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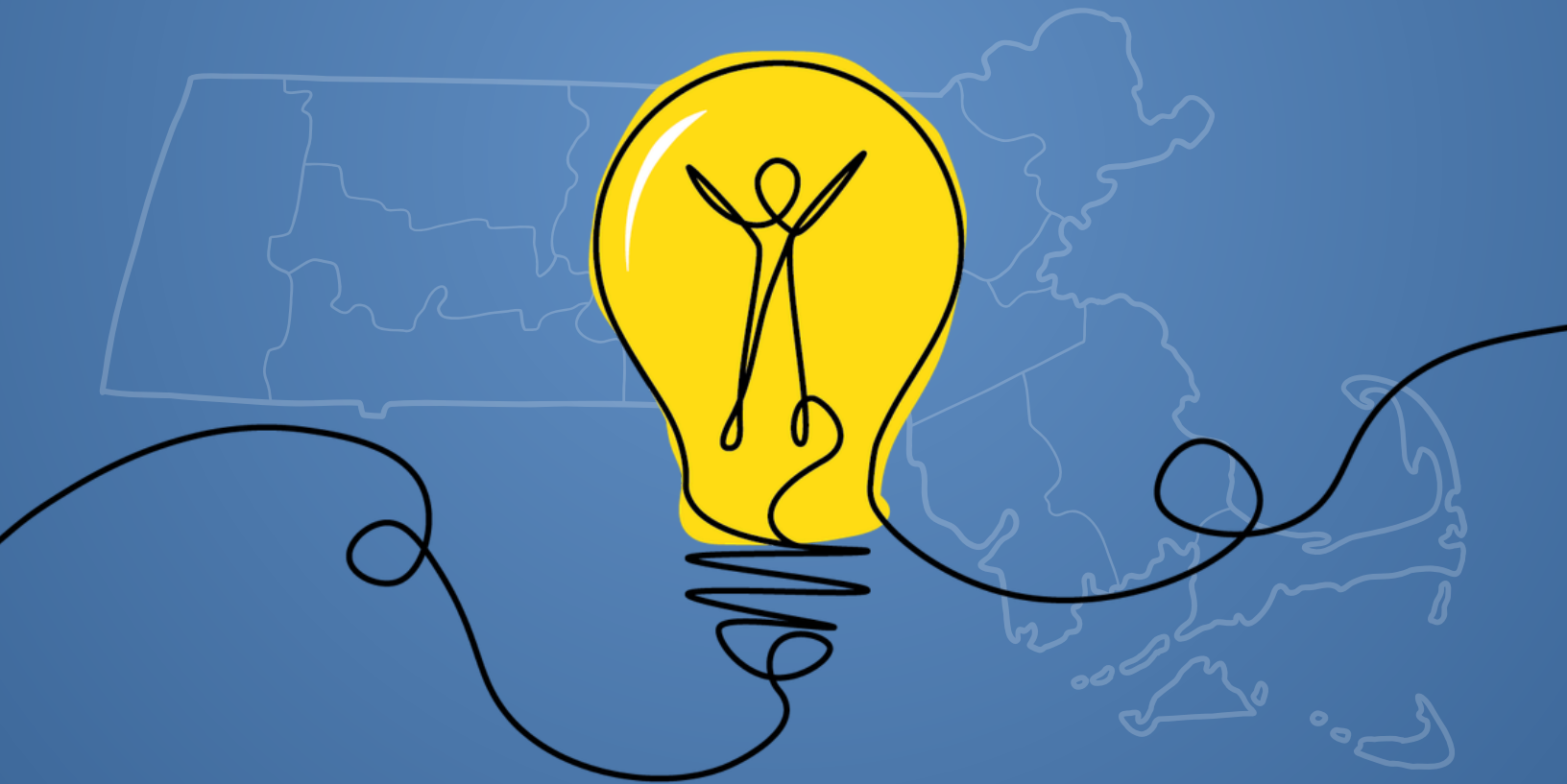
Electrification With Equity

PART

2

Scaling Behind-the Meter Solar+Storage in Massachusetts Environmental Justice Communities



Applied Economics Clinic
Economic and Policy Analysis of Energy, Environment and Equity

CleanEnergyGroup

Union of Concerned Scientists

VOTE SOLAR

May 2026

Electrification with Equity, Part 2:

Scaling Behind-The-Meter Solar and Storage in Massachusetts Environmental Justice Neighborhoods

Prepared by Applied Economics Clinic
for Clean Energy Group, Union of Concerned Scientists, and Vote Solar

Authors

Tanya Stasio, PhD
Elisabeth Seliga
Applied Economics Clinic

Contributing Editors

Todd Olinsky-Paul
Clean Energy Group

Paula García
Camilo Esquivia-Zapata
John Rogers
Union of Concerned Scientists

Elena Weissmann
Stephan Roundtree
Vote Solar

About This Report

Massachusetts has some of the best solar and energy storage programs in the country, but these programs lack meaningful equity provisions, and clean energy adoption rates in environmental justice communities are low. Solar and storage can provide many benefits that would be especially valuable to environmental justice communities, such as lowering energy costs, reducing local air pollution, and providing resilient backup power during grid outages. This report identifies nine primary barriers to solar and storage adoption in Massachusetts environmental justice neighborhoods and advances 18 recommendations to address these barriers through revisions to the Commonwealth's existing programs and policies.

This report is the second in a two-part series. Part 1 focuses on the opportunity for distributed solar and solar+storage to offset forecasted electric demand growth in Massachusetts. That report, *Electrification with Equity, Part 1: The Opportunity for Behind-the-Meter Solar and Storage in Massachusetts*, is available at: www.cleanegroup.org/publication/electrification-with-equity-part-1.

Acknowledgements

This report was prepared by Applied Economics Clinic for Clean Energy Group, Union of Concerned Scientists, and Vote Solar. Design and editing support were provided by Samantha Donalds and Zareen Reza at Clean Energy Group.

The report's analysis and recommendations were developed in collaboration with an advisory committee representing environmental justice organizations, affordable housing, and clean energy developers. Advisory committee members included: Raquel Halsey, Executive Director at the North American Indian Center of Boston; Gregory King, Managing Director at TSK Energy Solutions; Tristan Thomas, Director of Policy at Alternatives for Community and Environment; Ben Underwood, Co-Chief Executive Officer at Resonant Energy; John Walkey, Director of Climate Justice and Waterfront Initiatives at GreenRoots; and Mary Wambui, Environmental Justice Advocate.

