego, California, some benefits of this approach include:

- Demonstrating that local knowledge and participation is valued;
- Helping to bring a broader range of voices to the work [of community planning], leading to extended networks and stronger communities;
- Encouraging greater consistency, responsibility, and accountability in participation[2].

How?

Create a Community Participation Equity Fund to support equitable local governance processes. Develop a simple application and eligibility criteria. Institute a standardized compensation structure and policy[3].

Create a Neighborhood Advisory Council (NAC) composed of "Community Captains" (compensated position) representing all neighborhoods, demographics, and diverse backgrounds in Amherst. Elements of the Council's charge could include:

- Supporting renter advocacy around building and apartment complex upgrades for quality of life, energy efficiency, electrification, and climate resilience.;
- Supporting the acknowledgment and integration of diverse neighborhood priorities and concerns into the work of existing Boards and Committees, and acting as trusted community liaisons facilitating ongoing citizen engagement;
- Supporting the equitable implementation of community planning efforts.

Strategy Impact

E Supporting strategy, Potentially large effects on long-term emissions reductions via increased community participation in climate action.

$ Cost: **$.** Staff time, NAC compensation.

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

Support Universal Broadband Internet Access

Advance equitable access to information and economic prosperity through universal broadband internet access.

Amherst has fiber optic infrastructure town-wide, and yet over 30% of residents lack access to broadband internet service[1]. The COVID-19 pandemic has made it abundantly clear how essential access to the internet has now become for sustaining everyday life. Schools and public meetings have moved online, as have classes at the University and Colleges, and we have seen a massive surge in telemedicine and telehealth services[2]. Most retailers and service providers have limited their hours, and many have shifted their models to encourage online ordering coupled with contactless delivery or curbside pickup. These atypical circumstances have brought increased mainstream consciousness of the barriers that low-income residents and people with low mobility experience on a regular basis.

The federal Lifeline Program provides modest subsidies to eligible customers of designated internet service providers, with eligibility based on income and/or enrollment in other federal programs such as Medicaid or Supplemental Nutrition Assistance Program (SNAP). However, the Lifeline program does not cover the full cost of access, and does not address access where infrastructure is minimal and/or broadband speeds are not available. Some service providers created special one-time promotions or discounts to increase access during the pandemic, but these expire. Permanent universal internet access is critical to ensuring that all members of our community have equitable access to the internet, and in turn the things they need to live their everyday lives safely and healthily, now and into the future.

1 Broadband Now. “Amherst, Massachusetts.” Retrieved from https://broadbandnow.com/Massachusetts/Amherst

Strategy Impact

E Supporting strategy with important climate and community resilience impacts.

$ Cost: **$ to $$$**. Staff time, infrastructure investments.

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections

How?

The Massachusetts Legislature has filed bills to enable the Commonwealth to monitor broadband internet expansion and strategically target underserved areas for infrastructure development (see e.g. Bill H.2892, An Act relative to a Massachusetts broadband competitive marketplace study). **Amherst can support these efforts and work to understand where gaps exist at the local level.**

Together with Town efforts to enhance local communications networks, outreach and community participation efforts outlined throughout this section can **incorporate data collection and monitoring around local internet access needs and opportunities.**

This information can be used to **target grant funding requests and cultivate partnerships** to increase local access to telecommunications services.

2 MassHealth. (2020). MassHealth Provider Resource: Telephone and Internet Connectivity for Telehealth.
3 Wheeler, T. (2020). "5 steps to get the internet to all Americans." Brookings Institution. Retrieved from https://www.brookings.edu/research/5-steps-to-get-the-internet-to-all-americans/. Accessed January 22, 2021

Mill River, Robert Frost Trail
Photo credit: D.Dillon

Institute Progressive Procurement Policies

Develop and adopt internally-coordinated, Town-wide procurement policies that reinforce community values of good stewardship, local wealth creation, fair distribution, and emissions reduction.

Procurement policy is a tool with enormous potential to shift industry toward sustainable and **carbon neutral** products and practices. Municipal procurement is the process of soliciting and selecting bids for goods and services provided by contractors to the Town. The Town has significant influence over how bid solicitations are crafted, and can use procurement policy to consider the full **life-cycle costs** and impacts – including operational and **embodied carbon** – of any product or service being sought.

Operational carbon is affected most by factors like the energy efficiency of a building or vehicle, mechanical system, or appliance; embodied carbon is influenced most by the nature of the processes that are used to create products from raw materials and transport them from extraction through processing and to their final destination. Municipal procurement considerations related to building operational energy and carbon are also discussed under Strategy B2.2, Implement Strategic Energy Management Planning.

Embodied carbon is a major gap in current climate policy, because associated emissions are spread across the global supply chain. Simple, proven changes to administrative and sourcing practices can leverage money that is already being spent to stimulate market transformation and produce significant reductions in embodied carbon emissions, when adopted consistently and at scale. For instance, construction materials currently account for 11% of global emissions, with many sustainable and low-carbon alternatives to traditional materials now available[1].

How?

Innovative practices that Amherst can consider include[2]:

- Doing cost-benefit analysis that includes greenhouse gas emissions and resilience **co-benefits** when choosing which capital projects to pursue. When the emissions and resilience impacts of purchasing decisions are considered, the calculation changes – helping the Town to make decisions that avoid the use of fossil fuels in the first place.

1 Carbon Neutral Cities Alliance. (n.d.) City Policy Framework for Dramatically Reducing Embodied Carbon. Retrieved from https://www.embodiedcarbonpolicies.com/.
2 Policies for Embodied Carbon: An International Snapshot. (2020, January 15). The Carbon Issue. Architect: The Journal of the American Institute of Architects.

- Adopting a municipal Buy Local policy. The State of California established a groundbreaking precedent to prioritize local purchasing to reduce embodied emissions from transportation and manufacturing with its Buy Clean California policy[3]. A similar approach is possible at the municipal level.
- Adopting a performance-based procurement policy for contracted fleets. By giving scoring preference to bidders with cleaner fleets, Amherst can incentivize the transition to electric vehicles among vendors at no additional cost to the Town.
- Considering renewable energy readiness for all roof replacements and new or repaved parking lots, including rooftop/canopy solar, and electric vehicle charging stations.
- Requiring third party verified Environmental Product Declarations for construction materials and asphalt procurement, and establishing minimum performance standards. *Construction materials covered may include: concrete; cement; steel; bricks; glass; gypsum board; insulation; flooring materials; ceiling tile.*
- Developing partnerships and resources to connect developers, builders, and consumers to local timber, reclaimed/recycled materials, and other sustainable building materials (see Strategy TI 2.4).
- Requiring Forest Stewardship Council (FSC)-certified wood products. FSC certification indicates a commitment to good ecological, social, and economic stewardship[4], and sustainable forestry practices have many important co-benefits, including increased soil carbon sequestration and improved wildlife habitat.
- Giving preference to local businesses and labor participation in municipal solar development projects by using "local preference points" to evaluate proposals. Local/regional businesses, and/or businesses that propose to hire local residents or subcontractors could earn additional points by providing training, demonstrating sustainability practices, or including other desirable initiatives in their proposals.

Strategy Impact

E Estimated emissions reduction: +

$ Cost: **$$ to $$$** Staff time.

Plan Principles

- Local Wealth Creation and Fair Distribution
- Community Involvement & Connections

3 Carbon Leadership Forum. (2020). "What is a Buy Clean Policy?" [Fact Sheet]. CLF Policy Primer Series. Retrieved from https://carbonleadershipforum.org/clf-policy-toolkit/.
4 Forest Stewardship Council. "Mission and Vision" (webpage). Retrieved from https://us.fsc.org/en-us/what-we-do/mission-and-vision. Accessed January 24, 2021.

Implementation

Making it Happen

Leaders

- Town Council
- Town Manager
- Facilities Department
- Planning Department
- Finance Department
- Department of Public Works
- Community Participation Officers
- Sustainability Coordinator

Partners

- Disability Access Advisory Committee
- Human Rights Commission
- *Neighborhood Advisory Council (see Strategy GC2.1)*

Investments

- Staff time
- Technical consulting services
- Community expert advisor compensation
- Translation and interpretation
- Childcare and food

Existing Resources

- Amherst ADA Transition Plan
- Amherst Municipal Vulnerability Preparedness (MVP) Summary of Findings Report
- Spectrum from Community Engagement to Ownership (see Appendix C)

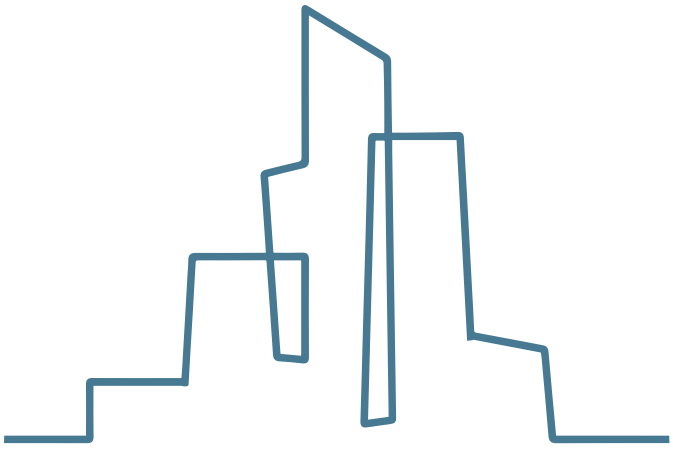
Potential Metrics for Success

- Participation by residents in our community who have been historically excluded from local governance due to financial and/or time barriers, as well as barriers associated with the definition of what counts as expertise.
- Community cohesion and community satisfaction with local planning and decision-making processes, as measured by a periodic Community Satisfaction Survey administered by the Neighborhood Advisory Council.
- Embodied carbon associated with municipal building construction and infrastructure projects.

Amherst College
Photo credit: D.Dillon

Beyond 2025

Buildings



The Town of Amherst is a leader in promoting sustainability in the built environment. Amherst was among the first municipalities in the state to adopt the Building Energy Stretch Code in 2012, and adopted a final version of its Zero Energy Town Buildings Bylaw in the spring of 2018. This bylaw requires all new municipal buildings and building additions[1] over $2 million to meet **net zero energy** standards, meaning that they must produce enough renewable energy on-site[2] to meet their annual energy consumption[3].

Consistent with national trends, existing buildings are the largest end-users of energy in Amherst, producing about 74% of town-wide greenhouse gas emissions. While the Town is committed to supporting and constructing net zero energy buildings, most of our buildings currently rely on fossil fuels[4]. As we work toward lowering our building emissions, we must also improve the quality of our buildings to support accessibility, health, and well-being. This will help to make our buildings, and our communities, more resilient to the impacts of climate change.

According to the Massachusetts Clean Energy Center (Mass CEC), between 60-80% of Amherst buildings were heated with high-cost heating fuels (including oil, electric resistance, and propane) in 2010[5]. Many households have switched to natural gas – a lower-cost fuel – in the interim[6], but this is not a long-term strategy for carbon neutrality or climate justice (natural gas is still a toxic combustible fossil fuel). Nationwide, low-income households still spend an average of 8.6% of their income on energy costs, which is three times more than the average for non-low-income households[7]. This energy cost burden is also a reality for renters and **BIPOC** residents[8].

Many homeowners and landlords of smaller multifamily units in town lack the up-front

resources to invest in energy efficiency upgrades, or coupled renewable and electric systems, regardless of potential savings down the line. Doing proactive planning for replacement before an appliance's end-of-life can make electrification easier while ensuring cost-effectiveness, since owners are more likely to go with what is cheap and readily available when equipment breaks down suddenly, and things like gas furnaces and boilers often have relatively long (15-30 year) lifespans. Finally, new construction is a key lever for climate action, because every building that is built today will have a lifespan longer than the time-frame of Amherst's carbon neutrality goals.

Regional green workforce and economic development can strengthen Amherst's ability to achieve many of the strategies in this sector and this report as a whole. There are many excellent examples of high-performance buildings in the area, including the Hitchcock Center for the Environment and the Kern Center at Hampshire College, both **Living Building Challenge**-certified buildings. What is needed now is for these types of buildings to become the norm rather than the exception. For that to happen, a robust and thriving local green building sector must be co-created along with a more resilient and sustainable built environment.

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1 Note that the Zero Energy Town Buildings Bylaw does not currently cover major renovations or retrofits.

2 The Town is also required to develop new municipally-owned renewable energy systems as part of any qualifying project, up to 10% of the total baseline efficient cost of the project. Remaining building energy needs can be met by other renewable sources, including opting building electricity supply up to 100% renewable energy through the upcoming Community Choice Aggregation (see Strategy RE1.1).

3 Kauth, L. & Hellerstein, B. (2019). "Amherst: Zero Energy Town Buildings Bylaw" (case study). Renewable Communities: Massachusetts cities and towns leading the way to 100% renewable energy. Environment Massachusetts.

4 Mandel, J. & Stone, L. (2019, December 4). "Making Our Existing Buildings Zero Carbon: A Three-Pronged Approach." Rocky Mountain Institute. Retrieved from https://rmi.org/making-our-existing-buildings-zero-carbon-a-three-pronged-approach/.

5 Massachusetts Clean Energy Center. (n.d.). "High Cost Heating Fuels Map – Amherst, MA" (webpage). Retrieved from https://www.masscec.com/high-cost-heating-fuels.

6 Briglio, T. (2017). Amherst Greenhouse Gas Emissions Inventory. Town of Amherst, Massachusetts.

7 US Department of Energy. (n.d.) "Low-Income Community Energy Solutions" (webpage). Retrieved from https://www.energy.gov/eere/slsc/low-income-community-energy-solutions. Accessed February 14, 2021.

8 Drehobl, A., & Ross, L. (2016). Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities. American Council for an Energy Efficient Economy. Accessed February 14. 2021.

Champion Resilient and Regenerative New Construction

Update local plans, zoning bylaws, and regulations to advance healthy, climate-ready, and net zero energy new construction for all buildings in town.

We spend the vast majority of our lives inside buildings, and our indoor environments have tangible impacts on our health and well-being. Proper ventilation can improve cognitive performance, while sunlight and thermal comfort impact everything from our moods to our energy bills (which may in turn affect our moods!). Climate change is driving up the average number of high-heat days we experience on an annual basis in Massachusetts, which can also impact public safety. Approximately 20% of households in the Commonwealth do not have any form of air conditioning at home, while close to 60% rely on a window or wall A/C unit[1]. Consistent with national trends, we heard in the Task Groups that lower-income Amherst residents tend to have less access to air conditioning, especially efficient air conditioning, than higher-income residents. This is a climate justice issue that must be addressed.

Another important aspect of building health and resilience is accessibility. The Town's 2019 Municipal Vulnerability Preparedness report points to the need for public meeting facilities that are both ADA compliant and accessible by public transit to support community resilience and equitable participation in local governance. The Town recently completed a new ADA Transition Plan, which includes comprehensive review of barriers to accessibility across the Town's public facilities, programs, services, activities, and events, and outlines strategies for the Town to better serve individuals with disabilities in the public realm.

Existing buildings represent the largest share of Amherst's current greenhouse gas emissions (74%). While it is technically feasible to retrofit all buildings in town to a **net zero energy** or higher standard, and building energy retrofits are top priority for Amherst, they will not eliminate all emissions associated with buildings – notably **embodied carbon** emissions. The emissions that are produced through the manufacturing and transportation of building materials, and other emissions associated with the construction process itself, will still occur unless we plan ahead. Also, until all grid-sourced electricity is 100% renewable, and/or Amherst generates all of the energy it

1 Commonwealth of Massachusetts. (2020). 2050 Decarbonization Roadmap Buildings Sector Technical Report. Massachusetts Executive Office of Energy and Environmental Affairs.

consumes locally, the town will not be able to claim a truly **carbon neutral** buildings sector – broader advocacy is necessary and essential (see State and Federal Advocacy and Collaboration).

