



CLIMATE ADAPTATION AND SUSTAINABILITY ELEMENT TECHNICAL PAPER

INTRODUCTION

While the reality of the climate crisis can feel overwhelming, the Town of East Longmeadow is taking thoughtful, well-researched, deliberate actions to enhance community resilience and grow sustainably. Resilience is the ability to respond, absorb, and adapt to, as well as recover in a disruptive event. A resilient structure/system/community is expected to be able to resist an extreme event with minimal damages and functionality disruptions during the event; after the event, it should be able to rapidly recover its functionality similar to or even better than the pre-event level.

Sustainability is defined as “meeting the needs of the present generation without jeopardizing the ability of future generations to meet their own needs.” This resilient Master Plan, and this chapter, lay out a course of action for East Longmeadow to adapt to our changing climate and sustainably grow into a shared future.

OVERVIEW

East Longmeadow recognizes the fact of increasingly severe and unpredictable weather events resulting from our changing climate caused by the dramatic increase in Greenhouse Gas (GHG) emissions and commits to both reducing GHG emissions and taking action to increase the resilience of the Town’s people, natural and built environment, and infrastructure. Given the Commonwealth of Massachusetts’ climate policy legislation and [Governor Baker’s commitment to 50% reduction in GHG emissions](#) (from 1990 baseline) by 2030 and net-zero emissions by 2050, the Town of East Longmeadow commits

to doing its part to achieve these goals. Seeking funding to conduct a GHG emissions inventory will be necessary as will securing funds and technical assistance to complete a net zero by 2050 action plan for the Town.

[MA Decarbonization Roadmap](#) - Secretary Theoharides

Here in Massachusetts, climate change presents unique challenges, from intense heat waves and droughts, storm surges and flooding, to increases in insect-related diseases such as Eastern Equine Encephalitis and West Nile Virus. The climate crisis is a generational challenge that, without decisive action, leaves residents and communities across the state on the front lines.

*Recognizing the urgency of this crisis, the Baker-Polito Administration listened to the science, and set Massachusetts on an aggressive path to **Net Zero Greenhouse Gas emissions by 2050**.*

At a time when the nation and the world are grappling with a global pandemic, we are reminded that climate change presents a still greater long-term threat, and one for which there will be no vaccine. Achieving Net Zero by 2050 will require deep change and out-of-the-box thinking, and this report underscores the importance of local and regional partnerships to build stronger, more resilient communities, nation-leading clean energy jobs, and a vibrant economy.

An immediate focus on Town-wide building energy efficiency including both municipal buildings (on average 3-5% of overall building energy use) and privately owned commercial, industrial and residential buildings could result in a 20% annual reduction in the Town's current GHG emissions and is a well-supported action given the Commonwealth's existing funding and other resource programs, including the Green Communities certification program, the Massachusetts Clean Energy Center offerings, and the Mass Save program. A focus on building energy efficiency has proven a win-win strategy for reducing energy costs and creating local jobs and it also produces a ripple effect across the lifetime and operating costs of buildings. For a detailed explanation of the multi-sectoral system change approach the state is following, from which this simplified explanation is adapted, please review the Massachusetts Decarbonization Roadmap.

Replacing lights, water heaters, and HVAC systems, and adding insulation, can each reduce a building's GHG emission by a few percent, but these components add up to even more than the sum of their parts. When a building is well insulated, its lights are efficient, and its room temperatures well controlled, it needs a much smaller HVAC system to provide heating and cooling meaning that a building owner who decides to take the next step and go net-zero energy can invest in a much smaller photovoltaic system and less-expensive battery storage. Building retrofits not only save energy and reduce carbon emissions, but they also improve occupants' health, comfort, and productivity, as well as community resilience.

Likewise, green infrastructure, "a network providing the "ingredients" for solving urban and climatic challenges by building with nature" offers a multi-benefit and sustainable supplement to most existing gray infrastructure. The main components of green infrastructure include stormwater management, climate adaptation, less heat stress, more biodiversity, food production, better air quality, sustainable energy production, clean water and healthy soils, as well as the more human benefits such as increased quality of life through recreation and providing shade and shelter in and around the community. Green infrastructure also serves to provide an ecological framework for social, economic and environmental health of the surroundings.