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Design: Zareen Reza, Clean Energy Group

Contents

Foreword

This report is the second in a two-part series. The first, *Electrification with Equity 1: The Opportunity for Behind-the-Meter Solar and Storage in Massachusetts*, evaluates the opportunity for distributed solar and solar+storage to offset forecasted peak demand growth in Massachusetts. This second report focuses on how that opportunity should advance energy equity – specifically, it identifies barriers to solar and energy storage adoption in Massachusetts' environmental justice (EJ) communities, and makes recommendations to overcome these barriers through revisions to existing Massachusetts programs and policy.

Evaluation of locations highly suitable for solar siting indicates that the opportunity for deployment of distributed energy resources (DERs) in Massachusetts' EJ communities is huge. We calculate that the technical potential for behind-the-meter (BTM) solar in EJ neighborhoods is 31 gigawatts (GW), while the technical potential for BTM energy storage (batteries) paired with solar is 13 GW.

To put this in perspective, peak electricity demand in Massachusetts is predicted to reach 24 GW by 2050, double the 2020 peak of 12 GW. This means that the technical potential for new BTM solar+storage in EJ neighborhoods is greater than the expected increase in peak demand. Since most of the EJ neighborhoods are also hot spots – areas with the highest surface temperatures – there is great potential for resilient solar+storage systems to support needed cooling during summertime grid outages, while providing valuable grid services and energy cost burden reductions year-round. Advancing BTM solar+storage in EJ communities is not only necessary for decarbonization, it is an important tool to protect public health and energy affordability.

Massachusetts' current rate of DER adoption in EJ communities is quite low, meaning there is a great opportunity for growth. While the full technical potential of solar+storage in these communities may never be realized, more could certainly be done at the state level to support significantly higher rates of adoption. However, this will require overcoming significant barriers. As reported in the Clean Energy Group's 2024 report *Energy Storage Equity: An Assessment of Three Massachusetts Programs,*[1] most of the Commonwealth's solar and storage programs have no equity provisions, and those that do have shown meager success in reaching income-eligible customers. Simply put, program equity goals range from low to non-existent, as do equity-oriented incentives; and other long-standing barriers, such as split incentives for renters and the utility trust gap, remain unaddressed.

This report, through original analysis and input from an EJ advisory committee, identifies nine primary barriers to solar and storage adoption in EJ neighborhoods, and advances 18 recommendations to address these barriers. The barriers cover financial, technical, workforce, market, and program coordination issues. The recommendations involve incorporating equity-focused funding, incentives, targets, and carve-outs to ensure increased attention to EJ households and neighborhoods; implementing technical solutions to expand access; and bringing

[1] Tanya Stasio et al., *Energy Storage Equity: An Assessment of Three Massachusetts Programs*, Clean Energy Group and Applied Economics Clinic, September 2024, www.cleanegroup.org/publication/energy-storage-equity-massachusetts.

greater focus to communication and outreach to ensure that EJ neighborhoods have more tools for better decision-making around energy options.

Clearly, implementing these recommendations would require significant work on the part of state policymakers and regulators. Yet, the recommendations do not rely on untested new technologies or exotic program models. They are common-sense solutions to known problems, and many build on proven experience in Massachusetts and in other states. We have the technology and the policy tools to overcome these challenges. All that is needed is the political will.

With federal support vanishing, energy burdens rising, and climate change exacerbating environmental injustices, it is essential that states scale up proven clean energy technologies where they matter most. We hope this report will help inform a conversation about how Massachusetts can scale up BTM solar and storage in EJ neighborhoods to support decarbonization, meet load growth with affordability, and honor its commitment to equitable clean energy for all.

Todd Olinsky-Paul
Senior Project Director, Clean Energy Group

Executive Summary

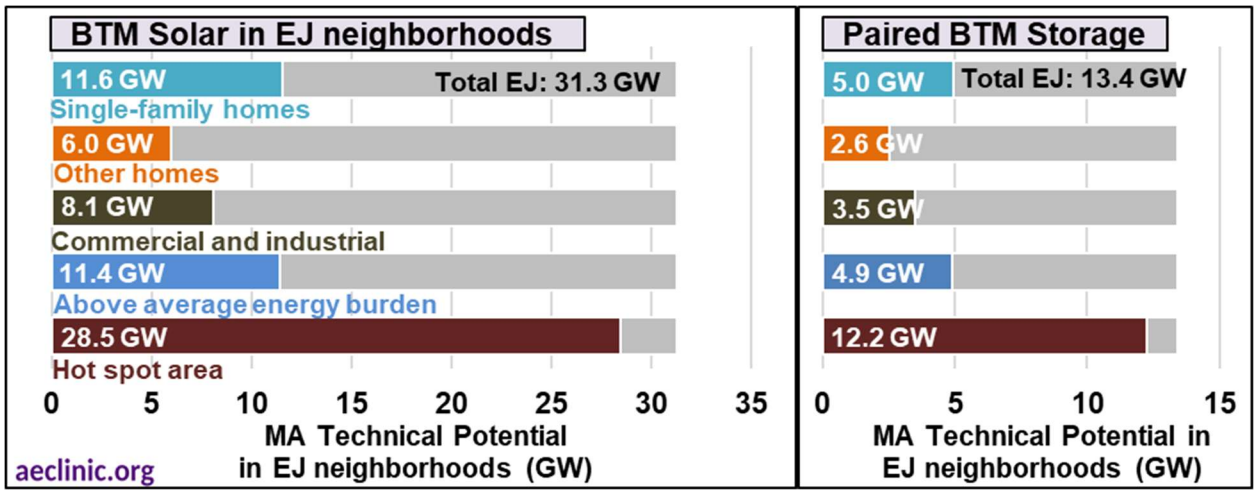
As Massachusetts advances electrification of the transportation and building sectors, a key strategy to achieve the Commonwealth's decarbonization goals, peak electric demand is expected to rise substantially. As electric demand rises, the cost of electricity will likely increase, putting Massachusetts households at risk for higher energy bills. For Massachusetts' lowest income households that face higher than average energy burdens—the share of household income spent on energy costs—increased energy costs may result in cascading financial impacts (e.g., increased household debt, missed mortgage or rent payments, etc.). Deployment of on-site or behind-the-meter (BTM) solar and BTM solar paired with storage in Massachusetts environmental justice (EJ) neighborhoods could lower energy bills in these communities as well as expanding equitable access to clean energy and providing access to reliable backup power for the Commonwealth's most vulnerable residents.