Buildings can have lifespans of many decades and even centuries. When the cost/benefit analysis deems it both a financial and sustainable gain to do new construction, every new building is an opportunity to avoid carbon emissions and embed climate resilience from the start. Conversely, new buildings that are built to the current energy stretch code will require costly investments in energy retrofits down the line to meet the Town's emissions reduction goals. Buildings constructed with **regenerative development** principles in mind even have the potential to become **carbon sinks** when the materials used to build them (and the processes used to create those materials) sequester and permanently store carbon (for example, in the form of long-lasting wood products from trees grown and harvested regeneratively). Finally, analyzing potential building sites with climate projections in mind can protect public health and safety and reduce vulnerability to climate hazards like flooding and erosion.

How?

Adopt the forthcoming Net Zero Stretch Code when it is released (see below).

Building standards are regulated by the Commonwealth through the Massachusetts Building Code, limiting the extent to which cities and towns are able to influence energy performance through regulatory means. Fortunately, the Massachusetts Legislature passed a major bill in 2021, entitled An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy, that requires the state Board of Building Standards (BBRS) and Regulations and Department of Energy Resources (DOER) to develop a Net Zero Energy stretch code (see State and Federal Advocacy and Collaboration).

Strategy B2.1

Require embodied carbon analysis for all new buildings. Move toward establishing regulatory limits on building life-cycle carbon (operational and embodied).

Embodied carbon analysis requirements can take the form of zoning regulations (see e.g. Boston, MA; Portland OR); procurement regulations, such as California's Buy Green policy (see Strategy GC2.3); and municipal carbon budgeting for buildings (operational and embodied).

The Leadership in Energy and Environmental Design (LEED) rating system incentivizes embodied carbon analysis, and has codified the process for US projects.

Create a local guide to resilient, accessible Net Zero Energy new construction.

Looking to the recent example set by Boston[1], Amherst can project into the future by anticipating new development and providing clear energy and resilience performance compliance pathways and resources.

Work with regional stakeholders to develop a municipal policy and strategy around design for disassembly and adaptability.

Encourage planning in advance for zero waste and adaptive reuse. This approach can help to minimize the overall **embodied carbon** of the Buildings sector[2].

Expand heating and cooling stations in town to increase community resilience to extreme weather.

Ensure that these locations are well-advertised in multiple languages and through a wide variety of media channels (see Strategy GC1.2, Execute Multilingual Municipal Communications).

Strategy Impact

E Estimated emissions reduction: **++**

$ Cost: **$$ to $$$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

Amherst Pelham Regional High School
Photo credit: D.Dillon

1 City of Boston. (2020). Guidebook for Zero Emission Buildings (ZEBs). Department of Neighborhood Development.

2 Carbon Neutral Cities Alliance. (n.d.) City Policy Framework for Dramatically Reducing Embodied Carbon. Retrieved from https://www.embodiedcarbonpolicies.com/

Implement Strategic Energy Management Planning

Develop building energy monitoring protocols that allow the Town to identify and prioritize capital investments that will maximize efficiency while minimizing greenhouse gas emissions.

With **building energy benchmarking** in place (see Strategy B1.4), the Town will track and monitor building energy use for all existing municipal facilities. This baseline data is exactly what's needed to set ambitious and achievable goals and identify opportunities to meet them through Strategic Energy Management (SEM) planning. SEM is a long-term approach to building energy reduction using iterative monitoring and strategic efficiency improvements. SEM planning will enable the Town to prioritize building energy audits (which can be costly) to align with real-time retrofit opportunities while reducing data collection needs and cost burdens.

SEM planning can also be a valuable stepping stone on the path toward implementing net zero energy retrofits, providing the necessary analysis to understand how to go about it, and identifying practical opportunities and synergies. Not only does this process clarify the capital investments needed for the Town to meet its goals, it can also provide a model for the private sector as it works to meet the requirements of Strategy B2.3, Establish Building Energy Performance Standards.

How?

Initiate Strategic Energy Management planning using baseline data from energy benchmarking and disclosure reporting.

The process should engage building users and other relevant stakeholders, and identify requirements and opportunities to transition to net zero energy over time. Other components of the plan might include:

- International reference standards for building decarbonization, such as ISO 50001, as the basis for goal-setting and performance management[1];
- A building multi-use strategy designed to maximize the efficient use of existing buildings and avoid unnecessary new construction;

- A holistic work-from-home policy that aims to reduce **peak energy demand** and associated emissions during extreme weather days, reduce energy costs for the Town, and improve employee resilience and well-being;

- A set of principles for monitoring and evaluation that specifies how the Town will track building energy performance, evaluate outcomes, and prioritize opportunities for retrofits.

Cross-reference SEM planning with the Town's ADA Transition Plan to identify opportunities for combined accessibility upgrades and deep energy retrofits.

This can help to streamline capital planning and realize significant cost savings.

Retrofit municipal and school buildings as opportunities are identified by Strategic Energy Management planning.

Update information regularly as new projects are completed and the landscape of opportunity evolves and shifts.

Strategy Impact

E Estimated emissions reduction: +

$ Cost: **$$ to $$$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

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1 Cunningham, A.M., Ralston, M.V., & Wu, K. (2019). Strategies and Approaches for Building Decarbonization. Building Decarbonization Coalition. Retrieved from https://www.buildingdecarb.org/uploads/3/0/7/3/30734489/bdc_report_3_approaches_for_building_decarb.pdf

Establish Building Energy Performance Standards

Build upon the Energy Benchmarking program (see the Roadmap to 2025) to establish building energy, water, and emissions-related performance standards that transition progressively to zero carbon standards over time.

Building energy benchmarking and disclosure requirements coupled with progressive long-term performance standards constitute a holistic action that has been shown to drive down emissions in the Buildings sector[1]. In technical terms, it is a way of eliminating externalities and properly accounting for the impacts of building energy performance on greenhouse emissions, costs, and quality of life.

How?

Evaluate Amherst's existing building stock across all sectors (residential, commercial, institutional, and other) to identify and inform implementation of decarbonization strategies, policies, and investments.

Introduce emissions-focused performance standards for applicable buildings after benchmarking has been in place for three (3) fiscal years.

Benchmarking and disclosure bylaws can encourage efficiency upgrades by increasing transparency. However, research shows that market-driven accelerations in building energy retrofits alone will not be enough to decarbonize all buildings in the U.S. by 2050[2]. Performance standards are the missing link that can drive forward meaningful emissions reductions over time.

Standards that also increase building resilience, energy efficiency, indoor comfort, and durability, such as **Passive House**, should also be considered and incorporated as appropriate for Amherst's goals and needs.

Develop an Heating, Ventilation, and Air Conditioning (HVAC) emergency swap-out program to assist property owners with the transition to energy efficient and electric HVAC systems (e.g. air-source heat pumps).

Planning ahead for capital transitions is the best way to ensure cost effective upgrades, but sometimes emergencies happen – a boiler breaks down early, a furnace dies suddenly. These are critical moments when decisions are driven by urgency, not agency to make a better choice. An emergency swap-out program can help property owners to navigate the oftentimes complex process under pressure and facilitate efficient electrification.

Develop a refrigerant education and capture program.

Refrigerants are highly potential **greenhouse gases** that have especially negative impacts in the atmosphere, and are found in many everyday devices such as refrigerators, air conditioners, freezers, and dehuå midifiers.

They can be recaptured and minimized, but need proper disposal. Quantifying the impacts of refrigerants at the community scale can be challenging, but enabling and enforcing proper disposal can minimize impacts in the process.

1 Cunningham, A.M., Ralston, M.V., & Wu, K. (2019). Strategies and Approaches for Building Decarbonization. Building Decarbonization Coalition. Retrieved from https://www.buildingdecarb.org/uploads/3/0/7/3/30734489/bdc_report_3_approaches_for_building_decarb.pdf

2 Not even close – the American Council for an Energy Efficient Economy estimates that without intervention, it would take over 100 years to decarbonize all buildings at current rates of adoption.

Strategy Impact

E Estimated emissions reduction: ++

$ Cost: **$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

Expand Community-Based Housing Ownership

Advance innovative models for resilient, energy efficient affordable housing development and community-based housing ownership.

The housing affordability crisis has been growing across the Commonwealth in recent years, and has only been exacerbated by the COVID-19 pandemic, with many residents facing eviction and insurmountable debt. Affordable housing lists are many years long in Amherst, and there are currently no emergency housing options in town. As the impacts of climate change are increasingly felt, insecure housing can worsen existing vulnerabilities and destabilize communities.

What's needed now to achieve both a **just transition** and a **just recovery** is not just more affordable housing, but more high-quality, permanently affordable housing that builds wealth for the community. Models such as community land trusts and housing cooperatives make homeownership possible and accessible for people who are excluded from the traditional housing market due to the legacies of economic inequality and racist practices like **redlining**. To accomplish this, we must consider affordable housing as a basic human right and a climate resilience imperative.

There are several models that can support community-based housing ownership in Amherst:

Community Land Trusts (CLTs): CLTs are nonprofit organizations that acquire and steward land in perpetual trust intentionally to support low-income communities. Residents share in the stewardship and decision-making for the property, but do not have an equity stake in it. The property is owned and held by the CLT in perpetuity.

The Amherst Community Land Trust (ACLT) was founded in 2014, and works to address the affordable housing shortage in Amherst with the goal of strengthening year-round family neighborhoods. The ACLT model allows residents to own their individual homes while retaining community ownership of the land itself.

Housing Cooperatives: Housing coops are organizations owned jointly by their members, meaning residents collectively co-own and control the developments where

1 East Bay Permanent Real Estate Cooperative. "New Member Orientation" (video). Retrieved from https://www.thenation.com/article/archive/aoc-sanders-housing-rent/. Accessed February 15, 2021.

they live. Residents buy membership stock in the cooperative, which owns the building and common areas, and retain exclusive rights to their specific unit. There are several forms of housing cooperatives that can support the expansion of affordable housing:

- A *Limited Equity Housing Cooperative* limits the return that shareowners can receive on the resale of their shares, to keep the property affordable to the community and ensure equitable distribution of wealth within the cooperative.
- A *Zero Equity Housing Cooperative* is structured such that members pay rent to the cooperative, and the cooperative leases the property from a third-party organization, such as a Community Land Trust or the Town. Because the cooperative does not have a profit motive, it keeps rents affordable while avoiding the liabilities associated with ownership.
- A *Permanent Real Estate Cooperative* is a limited equity umbrella cooperative that can hold multiple properties. Each individual property is governed by its own cooperative, and residents have co-ownership rights to that property. The umbrella cooperative raises capital by selling memberships and gaining investments from the broader community, with returns accruing to both residents and community investors over time.

East Bay Permanent Real Estate Cooperative

The East Bay Permanent Real Estate Cooperative (EB PREC) is a limited equity housing cooperative that organizes with tenants and community groups to purchase properties in the East San Francisco Bay area of California and make them permanently affordable. EB PREC acquired its first property in May of 2019 in partnership with the Northern California Land Trust, and has continued to grow since then.

As their website states:

*Our mission is to facilitate **BIPOC** and allied communities to cooperatively organize, finance, purchase, occupy, and steward properties, taking them permanently off the speculative market, creating community-controlled assets, empowering communities to cooperatively lead a just transition from an extractive capitalist system into one where communities are ecologically, emotionally, spiritually, culturally, and economically restorative and regenerative.*

Strategy B2.4

How?

Support the growth and development of the Amherst Affordable Housing Advocacy Coalition, and ongoing regional coalition-building around affordable housing.

In the Buildings Task Group, members envisioned expanding advocacy to encompass healthy, efficient, climate-resilient buildings in addition to housing production. Things that were important to people included windows and daylight, good insulation, and healthy indoor air (especially in a pandemic).

Update zoning and regulations to support sustained investments in affordable housing. Potential approaches include allowing small (2-3 unit) multifamily housing and/or Accessory Dwelling Units (ADUs) by right in all residential areas.

ADUs are typically smaller units that are added to already-developed properties, and can help alleviate displacement and reduce environmental impacts by making new, compact development possible in areas where infrastructure and services already exist.

Expand Inclusionary Zoning in Amherst. Several options exist, including updates to Amherst's current Inclusionary Zoning bylaw, as well as Smart Growth Overlay Districts.

Amherst's Zoning Bylaw currently requires the inclusion of affordable units in new developments with 10 or more dwelling units if the development requires a Special Permit. The Town is considering updates to strengthen these requirements so that more affordable units are produced.

Strategy Impact

E Supporting strategy with important community resilience benefits.

$ Cost: **$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections

North Amherst
Photo credit: D.Dillon

Under Chapter 40R of the Massachusetts General Laws, Smart Growth Overlay Districts allow communities to plan for denser, more compact, and more sustainable development that includes at least 20% affordable housing.

Both approaches can help to embed affordability, accessibility, and sustainability into the fabric of Amherst's neighborhoods as they continue to evolve, and have the potential to work together where applicable.

Implementation

Making it Happen

Leaders

- Town Manager
- Sustainability Coordinator
- Inspectional Services
- Facilities Department
- Planning Department
- Energy and Climate Action Committee
- Amherst Municipal Affordable Housing Trust Fund

Partners

- UMass Clean Energy Extension
- Amherst Affordable Housing Advocacy Coalition
- Amherst Housing Authority
- Pioneer Valley Habitat for Humanity
- Amherst Community Land Trust
- Valley Community Development
- Massachusetts Clean Energy Center (MassCEC)

Investments

- Staff time
- Technical consulting services

Existing Resources

- Amherst Zero Energy Municipal Buildings Bylaw
- Amherst Comprehensive Housing Policy

Potential Metrics for Success

- Percentage of housing stock that is considered affordable.
- Percentage of affordable housing stock that meets high-performance building standards (e.g. LEED, Living Building Challenge, Passive House, etc.).
- Percentage of overall housing stock that meets high-performance building standards (e.g. LEED, Living Building Challenge, Passive House, etc.).

Potential Milestones

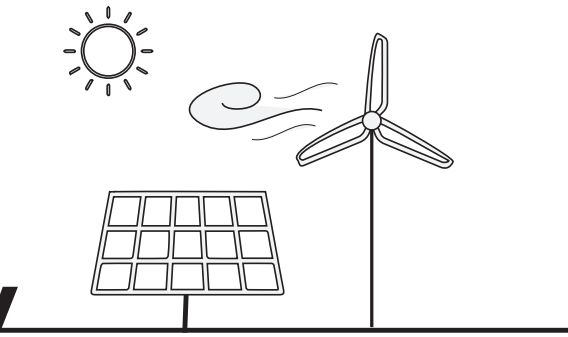
- According to the Rocky Mountain Institute:

"To keep warming below 1.5°, we need to reduce emissions from buildings by 45–50 percent by 2030, on the way to 100 percent by 2050. Given the slow capital investment cycle in buildings, that likely means that we need to retrofit nearly half of our buildings to zero emissions by 2030, rather than retrofit all of our buildings to half emissions by then."

R.W. Kern Center, a Certified Living Building
Hampshire College
Photo credit: D.Dillon

Beyond 2025

Renewable Energy



Renewable energy production is a key strategy for reducing carbon emissions across the world. An important goal is to locally generate the electricity we use, as much as possible. While it is probably not possible to generate enough energy within the Town of Amherst to meet all of the electricity needs of the town, the goal is to provide locally sourced renewable electricity while recognizing that there are some trade-offs to be made along the way. Cutting down forests to build solar fields probably creates net emissions of carbon for many years, and can degrade ecosystem services without proactive planning and management. Putting solar panels over parking lots is expensive and slow to permit. These and other obstacles and trade-offs form part of the foundation of the strategies outlined in this report.

Resilience is also an important consideration for energy systems. Resilience of the energy systems means that the systems are adapted to be resistant to failure (power outages) and have redundant sources and pathways for energy delivery. As the town moves more and more toward full electrification and away from fossil-fuel based energy sources, the resilience of the electric grid is more important than ever. Decentralized generation (local solar and wind power) and battery storage at both home and institutional scales will add to system resilience.

Expand Resilient Renewable Energy Infrastructure

Develop local distributed renewable energy resources in ways that enhance community resilience to climate hazards and reduce the potential for negative impacts to natural lands.

