

1 Greater Energy Efficiency
Residential and commercial buildings consume nearly 40% of the primary energy in the United States. High-performance buildings reduce carbon emissions, lower operating costs and increase net operating income, and are less vulnerable to volatile energy prices.

2 Increased Renewable Energy
Using solar and wind to provide electricity and heating reduces our reliance on carbon-polluting fossil fuels. Participation in Brookline Green Electricity could displace over 34 million to 130 million pounds of carbon dioxide per year, depending on the product you choose.

3 Improved Transportation Options
Providing 50 charging station ports in the public way to support an additional 300 EVs on the road could displace over 1400 pounds of greenhouse gas emissions annually. A Complete Streets policy provides for transportation options in the public way to reduce carbon dioxide emissions.

4 Reduced Waste
20 percent of total U.S. methane emissions comes from landfills. Reducing the amount of waste in our landfills means lower levels of polluting methane gas emissions over time. Programs like Pay As You Throw help to increase recycling rates.

5 Enhanced Tree Canopies, Open Space
The estimated value of carbon storage by Brookline's tree canopy exceeds \$8 million. It removes over 130,000 pounds of air polluting gases and particulate matter and avoids 26.7 million gallons of stormwater runoff per year. Trees reduce land surface temperatures and heating and cooling loads on buildings.

6 Adaptation
A significant portion of north Brookline is within the hottest 5% of land area in the 101-municipality MAPC region. North Brookline also includes a high proportion of individuals likely to be vulnerable to extreme heat, including individuals over 65 and those living alone. We can take steps to increase our community's resilience.

Town of Brookline

Climate Action Plan 2018

OBJECTIVE To prioritize planning to achieve Zero Emissions by 2050 Town- and community-wide (no reliance on fossil fuels)

Strategies 1 through 5 identify ways to mitigate impact of climate change by reducing greenhouse gas emissions (Mitigation).

Strategy 6 identifies ways to adapt to extreme weather events due to climate change to protect public health and infrastructure (Adaptation).

STRATEGY 1 GREATER ENERGY EFFICIENCY	Educate Incentivize Mandate	Costs 0-Low-Med-Hi	Funding Grant Source Budget Source
GREENHOUSE GAS REDUCTIONS X MMT CO ₂ e Y % of Total Brookline GHG Reductions			
ENERGY EFFICIENT BUILDINGS			
▪ Zero Emissions by 2050 Planning			
▪ Municipal Facilities			
1 Reduce energy use in Town Buildings by 20% by 2020			
2 Establish a municipal energy use baseline of X			
3 Conduct an updated energy audit of all municipal facilities and implement energy conservation measures where needed			
4 Reduce plug loads at office, public buildings, and schools			
5 Establish Energy Use Intensity goal of 25 (minimum 30) and LEED Platinum (minimum LEED Silver) for new construction of school buildings			

6	Exploring Passive House energy performance for affordable housing as a foundation for “Net Zero”			
	Ongoing:			
7	Implement a routine load-shedding program to reduce peak demand energy use and increase energy-efficiency operations			
8	Apply for utility incentive grants to retrofit buildings			
9	Continue energy efficiency upgrades to public housing			
10	Establish a procurement policy for purchase of green alternatives for supplies			
	▪ Buildings 25,000 sf+			
1	Devise Green Building Guidelines / Sustainable Site Guidelines as an amendment to Zoning Bylaw to increase energy efficiency and sustainability measures in major impact projects (new and renovated).			
2	Launch energy-use reporting pilot program with selected commercial and multifamily properties			
3	Adopt a Building Energy Reporting and Disclosure Ordinance (BERDO, BEUDO) for commercial, multifamily, and institutions			
4	Create energy-efficiency incentive and free energy-audits programs with utilities and commercial/multifamily sector			
5	Enter into an MOU with utilities to advance energy efficiency and renewable efforts and facilitate data sharing			
6	Establish a streamlined and fast-tracked			