Additionally, BTM solar and storage can provide human health benefits. Black, Indigenous, and people of color (BIPOC) populations and low-income households in the United States are disparately exposed to the environmental and health impacts of utility-scale polluting infrastructure like gas-fired power plants. In Massachusetts, more than 80 percent of emitting electric generating units are located in or within a mile of an EJ neighborhood. BTM solar paired with storage allows customers to generate and store their own clean energy, which in turn lowers peak electric demand, reducing the need for additional investments in expensive gas-fired power plants.

This report estimates the technical potential of Massachusetts' BTM solar paired with storage resources—or the maximum amount that could be installed given physical and land-use constraints, but not considering market forces, costs, or policies—within EJ neighborhoods. These technical potential estimates provide an upper bound of possible BTM capacity that can be compared to current levels to shed light on the scalability of BTM in EJ neighborhoods. The larger the gap between current installed capacity and technical potential, the more opportunity for BTM deployment. This report is the companion to *Electrification with Equity, Part 1: The Opportunity for Behind-the-Meter Solar and Storage in Massachusetts*, which assesses the opportunity for statewide scale-up of BTM solar and storage to reduce future peak demand in Massachusetts.

In total, this report estimates the technical potential of BTM solar in Massachusetts EJ neighborhoods to be 31.3 gigawatts (GW) of solar, 21 percent of statewide total BTM solar potential and enough to power all of Massachusetts' almost three million homes. In addition, this report estimates a technical potential of 13.4 GW of paired BTM storage, assuming a storage-to-solar ratio of 0.43. Almost all (91 percent) of Massachusetts' total BTM solar and storage potential in EJ neighborhoods is within a "hot spot" area (the highest five percent by land surface temperature in each Massachusetts Regional Planning Agency region) where heat-related health impacts could be reduced with greater BTM adoption (see ES-Figure 1). For example, on-site solar and storage may improve the affordability of customer electric bills, allowing more households and businesses to use or upgrade their air-conditioning systems. Located at community resilience hubs or cooling centers, BTM solar and storage may provide access to cooling for the local community during heat waves and/or power disruptions. Moreover, canopy and rooftop solar can keep homes and neighborhoods cooler, reducing temperatures and the risk of heat-related illness.

ES-Figure 1. Massachusetts EJ neighborhood BTM solar and storage technical potential



The scale at which BTM solar paired with storage systems can be realized in Massachusetts depends on efforts to address the existing barriers and challenges to adoption. The nine primary barriers identified in this report are:

1) Insufficient targeted financial incentives
2) Required electric system or building upgrades
3) Workforce limitations
4) Lack of incentives for renters and condo owners
5) Complexity and lack of program coordination
6) Lack of trust
7) Interconnection and permitting issues
8) Recycling and disposal concerns
9) Lack of internet access to learn about, and participate in, clean energy programs

To help realize BTM solar and storage potential in EJ neighborhoods, this report makes 18 recommendations that aim to address the pre-conditions and barriers to more widespread deployment of BTM solar and BTM solar paired with storage systems in and for EJ neighborhoods. These recommendations are:

1) Establish equity participation targets for statewide programs to ensure financial assistance is flowing to EJ neighborhoods
2) Expand SMART, Clean Peak Standard, and ConnectedSolutions to include more incentives for equitable deployment
3) Require state program budget carve-outs for BTM systems in low-income and EJ neighborhoods

4) Implement a Solarize Mass Plus program that supports BTM solar and storage deployment in EJ neighborhoods
5) Offer zero-interest financing for BTM readiness electric/building upgrades and grants for projects that benefit households in EJ neighborhoods
6) Establish a state-funded stretch and specialized code for BTM solar and storage readiness in new construction
7) Assess workforce trends and identify opportunities for expanding existing workforce training programs to secure employment for trainees
8) Expand budget for community solar and storage and invest in educational materials and outreach to support community-led solar development
9) Investigate opportunity for plug-in solar paired systems
10) Conduct a technical study to inform the development of a multifamily solar and storage incentive program
11) Establish incentive mechanisms for renters and condo owners to invest in BTM solar and storage
12) Create educational resources and an outreach plan for EJ neighborhoods
13) Ensure existing program materials are comprehensive and accessible
14) Establish a statewide whole-home electrification and backup power program based on the Cape and Vineyard Electrification Offering
15) Establish outreach and transparency requirements for clean energy solicitors
16) Set maximum interconnection costs that can be charged by utilities to project developers
17) Investigate recycling and reuse requirements for solar and storage systems
18) Require utilities to host workshops in EJ neighborhoods for customers to learn about and sign up for existing programs

This report was developed in collaboration with an advisory committee bringing perspectives from different sectors, including environmental justice organizations, affordable housing, and clean energy developers. The analysis and recommendations in this report strive to align with on-the-ground experiences and priorities for EJ neighborhoods.

I. Introduction

According to Massachusetts' *Clean Energy and Climate Plan (CECP) for 2025 and 2030*[2] and the 2050 CECP[3], the Commonwealth plans to electrify its transportation and building sectors to meet its sector-specific greenhouse gas emissions limits. As a result, Massachusetts expects electric load in 2050 to be 250 percent of 2020 load and plans for almost all of this load to be met with clean energy such as solar, wind, and battery storage resources.[4] Importantly, the CECP notes the Commonwealth's commitment to advancing equity in its clean energy transition stating: "all Massachusetts residents can fully access and participate in the transition to a low-carbon economy" and "differences in income-level, location, English proficiency, and previous marginalization" must not prevent anyone from participating in the benefits created by a new, low-carbon economy.[5] In line with this commitment, Massachusetts has passed several pieces of legislation to support an equitable clean energy transition, including:

- *An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy,*[6] enacted in 2021, defined environmental justice (EJ) populations, established a clean energy equity and market development program,[7] required the Massachusetts Department of Public Utilities (DPU) to consider equity impacts in its decision-making, and established the low-income services solar program[8] to provide grants for solar projects to non-profits that address food insecurity and homelessness.[9]

- *An Act Promoting a Clean Energy Grid, Advancing Equity and Protecting Ratepayers*,[10] enacted in 2024, created the Office of Environmental Justice and Equity and the Facility Siting Division within the Massachusetts Executive Office of Energy and Environmental Affairs (EEA), established four divisions within the Department of Energy Resources (DOER) , including the Clean Energy Siting and Permitting Division, and required DPU to investigate expanding net metering offerings.[11]

Deployment of on-site or behind-the-meter (BTM) solar and BTM solar paired with storage (simplified as "BTM solar and storage" for the remainder of this report) allows customers to generate and store their own clean energy, which in turn can lower peak electric demand, reduce the need for additional investments in expensive gas-fired power plants, and provide households