The New England grid – made up of the large power plants, local substations, and transmissions and distribution lines that deliver electricity to our homes, businesses, infrastructure, and institutions – is aging, centralized, and vulnerable to extreme weather events and security attacks[1]. As electrification increases economy-wide, and electricity demand continues to grow, integrating innovative technologies like smart meters and battery storage at multiple scales can help to optimize building energy use and grid performance while minimizing emissions and costs associated with everyday electricity usage. Technologies like **microgrids** can enable entire campuses and neighborhoods to continue operate independently during larger power outages.

A microgrid is a localized electricity network that is interconnected with the larger grid but can also disconnect and operate autonomously if needed. This works because the microgrid is served by enough on-site energy generation (fossil fuel and/or renewable) to be self-supporting if needed.

Grid resilience also has major equity implications. Lower-income populations (which include higher than average proportions of renters and **BIPOC**) tend to be the most vulnerable when there is a major power outage or grid failure, due to lack of access to transportation, affordable places to stay temporarily, and other emergency services[2]. The increasing frequency and intensity of storms and heat waves in New England under all climate change scenarios means the region must develop a resilient electric grid that can serve all residents equitably and keep them safe during extreme weather events.

The Town of Amherst has entered an agreement to purchase the 149-acre former Hickory Ridge Golf Course property. Major goals include protecting habitat, creating public open space, and developing 26 acres of solar panels with battery storage. (See Strategy LU1.1 for more information on the connectivity, conservation, and recreation benefits of this effort).

1 Mathur, S. (2020, July 28). "Why Grid Modernization Promises a Stronger Electrical, Environmental, and Economic Future." Climate XChange. Retrieved from https://climate-xchange.org/2020/07/28/why-grid-modernization-promises-a-stronger-electrical-environmental-and-economic-future/?mc_cid=2f51b3d6a3&mc_eid=2b754619c9.

2 City of Boston. (2016). Boston Community Energy Study. Boston Redevelopment Authority. Boston, MA.

How?

Invest in distributed energy systems and microgrids for essential and emergency services.

The City of Northampton recently received major grant funding to solarize its Fire Department parking lot (2014) and to develop a microgrid connecting Cooley Dickinson Hospital, the Department of Public Works headquarters, and an American Red Cross emergency shelter at the Smith Vocational and Agricultural High School (2015).

This clustering approach could be a model for Amherst. Prioritizing areas where essential and emergency services are located, ideally in coordination with the University and Colleges as part of ongoing emergency management planning, can create synergies and savings that would not be possible at smaller scales. Coupling these investments with renewable energy, as in the example above, can further enhance resilience.

Engage in conversations with residents, businesses, community organizations, Eversource (utility), and the broader public about smart meters for emissions reduction and building resilience.

Smart meters allow customers and utilities (and eventually the CCA – see Strategy RE1.1) to access real-time energy usage data. Since electricity prices vary throughout the day depending on demand and supply, time-based pricing can enable customers to save money by shifting their energy usage from peak periods to times of the day when electricity costs less. It can also enable utilities to manage demand and respond to extreme weather events more efficiently.

Time-based pricing can also work against customers who are not properly informed and equipped to manage their loads, either on their own or using technologies that automate this process.

Strategy Impact

E Estimated emissions reduction: **+**

$ Cost: **$$$ to $$$$**

Plan Principles

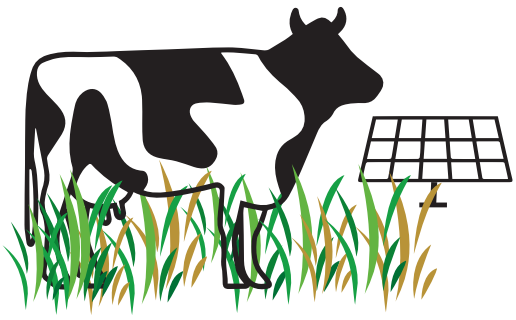
- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections

Customer education and engagement is critical to the success of any potential smart metering program, particularly for safeguarding equity, building community capacity, and maintaining public trust[1].

Studies have found that customers with time-based pricing can reduce their peak demand by up to 23.5% while saving money[2].

Monitor forest conversion to solar development. Require monitoring and reporting of land use changes from solar to avoid loss of ecosystem services.

Keeping a comprehensive database of solar development in town can support continuous improvements to regulation to better protect resilient natural lands, and can help the Town to track emissions reductions more accurately (see e.g. Strategy LU2.3).



1 Nowicki, A. (2013, March 18). "Boulder's Smart Grid Leaves Citizens in the Dark." Green Tech Media. Retrieved from https://www.greentechmedia.com/articles/read/boulders-smart-grid-leaves-citizens-in-the-dark.

2 U.S. Department of Energy. (2016). Advanced Metering Infrastructure and Customer Systems. Office of Electricity Delivery and Energy Reliability. SmartGrid.gov.

Enable Innovative Financing for Clean Energy Investments

Eliminate barriers to access and ownership of renewable energy resources by introducing innovative financing for all participating CCA members who wish to invest directly in community-level projects.

See page 48 (above) for more background on the Community Choice Aggregation effort.

As the CCA's Vision Statement asserts, "Participating communities will achieve carbon neutrality and provide sustainable energy systems that distribute benefits equitably." To achieve its full potential, the CCA can work to provide financing for its member customers to invest directly in clean energy assets and repay their loans through savings on their monthly bills. There are regulatory issues at the state level which will also need to be addressed, and proven pathways exist. This will make it possible for many more people to have an ownership stake in renewable energy assets, since current market-based financing options are largely limited to people who own property, have good credit scores, and can afford the long-term payback.

This kind of approach can produce the same general return on investment seen by homeowners who install solar panels, without the need for customers to own their own property, have access to capital for up-front costs, or have ideal conditions (e.g. unimpeded, southwest-facing rooftops[1]) . It can also encourage investments in small-scale and cooperative projects among neighbors, which can expand the types of projects that are possible, increase local resilience, and reduce reliance on grid resources.

As Local Power LLC note in their 2020 report to the Amherst-Northampton-Pelham Inter-Municipal CCA Task Force:

From this perspective, transformative climate policy is focused not merely on decarbonization of energy, but "climate equity." It replaces centralized, polluting resources with local renewable resources, and it changes the century-long electricity business model in which energy bills amount to a life-long lien on personal wealth by an absentee-owner.

How?

Provide innovative financing options to expand equitable customer access to renewable energy.

Work with the CCA and partner municipalities to enable financing of local renewable energy investments by any participating CCA member. This could be supported by revenue bonds, state-supported zero-interest loans, or other private sources.

Use data from the Solar Resource Assessment described in Strategy RE2.1 to guide projects from idea to execution, emphasizing support for renters, low- and moderate-income residents, and **BIPOC**.

The City of Cambridge is currently piloting a CCA model that adds a small fee to a customer's rate, which is then designated to fund local renewable energy projects[2] – an important step in the direction of distributional equity (see Plan Principles).

Incentivize a broad range of clean energy technologies that work together to support economy-wide greenhouse gas emissions reductions, climate resilience, and local economic development. These can include:

- Local renewable energy adoption (including residential and commercial solar photovoltaic and solar hot water systems);
- Fuel-switching (from oil/natural gas to electricity);
- Energy efficiency upgrades (e.g. weatherization, efficient HVAC systems and appliances);
- Consumer demand-management technologies (e.g. smart thermostats, smart meters);
- Agriculture-compatible technologies (e.g. renewable water pumping, methane digesters, biomass generators).
- Solar-integrated electric vehicle purchases (both individual and collective);
- Microgrids.

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1 Local Power, LLC, and Peregrine Energy Group. (2020). Community Choice Aggregation 3.0: Reducing Greenhouse Gas Emissions.
2 Metropolitan Area Planning Council. (2020). Green Municipal Aggregation Toolkit.

Strategy Impact

E Estimated emissions reduction: ++

$ Cost: **$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections

Implementation

Making it Happen

Leaders

- Planning Department
- Facilities Department
- Conservation Department
- Sustainability Coordinator
- Energy and Climate Action Committee
- Planning Board
- Zoning Board of Appeals; Conservation Commission
- Amherst-Northampton-Pelham Inter-Municipal Community Choice Aggregation

Investments

- Staff time
- Technical consulting services
- Land acquisition and management
- Infrastructure investments

Partners

- UMass Clean Energy Extension
- MA Department of Public Utilities

Existing Resources

- Amherst CCA Inter-Municipal Task Force Report
- Amherst Zoning Bylaw
- Amherst Zero Energy Municipal Buildings Bylaw
- Peliminary solar site suitability analysis (2020).

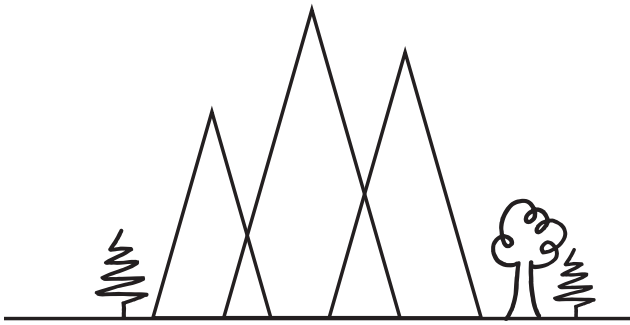
Potential Metrics for Success

- Town-wide battery storage capacity.
- MW of solar energy installed (tracked regularly over time).
- Peak energy and average/total electricity demand.
- Percentage of suitable rooftops in town that have solar panels.
- Percentage of renters and low-income homeowners invested in local renewable energy.
- Percentage of total applicable town population invested in local renewable energy.

UMass Amherst
Photo credit: D.Dillon

Beyond 2025

Land Use and Natural Systems



Land use and natural systems play an important role in Amherst's cultural identity, resident quality of life, and climate mitigation and resilience strategies. "Land use" refers to the purpose the land is use for. "Land cover" refers to what covers the land. As an example, one land use in town is playing fields that are used by many families and athletes. The land cover would be turf and trees and maybe a small building, along with pavement in the parking areas.

Part of what makes Amherst such a great place to live, work, and play is its abundance and diversity of protected natural lands. Farmland covers much of the northern, eastern, and southern parts of town, and Amherst's agricultural heritage continues to define the community's character in important ways. Conservation areas and recreational spaces like Amethyst Brook, Puffers Pond, Mount Pollux, Mill River, and Groff Park are beloved places to hike, swim, cycle, birdwatch, do yoga, fly a kite, or have a picnic with family and friends, and the Town has worked hard in recent years to connect its preserved lands through a growing network of trails.

Unbuilt areas of the Town such as conserved forests and wetlands or grasslands provide the bulk of **ecosystem services** that residents, both human and non-human, use to sustain life. These services include water storage and filtering, habitat, food and medicine, carbon storage and sequestration, and air purification. The forests of Amherst (including forested wetlands) cover 10,464 acres[1], representing a carbon pool of approximately 4,185,600 MTCO2e and sequestering 7,534 MTCO2e per year on average[2]. The town's 520 acres of wetlands represent a 1,248,000 MTCO2e carbon pool, while they capture and store about 1,040 MTCO2e annually.

About 30% of Amherst's total land area is permanently protected open space[3], including Town-and State-owned conservation land and private land under **Conservation Restriction**. Another 2,952 acres (about 17%) are partially protected; this includes private land owned by land trusts, land under **Agricultural Preservation Restriction**, and open space at schools and in conservation subdivisions. A Right-to-Farm bylaw safeguards agricultural uses and activities in town, and supporting local farms and locally-grown food can help Amherst to retain working agricultural land. This can have significant carbon sequestration potential in addition to enhancing the resilience of the local food system.

The built areas of Town support human activities. These areas include residences, commercial buildings, roadways, parking areas, and other types of man-made infrastructure. Human settlements need a range of land uses and land covers. The effort is to find an appropriate balance that support all species. This effort characterizes resilience in land planning and land use. The careful arrangement of buildings and infrastructure can help improve quality of life for residents, and reduce the need for driving and other emissions-intensive activities. Careful planning can also conserve unbuilt areas to support the ecosystem services they provide.

Unsustainable patterns of human development are the number one driver of habitat loss and ecosystem destruction in the Commonwealth[4]. Poorly conceived development degrades the integrity of our natural systems, making them less resilient to the impacts of climate change. Encouraging density, redevelopment, and **nature-based solutions** in already-developed areas, along with agricultural preservation and protection of undeveloped natural lands, can allow Amherst to enhance the health and resilience of its natural systems, sequester carbon sustainably, and ensure that all residents can be deeply connected to the natural world.

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1 All acreages derived from MassGIS 2016 Land Cover dataset. https://www.mass.gov/info-details/massgis-data-2016-land-coverland-use.

2 Estimates based on findings of the MA Healthy Soils Action Plan (2021), which shows an average forest sequestration rate of 0.72 MTCO2e per acre per year for Massachusetts forests, and an average rate of 2 MTCO2e per acre per year for wetlands.

3 Town of Amherst. (2017). Open Space and Recreation Plan Update. Amherst, Massachusetts.

4 Ricci, E.H., Collins, J., Clarke, J., Dolci, P., & de la Parra, L. (2020). Losing Ground: Nature's Value in a Changing Climate. Massachusetts Audubon Society, Inc. Lincoln, MA. Retrieved from https://www.massaudubon.org/losingground.

Facilitate Community Connections to Land

Increase outreach and information-sharing about existing publicly-accessible natural areas. Support public-private partnerships to increase public access to recreation and open space.

Amherst has many well-used and well-loved conservation areas, public parks, and other public open spaces. At the same time, many residents are not aware of these spaces, or feel excluded from them because of physical, social, economic, and/or transportation barriers. Increasing awareness is one aspect of promoting access and use; another important element is cultivating a sense of community ownership and belonging. Land Use Task Group participants noted that programming aimed at engaging low-income and youth of color in nature-oriented activities, such as sustainable agriculture and wildlife conservation, would be welcomed by many in the community, and could enhance experiences of equitable access to nature for low-income and BIPOC residents.

The Conservation Department manages and maintains over 80 miles of trails within Amherst's borders, and helps maintain regional trails in neighboring communities as well. The Town's long-term goal is to create a **greenway** network of conservation and recreation lands linked by walking paths, bike trails, and public transit, so that the need to drive and park to visit natural areas throughout town is minimized[1]. One way to accomplish this without the need for the Town to acquire and manage all that land is through partnerships with private landowners. Keeping land in private ownership maintains property tax revenues for the Town, supports the continued viability of working lands, and creates more direct connections between residents, their ecological surroundings, and their local economy. In parts of town where residents have limited access to public open space, and buying land would be too costly for the Town, partnerships can also increase access to nature closer to where people live, work, and play.

How?

Launch a collaborative effort between the Town, residents, and other local and regional stakeholders to expand options for recreational programming.

1 Town of Amherst. (2017). Open Space and Recreation Plan Update. Amherst, Massachusetts.
2 ibid.
3 Theodore Roosevelt Conservation Partnership. (2018). Voluntary Public Access & Habitat Incentive Program (fact sheet). Agriculture and Wildlife Working Group. Washington, DC.

Accessibility and youth nature programming were two important themes expressed in the Task Group.

The 2012 Massachusetts Statewide Comprehensive Outdoor Recreation Plan (SCORP) identified adolescents aged 13-18 as the age group whose recreational needs were least well-met in the state. This age group is also experiencing a growing problem with obesity that interacts with access to outdoor recreational amenities[2].

Seek funding and support for local voluntary public access and habitat improvements on private lands to ensure public health and safety and promote climate resilience.

Private landowners who make their land accessible to the public without charging fees are protected from liability under Massachusetts General Law. However, in situations where a landowner has been deemed "willful, wanton, or reckless in the upkeep of their land," liability protection no longer applies.

Natural Resources Conservation Service Voluntary Public Access and Habitat Improvement (VPA) Program

Created by the 2008 Farm Bill, and reauthorized with an additional $40 million in the 2014 Farm Bill, this competitive grant program provides funds to state agencies and partners to incentivize public access on private land for trails and hiking, fishing, hunting, and other outdoor recreational activities[3].