	permitting process as well as reduced or eliminated feeds for new construction and major renovations that include renewable energy or energy efficiency features			
7	Net Zero Plan: How would your property achieve carbon neutrality by 2050?			
	▪ Households			
1	Create outreach program to help connect residents with energy efficiency audits and upgrades through MassSave			
2	Research energy efficient measures compatible with historic preservation			
3	Develop incentive program to encourage conversion to LED lighting			
4	Develop an incentive program to encourage Energy Star appliance replacement			
5	Prepare a green-building toolkit to educate homeowners on ways to retrofit to conserve energy			
6	Prepare an energy conservation guide to reducing emissions by x metric ton per person annually			
7	Adopt a residential energy reporting ordinance to disclose energy-use at time of sale or rental			
8	Publicize bank loan programs incentivizing energy efficiency home projects			
	▪ Small Businesses and Institutions			
1	Create outreach program to help connect businesses and institutions with energy efficiency audits and lighting upgrades through MassSave			
2	Create outreach program to help connect businesses and institutions with			

Energy Start to improve financial and energy performance			
ENERGY EFFICIENT INFRASTRUCTURE			
1 Retrofit streetlights on all streets to efficient LEDs			
2 Implement a plan for addressing natural gas pipeline leaks in an accelerated and coordinated manner			
3 Implement a plan for addressing methane gas leaks in an accelerated and coordinated manner			
STRATEGY 2 INCREASED RENEWABLE ENERGY	Educate Incentivize Mandate	Costs 0-Low-Med-Hi	Funding Grant Source Budget Source
GREENHOUSE GAS REDUCTIONS X MMT CO₂e Y % of Total Brookline GHG Reductions			
▪ Zero Emissions by 2050 Planning			
▪ Municipal			
1 Install X megawatts of solar photovoltaic arrays on municipal buildings			
2 Achieve net zero/zero emissions on new school projects			
3 Require all new municipal projects and major renovations mandated solar-ready (warrant passed)			
4 Amend bylaw establishing Solar/Renewable Energy Overlay district (completed)			
5 Enter into Net Metering agreements to save X			
6 Research pros and cons of conversion to electric-based system			

7	Research the feasibility of installing geothermal heat pump installation on municipal property			
▪ Community-Wide				
1	Launch Brookline Green Electricity, a community electricity aggregation program, that includes the addition of new renewable energy generation to the local electric grid via purchase of MA Class I RECs [wind power](completed)			
2	Develop solar energy system regulations to better manage installation on large-tract private properties (in conjunction with tree protection policies—see Strategy 5)			
3	Launch Community Shared Solar Program			
4	Launch Air Source Heat Pump bulk purchasing program through Mass CEC			
5	Publicize available solar PV and solar thermal bulk purchasing programs for residential properties			
6	Implement streamlined and expedited permitting process, and reduced/eliminated fees for renewable energy system installations			
STRATEGY 3 IMPROVED TRANSPORTATION OPTIONS		Educate Incentivize Mandate	Costs 0-Low-Med-Hi	Funding Grant Source Budget Source
GREENHOUSE GAS REDUCTIONS X MMT CO₂e Y % of Total Brookline GHG Reductions				
▪ Zero Emissions by 2050 Planning				
▪ Municipal				
1	Participate in Eversource’s public benefits program to upgrade infrastructure in public areas to			

	accommodate fast EV charging stations			
2	Install EV charging stations on all Town owned lots and along Beacon Street median (number?)			
3	Adopt Complete Streets policy (plan completed; awaiting State approved) to encourage biking			
4	Implement a bike sharing program like Hubway			
5	Advocate for increased transit service in underserved areas like South Brookline			
6	Launch public-private partnership to implement clean shuttle buses in underserved commercial areas			
7	Adopt a green fleet policy for all new and replacement municipal vehicle purchases			
8	Purchase electric school buses			
9	Purchase electric vehicles for municipal fleet			
	Community-Wide			
1	Update Transportation Access Plan Guidelines to recommend for all projects above 25,000 square feet or at least 25 dwelling units that either one parking space or 2% of parking spaces (whichever is greater) be installed with electric vehicle charging stations and that an additional 15% of parking spaces have conduit to accommodate the installation of electric vehicle charging stations in the future			
2	Identify commercial properties that could install EV charging stations for public use. Work with Eversource to provide incentives for upgrades and installations.			
3	Identify commercial parking lots suitable			