Adopting the proposed Green Infrastructure and Climate Resiliency Policy combined with becoming a certified Green Community are the top two priority actions recommended to advance East Longmeadow's sustainability and climate resiliency. East Longmeadow is also integrating climate resilience and sustainability throughout this resilient Master Plan, and across all the essential infrastructure on which the town depends: transportation, gas, electricity, water and sewage, communications, and public safety.

INVENTORY AND EXISTING CONDITIONS

Engagement: Resilient Master Plan Committee, Visioning Workshop, Focus Group, 2020 Community Survey

East Longmeadow's vision includes a focus on sustainable growth and a commitment to "Plan for energy efficiency, green initiatives, and resiliency to climate change." Throughout the engagement activities and events we learned that there is a significant amount of energy for sustainability and climate initiatives among the youth of East Longmeadow and there is an opportunity to capitalize on this energy through the East Longmeadow high school requirement for public service. Trees and



maintenance of the urban forest emerged as a priority, especially making the connection between trees, tree canopy and public health. As heard throughout the resilient Master Planning process, multi-generational activities and projects are favored in the community. Expanding recycling and composting was suggested as was the need for more community gardens so residents who do not have access to a yard can grow their own food. Complete streets, expanding the terrific trail network and generally making it easier to walk everywhere were also expressed throughout the planning process.

As expected, the need for culvert repair, maintenance and in some places re-sizing and/or replacement was also brought up as was the stormwater management requirements related to the federal MS4 permit, and the need to integrate green infrastructure into town public works as part of climate resilience; these issues are further addressed in the Public Facilities and Services chapter.

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East Longmeadow's MVP report includes the recommendation: Become a Massachusetts Department of Energy Resources (DOER)-certified Green Community. Do you support this recommendation?



■ Yes ■ No ■ Unsure

Key takeaways clean energy/energy efficiency

The town currently has a moratorium in place on large scale solar projects with a number sited in the community. This plan recommends the Planning Board look at crafting a bylaw that considers use of the University of Massachusetts Clean Energy Extension and Cooperative Extension's pollinator program as a certification for new solar installations because it will be very difficult to reach decarbonization goals without new solar.

Massachusetts law allows home owners to place small-scale solar on their homes and this is increasingly happening in the community. In addition, the town has agreements with Altus Power, LLC that generates 3.5 megawatts of power per year located in the Town of Hampden to purchase solar renewable energy credits. The town has not moved forward on Green Communities certification previously, but there is interest now, especially as the Stretch code is no longer a stretch and has become the standard to which most homebuilders build. The 'stretch code' has been adopted in 288 cities and towns across the Commonwealth including 35 in the Pioneer Valley. The town does have a robust energy efficiency program at municipal and school buildings, taking advantage of utility offerings to reduce energy use, save money, and replace aging inefficient equipment and windows. The town is also taking advantage of National Grid's LED streetlight conversion program. The town's lack of municipal EV charging stations was identified.

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Review of Existing Plans

East Longmeadow has several plans that include recommendations for climate action and sustainability: Hazard Mitigation plan 2016, Municipal Vulnerability Preparedness (MVP) Community Resilience Building workshop findings and priority actions 2019, the Open Space and Recreation plan 2020, and the Complete Streets 'plan'. These plans were reviewed as part of this process and the relevant recommendations (and/or actions to achieve comparable ends updated



for current technology/knowhow) are being carried forward into this plan, some in this chapter and others throughout the plan.

Areas of Concern highlighted in the MVP CRB workshop

- Infrastructure: pole-based electricity and communication lines, town and state-owned roads
- Drinking, Storm, and Wastewater Infrastructure: dams, culverts, and bridges, sewage pump stations, drinking water, and stormwater infrastructure
- Natural Resources: food systems, invasive species, habitat change, erosion, management and/or loss of open space and farmland
- Social Vulnerabilities: changing age-related demographics, residents with limited mobility, residents with limited English language capacity, low-to-moderate income populations, emergency shelter network, emergency communications platform (Rave)
- Built Environment: older/energy inefficient housing stock, lack of affordable housing