The Franklin Land Trust recently led the implementation of a regional VPA-sponsored program in partnership with the MA Department of Conservation and Recreation, the Berkshire Natural Resources Council, and the MA Forest Alliance. Eligible landowners received a one-time payment based on the acreage or trail length they provided access to, whether hunting would be allowed, and whether access would be temporary (10 years) or permanent.

Strategy LU2.1

To maintain safety, additional funding for things like trail improvements, signage, hazard monitoring, and/or expanded liability protection can make the difference between whether landowners choose to provide public access or not. This kind of program would be an excellent candidate for implementation by Terracorps Service Members through partnership with a local conservation nonprofit such as the Kestrel Land Trust.

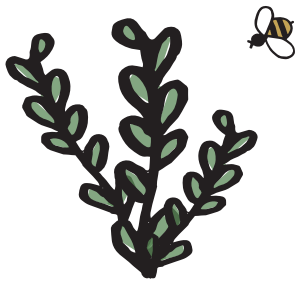
Strategy Impact

E Supporting strategy. Potentially large effects on long-term community and ecological resilience.

$ Cost: **$$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections



1 (next page) Donahue, Brian, et al. (2014). A New England Food Vision. Durham, NH: Food Solutions New England, University of New Hampshire.

Foster a Coordinated Regional Food System

Support the implementation of the Amherst Food Justice Plan and long-term development of a coordinated and resilient regional food system through ongoing participation in planning and policy development.

Food sovereignty is **"the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems."**

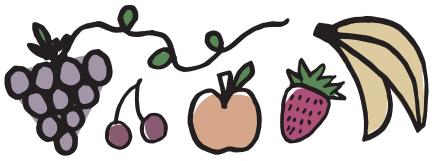
As this definition suggests, food sovereignty and **climate justice** are inextricably linked. The basis for local food sovereignty is a coordinated regional food system. At present, it requires approximately 16 million acres to feed New England's 14.5 million residents, yet the region only produces an amount equal to about 12% of what it consumes[1].

Food Solutions New England, a regional policy and advocacy organization based at the University of New Hampshire, developed A New England Food Vision in 2014 in collaboration with a broad coalition of food systems stakeholders, which calls for the region to produce 50% of its food by 2060.

Despite its strong agricultural base, reaching this goal at a local level in Amherst may not be feasible given the competing influences of conservation and development, and the need to balance these in service of climate justice. Therefore, we must think, plan, and act regionally.

Just last year, regional stakeholders including the Collaborative for Educational Services (home to Healthy Hampshire) received a $555,555 state grant to develop a Hampshire County Food Policy Council. The Council's mission is to "cultivate shared governance and a county-wide network that builds the power of community voice to make food policies more equitable, honor diverse cultures, and help local food economies to flourish."
The COVID-19 pandemic exacerbated systemic vulnerabilities when it comes to ensuring food security in Amherst and across the region, making it more difficult and dangerous for many residents to access services. Food Solutions New England plans to update A New England Food Vision to better reflect the historical and systemic influences of racism and white supremacy that have led to these disparities, and the Hampshire County Food Policy Council will be poised to contribute to the evolution and implementation of this vision.

Strategy LU2.2



How?

Work with the Hampshire County Food Policy Council to develop targets, timelines, and pathways for equitable food access and regenerative food production in the region.

Understand current dietary trends and needs, how much food is produced locally, where it goes, and what the capacity for increased production and local distribution looks like.

Studying these trends at the regional level is likely to point to stronger solutions that allow individual communities to leverage their unique strengths to help the region while ensuring that their specific local needs are addressed.

Develop and deepen relationships between local schools and local farms.

Move toward increased local food purchasing for schools, and continue to integrate hands-on agricultural education opportunities for students.

Support the development of shared processing, storage, and distribution centers for local food products.

Processing centers can allow farmers to add value to their products and diversify their offerings, while storage and distribution centers support a resilient food system that minimizes waste and ensures equitable access to healthy food for all residents.

Strategy Impact

E Estimated emissions reduction: **+**

$ Cost: **$$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections

As the Town's 2017 Open Space and Recreation Plan Update suggests, the Town can work with local stakeholders to develop a cooperative model for processing, distribution, and storage facilities, potentially through the proposed regional Food Policy Council (see below).

These efforts can also be dovetailed with the creation of Resilience Hubs in town – see Strategy TI2.6 for more information.

Promote existing resources and create new workforce development programs to build on the strength of the agriculture industry.

For example, the Natural Resources Conservation Service's Environmental Quality Incentives program supports tree planting and other **nature-based solutions** around the edges of farms, such as pollinator hedgerows, windbreaks, and **riparian buffers**.

Continue to work with local farmers and regional food systems stakeholders to identify unmet needs in terms of resources, training, and education.

Work collaboratively to fill gaps and realize the full regenerative potential of the local agricultural sector.

Encourage Climate-Beneficial Stewardship Practices

Promote regenerative land stewardship practices through outreach, network-building, policy, technical assistance, and incentives.

Natural lands provide **ecosystem services** that humans rely on for our individual and planetary health. These include air and water quality improvements, flood mitigation, cooling on hot days, local food production, and more. Healthy, undisturbed natural systems can better withstand or adapt to the impacts of climate change, and should be prioritized for protection[1]. In so doing, Amherst can ensure that they will continue to provide ecosystem services for future generations, supporting healthy communities and avoiding significant long-term costs associated with the engineered infrastructure that often replaces the inherent capacity of natural landscapes to manage climate change when they are developed or otherwise disturbed.

Our forests, wetlands, farmlands, grasslands, and soils also store and sequester carbon, drawing it down from the atmosphere through processes like photosynthesis and microbial activity. When these lands are developed or degraded, not only does the carbon stored in trees, plants, and soils get released, but the future capacity of that land to sequester carbon is significantly and often permanently limited[2]. Therefore protecting our natural lands is one of the most important things we can do to mitigate climate change.

The Commonwealth's recently-released 2050 Decarbonization Roadmap projects that Massachusetts forests have the capacity to sequester approximately 5 million **$MTCO_2e$** (about 7% of current emissions in the state) per year from now through 2050. Similarly, the Massachusetts Healthy Soils Action Plan estimates that agricultural soils could sequester approximately four times as much carbon annually if **Best Management Practices (BMPs**) are widely adopted and 50% of the development projected between now and 2050[3] is avoided[4].

At the same time, adoption of **regenerative agriculture** and forestry BMPs for carbon sequestration can require significant investments in equipment, training, materials and supplies, and can also be considered high risk under current crop insurance programs. For many farmers and forest managers, the risk is not worth the reward. These misaligned incentives limit the potential of our landscapes to support climate mitigation, and discourage the adoption of practices that may enhance long-term landscape resilience.

Another important potential source of land-based carbon sequestration comes from our turf and ornamental landscapes – our lawns, gardens, parks, campus greens, golf courses, and urban greenways. Together these lands have significant potential to increase carbon sequestration; the MA HSAP estimates that avoiding 50% of projected development and adoption of best management practices could increase annual sequestration from soils on turf and ornamental landscapes by a factor of five by the year 2050. The Town is poised to examine opportunities to sequester carbon on municipally-owned land and guide residential turf and ornamental landscape management toward practices that support climate mitigation.

How?

Pilot a local healthy soils program as a model for a regional/statewide program. Some functions of this program could include:

- Providing technical assistance and low- to no-cost soil testing to homeowners, landowners, and land managers to adopt and monitor the effects of BMPs on soil health over time;
- Investing in municipal staff training and monitoring equipment to support pilot data collection and tracking;
- Creating a local campaign to engage land managers, landscape professionals, and homeowners in conversations about the potential for BMP adoption.

Encourage local farm participation in the USDA's proposed Carbon Bank and/or other emerging private carbon markets, such as the Soil and Water Outcomes Fund[5].

United States Department of Agriculture (USDA) is currently proposing to create a carbon bank that would provide financial incentives to land managers for the implementation of BMPs that result in net carbon sequestration[6].

Strategy LU2.3

A federal Carbon Bank would enable the USDA to offer a minimum price to producers per ton of carbon sequestered through verified forest and farmland management practices.

South Amherst
Photo credit: D.Dillon

1 The Nature Conservancy. (n.d.). "Resilient and Connected Landscapes" (webpage). Conservation Gateway. Retrieved from https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/Pages/default.aspx. Accessed 2/22/2021.

2 Commonwealth of Massachusetts. (2021). MA Healthy Soils Action Plan. Executive Office of Energy and Environmental Affairs.

3 Harvard Forest. (n.d.). "Future Scenarios" (webpage). New England Landscape Futures Project. Retrieved from https://harvardforest.fas.harvard.edu/other-tags/future-scenarios. Accessed February 23, 2021.

4 Commonwealth of Massachusetts. (2021). Massachusetts Healthy Soils Action Plan. Executive Office of Energy and Environmental Affairs.

5 https://www.theoutcomesfund.com/

6 Bonnie, R., Jones, L., & Harrell, M. (2020). Climate 21 Project Transition Memo to the US Department of Agriculture. Climate 21 Project. Retrieved from https://climate21.org/.

Strategy Impact

E Estimated emissions reduction: **+**

$ Cost: **$ to $$$**

Plan Principles

- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections

2016 Land Cover with 7 Classes

Data layers:
Towns from MassGIS
Landcover derived from 2016 Landcover Data obtained through the NOAA data acess viewer and reclassified into 7 classes.

Regenerative DesignGroup

AMHERST

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Implementation

Making it Happen

Leaders

- Conservation Department
- Planning Department
- Department of Public Works
- Amherst Recreation
- Agricultural Commission
- Conservation Commission

Partners

- Hampshire County Food Policy Council
- Kestrel Land Trust
- MA Department of Conservation and Recreation
- UMass Agricultural Extension
- Healthy Hampshire
- Family Outreach of Amherst
- Hampden Hampshire Conservation District
- Northeast Organic Farming Association
- Community Involved in Sustaining Agriculture

Investments

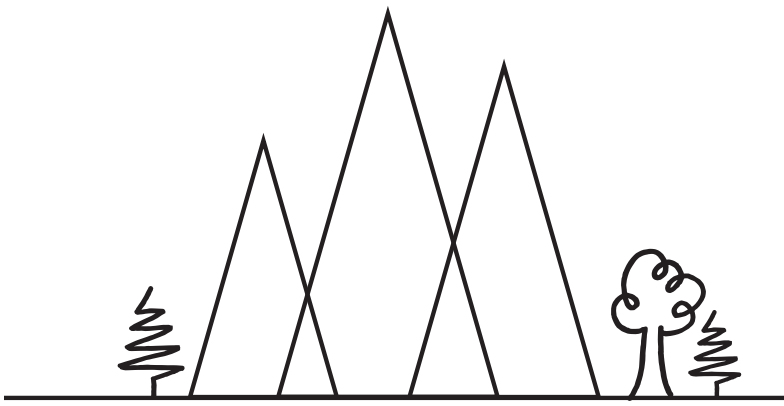
- Staff time
- Technical consulting services
- Community expert compensation
- Materials and distribution
- Translation and interpretation
- Direct costs for meetings (childcare, food, supplies, etc.).

Existing Resources

- Amherst Master Plan
- Amherst Open Space and Recreation Plan
- Amherst Food Justice Plan
- Amherst Stormwater Management Plan

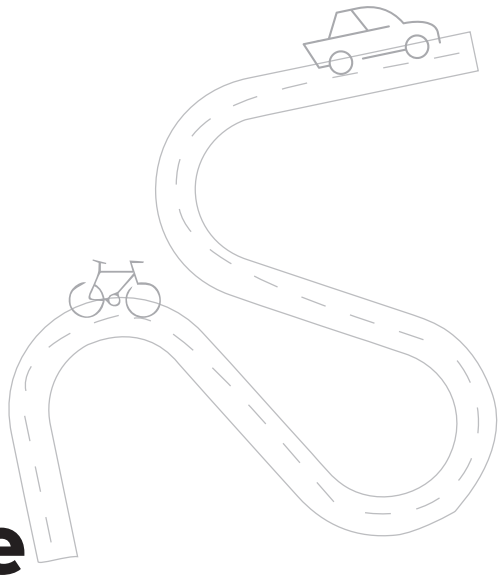
Potential Metrics for Success

- Land-based **carbon sequestration** rates and potential.
- Acres of local natural lands enrolled in soil health and carbon banking programs.
- Perceptions of accessibility and inclusion of public open space and recreational areas in town.
- Acres of interconnected green space in town (size of **green infrastructure** network).
- Acres of private land with public access.
- Agricultural acres employing **regenerative** practices.
- Percentage of residents who are food insecure or live in "**food deserts**".



Beyond 2025

Transportation and Infrastructure



Amherst is an important transportation hub in the region, in large part due to the presence of UMass Amherst, Amherst College, and Hampshire College. The operations of the regional Pioneer Valley Transit Authority (PVTA) in town reflect this reality: routes and schedules tend to be geared toward the student population, with service decreasing markedly during the summer months. While PVTA service is robust for a town of Amherst's size, these seasonal fluctuations present challenges for year-round residents who rely on public transportation to get to work, do their grocery shopping, travel to appointments, and otherwise get around easily, affordably, and efficiently. Ten percent (10%) of Amherst residents use public transportation to get to work, which is a significantly higher percentage than in other communities in the region. Amherst residents also report relatively high rates of walking (18%), cycling (2%), and carpooling (6%). Nonetheless, nearly half of Amherst residents (49%) drove alone to work in 2013[1], pointing to the significant potential for mode-shifting in town to contribute to greenhouse gas emissions reductions. Transportation is responsible for 23.3% of the town's greenhouse gas emissions, 90% of which is personal vehicles.

The COVID-19 pandemic has devastated public transportation systems across the country. The combination of work-from-home policies, stay-at-home orders, and high unemployment – especially among lower-income residents, who are more likely to take public transportation under typical circumstances[2] – has led to decreased ridership and revenues that put a just recovery in jeopardy. At the same time, use of the town's recreational trails and bike paths, including the popular Norwottuck rail trail, a regional multi-use path connecting Amherst to Hadley, Northampton, and Belchertown,

increased significantly during the summer of 2020. Amherst's 2015 Transportation Plan highlights the likelihood of future growth in the region, given increasing enrollment at UMass and the potential for east-west and north-south rail service to return to town, which would connect Amherst directly to both Boston and New York by train. The trend in out-migration from major cities to smaller, more affordable locations with convenient access to urban amenities has made Western Massachusetts an appealing landing place for many who can afford to relocate. Whether and how this trend continues has important local and regional implications for affordable housing, economic development, and especially for transportation.

While responsibility for the transit system ultimately rests with the Pioneer Valley Transit Authority (PVTA), the Town of Amherst and other regional stakeholders are active participants in the PVTA's governance and decision-making processes. To support safe, accessible, and low-carbon transportation in town, Amherst must continue to develop a robust multi-modal system that creates convenient and enjoyable alternatives to driving alone by car. Most importantly, Task Group participants pointed to the need to emphasize connections to regional commercial and employment hubs, which is critical to ensuring access to healthy food (see Strategy LU1.2), economic opportunity, and participation in municipal planning and decision-making processes (see Strategy GC1.1, GC2.1). Increasing intermodal connectivity – including bike paths and bike lanes, walking trails, and bus routes – should be part of a holistic approach to pandemic recovery.

With personal vehicles, homeowners are three to six times more likely to own an electric car than renters in part because renters are less likely to have access to chargers in their rental home or apartment complex. Therefore, without further action to prioritize equity, homeowners are more likely to benefit from vehicle-to-grid technology both financially and in terms of infrastructure resilience than renters. More than 50% of Amherst residents live in rental housing where they may not have access to an electric vehicle charging station. Ensuring the widespread availability, accessibility, and affordability of ZEV charging infrastructure, especially for renters, will promote equitable outcomes and avoid creating a bottleneck that limits the adoption of electric cars in Amherst.