for fast EV charging; work Eversource to provide incentives to property owners upgrade and install EV charging stations			
4 Identify workplaces or retail properties suitable for fast EV charging; work Eversource to provide incentives to property owners upgrade and install EV charging stations			
5 Pedestrian			
STRATEGY 4 REDUCED WASTE	Educate Incentivize Mandate	Costs 0-Low-Med-Hi	Funding Grant Source Budget Source
GREENHOUSE GAS REDUCTIONS X MMT CO₂e Y % of Total Brookline GHG Reductions			
▪ Zero Emissions by 2050 Planning			
▪ Municipal			
1 Create a Zero Waste Plan			
2 Install permeable pavement on Town-owned properties to reduce runoff			
• Community-Wide			
1 Establish/expand plastic bag policy			
2 Launch a composting and organics diversion program			
3 Publicize Town's Rain Barrel Program			
4 Promote use of alternative refrigerants			
STRATEGY 5 ENHANCED/PROTECTED TREE CANOPIES AND OPEN SPACE	Educate Incentivize Mandate	Costs 0-Low-Med-Hi	Funding Grant Source Budget Source
GREENHOUSE GAS REDUCTIONS X MMT CO₂e Y % of Total Brookline GHG Reductions			
▪ Municipal / Community-Wide			

1	Amend erosion control management bylaw			
2	Adopt Site Plan Review with Tree Survey/Review component			
3	Adopt solar energy system regulations to balance objectives for renewable energy with tree protection			
4	Create tree inventory to compare with heat island and flood maps to identify areas suitable for more plantings for cooling effect, detaining runoff, sequestering carbon <i>Utilize the tree canopy and heat maps to strategically increase tree planting and landscaping for heat relief.</i>			
5	Add tree planting component to Green Building / Sustainable Site Guidelines—see Strategy 1			
6	[See latest Open Space Plan]			
IMPLEMENTATION				
Amend Brookline Comprehensive Plan to include Climate Action Plan				
STRATEGY 6 ADAPTATION AND CLIMATE PREPAREDNESS		Primary Municipal Depts	Costs 0-Low-Med-Hi	Funding Grant Source Budget Source
PUBLIC HEALTH				
1	Promote wellness programs that address the illnesses and conditions forecast to be exacerbated by climate changes and the populations forecast to be disproportionately affected. Resource: The Bureau of Environmental Health of the Massachusetts Department of Public Health has online resources, including a conceptual pathways matrix that identifies hazards, exposures, vulnerable groups, and health risks https://matracking.ehs.state.ma.us/Climate-Change/conceptual-pathways.html .	Public Health, Planning		
2	Identify properties occupied by vulnerable residents to aid emergency	Public Health, Emergency		

evacuation efforts	Management, Planning		
3 Reach out to hospitals, nursing homes, and group homes to ensure they have Continuity of Operations (COOP) plans so they can perform essential functions during emergencies	Public Health		
4 Create an outreach campaign focused on the impacts of extreme heat and how to manage it. Partner with local hospitals and social assistance organizations on awareness campaigns for heat-related illnesses. Guidebook: https://www.cdc.gov/climateandhealth/pubs/extreme-heat-guidebook.pdf MAPC's Keep Cool App. Resources: Center for Disease Control	Public Health, BHA		
5 Educate turf field users about managing high heat.	Park and Rec, Schools, Planning		
6 Develop extreme weather guidance for town employees whose jobs involve outdoor work.	DPW, Building, Planning		
7 Ensure adequacy of cooling centers and access for vulnerable populations. Consider developing relationships with large businesses and institutions to explore opportunities to add informal cooling areas throughout the Town.	Building, Planning		
8 Develop an outreach/support plan to remediate properties impacted by mold as a result of flooding.	Planning, Building		
9 Place signage at popular park and recreation areas to let residents know about tick/mosquito risk and to provide information about how to protect themselves.	Public Health, DPW		
10 Review and update the Comprehensive Emergency Management Plan to incorporate changes in emergency situations and response activities that	Emergency Management		