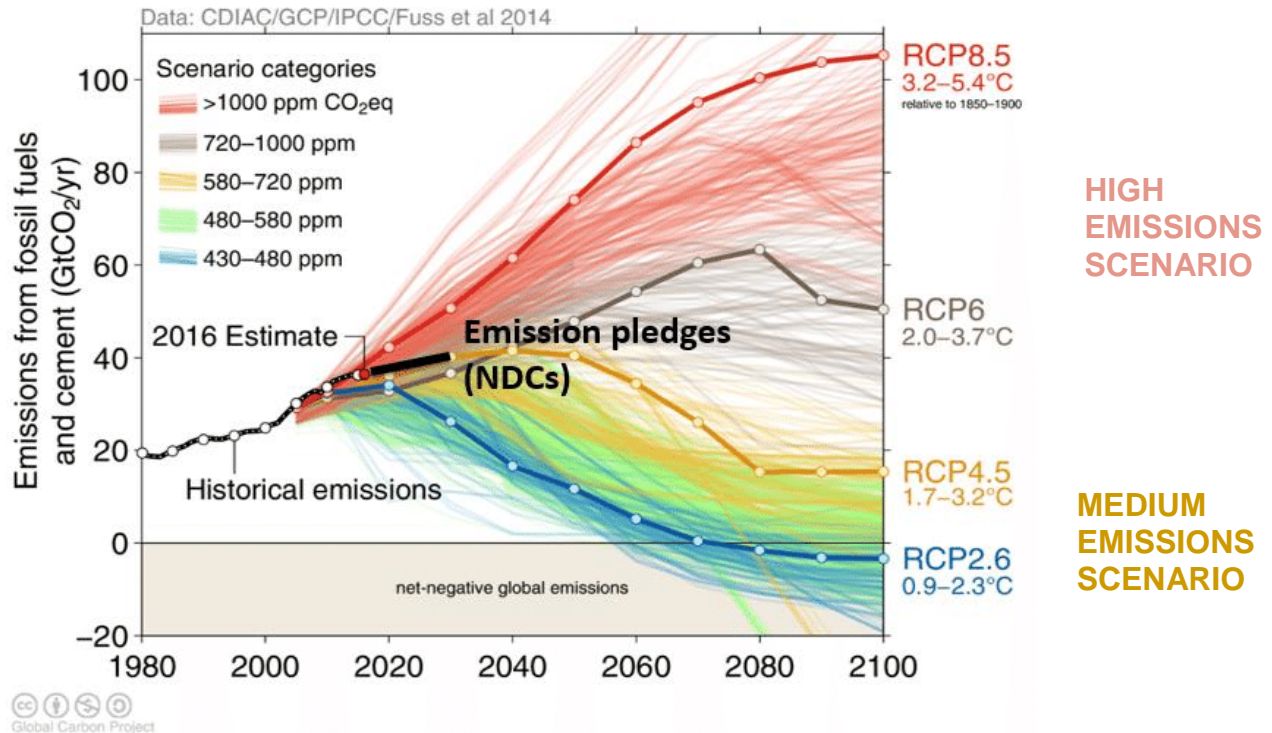
The top priorities included in the soon to expire Hazard Mitigation plan included a focus on culvert assessment and replacement, backup generators and understanding how the climate crisis will affect the town including a new awareness of possible drought concerns.

The OSRP identifies the land that needs to be protected for stormwater management = green infrastructure and the Complete Streets 'plan' advances efforts to make it easier and safer to walk and bike, GHG emission free forms of transportation that also improve public health.

Climate Data

The ResilientMA website includes the following data about projected weather changes including severe heat and increased flooding likely to affect East Longmeadow. It also shows the variability in extreme weather based on the amount of GHG emissions produced in the next 60 years.





The scenarios of how emissions change in the future become vastly different as we look further out towards the end of the century, which is why it is so important to reduce GHG emissions now to avoid the worst case scenarios. The International Panel on Climate Change (IPCC) considers a range of scenarios from the extremes of approximately 3.6°F (RCP2.6) to between 7°F (RCP8.5). RCP = REPRESENTATIVE CONCENTRATION PATHWAYS, essentially defined by their cumulative measure of human emissions of GHGs from all sources, expressed in Watts per square meter.

Because of the variation in the different future scenarios possible, the Commonwealth of MA Exec Office of Energy and Environmental Affairs (EOEEA) commissioned researchers from the Northeast Climate Science Center at UMass to develop projections for changes in temperature, precipitation, and sea level rise specifically for the Commonwealth, and then downscale them for local use. These projections are based on simulations from the latest generation of climate models from the International Panel on Climate Change and scenarios of future GHG emissions and are made to the watershed AND county level.