Solid waste management and infrastructure resilience are two other important areas

of focus within this sector. The Town's 2016 Solid Waste Master Plan advocates for a zero waste approach, emphasizing that this requires residents not only to deal with waste in more sustainable and ultimately circular ways, but also to dramatically reduce the total amount of waste generated in the first place. To make this happen, the Town will need to advocate for regulatory measures and incentives that work at the level of materials extraction and supply chain management, since individuals do not have control over how companies source and package their products. This is an important point in relation to equity: no one should be made to feel ashamed of the waste "they" produce when they have no control over the decisions that companies make, and there are real economic and practical constraints on the accessibility of zero waste products in the market at present. Individual choices matter where there are choices to be made, and outreach and education can help people to make better choices, but systemic change is required to realize the full climate benefits of a circular economy.

The upgrades to transportation and waste management infrastructure required to realize these goals cannot be undertaken responsibly without incorporating climate change projections into planning and design. Extreme weather events are becoming more frequent and intense, putting even more strain on aging infrastructure and increasing risks to public health and private property alike. The

*The Zero Waste International Alliance defines **zero waste** as follows: "The conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning, and with no discharges to land, water, or air that threaten the environment or human health."*[3]

Town commissioned a flood insurance study in 2019 to update existing maps created in 1983 so they more accurately reflect current hydrological conditions and floodplains. Integrating **life cycle cost** analysis into capital planning can also create a more accurate picture of the long-term benefits of increasingly climate resilient infrastructure, helping to make the case for investments today that will pay off long into the future.

1 Slotnick, E., Basch, B., & Dolinger, J. (2018). Amherst Bicycle and Pedestrian Network Plan. Pioneer Valley Planning Commission.
2 Commonwealth of Massachusetts. (2021). MA HeaParker, K., Minkin, R., & Bennett, J. (2020). "Economic Fallout From COVID-19 Continues to Hit Lower-Income Americans the Hardest." Pew Research Center. Retrieved from https://www.pewresearch.org/social-trends/2020/09/24/economic-fallout-from-covid-19-continues-to-hit-lower-income-americans-the-hardest/. Accessed February 27, 2021.
3 Zero Waste International Alliance. (2018). Zero Waste Definition. Retrieved from http://zwia.org/zero waste-definition.

Develop a Robust Alternative Transportation Network

Continue to increase downtown and village center walkability, cycling infrastructure, and transit-orientation to encourage mode-shifting and local economic development.

Amherst's vibrant downtown area is highly walkable and well-trafficked by pedestrians – in Amherst Center, 34% of people walk to work, compared to 18% town-wide. Recent improvements to intersections and crosswalks, such as those along S Pleasant St and at the intersection of N Pleasant, Triangle, and E Pleasant Streets, have increased safety and visibility for pedestrians and cyclists. The town's village centers are also targets for infrastructure investments that support walking, cycling, and commercial activity, yet safe continuous connections between these hubs are lacking.

The Commonwealth's Complete Streets Funding Program supports municipalities in adopting policies and implementing infrastructure upgrades that provide safe and accessible options for all modes of travel and all ages and abilities. The Town adopted its Complete Streets Policy in 2018, which lays out the Town's goals and approach to transforming alternative transportation:

The Town of Amherst Complete Streets Policy will focus on developing an interconnected, integrated, multi-modal transportation network. This network will offer robust transportation routes and options together with inter-modal transfers, to provide connections between neighborhoods, schools/higher education institutions, major employers, recreation/ retail destinations including downtown, village centers as well as adjoining towns and transportation systems.

Complete Streets can help Amherst to reduce vehicular traffic in the downtown and village center areas, and reclaim street parking spaces for green space, protected paths, and bicycle parking. This strategy relies on increased mode-shifting to reduce the use of personal vehicles and encourage adoption of healthier, more sustainable alternatives.

Amherst's bike path network has continued to develop in recent years, consisting of standard five-foot bike lanes along several major roadways, as well as the Norwottuck rail trail, and the multi-use path along N University Drive that connects the Norwottuck to UMass. PVTA buses are equipped with front-loading bike

racks, and the town's zoning bylaw requires new developments with 10 or more car parking spaces also to install bicycle parking. The Valley Bike Share program, launched in 2018, is another important resource for cycling in the region, with stations located throughout town as well as in Northampton, Easthampton, Holyoke, South Hadley, and Springfield.

Public outreach during the development of the 2015 Transportation Plan also pointed the need for protected connections between downtown and the villages of North Amherst and Cushman. This finding was supported by the ensuing 2018 Bike and Pedestrian Network Plan created for the town by the Pioneer Valley Planning Commission.

How?

Plan for streets and public places that prioritize access, safety, and convenience for people over cars.

Expand "Complete Streets" infrastructure, such as protected bike lanes and priority bus lanes, to create streets that put pedestrian safety and alternative modes of transportation first.

Plan for temporary and, eventually, permanent car-free zones.

Build upon precedents set by many municipalities, including Boston, Minneapolis, MN, and Oakland, CA, during the summer of 2020 as a strategy to increase access to public space and decrease pollution from vehicles in communities during COVID-19[1].

Strategy Impact

E Estimated emissions reduction: **++**

$ Cost: **$$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections

Expand cycling resources, programs, and infrastructure.

Increase on-road and protected bicycle lanes and intersection accommodations for bikes throughout town in accordance with the 2018 Bike and Pedestrian Network Plan.

Increase bicycle parking and storage infrastructure at key hubs around town, such as apartment complexes, academic campuses, and the downtown and village centers.

Install bike racks at all bus stops in town to support "first mile/last mile" coverage – i.e. the typical distance from home to the closest transit stop.

Continue to expand the Valley Bike Share program by adding new stations and accessible bike options. Continue to advocate with the Town of Hadley to join the program.

Accessible bike options can include handcycles, tandem (side-by-side) bicycles, trikes, and bicycle attachments for wheelchairs. The City of College Park, MD, launched its bike share program in 2016 in partnership with the University of Maryland, which includes five accessible bikes in its fleet, including handcycles, tricycles, and tandem bikes[2].

1 Diaz, J. (2020, April 11). Cities Close Streets to Cars, Opening Space for Social Distancing. The New York Times. Retrieved from https://www.nytimes.com/2020/04/11/us/coronavirus-street-closures.html. Accessed March 4, 2021.

2 National Aging and Disability Transportation Center. (2017). Accessible Bikeshare: Benefits to Older Adults and People with Disabilities.

Support Regional Transportation Demand Management

Develop a regional Transportation Demand Management program to support equitable and affordable access to commercial and employment centers.

Amherst's walkable downtown and large student population contribute to lower rates of personal vehicle use than in other towns in the region, yet almost 50% of Amherst residents still drive alone to work on average[1]. Amherst's current road network cannot accommodate large expansions for vehicles, nor is that desirable if the town is going to meet its climate goals while continuing to grow. Decreasing the use personal vehicles is one of the best ways for the town to reduce its **greenhouse gas emissions** and adapt to climate change. The University and Colleges provide public transportation subsidies for their affiliates during the academic year, and UMass encourages employees and off-campus students to carpool by providing discounted parking permits and preferred parking spaces. Amherst can build from these precedents but to encourage more widespread alternatives to driving alone.

How?

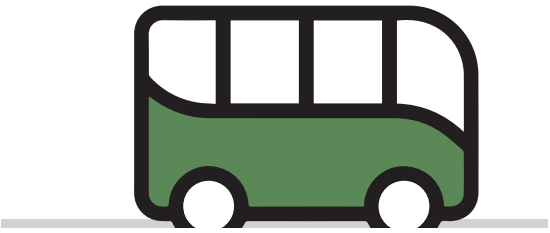
Promote the Commonwealth's Ride Match online ride-sharing and carpooling network. Ride Match is a searchable directory of public, private, and accessible transportation options in Massachusetts.

Ride Match collaborates with hundreds of employers statewide to support employees in finding alternatives to driving alone to work. This service can be accessed at https://massridematch.org/.

1 Town of Amherst. (2015). Amherst Transportation Plan. Transportation Advisory Committee. Amherst, MA.

Engage Amherst businesses in a local employee incentive benefit program.

Collaborate with the Downtown Amherst Business Improvement District (BID), Amherst Area Chamber of Commerce, and area employers to offer flexible options for local businesses. For example, businesses could pay a sliding-scale fee based on the number of employees participating and incentives offered. These could include free or discounted PVTA bus passes, Valley Bike memberships, ride-sharing trips, employee discounts at participating local businesses, or other innovative methods devised by the local business community.



Promote working remotely and Amherst as a place to do so. Coordinate with institutions and local businesses around work-from-home days to reduce roadway congestion and increase the appeal of alternative transportation.

Pandemic recovery will undoubtedly see many individuals returning to places of work outside the home, but remote work is likely to remain a viable option for many people, and should be harnessed for collective benefit.

Strategy Impact

E Estimated emissions reduction: **+**

$ Cost: **$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

Facilitate ZEV Car-Sharing at Apartment Complexes

Implement an electric zero-emission vehicle (ZEV) car-sharing program focused on the many apartment complexes in town where vehicle access is limited.

The convenience and quality of life benefits that affordable access to a vehicle can provide are tremendous, especially for low-income residents, parents of young children, and people with limited mobility, among others. It can also lead to increased climate resilience, making it easier for residents to acquire groceries and supplies on short notice, check on friends and relatives, or transport people in need of assistance. At the same time, Amherst aims to decrease car ownership overall while transitioning all vehicles to ZEVs.

Decarbonizing the transportation sector will require a transformational approach that includes major mode-shifting, expanded ZEV charging infrastructure, and fewer personal vehicles on the road. Car-sharing is a proven solution that can provide for equitable access to the benefits of driving, while reducing car ownership and the emissions associated with it. In fact, one shared car can replace an average of 20 private vehicles[1]. Amherst's apartment complexes are ideal candidates for ZEV car-sharing because they are densely populated neighborhoods with lower rates of access to personal vehicles, especially in South Amherst.

How?

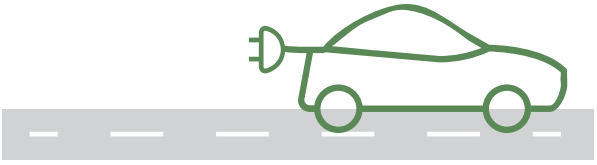
Develop a pilot car-sharing program in partnership with one or more apartment complexes in town.

Couple pilot recruitment with outreach and education as part of the Multifamily Deep Energy Retrofit Program (see Strategy B1.2), which also focuses on engaging apartment complexes to increase equity, climate resilience, and quality of life.

ZEV car-sharing is an activity that is well-suited for integration with the upcoming Inter-Municipal Community Choice Aggregation (see Strategy RE1.1).

Car-sharing vehicles can become an integrated element of strategic renewable energy management through vehicle-to-grid technologies, supporting future apartment complex-based microgrids and/or helping to balance the energy of the larger grid.

1 Town of Amherst. (2015). Amherst Transportation Plan. Transportation Advisory Committee. Amherst, MA.



Strategy Impact

E Estimated emissions reduction: +

$ Cost: **$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

Mainstream Zero Waste Infrastructure and Programs

Expand zero waste public infrastructure, programming, and resources town-wide.

Global waste generation is increasing faster than any other environmental pollutant. When all waste management streams are considered, including strategies to reduce primary waste generation, the waste sector has the capacity to reduce up to 20% of global emissions, with food waste representing the largest opportunity for climate mitigation[1]. Amherst's current waste collection system is inefficient and insufficient to meet the needs of a zero waste community. Multiple haulers service the same routes, creating excess pollution; not all offer curbside compost pickup, and none offer it free. Zero Waste Amherst has been an active community voice advocating for Amherst to adopt time-framed zero waste targets and expand zero waste infrastructure to support their achievement. Amherst has opportunities to analyze its own generation and diversion rates, and to create a community-driven plan for expanding, maintaining, and evolving infrastructure and programs to meet the broad range of priorities and needs.

How?

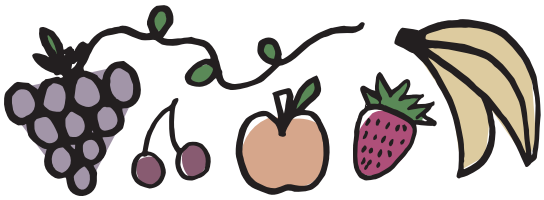
Implement a town-wide curbside composting program for residential and commercial customers.

Ensure that service is inclusive of large apartment complexes through agreements with owners/property managers.

Create or contract with a compost processing facility in the region to reuse the compost generated locally for community gardens, farms, etc.

1 C40 Cities. (2018, August 28). Advancing Towards Zero Waste Declaration. Retrieved from https://www.c40.org/other/zerowaste-declaration.

Contract with waste hauler(s) to increase efficiency, expand the scope of services offered, and reduce vehicle emissions from trash and recycling collection in Amherst's neighborhoods.



Develop a local Zero Waste outreach, education, and community engagement program focused on reducing waste using zero waste principles.

Recruit, train, and pay Amherst residents to serve as community liaisons for local zero waste issues, resources, and programs. Develop a local zero waste toolkit, resources, and trainings informed by the work of community liaisons, geared toward a variety of audiences, and available in multiple languages.

Increase zero waste infrastructure town-wide. Examples include:

- Pair together recycling and trash receptacles in all public and community spaces.
- Explore options for public compost receptacles, per UMass Amherst's example.
- Offer day passes for the Amherst Waste Transfer Station. This creates an affordable option for residents who only require infrequent access to properly dispose of items that may otherwise end up in the landfill.
- Install water refill stations at schools, parks, downtown, and for public events.
- Develop a community repair space at the Transfer Station, and make access free.

Strategy Impact

E Estimated emissions reduction: +

$ Cost: **$$$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

Integrate Climate Adaptation and Water Resources Management

Leverage new data sources and scientific understanding to incorporate climate change projections into integrated water resources management for the town.

Amherst employs a watershed-based approach to water resources protection. The Town owns almost 2,600 acres of forested watershed lands, which are sustainably managed for timber harvesting. The Town's Surface Water Protection Plan lays out goals that include producing continual income, enhancing wildlife habitat, protecting soil and water quality, and limiting the spread of invasive species in the area.

The Plan also specifies management practices that increase forest resilience to climate change, including maximizing a diverse base of species and range of successional stages[1].

Protecting watershed lands ensures that future development doesn't lead to aquifer depletion and/or contamination of Amherst's drinking water supply.

The Town's first Stormwater Management Plan (SWMP) was developed and published in 2019 as part of the MS4 regulatory requirements under the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) Stormwater Phase II MS4 General Permit. The SWMP is required to address six "minimum control measures" that help the community to address ***stormwater runoff*** *and contamination entering area water bodies: 1) public education and outreach; 2) public involvement and participation; 3) illicit discharge detection and elimination; 4) construction site stormwater runoff control; 5) post-construction stormwater management; and 6) good housekeeping and pollution prevention.*

1 Town of Amherst. (2017). Open Space and Recreation Plan Update. Amherst, Massachusetts.
2 Briglio, T. (2017). Amherst Greenhouse Gas Emissions Inventory. Town of Amherst, Massachusetts.
3 See, e.g., Harvard Forests's New England Landscape Futures Project, https://harvardforest.fas.harvard.edu/other-tags/future-scenarios.

In addition to direct land protection, the Town has adopted a Watershed Protection Overlay District covering areas of North Amherst, and an Aquifer Recharge Zone Overlay District covering parts of South Amherst which is designed to protect the Lawrence Swamp. These tools manage development practices so that potential negative impacts to water quality and groundwater recharge are minimized. Despite these extensive proactive measures, climate change is likely to place additional strain on Amherst's water supply, potentially limiting regional agricultural productivity, housing development, and economic growth.

Water treatment is an important source of greenhouse gas emissions in Amherst, accounting for 18% of municipal emissions in 2017[2]. The Amherst Department of Public Works has worked to reduce energy use at the wastewater treatment plant, and is exploring the potential for innovative technologies to further improve energy efficiency and reduce electric loads. Green stormwater infrastructure and watershed land protection help to reduce nutrient loading into drinking water supplies, reducing the amount of energy needed for water and wastewater treatment.

How?

Require drainage systems to be designed in line with climate change projections for average storm size.