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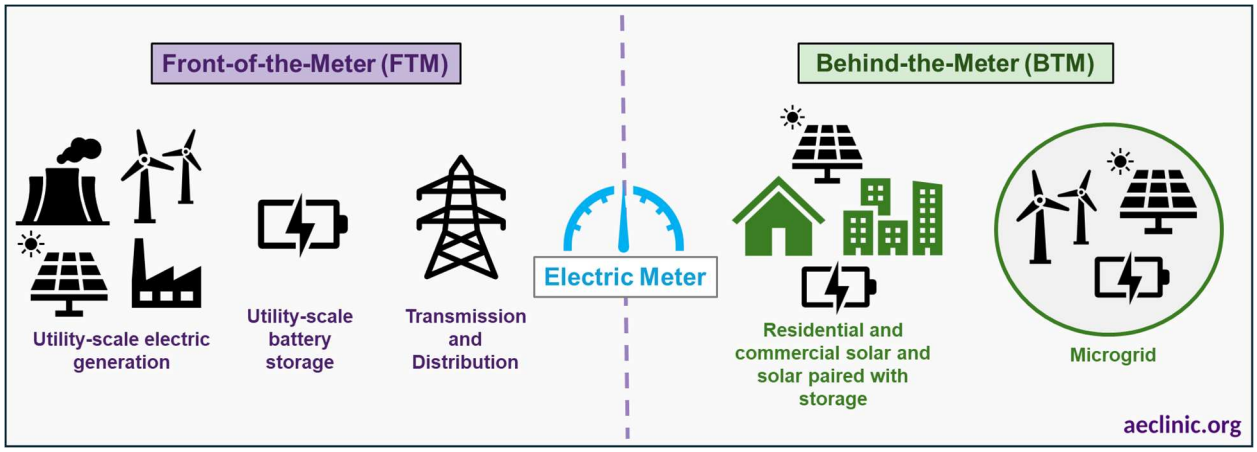
[2] *Massachusetts Clean Energy and Climate Plan for 2025 and 2030*, Massachusetts EEA, 2022, www.mass.gov/info-details/massachusetts-clean-energy-and-climate-plan-for-2025-and-2030.
[3] Ibid.
[4] Ibid. p. 31
[5] Ibid. p.11
[6] *An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy,* Massachusetts Legislature, 2021, https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8.
[7] MassCEC's Equity Workforce Training Implementation Grant program is described in *Appendix B: Massachusetts Energy and Housing Programs*.
[8] Massachusetts Low-Income Services Solar Program is described in *Appendix B: Massachusetts Energy and Housing Programs*.
[9] *An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy,* Massachusetts Legislature, 2021, https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8.
[10] *An Act Promoting a Clean Energy Grid, Advancing Equity and Protecting Ratepayers*, Massachusetts Legislature, 2024, https://malegislature.gov/Laws/SessionLaws/Acts/2024/Chapter239.
[11] Ibid.

and businesses with energy bill savings, increased resilience, and energy autonomy. BTM resources such as residential or commercial solar, solar paired with storage, or microgrids can provide energy directly to homes and businesses without passing through an electric meter; in contrast, front-of-the-meter (FTM) systems, including utility-scale electric generation (power plants), energy storage, and transmission and distribution, pass through an electric meter to supply electricity (see Figure 1). So-called "community solar" can be either FTM or BTM and provide the benefits of solar to multiple customers (e.g., residents, businesses, nonprofits) through customer subscriptions.[12]

Figure 1. FTM and BTM electric generation and storage



Examples of FTM infrastructure (e.g., utility-scale electric generation, battery storage, transmission and distribution) and BTM resources (e.g., small-scale solar and solar paired with storage installed, and microgrids). Source: AEC.

Equity, economic, and resiliency benefits of BTM solar and storage

Deployment of BTM solar increases renewable energy integration, providing greater supply diversity and assisting the Commonwealth in meeting its clean energy and climate goals. Paring BTM solar with storage increases the value of renewable energy by allowing solar electricity to be stored for a later time (i.e., during evening peak demand hours).[13] In addition, BTM solar and storage provide unique economic, environment, equity and grid resiliency benefits to customers. Applied Economics Clinic (AEC) identifies 17 benefits of BTM solar and storage in this report (see Table 1).

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[12] Waechter, K., O'Shaughnessy, E., Kannan, S., & Burton, R., *Technical Potential and Meaningful Benefits of Community Solar in the United States*, National Laboratory of the Rockies, February 2024, www.NLR.gov/docs/fy24osti/87524.pdf.

[13] (1) Baik, S., Miller C., Carvallo, J. P., *The resilience value of residential solar + storage systems in the continental U.S.,* prepared for U.S. Department of Energy by Lawrence Berkeley National Laboratory, December 2024, https://eta-publications.lbl.gov/sites/default/files/2024-12/5_resilience_benefits_final.pdf; (2) O'Brien, J. G., Cassiadoro, M., Becejac, T., et al., *Electric Grid Blackstart: Trends, Challenges, and Opportunities*, prepared for U.S. Department of Energy by the Pacific Northwest National Laboratory, April 2022, www.pnnl.gov/main/publications/external/technical_reports/PNNL-32773.pdf; (3) Woods, B.W., Peddada, S., Seliga, E., Lala, C., Tavares, E., Lewis, G., Rakotoarisoa, T., Stanton, E.A. *Energy Storage Benefit-Cost Analysis*, Applied Economics Clinic and Clean Energy States Alliance, December 2022, www.cesa.org/resource-library/resource/energy-storage-benefit-cost-analysis-a-framework-for-state-energy-programs.

Table 1. Economic, environment, equity, and resiliency benefits of BTM solar and storage

Benefits of BTM solar and storage systems	
Economic	Lower customer energy usage
	Bill savings or rebates from state program incentives
	Federal and state tax credits
	Avoided system costs
	Clean energy job growth
	Higher property values
Environment and Equity	Increased energy independence for customers
	Access to electricity during grid disruptions and outages
	Avoided air pollution
	Avoided greenhouse gas emissions
	Reduced water consumption
	Reduced land footprint of large-scale generation facilities
Grid Resiliency	Black start capability
	Increased renewable energy integration
	Fewer power outages and avoided emergency calls
	Peak demand shaving and shifting
	Reduced grid congestion

Source: AEC

Installing BTM solar and storage provides **economic** benefits to homes and businesses through reduced energy usage, bill savings, tax credits or rebates from federal[14] and state programs,[15] and higher property values.[16] For example, EnergySage estimates that Massachusetts customers that install rooftop solar save $40 to $125 per month on their energy bills.[17] In addition, a 2025 study published in *Nature Energy* found that 60 percent of United States households could reduce

[14] Federal tax credits for solar have been or will be phased out in the near future under the federal *One Big Beautiful Bill Act.* See *Appendix B: Massachusetts Energy and Housing Programs* for more information.