Here in the CT River Basin, Climate Projections by 2100 are:

- Increase (↑) in:
 - Average temperatures
 - Min and max temperatures
 - # of days with temps over 90, 95, and 100
 - Cooling degree days (65 and above)
 - Winter precipitation
 - Frequency of heavy precipitation (winter)
- Decrease (↓) in:
 - # of days below 32 and 0
 - # of heating degree days (65 and below)
 - Fall precipitation (potential)

The rise of average temperatures is well documented. Maximum and minimum temperatures are also expected to increase throughout the end of the century, and that will be true for annual and seasonal projections. Summer and fall temperatures expected to see the greatest increases:

- Summer mid-century increase of 2.8 °F to 7.5 °F (3-9% increase); end of century increase of 3.8 °F to 13.4 °F (5-17% increase).
- Fall mid-century increase of 3.7°F to 7.2°F (6-12% increase); end of century increase by and 4.2 °F to 12.2 °F (7-20% increase).

Even what seems like a very small rise in average temperatures can cause major changes in other factors, such as the relative proportion of precipitation that falls as rain or snow, and impacts on species and ecosystem health. New species, that may become invasive, have entered the region due to climate change, species hierarchies in ecosystems will change, and climate induced stress in an ecosystem will facilitate invasive pathways.

Beyond the general warming trend, projections show increases in the number of days with extreme heat throughout 2090. The model looked at daily max temps over 90 °F, 95 °F, and 100 °F. Generally, extreme heat is considered to be over 90 °F, because at temps above that threshold, heat-related illnesses and mortality show a marked increase. We currently see roughly 6 days per year over 90 (Temps recorded at Barnes Muni Airport in Westfield hit 90 10 times this year in July alone (closest weather station to Longmeadow)). There are projections of 10 to 35 more 90+ days by mid-century, and 15 to **76** more by 2100. Summer daytime high temperatures rarely go above 95°F in today's climate. By mid century, we can expect 3 to 15 more days over 95 in the CT Basin.

We also know that changes to the frequency of extreme heat days will be most pronounced in the summer, with an increase of 12-60 more days by 2090. Why is this important? Heat waves can lead to illness and death, particularly among older adults, the very young, economically disadvantaged groups, and other vulnerable populations such as those in outdoor occupations. In addition more frequent days above 65°F and more frequent extreme high temperatures will drive an increase in cooling degree days, change patterns of energy use and increase net electricity demand which could



strain the grid enough to force an outage. An analysis conducted for The New York Times by the [Climate Impact Lab](#), says we saw about 7 days per year over 90 degrees in 1970, compared to 9 days per year in 2015, by the time you would be 80 years old in 2050, you will likely see 21 days over 90 degrees.

The flip side of that increased heat in the summer months is that there will be fewer days below 32° and 0°, with the greatest changes to be seen in the fall (10-16 fewer days below 32° by 2050) and spring (6-14 fewer days). We think about cold weather in terms of the need for heating shelters, and concern about winter storms knocking out power – these concerns don't necessarily change with fewer days below freezing. However, fewer very cold days may impact the life cycle of certain insects and other species, such as ticks. East Longmeadow may see earlier insect emergence and expansion in the geographic range and pop size of tree pests such as the hemlock woolly adelgid, emerald ash borer, and southern pine beetle.

This can also impact agricultural operations - unusually warm winters like the ones we have had recently lead to early release from dormancy in perennial plants and damage from late winter or spring cold. In 2016 peach crops in the northern half of the Northeast were affected in this way with almost total losses. Grapes, apples, cherries, and other fruit crops in this region suffered widespread losses following cold conditions after warm winters in 2010 and 2012.

Roads - This trend may also indicate an increase in the frequency of the freeze frost cycle, something that we have seen in recent years wreaking havoc on highway departments as it leads to increased maintenance needs and increased costs in anti-icing measures in areas that previously rarely had mid-winter thawing and freezing rain. It is important for the Town to document the amount currently being spent fixing potholes as this is a concrete number that can be used to track an immediate impact of the climate crisis in the community.