The City of Cambridge is currently considering the projected 10-year 24-hr storm of 2070 as the minimum design standard for new drainage infrastructure.

Encourage the use of green stormwater infrastructure as a best practice throughout the Town's stormwater management policies and plans.

Identify, assess, and prioritize areas that are highly vulnerable to flooding for **green stormwater infrastructure** interventions.

Investigate areas in town that are potentially suitable for larger green stormwater retention systems (e.g. retention ponds, constructed wetlands).

Strategy TI2.5

Assess existing local regulations to understand the current feasibility of green stormwater infrastructure practices and opportunities to expand adoption.

Identify and prioritize climate-resilient watershed lands, including protocols for monitoring and managing agricultural runoff, protecting habitat, and managing the impacts of development and drought.

Develop a comprehensive climate-informed water resources management plan.

Examine current trends in water use, demand, and management, and analyze in quantitative and qualitative terms how they will be affected by future development scenarios[3] under climate change.

Consider the needs and impacts of population growth, conservation land, agricultural land, and stormwater management as part of a comprehensive strategy for meeting the town's future water needs.

Explore the potential for adoption of innovative reclaimed water strategies on municipal and private property.

Water recycling can include **greywater** reuse for irrigation, toilet flushing, or industrial use. Reclaiming greywater results in more efficient use of potable water and less energy required for water treatment, a joint climate mitigation- and adaptation-centered approach.

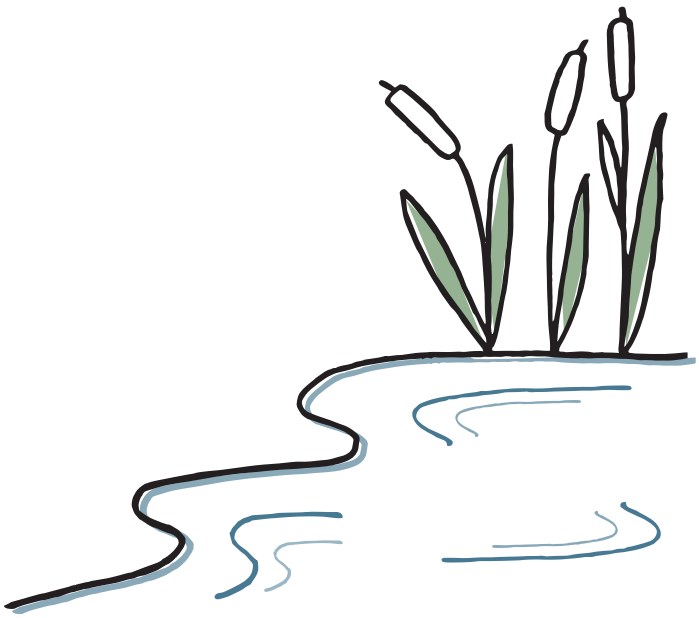
Strategy Impact

E Estimated emissions reduction: +

$ Cost: **$$$ to $$$$.**

Plan Principles

- Local Wealth Creation & Fair Distribution
- Community Involvement & Connections



Transition water and wastewater treatment operations to efficient renewable power.

Students at Worcester Polytechnic Institute analyzed three water and wastewater facilities in Massachusetts to determine potential pathways to energy independence[4], and found that through a combination of investments in traditional renewable energy (wind and solar), energy efficiency, anaerobic digestion, and/or hydropower, two of the three facilities could achieve net zero energy demand within financially feasible means, and the third could achieve significant energy and emissions savings. The outlined approach can serve as a model for analysis of water and wastewater facilities.

Continue to coordinate on a regional/ watershed scale to protect watershed lands and the habitats they provide from a wide range of threats, including pollutants, debris, development, and drought.

3 See, e.g., Harvard Forests's New England Landscape Futures Project, https://harvardforest.fas.harvard.edu/other-tags/future-scenarios.

4 Nguyen, C., Tang, K., & Won, Y. (2014). Reaching Zero-Net Energy at Water and Wastewater Treatment Facilities. Worcester Polytechnic Institute / Massachusetts Department of Environmental Protection.

Prepare Infrastructure for Climate and Community Resilience

Strengthen Amherst's physical and social infrastructure in ways that enhance climate and community resilience.

The COVID-19 pandemic has exacerbated social and economic vulnerabilities and inequities in ways that parallel climate change, contributing to challenges such as food access, affordable housing, and employment insecurity, and pushing healthcare and emergency services to the limits of their capacity to cope in the short-term. Add to these a catastrophic climate-driven extreme weather event such as Winter Storm Uri, which left at least 111 people dead and devastated Texas's infrastructure, and the effects are multiplied. Flooding is a priority concern is Amherst, and the Town's efforts to catalogue areas that regularly flood prompted a community-wide update to the town's floodplain maps to reflect updated conditions and projects in 2019 (previous maps dated from the 1970s).

Another one of the most promising ways that municipalities have begun to address community resilience in a proactive manner is through the creation of Resilience Hubs.

Resilience Hubs are enhanced community centers designed to serve as accessible support facilities for all residents in dealing with acute/emergency and chronic/ongoing challenges which may or may not be directly impacted by climate change but that impact people's everyday ability to thrive and therefore to adapt to a changing climate.

Resilience Hubs are a concept advanced by the Urban Sustainability Directors Network (USDN). They encourage physical and logistical coordination among local service providers within climate-resilient facilities, to support communication, distribute resources, and enhance quality of life.

How?

Community-wide incentives like the National Flood Insurance Program's Community Rating System (CRS) can help to increase local knowledge and flood risk awareness, and create momentum for community-wide improvements.

The CRS program can also reduce flood insurance rates while increasing community resilience to hazards.

Funding is available to help cities address these challenges through the Federal Emergency Management Agency (FEMA)'s Building Resilient Infrastructure and Communities (BRIC) program, which is poised to receive robust funding under the proposed Infrastructure Plan, as well as the MA Municipal Vulnerability Preparedness (MVP) program.

Amherst Survival Center
Photo credit: D.Dillon

Spread the word about climate-resilient infrastructure upgrades and their relationship to emissions reduction.

For instance, strategies and technologies like green stormwater infrastructure, smart meters, and electric battery storage (see e.g. Strategy RE2.1) are complex, and unfamiliar for many people today. Making these ideas approachable and relevant to daily life is essential for creating understanding and building trust to support widespread adoption.

Strategy TI2.6

Explore the potential for Resilience Hubs in Amherst.

Develop a community-driven process to understand what kinds of services, programming, facilities, and resources will best serve the needs of the community. Include a feasibility study of potential sites and facilities upgrades that would be necessary to develop successful Resilience Hubs.

Strategy Impact

E — Supporting strategy with important benefits to community and climate resilience.

$ — Cost: **$$$ to $$$$**

Plan Principles

- Equity, Accessibility, and Belonging
- Racial and Climate Justice
- Community Involvement & Connections

Resilience Hubs

"Resilience Hubs are a concept by the Urban Sustainability Directors Network (USDN) meant to empower communities and increase community capacity to prepare, respond, and recover from climate change and other emergencies. Resilience Hubs provide an opportunity to work at the intersection of community resilience, emergency management, climate change mitigation, and social equity. Resilience Hubs mainly operate as multi-use spaces with a variety of programs that build relationships, promote community preparedness, and improve residents' health and well-being. In times of emergency, these spaces may act as communication centers, distribution centers, and potential emergency shelters that are also necessary for emergency recovery."

– Resilient Medford Resilience Hubs Report, City of Medford MA, June 2020

PVTA riders board the bus
Photo credit: Newflyer504

Implementation

Making it Happen

Leaders

- Planning Department
- Department of Public Works
- Economic Development Department
- Conservation Department
- Sustainability Coordinator
- Transportation Advisory Committee
- Board of Health
- Water Supply Protection Committee
- Energy and Climate Action Committee
- Conservation Commission.

Investments

- Staff time
- Infrastructure investments
- Technical consulting services

Partners

- Amherst Regional Public Schools
- Business Improvement District
- Chamber of Commerce
- Apartment complex owners & managers
- Healthy Hampshire
- Valley Bike Share
- Zero Waste Amherst
- Higher education institutions

Existing Resources

- Amherst Transportation Plan
- Amherst Bicycle and Pedestrian Network Plan
- Amherst Complete Streets Policy
- Amherst Solid Waste Master Plan

Potential Metrics for Success

- Percentage of residents who walk/bike to school/work.
- Percentage of elementary and high school students living within 1.3 miles (walking distance) who walk to school.
- Connectivity of the town's bicycle and pedestrian network.
- Rates of access to electric vehicles at local apartment complexes.
- Percentage of residents who take the bus to school/work.
- Percentage of residents who carpool..
- Percentage of residents who work remotely and/or average number of remote work days.
- Number and locations of protected and on-road bike lanes.
- Number and locations of bike racks and covered bicycle storage.
- Number of trips taken on Valley Bike.
- Percentage of local food waste diverted from landfill.
- Number and location of zero waste receptacles in town.
- Overall waste generation/ diversion rates.
- Frequency and severity of stormwater flooding and storm sewer overflows.
- Number and location of heating and cooling stations / Resilience Hubs in town.

Potential Milestones

- Reduce the municipal solid waste generation per capita by at least 15% by 2030 compared to 2015*.
- Reduce the amount of municipal solid waste disposed to landfill and incineration by at least 50% by 2030 compared to 2015, and increase the diversion rate away from landfill and incineration to at least 70% by 2030*.
- 100% renewable energy-powered water treatment by 2030.

** C40 Cities Climate Leadership Group Zero Waste Commitments*

Town of Amherst
Photo credit: ©University of Massachusetts Amherst

State and Federal Advocacy and Collaboration

In early 2021, the Massachusetts State Legislature passed An Act creating a Next Generation Roadmap for Massachusetts Climate Policy. This new law establishes ambitious statewide goals that align directly with Amherst's, including a 50% reduction in **greenhouse gas emissions** from the state's baseline of 1990, and carbon neutrality by 2050. The Act codifies Environmental Justice into law, integrates climate change into the official priorities of the Department of Public Utilities, and legislates a new opt-in Net Zero Stretch Code (see Strategy B2.1). It also sets emissions reduction targets for six specific sectors: electricity, transportation, commercial and industrial buildings, residential buildings, industrial processes, and natural gas distribution – targets that can help to guide Amherst's data tracking and decision-making.

The Next Generation Roadmap law also contains provisions to increase funding for the Massachusetts Clean Energy Center (MassCEC), and the Mass Save program that it administers. Mass Save is a statewide clean energy incentive program that provides no-cost home energy assessments, weatherization, and other energy efficiency and fuel-switching packages for residential, commercial and industrial buildings. Its focus has been on energy efficiency in the past, but with this new legislation, emissions reduction has also become a priority. MassCEC also supports clean energy workforce development (see e.g. Strategy B1.6), and funding for this work will be expanded under this new law.

Complementing legislative action is the MA Decarbonization Roadmap, released by the MA Executive Office of Energy and Environmental Affairs (EEA) in 2020. The Roadmap analyzes the potential for a robust suite of technologies and policy tools to get

Buildings

the Commonwealth to its goals by 2050, and lays out potential pathways to implementation. The MA Clean Energy and Climate Plan for 2030, also developed by EEA, guides the actions the Commonwealth will take, and the investments it will make, to ensure that the state's 2030 emissions limit is met. The state's Renewable Portfolio Standard (RPS), which sets minimum requirements for utility renewable energy procurement, continues to drive down emissions in the electricity sector, and that pace will be accelerated starting in 2025 to reach 40% by 2030.

Buildings and Transportation are two areas where new and ongoing state and federal initiatives will have a significant long-term impact on Amherst's ability to meet its goals, and where advocacy from community members, the Town, and other local partners and stakeholders can help to drive and inspire larger-scale change.

Residential Energy Performance Disclosure

Residential energy performance disclosure policies require property owners to complete an energy assessment and disclose the energy characteristics of a unit before sale or rental, using a recognized industry standard such as the Home Energy Score (HES)[1] or Home Energy Rating System (HERS) Index[2]. Disclosure policies have been shown to drive down building-related emissions by allowing potential tenants and buyers to evaluate the full scope of potential costs associated with a given unit, increasing access to information, and creating a mechanism for valuing the energy efficiency of a property on the market (see Strategy B1.4 and Strategy B2.3 for more). Both the Governor and the Legislature have submitted unsuccessful proposals to require real estate agents, property owners, and landlords to assess and disclose the energy characteristics of any residential unit at the time of listing, sale, or lease over the past several years. As of fall 2020, the MA Legislature is considering a bill that would require residential property owners

1 https://betterbuildingssolutioncenter.energy.gov/home-energy-score
2 https://www.hersindex.com/hers-index/what-is-the-hers-index/

to disclose the energy performance of their property before sale.

Amherst Town Staff, volunteers, community organizations, and community leaders can organize support for legislation and provide testimony at opportunities for public input, write op-eds and letters to their representatives, and continue to raise the issue at other interfaces with State lawmakers and administrators. Opportunities exist to include the required home energy performance assessments under the scope of Mass Save's no-cost services, which may increase support for the policy overall. If such legislation is not in place at the state level by 2022, the town should move swiftly to implement a local Residential Energy Disclosure Bylaw. Collaborating with regional partners to encourage adoption of similar policies region-wide can reduce the likelihood of negative impacts to the Amherst local real estate market. For instance, transparency in the local real estate market around energy efficiency is a strategy outlined in Northampton's 2014 Clean Energy Roadmap.

Transportation

Public Transportation Investments

In an effort to spur major investments in sustainable transportation, twelve states of the Northeast and Mid-Atlantic – including Massachusetts – and the District of Columbia have collaborated to create the Transportation and Climate Initiative (TCI)[3]. In December 2020, Massachusetts, Connecticut, Rhode Island, and the District of Columbia announced they would be launching the first multi-state program under the TCI, dubbed TCI-P, that will require large gasoline and diesel fuel suppliers to pay for the pollution that they produce. This regulatory requirement is expected to generate approximately $300 million annually among the participating states, which will be reinvested in equitable, low-carbon, resilient transportation infrastructure, including public transportation. The TCI-P is expected to reduce emissions from the transportation sector by 26% between 2022 and 2032. Other member states of the TCI will have the opportunity to join the TCI-P in the future.

3 Transportation and Climate Initiative. (Updated December 21, 2020). "TCI's Regional Policy Design Process" (webpage). Retrieved from https://www.transportationandclimate.org/main-menu/tcis-regional-policy-design-process-2019.

Pioneer Valley Transit Authority (PVTA)

The Pioneer Valley Transit Authority (PVTA), Amherst's regional public transportation agency, is funded by federal, state, and local dollars from its 24 member communities, as well as fares and advertising revenues. Member communities pay an amount to the PVTA annually that is based on the number of fixed route miles and paratransit passengers served in that community. The Five College Consortium also contributes to the PVTA, and Five College students, faculty, and staff ride free with a valid institutional ID during the academic year. Service is significantly reduced during the summer months. This structure effectively creates seasonal transit deserts for full-time residents who rely on public transportation, many of whom are low-income and do not have access to other modes of travel, while asking them to subsidize the expanded free service offered during the academic year to University and College affiliates only, by paying fares year-round.

Access to safe, reliable, affordable transportation is a prerequisite to economic opportunity for most people, and this is especially true for individuals who rely on public transportation. As a regional entity, the PVTA must balance the priorities of the many different communities that it serves. The economic crisis precipitated by the COVID-19 pandemic has further constrained budgets, and new sources of funding are badly needed. Amherst is one of 24 member communities served by the PVTA, with the Town Manager and Town Council President sitting on its Advisory Board. In its role as a key regional hub and source of funding for the agency, Amherst can advocate for the changes that will be most impactful for meeting community needs, increasing ridership equitably, and decreasing greenhouse gas emissions. These include shelters, real-time travel information, accessibility improvements, bike racks, and bilingual signage at bus stops[5]; reducing travel times and improving inter-modal connections; and addressing service-related passenger concerns such as the current three-bag limit for groceries, which disproportionately impacts low-income community members[6].