[15] See *Appendix B: Massachusetts Energy and Housing Programs* for more information on Massachusetts tax credits or rebates available for BTM solar and storage.

[16] Bolinger, M. and Mims Frick, N., *Consumer Benefits of Clean Energy: Renewable Energy,* prepared for the U.S. Department of Energy by Lawrence Berkeley National Laboratory, December 2024, https://eta-publications.lbl.gov/sites/default/files/2024-12/re_consumer_benefits_final.pdf.

[17] "Your guide to solar energy in Massachusetts," Mass Save, www.masssave.com/solar.

electricity costs by 15 percent on average using solar paired with battery systems.[18] Access to on-site generation can alleviate energy burden for lower income households, which typically face higher energy burdens compared to their wealthier counterparts,[19] by reducing how much electricity the household needs from its utility and through statewide incentive programs that provide on-bill savings.[20]

Greater BTM adoption can also provide economic benefits to ratepayers through avoided system costs when BTM resources allow utilities to defer investment in new FTM resources like powerplants and transmission and distribution infrastructure.[21] Lastly, increased BTM deployment supports clean energy job growth in the Commonwealth;[22] Since 2010, according to the Massachusetts Clean Energy Center (MassCEC), Massachusetts' clean energy industry has grown 100 percent.[23]

BTM resources also provide environmental and equity benefits by enabling greater customer energy independence and reducing the need for utility-scale fossil fuel generation. By using electricity generated on-site, customers with BTM solar and storage are able to reduce their exposure to electric rate increases and have more control over their energy bills. In addition, deployment of clean energy resources such as BTM solar reduces the need for new utility-scale fossil fuel generation that would have a larger land footprint, require more water consumption, expose local communities to air pollutants and release greenhouse gas emissions into the atmosphere.[24] Avoiding increased local pollution is especially important for Black, Indigenous,[25] and people of color (BIPOC) and low-income communities that are already disproportionately exposed to pollution, environmental hazards, and negative climate impacts.[26]

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[18] Sun, T., Feng, Y., Zanocco, C., Flora, J., Majumdar, A., and Rajagopal, R., "Solar and battery can reduce energy costs and provide affordable outage backup for US households," *Nature Energy 10* (2025), www.nature.com/articles/s41560-025-01821-w.

[19] "Energy Burden Research," ACEEE, 2024, www.aceee.org/energy-burden.

[20] "Low-Income Energy Affordability Data (LEAD) Tool," U.S. Department of Energy, 2022, www.energy.gov/scep/slsc/lead-tool.

[21] (1) Woods et al., *Energy Storage Benefit-Cost Analysis: A Framework for State Energy Programs*, (2) Junod, A. N., Cohen, O., Zinn, A., and Lloyd, K., *Where can solar investments reduce energy burdens?,* Urban Institute, 2025, www.urban.org/research/publication/where-can-solar-investments-reduce-energy-burdens.

[22] Woods et al., *Energy Storage Benefit-Cost Analysis: A Framework for State Energy Programs*.

[23] King, V., *Massachusetts Clean Energy Center's 2024 Industry Report finds 100% growth since 2010 and identifies need for 28,000 additional workers by 2030*, MassCEC, 2025, www.masscec.com/press/massachusetts-clean-energy-workforce-doubled-14-years-new-report-shows.

[24] (1) Mango, M., and Tym, O., *Equitable Resilience: Opportunities to Advance Solar Paired with Battery Storage in Historically Marginalized Communities*, Clean Energy Group, January 2025, www.cleanegroup.org/publication/equitable-resilience-solar-storage-in-marginalized-communities; (2) Mango, M., Oxnam, G., Mills, N., Sheehan, C., *Resilient Solar and Battery Storage for Cooling Centers: Mitigating the Impacts of Extreme Heat on Vulnerable Populations*, Clean Energy Group, 2022, www.cleanegroup.org/publication/resilient-solar-and-battery-storage-for-cooling-centers-mitigating-the-impacts-of-extreme-heat-on-vulnerable-populations.

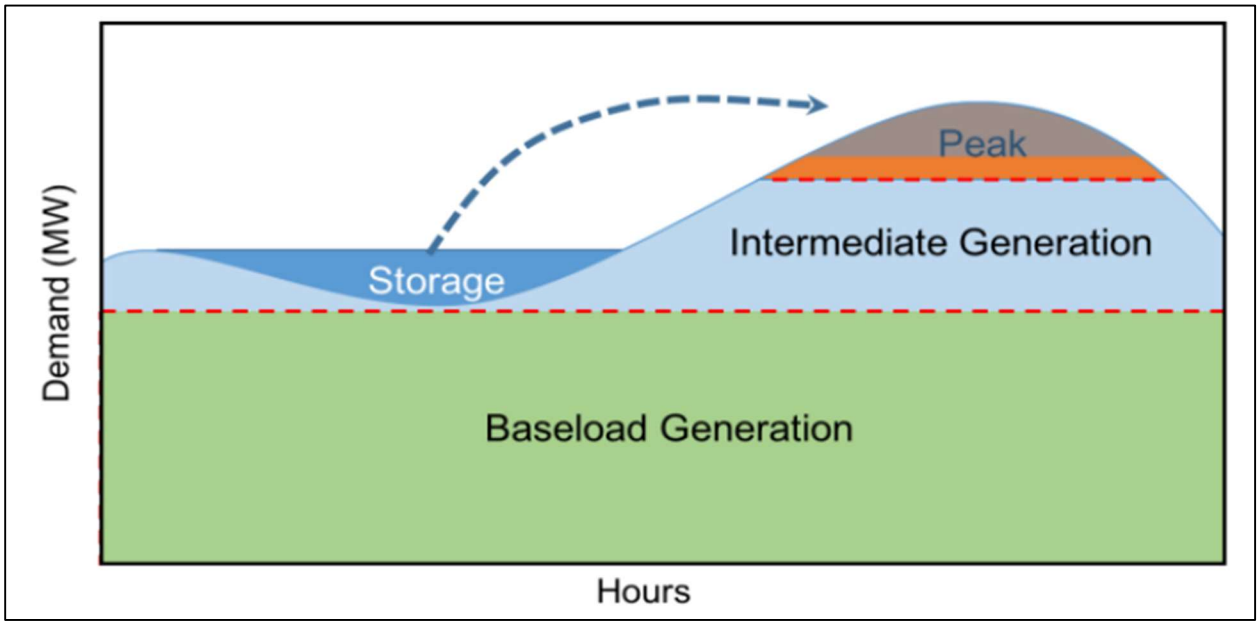
[25] Indigenous Peoples is inclusive of Tribal governments, urban Indian organizations, all American Indians recognized as having a special status relationship with the Commonwealth, and individual Indians as defined in federal law.