	may result from climate impacts.			
11	Improve emergency response and preparedness for municipal buildings such as schools	Emergency Management, Schools		
12	Improve communications infrastructure, building off of current alert system to improve emergency response/preparedness	IT, Emergency Management		
13	Consider an emergency preparedness plan for pet companions to reduce number of individuals sheltering in place during extreme weather events	Public Health		
14	Emergency shelter plan for public facilities	Emergency Management		
15	Consider strategies to identify and support vulnerable households most in need of air conditioning. Encourage use of efficient air conditioning.	Public Health		
16	Identify households reliant on electricity for medical devices. Develop plans for backup power in the event of Identify households reliant on electricity for medical devices. Develop plans for backup power in the event of outages.	Public Health, Emergency Management, Planning		
NATURAL RESOURCES				
1	Incorporate climate resilience into open space planning. Strategic considerations include: 1) protecting large and/or connected green spaces to foster resilience and biodiversity; 2) creating green space to cool “hot spots”; 3) maintaining or creating open space buffers to protect water quality and provide flood protection; 4) identifying locations where soils will support stormwater infiltration to replenish groundwater and support stream flow. Resource: The Metro Mayors Climate-Smart Region (CSR) Decision Support Tool is a new GIS-based program developed to prioritize locations for	Conservation		

	green infrastructure. The CSR program analyzes spatial data in four climate strategies: Connect (carbon-free transportation links), Cool (shade areas to reduce heat), Absorb (innovative stormwater management), and Protect (natural land buffers for sea level rise). MAPC can arrange training on use of the tool.			
2	Increase tree planting efforts to increase tree canopy. Continue to boost climate resilience by increasing tree diversity and by considering trees well-adapted to warming temperatures. To address public health concerns, consider trees that produce fewer allergens. Resource: The U.S. Forest Service has developed a comprehensive manual, "Forest Adaptation Resources: Climate Tools and Approaches for Land Managers," available at https://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs87-2.pdf .	Conservation		
3	Ensure that stream-crossing standards for fish and wildlife passage and stream continuity are applied to bridge and culvert repairs. Resource: Massachusetts Stream Crossing Handbook: http://www.mass.gov/eea/docs/dfg/der/pdf/stream-crossings-handbook.pdf Resource: State grant program for replacement of high ecological value culverts.	Conservation		
4	Investigate stream daylighting or naturalizing opportunities to restore natural habitats.	Conservation		
5	Monitor for new invasive plant and animal species that may be introduced by a warming climate. Develop management strategies as needed.	Conservation		
BUILDING ENVIRONMENT: FLOODING				
1	Conduct a by-law/zoning review to ensure GI/LID and climate resiliency are promoted and not restricted. Examine	Planning, SCAC, Building, DPW		

	requirements for parking, driveways, street width, open space residential design, stormwater, and site plan review. Develop recommendations for requirements and incentives that will integrate GI/LID into all development and redevelopment work. Provide guidance to project proponents early in the development process.			
2	Develop design guidelines for Green Infrastructure and Low Impact Development. Resource: MAPC Low Impact Development Toolkit. Example: Town of Littleton Low Impact Development Manual.	Engineering, Planning		
3	Provide training, as needed, for Town staff implementing new green infrastructure strategies. Resource: The University of New Hampshire Stormwater Center conducts research and offers technical training on innovative stormwater treatments.	Engineering		
4	Consider expanding the Floodplain or Wetlands by-law to apply to documented areas of flooding. Example: The Town of Braintree Floodplain By-law provides for inclusion of documented areas of flooding outside of FEMA flood zones.	Engineering, Conservation		
5	If the state releases precipitation projections, update design storm requirements so that development projects address rainfall projections for their planned lifespan.	Engineering, Conservation		
6	Consider establishing a Stormwater Utility to provide resources for stormwater management and MS4 requirements. Include incentives for property owners to infiltrate stormwater. Resource: MAPC Stormwater Utility Kit. Examples: City of Newton, Town of Milton.	Engineering		
7	Assess municipal properties for	Building		