Annual precipitation in in the basin is expected to increase by +1.3 to +6.2” by 2050s and by up to 8.3” by the end of the century. Rainfall is expected to increase in spring and winter months in particular. Understanding that both winter precipitation and winter temperatures could increase in future decades, we can expect more of this precipitation to fall as rain instead of snow. There are all sorts of human and environmental impacts that could result from this change including reduced snow cover for winter recreation and tourism, less spring snow melt to replenish aquifers, higher levels of winter runoff, and lower spring river flows for aquatic ecosystems. Interestingly, this may leave some infrastructure more vulnerable to damages from deep freezes. Pipes are especially vulnerable to freezing if they are exposed to outside air. “Wind chill,” can play a major role in accelerating ice blockage, and thus bursting, in water pipes.

One of the most pronounced changes in climate in the Northeast —more than any region of the U.S. - during the past several decades has been a 71% increase in the frequency of extreme precipitation events since the mid-1990s. The climate projections suggest that the frequency of high-intensity rainfall and storm events will continue to trend upward. Again, we see the greatest changes in the spring and winter. These are the types of storms that cause flooding, erosion, and pollutant runoff



from agricultural activities. Flooding that results from a single intense downpour can cause widespread damage to property and critical infrastructure. High-intensity rainfall events mobilize pollutants such as sediments and nutrients and pose a threat to surface water quality. Other effects of more intense downpours include: more inland flooding as soils become saturated and stop absorbing more water; rise in creek and river flows; and failure of storm water systems as their capacity is exceeded.

Rainfall is expected to increase in spring and winter. Conversely, we will see increasing consecutive dry days in summer and fall. When coupled with variable precipitation patterns and higher temperatures, increasing consecutive dry days in summer and fall can deplete groundwater and intensify droughts, like the one we experienced across the Commonwealth in the summer of 2016. More frequent droughts could also exacerbate the impacts of floods by damaging vegetation that could otherwise help mitigate flooding impacts. Droughts can also weaken tree root systems, making them more susceptible to toppling during high wind events. Also increases the risk of wild fire.

To summarize, some of the more daunting climate challenges facing East Longmeadow are:

- More extreme storm events/precipitation
- More extreme heat
- Warm winters and spring cold

ISSUES AND OPPORTUNITIES

Opportunities refer to favorable external factors that could give the town a competitive advantage implementing the strategies (actions) recommended in this chapter. Massachusetts commitment to climate action and sustainability, combined with the region's commitment are significant opportunities for East Longmeadow to act on this plan's recommendations for energy efficiency, green initiatives and resiliency to climate change. Just as the research for this plan was wrapping up Governor Baker signed the 2021 Massachusetts Climate Legislation. This amendment to and strengthening of the 2008 Global Warming Solutions Act will ensure availability of funding in Massachusetts for energy efficiency (reduction in GHG emissions) and clean energy generation for the foreseeable future and beyond. It also includes Environmental Justice (EJ) siting requirements for power as well as things like sector benchmarks and climate requirements for DPU when approving new infrastructure. This amended legislation combined with the States existing commitment to climate adaptation manifest in the MVP program, are significant opportunities for East Longmeadow as they do line up funding for many of the specific actions/strategies identified in this plan. Additional favorable factors facilitating advancement of this plan include the enthusiasm and support for climate action and resilience expressed by the vast majority of residents, town officials and staff, business owners, students and visitors and workers who participated in this resilient master plan development process.



The co-benefits of climate action and resilience are also compelling factors that enhance the likelihood of East Longmeadow's success implementing the strategies. Co-benefits include: saving money; improving public health; creating good-paying locally owned jobs; more money circulating in the local economy; improved air and water quality; enhanced public safety; reduced maintenance costs; reduced risks and an improved ability to accurately project municipal budget needs into the future.

Challenges refer to factors that have the potential to make it difficult for the town to succeed with implementation. As many people have observed, challenges, depending upon how one looks at them, can be transformed into opportunities. This plan could be thought of as a challenge, as it lifts up more than 100 actions the town needs to take to move toward the chosen sustainable future, possibly making the implementation of them all less likely than if there were fewer of them. The presence of these recommendations, and their publication, delivery to the state agency that funded this plan, and enshrinement in the records of the Planning Board and Town Council when they vote to adopt this plan could turn that 'challenge' into an opportunity. Many communities dramatic and measurable success enhancing sustainability and climate resilience while boosting local revenues, increasing tourism and the community's visibility and desirability (eg. Asheville NC, Northampton MA) provide the evidence to rebut any proposed challenge to implementing the actions/strategies identified in this plan.