[26] (1) Jbaily, A., Zhou, X., Liu, J., Lee, T., et al., "Air pollution exposure disparities across US population and income groups," *Nature, 601,* 228-233 (2022), www.nature.com/articles/s41586-021-04190-y; (2) *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts*, U.S. EPA, 2021, www.epa.gov/cira/social-vulnerability-report; (3) Liu, J., Clark, L. P., Bechle, et al., "Disparities in Air Pollution Exposure in the United States by Race/Ethnicity and Income, 1990–2010," *Environmental Health Perspectives, 129(12)* (2021), https://doi.org/10.1289/EHP8584.

BTM deployment improves grid resiliency by providing black-start[27] capabilities and reduces power outage impacts when used to provide back-up power during grid outages. This ability is especially important for maintaining essential services during emergencies, such as police services, fire stations and hospitals. In addition, constant supply of power is critical for households that use electricity-dependent medical equipment or require medications to be refrigerated.[28]

Lastly, BTM deployment can shift demand from peak to off-peak periods because, during peak periods, customers can rely on onsite generation and stored power to meet their energy needs and export any excess stored electricity onto the grid (see Figure 2).

Figure 2. *State of Charge* illustration of energy storage using off-peak energy during peak periods



Stored generation (in blue) can be used to meet demand (y-axis) during hours (x-axis) when demand is highest. Source: Reproduced from Figure 3 in Massachusetts DOER's 2016 report State of Charge: Massachusetts Energy Storage Initiative, *www.mass.gov/info-details/energy-storage-study*.

This report's analysis of technical potential for BTM solar and storage systems in Massachusetts EJ neighborhoods builds on Massachusetts DOER's *2023 Massachusetts Technical Potential of Solar Study*[29] *as well as* the companion to this report, *Electrification with Equity, Part 1: The Opportunity for Behind-the-Meter Solar and Storage in Massachusetts*,[30] that assesses the

[27] "Black Start," National Laboratory of the Rockies (NLR), www.nlr.gov/grid/black-start.
[28] Casey, J. A., Fukurai, M., Hernandez, D., Balsari, S., and Kiang, M. V., "Power outages and community health: a narrative review," *Current Environmental Health Reports, Volume 7,* 371-383 (2021), https://link.springer.com/article/10.1007/s40572-020-00295-0.
[29] Knight, P., Griot, O., Carlson, E., et al., *Massachusetts Technical Potential of Solar Study,* prepared by Synapse Energy Economics for Massachusetts DOER, July 2023, www.mass.gov/info-details/technical-potential-of-solar-study.
[30] Stasio, T., Stanton, E.A., Castigliego, J. R., *Electrification with Equity, Part 1: The Opportunity for Behind-the-Meter Solar and Storage in Massachusetts*, Applied Economics Clinic, Clean Energy Group, and Vote Solar, April 2026, www.cleanegroup.org/publication/electrification-with-equity-part-1.

opportunity for BTM solar and storage to reduce future peak demand. Recommendations for addressing barriers to BTM solar and storage deployment in EJ communities were developed in collaboration with [31] with perspectives from different sectors, including environmental justice organizations, affordable housing, and clean energy developers. The analysis and recommendations presented in this report strive to align with on-the-ground and priorities for EJ neighborhoods.

The remainder of this report is as follows: Section II, Section III, and Section IV estimate the technical potential for BTM solar and storage systems in Massachusetts EJ neighborhoods, EJ neighborhoods with above average energy burdens, EJ neighborhoods in hot spot[32] areas, and EJ neighborhoods with higher than average heat vulnerable populations (overcrowded, children, older adults); and Section V provides recommendations for addressing gaps in existing offerings to unlock equitable BTM adoption in the Commonwealth.

II. Environmental Justice Analysis

Environmental justice is rooted in ensuring access to a clean environment and protection against environmental harm and inequities regardless of race or socioeconomic status.[33] Historically, BIPOC and low-income neighborhoods are more likely to be located near polluting facilities and, subsequently, have been disproportionately exposed to local air pollutants like particulate matter ($PM_{2.5}$), ozone (O_3), and nitrogen dioxide (NO_2).[34] In Massachusetts, 84 percent of emitting electric generating units are located in or within a mile of EJ neighborhoods.[35] Studies have also shown that communities with higher shares of BIPOC and low-income households are more likely to be located near hazardous waste sites.[36] Increased exposure to air pollution and hazardous

[31] Members of the advisory committee included: **Raquel Halsey**, Executive Director at the North American Indian Center of Boston; **Gregory King**, Managing Director at TSK Energy Solutions; **Tristan Thomas**, Director of Policy at Alternatives for Community and Environment; **Ben Underwood**, Co-Chief Executive Officer at Resonant Energy; **John Walkey**, Director of Climate Justice and Waterfront Initiatives at GreenRoots; and **Mary Wambui,** Environmental Justice Advocate.

[32] Areas with the 5 percent highest land surface temperature index in each Massachusetts Regional Planning Agency (RPA) region. For more information, see: "Hot Spots," Massachusetts EEA, https://mass-eoeea.maps.arcgis.com/home/item.html?id=6ef24687f7bf443085e22a1b65017354.

[33] "The Environmental Justice Movement," Natural Resources Defense Council, August 2025, www.nrdc.org/stories/environmental-justice-movement.

[34] "Power Plants and Neighboring Communities," U.S. EPA, www.epa.gov/power-sector/power-plants-and-neighboring-communities; (2) Liu et al., "Disparities in Air Pollution Exposure in the United States by Race/Ethnicity and Income, 1990–2010"; (3) Jbaily et al., "Air pollution exposure disparities across US population and income groups"; (4) (2) Fleischman, L., and Franklin. M., *Fumes across the fence-line: The health impacts of air pollution from oil and gas facilities on African American communities*, National Association for the Advancement of Colored People and the U.S. Clean Air Task Force, 2017, www.catf.us/wp-content/uploads/2017/11/CATF_Pub_FumesAcrossTheFenceLine.pdf.