	opportunities for LID/GI retrofits. Resources: Possible project with MAPC. Climate Smart Region Tool.			
8	Encourage residents to capture or infiltrate rainwater with strategies including rain barrels, landscaping, and pervious pavements.	Planning		
9	Document flooding and utilize flood-claim mapping to assist targeting of stormwater improvement resources.	Engineering		
10	Continue to prioritize stormwater treatment in capital planning.	Engineering		
BUILDING ENVIRONMENT: HEAT				
1	Establish green building recommendations or requirements. Example: The City of Cambridge has developed sustainable building requirements. Resource: The Boston Planning and Development Agency has a climate resiliency checklist that could be modified for use in Brookline. Resource: LEED resources include climate resilience screening tools.	Planning, SCAC, Building, DPW		
2	Explore zoning code and/or incentives to increase green landscaping, reflective pavements, and cool or green roofs to lessen heat island impacts. Examples: Seattle Green Factor establishes green landscaping requirements for projects of a certain size. Sacramento Parking Lot Shading Requirement mitigates urban heat island impacts.	Planning, SCAC, Building, DPW		
BUILDING ENVIRONMENT: HEAT AND FLOODING				
1	Encourage use of microgrids, district energy, and battery storage to keep critical facilities functioning in the event of power loss. Example: The City of Northampton is building a microgrid to power its DPW, emergency shelter, and local hospital. The Town of Sterling	Planning, Building		

	Municipal Light Plant has installed battery storage that can operate the police station and dispatch center for two weeks in the event of an outage. Resources: The state's Advancing Commonwealth Energy Storage (ACES) program and the Mass Clean Energy Center Community Microgrids program.		
2	Explore joint procurement opportunities with MAPC to purchase emergency generators and pumps.	Planning, Building, Emergency Management	
3	Develop and distribute education and outreach materials on climate related retrofits including elevating utilities, preventing backflow, protecting basements, and weatherization. Create a contractor/homeowner resilience checklist to address flood and heat strategies and a checklist for use in inspections. Examples: Basement protection materials from Kingston, Ontario, Canada https://utilitieskingston.com/Wastewater/BasementFlooding/Protect . City of Cambridge flood protection brochure.	Planning, SCAC, Building, DPW	
4	Publicize hot spot and potential flooding areas to current residents and to permit applicants. Direct them to educational materials. Consider creating overlay maps to identify sensitive areas.	Planning, SCAC, Building, DPW	
5	Alert homeowners to flood insurance savings available for those who elevate above base flood levels, and to reduced rates for those not in a flood zone. Resource: MA Coastal Zone Management freeboard handout.	Planning	
6	Prioritize retrofits and emergency planning for Town facilities vulnerable to flooding and heat impacts and to town facilities that serve as shelters.	Building	
7	Encourage depaving and use of permeable concrete and asphalt. Use GIS	Planning, Conservation,	

to prioritize areas where depaving and permeable surfaces can reduce flooding. Resource: The University of New Hampshire Stormwater Center.	Engineering, DPW		
SEA LEVEL RISE			
1 Continue to monitor changes in sea level and plans to address the capacity of the downstream Charles River dams.	Conservation		
ECONOMIC			
1 Consider developing an emergency preparedness checklist that can be provided to local businesses. Example: The City of Cambridge maintains a Business Emergency Preparedness website: https://www.cambridgema.gov/CDD/ecomdev/resourcesforbusinesses/smallbusiness/emergencypreparednessforbusinesses	Planning, Economic Development		
2 Promote awareness and use of educational materials that address workplace safety issues. Example: Federal Centers for Disease Control and Prevention and National Institute for Occupational Safety and Health 2-page Spanish and English “FastFact” fact sheets on heat stress, sun exposure, and ticks and mosquitoes.	Public Health		
UTILITIES, STATE-OWNED INFRASTRUCTURE			
1 Establish relationships with state agency staff responsible for climate resilience. Communicate Town concerns and priorities, and stay abreast of agency planning.	Planning		
2 Continue efforts to ensure timely repair of gas leaks and replacement of leak-prone pipes. Resource: MAPC and the Home Energy Efficiency Team collaborated on a report which identifies low-cost best practices that	Engineering		