Members of the Transportation and Infrastructure Task Group introduced and

advocated for the principle of transportation as a fundamental human right. As a public good, our public transportation system should be funded and regarded in the same way we fund and think about our schools, libraries, and parks, with free and universal access as the guiding principle. The benefits of expanded service and fare-free transit extend beyond affordability and convenience for riders, increasing equity across the transportation sector and improving public health as more people switch to riding the bus and vehicle emissions (and resulting air pollution) go down. This effect will be amplified as the PVTA transitions its fleet to electric vehicles, and Amherst must continue to advocate for this priority. At present, the PVTA fleet includes three electric buses purchased in 2016, out of a total fleet size of 186 buses. The Martha's Vineyard Transit Authority has already committed to achieving an all-electric bus fleet, and is actively investing in distributed on-route charging platforms to ensure reliable service[7], providing a model for the PVTA to follow.

Demand-responsive public transportation options were also a priority raised by community members in the Task Groups, many of whom had been impacted by reduced bus service in the summer months before. An equity-focused approach could prioritize areas with higher proportions of residents who do not have access to a car[8] and areas that currently lack consistent or adequate transit service. This could include smaller neighborhood shuttles, and/or partnerships with private ride-sharing companies like Lyft and Uber. However, the latter should be approached with caution and monitored closely if implemented; a recent study found that on average, vehicle ownership increases by 0.7% when Uber or Lyft enters an urban area[9]. If this strategy is still deemed desirable by community members, Amherst can plan to mitigate increased emissions by instituting **vehicle miles traveled (VMT)** fees to curb empty rideshare driving and idling[10].

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5 Town of Amherst. (2015). Amherst Transportation Plan. Transportation Advisory Committee. Amherst, MA. p.16.

6 Pioneer Valley Planning Commission. (2016). PVTA Onboard Customer Survey: Northern Service Region 2016. Pioneer Valley Transit Authority. Springfield, MA.

7 Commonwealth of Massachusetts. (2021). 2050 MA Decarbonization Roadmap. Executive Office of Energy and Environmental Affairs.

8 See Amherst's 2018 Bike and Pedestrian Network Plan for maps reflecting income and car access..

9 Ward, J.W., Michalek, J.J., Samaras, C., Azevedo, I.L., Henao, A., Rames, C., & Wenzel, T. (2021). The impact of Uber and Lyft on vehicle ownership, fuel economy, and transit across U.S. cities. iScience, 24(1). DOI: https://doi.org/10.1016/j.isci.2020.101933.

10 Town of Amherst. (2015). Amherst Transportation Plan. Transportation Advisory Committee. Amherst, MA.

State and Federal Advocacy and Collaboration

The City of Lawrence, MA implemented fare-free service on three bus lines in the city starting in 2019, and a 2020 survey found a 24% jump in ridership as a result. Ninety percent of those riders were commuting to work, and 87% of them earned less than $20,000 per year[11]. In Amherst's service area, the PVTA regularly surveys its customers to understand travel needs, customer satisfaction, and priorities for improvements, especially when it comes to assuring equity and accessibility. Their 2015 survey of riders in Hampshire County found that 52% of customers said they had no other way (than the PVTA) to make their trip, while 79% of riders reported annual incomes of $20,000 or less[12]. By making public transportation 100% free and electric, the PVTA and its member communities will be supporting economic and environmental justice and improved quality of life for residents already disproportionately impacted by climate change and the COVID-19 pandemic.

11 Berke, B. (2020, February 9). "Lawrence made buses free. Could Brockton do the same?" The Enterprise. Retrieved from https://www.enterprisenews.com/news/20200209/lawrence-made-buses-free-could-brockton-do-same. Accessed March 3, 2021.

12 Pioneer Valley Planning Commission. (2016). PVTA Onboard Customer Survey: Northern Service Region 2016. Pioneer Valley Transit Authority. Springfield, MA.

Conclusion

This Climate Action, Adaptation, and Resilience Plan is the work of many hands. Over 50 residents of Amherst helped develop the principles that guide the plan and define many strategies that will drive the plan forward. Amherst Town staff have been willing partners in developing and reviewing strategies and providing important contextual information to the plan. The Energy and Climate Action Committee has worked tirelessly to support and guide the planning process. This all shows how seriously town residents and staff take the need for transformative carbon emissions reduction and climate adaptation and resilience.

Amherst is facing a rapidly changing world. Climate change, economic change, and unforeseen events— such as the COVID-19 pandemic—have the power to completely change how Amherst residents and those working and schooling in Town live their lives. It is wise to expect more disruption and more change, and prepare for it.

The strategies and timeframe laid out in this plan will not be easy to fulfill. There are any number of difficult choices to make and expensive programs to fund. However, it has become increasingly clear that the time is now for many of the actions in this plan. Luckily, our State and Federal governments are leading the way. The Town of Amherst is not alone.

This plan should provide a framework for action to guide a range of players for the foreseeable future. It will need to adapt to future events and conditions in order to achieve the overarching climate and resilience goals. The Climate Action, Adaptation, and Resilience Plan should be considered a living document. The strategies outlined should be considered dynamic and adaptable to future conditions.

Nonetheless, the strategies that Amherst puts forward today reflect the magnitude and urgency of change. Amherst will need to rely on the residents, businesses, community partners, and institutions within the Town to work together to achieve these goals. Success will depend on ongoing commitments of time, resources, and collective will. Hopefully, Amherst will regularly report on progress to hold the Town and residents accountable for bold action.

Amherst is not starting from scratch, but rather building upon years of clean energy and climate initiatives. This momentum across Town departments, community organizations, businesses, and residents positions Amherst well to launch into immediate action that will bring transformative change.

Mount Holyoke Range
Photo credit: D.Dillon

Roadmap to 2025

ROADMAP TO 2025

SECTOR	STRATEGY	Town Program	Bylaw/ Regulation	Govern-ance	Advocacy	Public Outreach	Readiness	Cost	Carbon Mitigation Value
GOVERNANCE AND COMMUNICATIONS	Center Equity in Planning and Decision-Making			X		X	R	$$	N/A
	Execute Multilingual Municipal Communications	X				X	R	$$	N/A
	Support Climate Outreach and Collaboration					X	R	$	N/A
BUILDINGS	Continue to Lead on Affordable Housing	X			X		R	$	L
	Prioritize Multifamily Building Energy Retrofits	X				X	R	$$	M
	Promote Single-Family Deep Energy Retrofits	X				X	R	$ to $$	M
	Institute Building Energy Benchmarking		X			X	R	$$	M
	Adopt Property-Assessed Clean Energy (PACE)	X				X	R	$$$	H
	Strengthen the Regional Economy and Workforce Development	X	X		X		R	$ to $$	L
RENEWABLE ENERGY	Transform Local Energy Through Community Choice Aggregation			X		X	R	$	H
	Encourage Responsible Local Solar Develpments	X					R	$$ to $$$	M
LAND USE AND NATURAL SYSTEMS	Increase Access to Green Space, Recreation, and Community gardens	X				X	R-RR	$$ to $$$	N/A
	Expand the Mobile Market and Local Food Access	X				X	R	$$	L
	Balance Smart Growth and Conservation	X			X		R	$$	L
TRANSPORTATION AND INFRASTRUCTURE	Prioritize Transportation Safety and Accessibility	X				X	RR-RRR	$$$ to $$$$	M
	Transition Rapidly to Zero-Emission Vehicles	X	X		X		RR	$$$ to $$$$	H
	Develop Evidence-Based Zero Waste Policy		X			X	R	$ to $$	L

Beyond 2025

BEYOND 2025

SECTOR	STRATEGY	Town Program	Bylaw/ Regulation	Govern-ance	Advocacy	Public Outreach	Readiness	Cost	Carbon Mitigation Value
GOVERNANCE AND COMMUNICATIONS	Sustained Investment in Equitable Community Participation	X		X		X	R	$	N/A
	Support Universal Broadband Internet Access	X			X		R	$ to $$$	N/A
	Institute Progressive Procurement Policies	X	X				R	$$ to $$$	L
BUILDINGS	Champion Resilient and Regenerative New Construction		X			X	R	$$ to $$$	M
	Implement Strategic Energy Management Planning	X					R-RR	$$ to $$$	L
	Establish Building Energy and Carbon Performance Standards		X				R	$	L
	Expand Community-Based Housing Ownership	X	X		X	X	RR	$	N/A
RENEWABLE ENERGY	Expand Resilient Renewable Energy Infrastructure	X			X		R-RR	$$$ to $$$$	M
	Enable Innovative Financing for Renewable Energy Investments	X			X		R	$	H
LAND USE AND NATURAL SYSTEMS	Facilitate Community Connections to Land					X	R	$$	N/A
	Foster a Coordinated Regional Food System	X			X	X	R-RR	$$	N/A
	Encourage Climate-Beneficial Stewardship Practices	X	X				R	$-$$$	M
TRANSPORTATION AND INFRASTRUCTURE	Develop a Robust Alternative Transportation Network	X					RR-RRR	$$	M
	Support Regional Transportation Demand Management	X			X		R	$	H
	Facilitate ZEV Car-Sharing at Apartment Complexes	X			X	X	R	$	M
	Mainstream Zero Waste Infrastructure and Programs	X					RR	$$$	L
	Integrate Climate Adaptation and Water Resources Management	X					RR-RRR	$$$ to $$$$	M
	Prepare Infrastructure for Climate and Community Resilience	X			X		RR-RRR	$$$ to $$$$	L

Key Terms and Definitions

Agricultural Preservation Restriction (APR)
From the Hilltown Land Trust: "An Agricultural Preservation Restriction (APR) is a specific type of Conservation Restriction that protects farmland. The Commonwealth of Massachusetts has an active program in which owners of high quality active farmland can be paid to extinguish the development rights on their farms. APR's can also, at times, be donated to or purchased by conservation organizations and towns."

Best Management Practices (BMPs)
From the Utah State University Extension: "Best management practices (BMPs) describe ways to manage your land and activities to mitigate pollution of surface and groundwater near you."

BIPOC
Black, Indigenous, and People of Color. From The BIPOC Project: "We use the term BIPOC to highlight the unique relationship to whiteness that Indigenous and Black (African Americans) people have, which shapes the experiences of and relationship to white supremacy for all people of color within a U.S. context."

Carbon Neutral
From Climate Seed: "Carbon neutrality refers to net zero CO2 emissions and is achieved when anthropogenic CO2 emissions are balanced globally by anthropogenic CO2 removal over a specific period" (by 2050, in Amherst's case).

Carbon Sequestration
The process whereby carbon dioxide that pollutes the air is absorbed by the land, plants and organisms of the planet. The world's oceans can also absorb carbon dioxide, but it is not permanently stored, or sequestered.

Clean Energy
Clean energy is energy that comes from renewable, zero emission sources that do not pollute the atmosphere when used, as well as energy saved by energy efficiency measures.

Climate Adaptation
From NASA: "Adaptation – adapting to life in a changing climate – involves adjusting to actual or expected future climate. The goal is to reduce our vulnerability to the harmful effects of climate change (like sea-level encroachment, more intense extreme weather events or food insecurity). It also encompasses making the most of any potential beneficial opportunities associated with climate change (for example, longer growing seasons or increased yields in some regions)."

Climate Hazard
From the United Nations Intergovernmental Panel on Climate Change (UN IPCC): The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources."

Climate Justice
From Grassroots International: "Climate justice operates at the intersection of racial

and social rights, environmental and economic justice. It focuses on the roots causes of climate change, and calls for a transformation to a sustainable, community-led economy."

Climate Mitigation
From NASA: "Mitigation – reducing climate change – involves reducing the flow of heat-trapping greenhouse gases into the atmosphere, either by reducing sources of these gases (for example, the burning of fossil fuels for electricity, heat or transport) or enhancing the "sinks" that accumulate and store these gases (such as the oceans, forests and soil).

Climate Resilience
From the United Nations Intergovernmental Panel on Climate Change (UN IPCC): "The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions."

Co-Benefits
From The Climate Bonus: "Co-benefits are the added benefits we get when we act to control climate change, above and beyond the direct benefits of a more stable climate. They are sometimes referred to as "multiple benefits" or "synergies". They do not include the direct benefits of climate policy arising from a more stable climate."

Community Ownership
From the Spectrum of Community Engagement to Ownership (see Appendix C): "The key to closing equity gaps and resolving climate vulnerability is direct participation by impacted communities in the development and implementation of solutions and policy decisions that directly impact them. This level of participation can unleash much needed capacity, but also requires initial capacity investments across multiple sectors to strengthen our local democracies through systems changes and culture shifts."

Conservation Restriction
From the MA Conservation Restriction Review Program: "Conservation Restrictions are legal agreements that prohibit certain acts and uses, while allowing others, on private or municipally-owned property in order to permanently protect conservation values present on the land."

Ecosystem Services
From the International Union for Conservation of Nature: "... "the benefits people derive from ecosystems". Besides provisioning services or goods like food, wood and other raw materials, plants, animals, fungi and micro-organisms provide essential regulating services such as pollination of crops, prevention of soil erosion and water purification, and a vast array of cultural services, like recreation and a sense of place."

Embodied Carbon
Greenhouse gas emissions that come from the process of creating or renovating a building. Sources often include materials (e.g. emissions from concrete manufacturing) and transportation (of materials and labor to the job site).

Energy Democracy
From the Climate Justice Alliance: "Energy Democracy represents a shift from the corporate, centralized fossil fuel economy to one that is governed by communities, is designed on the principle of no harm to the environment, supports local economies, and contributes to the health and well-being for all peoples."

Appendix A
Key Terms and Definitions

Equity
From the US Climate Network: "The guarantee of fair treatment, access, opportunity, and advancement while at the same time striving to identify and eliminate barriers that have prevented the full participation of some groups. The principle of equity acknowledges that there are historically underserved and underrepresented populations, and that fairness regarding these unbalanced conditions is needed to assist equality in the provision of effective opportunities to all groups."

Food Access
From InTeGrate: "Determined among consumers by the spatial accessibility and affordability of food retailers---specifically such factors as travel time to shopping, availability of healthy foods, and food prices---relative to the access to transportation and socioeconomic resources of food buyers."

Food Desert
From The Food Empowerment Project: "Food deserts can be described as geographic areas where residents' access to affordable, healthy food options (especially fresh fruits and vegetables) is restricted or nonexistent due to the absence of grocery stores within convenient traveling distance."

Food Security
From the World Health Organization: "... when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life. Commonly, the concept of food security is defined as including both physical and economic access to food that meets people's dietary needs as well as their food preferences."

Food Sovereignty
From the Declaration of Nyéléni: "Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations."

Frontline Communities
Communities that will be impacted "first and worst" by climate change, due to structural inequities that have resulted in unevenly distributed economic, environmental, and social vulnerabilities.

Greywater
From New Mexico State University: "Greywater is water that has been used for washing dishes, laundering clothes, or bathing. Essentially, any water, other than toilet wastes, draining from a household is greywater."

Greenhouse Gas (GHG)
Gases that trap heat in the atmosphere are called greenhouse gases. Carbon dioxide is the most abundant GHG in the atmosphere, and is produced by humans through the burning of fossil fuels like oil and natural gas at rates much higher than the earth is capable of sequestering naturally. This causes average global temperatures to rise and climate patterns to shift.

Green Infrastructure
From the American Society of Landscape Architects: "The idea that nature is also infrastructure isn't new. But it's now more widely understood to be true. Nature can be harnessed to provide critical services for communities, protecting them against flooding or excessive heat, or helping to improve air and water quality, which underpin human and environmental health. When nature is harnessed by people and used as an infrastructural system it's called "green infrastructure.""

Green Stormwater Infrastructure
From American Rivers: "Green [stormwater] infrastructure is an approach to water management that protects, restores, or mimics the natural water cycle. Green [stormwater] infrastructure is effective, economical, and enhances community safety and quality of life... [it] incorporates both the natural environment and engineered systems to provide clean water, conserve ecosystem values and functions, and provide a wide array of benefits to people and wildlife."