[35] *Siting for a Cleaner, More Equitable Grid in Massachusetts*, Alternatives for Community and Environment, Conservation Law Foundation, GreenRoots, and UCS, March 2024, www.ucs.org/sites/default/files/2024-03/MA-infrastructure-fact-sheet-3-21.pdf.

[36] Mascarenhas, M., Grattet, R., and Mege, K., "Toxic Waste and Race in Twenty-First Century America," *Environment and Society, 12,* 108-126 (2021), https://doi.org/10.3167/ares.2021.120107.

materials can increase the risk of cancer and adverse health outcomes.[37]

In addition to releasing local pollution that impacts nearby neighborhoods, fossil fuel-fired generators release greenhouse gas emissions like carbon dioxide (CO_2) and nitrous oxide (N_2O) that exacerbate climate change.[38] Climate change impacts like extreme heat, flooding, and more frequent storms impact BIPOC and low-income communities more severely than wealthier, whiter communities.[39]

In line with the *2021 Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy*,[40] the Massachusetts EEA established the below criteria for identifying EJ neighborhoods on the basis of race/ethnicity, English-speaking status, and household income:[41]

- Annual median household income is 65 percent or less of the statewide annual median income ($99,858 in 2023[42]); **or**,
- At least 40 percent of the population is BIPOC; **or**,
- At least 25 percent of households identify as limited English-speaking; **or**,
- At least 25 percent of the population is BIPOC and the median household income of the municipality housing the block group is less than or equal to 150 percent of the statewide annual median household income.[43]

Massachusetts' EJ population definition sets the framework for identifying disproportionately impacted communities. EJ definitions are imperfect tools for identifying areas that are likely to have experienced increased exposure to air pollution, environmental hazards, and climate change impacts. For example, a 2025 study found that air pollution in the Greater Boston area was concentrated in Boston, Cambridge, Chelsea, and Everett, where there are many EJ

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[37] (1) Taylor, A., *Millions of Americans Live Near Toxic Waste Sites. How Does This Affect Their Health?,* Urban Institute, February 2022, https://housingmatters.urban.org/articles/millions-americans-live-near-toxic-waste-sites-how-does-affect-their-health; (2) Khadke, S., Kumar, A., Al-Kindi, S., et al., "Association of Environmental Injustice and Cardiovascular Diseases and Risk Factors in the United States," *Journal of the American Heart Association, 13(7)* (2024), https://doi.org/10.1161/JAHA.123.033428; (3) Beard, S., Freeman, K., Velasco, M.L. et al., "Racism as a public health issue in environmental health disparities and environmental justice: working toward solutions," *Environmental Health, 23(8)* (2024), https://doi.org/10.1186/s12940-024-01052-8.

[38] "Overview of Greenhouse Gases," U.S. EPA, 2025, www.epa.gov/ghgemissions/overview-greenhouse-gases.

[39] (1) *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts,* EPA, 2021; (2) Berberian, A. G., Gonzalez, D. J. X., and Cushing, L. J., "Racial Disparities in Climate Change-Related Health Effects in the United States," *Early Life Environmental Health, 9,* 451-464 (2022), https://link.springer.com/article/10.1007/s40572-022-00360-w.

[40] *An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy,* Massachusetts General Laws, Chapter 8, (2021).

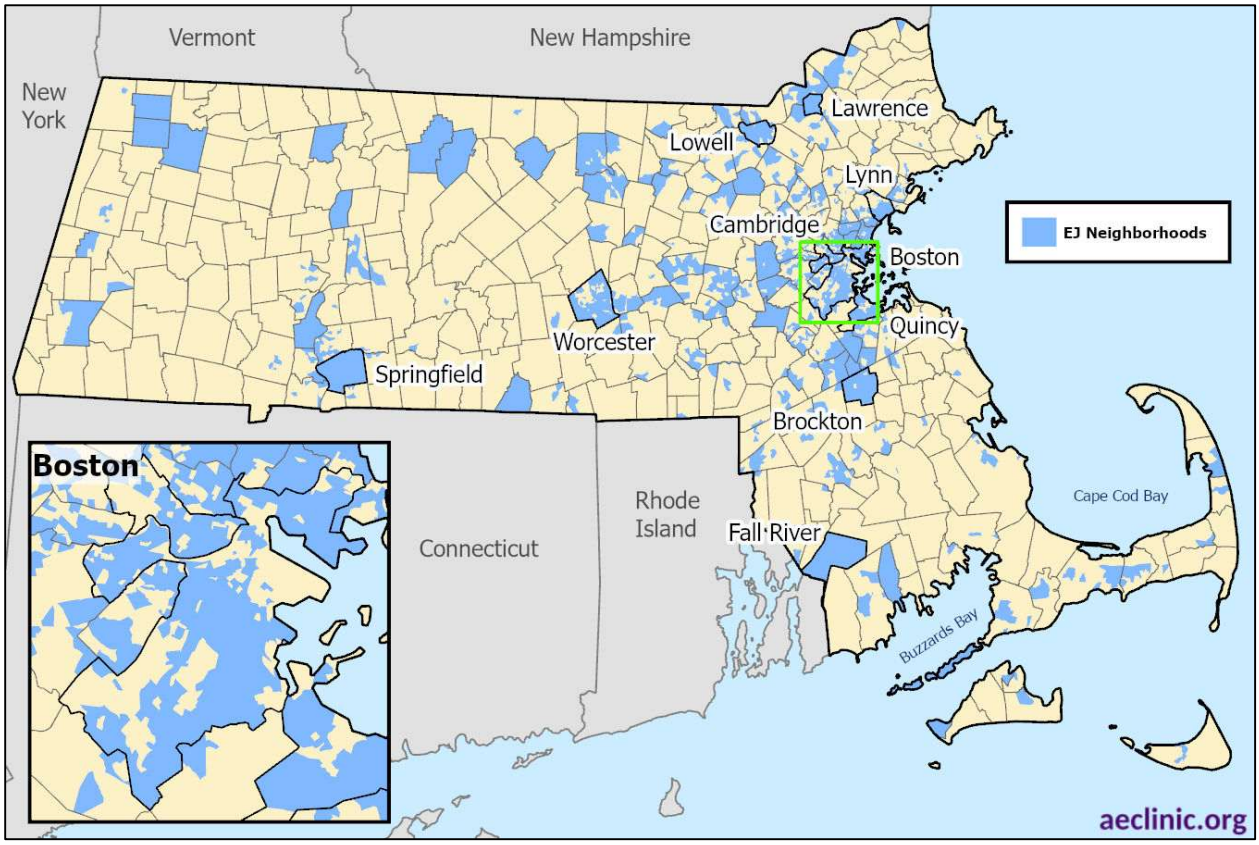
[41] (1) "Environmental Justice Policy," Massachusetts EEA, June 2021, www.mass.gov/info-details/environmental-justice-policy; (2) The U.S. Census Bureau defines census block groups as divisions of census tract areas containing between 600 and 3,000 people, see: "Glossary," U.S. Census Bureau, www.census.gov/programs-surveys/geography/about/glossary.html.