	municipalities and gas companies can implement to accelerate replacement of leak-prone pipes, better protect the quality of local roads, and avoid unnecessary costs: http://fixourpipes.org/			
3	Work with Eversource to coordinate to ensure protection of Brookline assets.	DPW		
4	Investigate options to increase knowledge of telecommunications infrastructure serving Brookline. Resource: The MAPC Metro Mayors Coalition has been able to provide some information and is continuing research on this issue.	DPW		
EMERGENCY MANAGEMENT				
1	Ensure adequacy of cooling centers and access for vulnerable populations. Ensure that all shelters have adequate back-up generators. Consider developing relationships with large businesses and institutions to explore opportunities to add informal cooling areas throughout the town.	Emergency Management, Public Health, Building		
2	Review and update the Comprehensive Emergency Management Plan to incorporate changes in emergency situations and response activities that may result from climate impacts. Conduct table-top exercises.	Emergency Management		
3	Improve emergency alert systems to reach a wider audience.	Emergency Management, IT		
4	Review the Town's internal emergency communications infrastructure to ensure redundancy during emergencies when cell phone or other services may not be available.	Emergency Management		
5	Research whether the town may gain access to local video cameras for emergency monitoring.	Emergency Management		

SOCIO-ECONOMIC			
1	Conduct an assessment of vulnerable populations. Identify gaps in services and prioritize strategies to address gaps.	Public Health, Planning	
2	Review Town strengths and weaknesses regarding outreach and connections to vulnerable populations. Identify community partners that can strengthen relationships where needed.	Public Health, Administration, Planning	
3	Expand the successful Brookline Buddies program.	Public Health	
4	Reach out to facilities that serve vulnerable populations. Assess retrofit needs and emergency readiness, including evacuation plans. Review needs for air conditioning and back-up generators. Encourage sign-up for the emergency notification system.	Public Health, Planning	
5	Develop programs, or provide information, to assist low-income residents with property retrofits. Example: Investigate whether CDBG funds can be utilized for heat and flood retrofits.	Planning	
6	Target affordable housing sites for flood and heat retrofits and upgrades.	BHA	
7	Create a plan to conduct outreach to linguistically isolated households. Provide emergency preparedness information in their native languages. Consider needs for translator services.	Public Health, Planning	
8	Develop advance shelter-in-place and communication strategies for residents who may not be able to evacuate during emergencies.	Public Health, BHA	
IMPLEMENTATION			
1	Review climate projections and revise and update climate resilience priorities every five years.	Planning	

2	Periodically review town demographics to ensure the needs of residents are addressed.	Planning		
3	Establish a climate adaptation and mitigation coordinator position.	Administration		
4	Have each town department review climate vulnerabilities relevant to its assets and mission, and identify potential and current activities that bolster resilience.	Planning		
5	The Working Group, or a successor committee, should continue to meet to establish priorities, incorporate new information, and monitor progress on climate goals. The Town should expand the Working Group to include additional relevant departments, such as the Housing Authority, Schools, and Emergency Management. Consider including community partners.	Planning		
6	Develop outreach programs and host events to inform specific populations about the impacts of climate change and Brookline's climate risk. Consider the business community, developers, contractors, neighborhood groups, human service providers, and community groups, to gain feedback on their concerns and needs. Resource: A grant from MAPC's Community Engagement or Arts & Culture Divisions. Example: City of Boston Ambassador's Program that trains volunteers to do outreach to their communities.	Planning		
7	Consider creating a brochure for residents who are interested in helping the town and themselves to become climate resilient. Topics could include emergency planning; property management for drought, stormwater infiltration, invasive species, and renewable and resilient energy.	Planning		
8	Incorporate climate resilience into all	Planning		

Town planning documents. Ensure that all capital projects incorporate climate resilience.			
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