Greenway
From UMass Professor Emeritus Julius G. Fabos: "...corridors of various widths, linked together in a network in much the same way as our networks of highways and railroads have been linked. The major difference is that nature's super infrastructure - the greenway corridor networks - is pre-existent. The river valleys have been carved out over many thousands of years... extensive coastal wetland and floodplain systems have been formed by nature. This 'giant circulating system'... is our greenway corridor network which needs to be treated with special care."

Highest and Best Use
The use of land or property in ways that are physically possible, appropriately supported, financially feasible, and that meet community needs and reflect long-term priorities.

Just Recovery
Applies the Just Transition framework to social, economic, and environmental recovery from the COVID-19 pandemic. See "Just Transition," below.

Just Transition
From the Climate Justice Alliance: "Just Transition is a vision-led, unifying and place-based set of principles, processes and practices that build economic and political power to shift from an extractive economy to a regenerative economy."

Life Cycle Costs
From Building and Environment: "Life cycle cost (LCC) is an approach that assesses the total cost of an asset over its life cycle including initial capital costs, maintenance costs, operating costs and the asset's residual value at the end of its life."

Living Building Challenge
The Living Building Challenge is a green building certification program and sustainable design framework that visualizes the ideal for the built environment.

Mixed-Use Development
From the University of Delaware: "Mixed-use development is characterized as pedestrian-friendly development that blends two or more residential, commercial, cultural, institutional, and/or industrial uses. Mixed use is one of the ten principles of Smart Growth."

$MTCO_2e$
Metric tons of carbon dioxide equivalent; the standard unit of measurement for expressing GHG emissions, which are caused by several different greenhouse gases, of which carbon dioxide is the most common and abundant. From Carbon Free Boston: "The term carbon dioxide equivalent (CO_2-e or CO_2-eq) captures the combined effect of all anthropogenic GHG emissions in a single metric based on each gas's global warming potential."

Nature-Based Solutions
Nature-based solutions are cost-effective approaches to addressing ecological climate impacts while supporting human well-being and sustainable development. They work with nature to sequester atmospheric carbon in biomass and soil, and provide a wide range of ecosystem services that enhance community resilience.

Appendix A
Key Terms and Definitions

Net Zero Energy
From the US Department of Energy: "Generally speaking, a zero energy building produces enough renewable energy to meet its own annual energy consumption requirements, thereby reducing the use of nonrenewable energy in the building sector." Net zero energy includes buildings that meet their energy needs through off-site renewable generation.

Passive House
According to the Mass Save website: "Passive House refers to the ultimate goal in high-efficiency design: buildings that minimize energy consumption and have added comfort and durability features. Passive House design focuses on robust insulation and air tightness, high-performing glazing, and simplified mechanical systems to achieve significantly lower energy use while creating a comfortable and durable space for inhabitants."

Peak Demand
From Advanced Energy: "Peak demand is the time when consumer demand for electricity is at its highest; this can be by day, season or year. Peak periods tend to be in the morning during winter months (when lots of heating is occurring) and in the afternoon during summer months (lots of cooling) [in Northern temperate zones]."

Racial Equity
From the US Climate Network: "The condition where one's race identity has no influence on how one fares in society. Race equity is one part of race justice and must be addressed at the root causes and not just the manifestations. This includes the elimination of policies, practices, attitudes, and cultural messages that reinforce differential outcomes by race."

Redlining
From The Urban Displacement Project: "Redlining was a process in which the Home Owners' Loan Corporation (HOLC), a federal agency, gave neighborhoods ratings to guide investment. This policy is so named for the red or "hazardous" neighborhoods that were deemed riskiest. These neighborhoods were predominantly home to communities of color, and this is no accident; the "hazardous" rating was in large part based on racial demographics. In other words, redlining was an explicitly discriminatory policy. Redlining made it hard for residents to get loans for homeownership or maintenance, and led to cycles of disinvestment."

Regenerative Agriculture
From Regeneration International: "Regenerative Agriculture describes farming and grazing practices that, among other benefits, reverse climate change by rebuilding soil organic matter and restoring degraded soil biodiversity – resulting in both carbon drawdown and improving the water cycle."

Regenerative Development
From Re-Alliance: "Regenerative development marks an evolution in the concept and practice of sustainable development. Sustainable or green development has focused on minimizing damage to the environment and human health and using resources more efficiently to limit the degradation of earth's natural systems. Regenerative approaches, however, seek to reverse the degradation of the planet's natural systems and also design human systems that coevolve with natural systems to generate mutual benefits and greater expression of life and resilience."

Renewable Energy Certificates (RECs)
From the Conservation Law Foundation: "Renewable Energy Certificates (RECs) are an accounting system used by utilities and states

to track clean energy. Every megawatt hour generated by a clean energy source (such as a wind turbine) creates one Renewable Energy Certificate. RECs let us measure our progress on clean energy by giving utilities a way to buy and sell renewable power. They also ensure that states can track Renewable Portfolio Standard targets [see below], which are an important tool for combatting the worst effects of climate change and bringing new clean energy jobs to New England."

Renewable Portfolio Standard (RPS)
From the Conservation Law Foundation: "A Renewable Portfolio Standard (RPS) is a state policy that requires electric utilities like Eversource... to get a specified amount of their electricity from clean resources, such as wind and solar, by a certain year. In many cases, this amount is then set to increase year over year."

Riparian Buffer
From Iowa State Extension: "A riparian buffer is a vegetated "buffer-strip" near a stream, which helps to shade and partially protect the stream from the impact of adjacent urban, industrial or agricultural land use. It plays a key role in increasing water quality in associated streams, rivers and lakes and provides a greatly enhanced and varied habitat for wildlife."

Split Incentive
According to the Consortium for Building Energy Innovation: "Traditional leasing agreements often create a condition known as "split incentives" between owner and tenant, in which capital improvements that yield energy savings result in one party paying for improvements while the other party receives the benefits of reduced utility costs."

Smart Growth
From the University of Delaware: "Smart growth is a planning strategy that seeks to foster community design and development that serves the economy, community, public health, and the environment."

Stormwater Runoff
From the Environmental Protection Agency: "Stormwater runoff is generated from rain and snowmelt that flows over land or impervious surfaces, such as paved streets, parking lots, and building rooftops, and does not soak into the ground. Runoff can pick up and deposit harmful pollutants like trash, chemicals, and dirt/sediment into streams, lakes, and groundwater. Construction sites, lawns, improperly stored hazardous wastes, and illegal dumping are all potential sources of stormwater pollutants."

Vehicle Miles Traveled (VMT)
From the Texas A&M Transportation Institute: "Vehicle miles traveled (VMT) is a measure used extensively in transportation planning for a variety of purposes. It measures the amount of travel for all vehicles in a geographic region over a given period of time, typically a one-year period. It is calculated as the sum of the number of miles traveled by each vehicle."

Walk Score®
Index that uses information about transit availability and proximity to services to calculate how car-dependent residents are in different areas of a city or town.

Zero Emission Vehicle (ZEV)
From the Union for Concerned Scientists: "Three distinct vehicle designs are considered "zero emission," though to varying degrees. Plug-in hybrid vehicles combine a conventional gasoline-powered engine with a battery that can be recharged from the electrical grid. Battery electric vehicles run entirely on electricity and can be recharged from the electricity grid. Hydrogen fuel cell vehicles run on electricity produced from a fuel cell using hydrogen gas."

Greenhouse Gas Emissions Calculations

ROADMAP TO 2025: ACTIONS AND ESTIMATED EMISSIONS REDUCATIONS				
Action	**Calculations**	**Reductions**	**Units**	**Assumptions**
Affordable Housing Retrofit Program				
	- Multifamily retrofits result in reductions of 3kg CO2e/sq ft/yr (Carbon Free Boston) - Carbon Free Boston report assumes average unit size of 1000 sq ft - AHA owns 170 units total. 25% of units = 34 = 34,000 sq ft total. 34,000 X 3 = 102 MT CO2e/yr. for 1 year.	102	MTCO2e	Multifamily retrofits result in reductions of 3kg CO2e/sq ft/yr (Carbon Free Boston) 25% of AHA (1000sf) units = 34 = 34,000 sq ft total.
Multifamily Housing Retrofit Program				
	- Multifamily retrofits result in reductions of 3kg CO2e/sq ft/yr - Carbon Free Boston report assumes average unit size of 1000 sq ft - Total number of multifamily units in Amherst = 2574 Minus AHA-owned multifamily units (148) = 2426 units. 25% of non-AHA multifamily units = 606 = 606,000 sq ft total. 606,000 X 3 = 1818 MT CO2e/yr. for 1 year.	1818	MTCO2e	Total non-AHA multifamily units in Amherst = 2426. 25% = 606 = 606,000 sq ft total.
Single-Family Housing Retrofits				
	- Single-family retrofits result in reductions of 2.2kg CO2e/sq ft/yr (CFB) - Total number of single-family homes in Amherst = 4,735 - Tot. duplexes = 926 - Tot. small multifamily (<5 units) = 926 - Total in single-family category = 6,587 units - 10% of single-family units = 659 units - Total single-family square footage (entire Commonwealth) = 2.8 billion - Total number of single-family households (entire Commonwealth) = 1.42 million - Therefore, average house square footage = 2.8 billion / 1.42 million = approximately 2,000 sq ft per unit - 10% of total square footage = 1,318,000 X 2.2 = 2899.6 MT CO2e/yr. for one year.	2899.6	MTCO2e	Single-family retrofits result in reductions of 2.2kg CO2e/sq ft/yr (CFB). Average House size (State ave.) = 2000 sf. 10 % of single fam and small multi-fam is 1318,000 sf.
Energy Benchmarking and Disclosure Bylaw				
	- Emissions for buildings with 10+ units = 44,031 MT CO2e. - Emissions for commercial buildings = 27, 012 MT CO2e. - Total annual "Community" category emissions = 71,043 MT 5% expected reduction of CO2e total in first 2 years (2024 and 2025) of reporting = 3552 MT CO2e	3352	MTCO2e	Estimates of energy use reductions from instituting energy use reporting range from 3% to 7%. This report uses estimate of 5%.

Property-Assessed Clean Energy (PACE) Financing				
	- Commercial and industrial emissions in 2016 = 164,225 MTCO2e - 74% comes from natural gas, 16% from electricity --> focus should be on natural gas! Get 15% of all square footage currently using natural gas to do deep retrofits and switch to efficient heat pumps. Try to focus on older buildings wherever possible. - Deep retrofit + switching from gas to efficient heat pumps reduces emissions by 50% for existing buildings (CFB Buildings Technical report) 0.74*164,225 = 121,527 MTCO2e 0.15*121,527 = 18,229 MTCO2e 0.5*18,229 = 9115 MTCO2e	9115	MTCO2e	Get 15% of commercial and industrial properties to reduce emissions by 50%. Estimates from Carbon Free Boston.
Community Choice Aggregation 3.0				
	- Total non C&U emissions from electricity = 25,937 MT/ (in 2016). - Estimated 75% of non C&U usage opts in to CCA. Expected CCA standard service includes 26% renewable electricity from RPS plus 22% additional renewable content. (2016 renewable content = 18%) 5% of CCA customer usage opts up to 100% renewable. - Total emissions reductions from standard CCA = 5850 MT CO2e/yr in 2025. Total emissions reduction from 100% renewable customers = 712 MT CO2e/yr in 2025.	6562	MTCO2e	The RPS is estimated to be 26% in 2025. CCA base rate adds 22% to that. 75% of non-C&U customers opt in plus 5% of them opt to 100%.
Business and Household Renewables Adoption				
	- 2016 Residential electricity = 41% of electricity emissions in Amherst = 44,324*.41 = 18,173 MT CO2e - 25% of residential square footage = 3,293,500 - Minus the 200 homes that installed solar through Solarize = 3,293,500 - (200*2,000) = 2,893,500 sq ft residential - Residential solar emissions reductions if the Town reaches 25% household solar adoption = (2,893,000*.8)/1000 = 2,315 MTCO2e	2315	MTCO2e	Estimate of 25% of households (including 200 existing installations) install solar by 2025.
Transportation Mode-Shifting				
	- Reduce VMTs by 10% through a combination of facilitating mode shifting to alternative transportation, robust transportation demand management planning, and encouraging work from home. - Reducing the proportion of people who report they drive alone to work. – 2016 personal vehicle VMTs = 107,544,741 - 2016 personal vehicle emissions = 34,701 MTCO2e - 10% reduction in emissions = 3,470 MTCO2e	3470	MTCO2e	Estimates 10% reduction in vehicle miles traveled.
ZEV Adoption and Charging Infrastructure				
	- 2016 emissions from personal vehicles in Amherst estimated at 61,457 MT CO2e. - Goal of 15% replacement of current vehicles with ZEVs. - Reduction of 50% of emissions for ZEVs based on CCA standard service level.	6361	MTCO2e	Estimate replacement of 15% of personal vehicles with ZEVs. ZEV emissions based on CCA 2025 emissions factor.

Tools and Resources

Spectrum of Community Engagement to Ownership

The Spectrum of Community Engagement to Ownership was created by Facilitating Power in partnership with the Movement Strategy Center. It is based on scholar Sherry Arnstein's Ladder of Citizen Participation, a highly influential applied model in the field of public participation. Arnstein's ladder was developed to clarify the role of the public in planning and decision making processes, and how much influence the community has over them. Both models delineate 5 levels of community engagement, but it is important to note that these are not stepwise. The further to the right on the Spectrum, the more influence the community has over decisions, and each level can be appropriate depending on the context.

However, as the Spectrum's authors note, deepening community participation – and moving to the right on the Spectrum – can strengthen and transform local democracies to meet the complex and intersecting challenges of the modern world, including climate change.

Gonzalez, R. (2019). Spectrum from Community Engagement to Ownership. Facilitating Power (with Movement Strategy Center). 14pp. Retrieved from https://movementstrategy.org/b/wp-content/uploads/2019/09/Spectrum-2-1-1.pdf

THE SPECTRUM OF COMMUNITY ENGAGEMENT TO OWNERSHIP

Facilitating Power

▸▸▸▸▸▸ INCREASED EFFICIENCY IN DECISION-MAKING AND SOLUTIONS IMPLEMENTATION ▸▸▸▸▸▸ EQUITY

STANCE TOWARDS COMMUNITY	IGNORE 0	INFORM 1	CONSULT 2	INVOLVE 3	COLLABORATE 4	DEFER TO 5
IMPACT	**Marginalization**	**Preparation or Placation**	**Limited Voice or Tokenization**	**Voice**	**Delegated Power**	**Community Ownership**
COMMUNITY ENGAGEMENT GOALS	Deny access to decision-making processes	Provide the community with relevant information	Gather input from the community	Ensure community needs and assets are integrated into process & inform planning	Ensure community capacity to play a leadership role in decision-making and the implementation of decisions.	Foster democratic participation and equity through community-driven decision-making; Bridge divide between community & governance
MESSAGE TO COMMUNITY	***Your voice, needs & interests do not matter***	***We will keep you informed***	***We care what you think***	***You are making us think, (and therefore act) differently about the issue***	***Your leadership and expertise are critical to how we address the issue***	***It's time to unlock collective power and capacity for transformative solutions***
ACTIVITIES	Closed door meeting Misinformation Systematic Disenfranchisement Voter suppression	Fact sheets Open Houses Presentations Billboards Videos	Public Comment Focus Groups Community Forums Surveys	Community organizing & advocacy Interactive workshops Polling Community forums Open Planning Forums with Citizen Polling	MOU's with Community-based organizations Citizen advisory committees Collaborative Data Analysis Co-Design and Co-Implementation of Solutions Collaborative Decision-Making	Community-driven planning and governance Consensus building Participatory action research Participatory budgeting Cooperative models
RESOURCE ALLOCATION RATIOS	**100%** Systems Admin	**70-90%** Systems Admin **10-30%** Promotions and Publicity	**60-80%** Systems Admin **20-40%** Consultation Activities	**50-60%** Systems Admin **40-50%** Community Involvement	**20-50%** Systems Admin **50-70%** Community Partners	**80-100%** Community partners and community-driven processes ideally generate new value and resources that can be invested in solutions