[42] *ACS 5-Year Estimates* [Table ID: B19013], U.S. Census Bureau, 2023, https://data.census.gov/table/ACSDT5Y2023.B19013?q=B19013:+Median+Household+Income+in+the+Past+12+Months+(in+2023+Inflation-Adjusted+Dollars)&g=040XX00US25&moe=false.

[43] "Environmental Justice Populations in Massachusetts," Massachusetts Office of Environmental Justice & Equity, www.mass.gov/info-details/environmental-justice-populations-in-massachusetts.

neighborhoods (see Figure 3).[44] (Note: Not all financially vulnerable households are located within EJ neighborhoods and there are some wealthier households within EJ neighborhoods.)

Figure 3. Massachusetts EJ neighborhoods (2023)



Massachusetts EJ neighborhoods (in blue). The top ten largest cities in Massachusetts are labeled and outlined in black. Data source: ACS 5-Year Estimates [Table IDs: B03002, B19013, C16002], U.S. Census Bureau, 2023.

Using data from DOER's 2023 *Massachusetts Technical Potential for Solar Study*[45] ("MA DOER Solar Study") together with the 2023 U.S. Census Bureau American Community Survey (ACS),[46] AEC estimates the technical potential—an upper bound estimate of resource deployment that considers system/topographic constraints, land-use constraints, and system performance[47]—of BTM solar in Massachusetts EJ neighborhoods to be 31.3 gigawatts (GW) of solar, dwarfing existing BTM solar capacity enrolled in the Solar Massachusetts Renewable Target program (SMART) that are located on low-income properties (see Figure 4). In addition, AEC estimates a technical potential of 13.4 GW[48] of paired BTM storage, assuming a storage-to-solar ratio of

[44] Do, K., Zhang, Y., Ma, S., and Tong, D., "Assessing air pollution exposure disparities in disadvantaged communities of Greater Boston: a new cumulative environmental justice score system," *Environmental Research Letters, 20,* 034018 (2025), https://doi.org/10.1088/1748-9326/adb16c.

[45] Knight et al., *Massachusetts Technical Potential of Solar*.

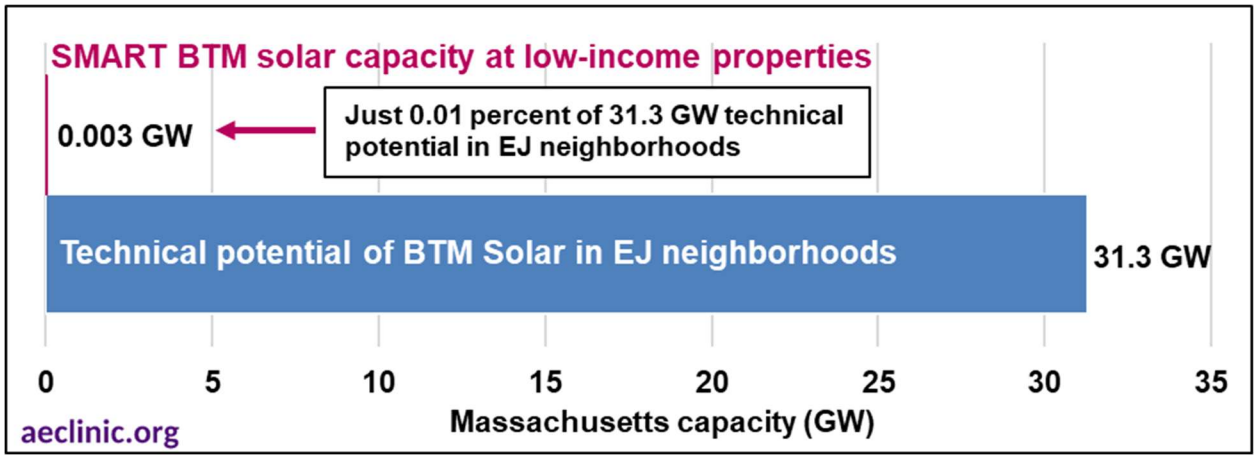
[46] *ACS 5-Year Estimates* [Table IDs: B03002, B19013, C16002], U.S. Census Bureau, 2023, https://data.census.gov/advanced?g=040XX00US25$1400000,25$1500000&y=2023.

[47] "Energy Technical Potential," NLR, www.nlr.gov/gis/re-potential

[48] Assuming the use of 4-hour battery storage, this amounts to 13*4=52 GWh.

0.43. (Note: As of December 2025, there was 3.1 GW of BTM solar and just 0.2 GW of BTM storage in Massachusetts.[49])

Figure 4. Massachusetts BTM solar technical potential in EJ neighborhoods



Total BTM solar capacity of approved SMART units on low-income properties (in pink) and the technical potential of BTM solar in Massachusetts EJ neighborhoods (in blue). Technical potential includes BTM solar at tax parcel locations with any suitability grade (i.e., "All A," "Mostly A," "Mixed Suitability").
Data source: (1) SMART Solar Tariff Generation Units, *Massachusetts DOER, January 2026, www.mass.gov/doc/smart-solar-tariff-generation-units; (2) AEC calculation.*

Methodology for estimating technical potential of BTM solar and storage in EJ neighborhoods

The technical potential of a resource is an upper bound estimate of resource deployment and does not consider technology costs or market conditions (e.g., policy, regulations, investor response, regional competition).[50] To estimate the technical potential for BTM solar in Massachusetts EJ neighborhoods, AEC uses parcel data from the MA DOER Solar Study[51] combined with census block group data from the 2023 U.S. Census Bureau American Community Survey (ACS)[52] to identify EJ neighborhoods. AEC then employs a storage-to-solar ratio—the ratio between storage capacity and solar capacity in BTM paired systems—based on a Lawrence Berkeley National Laboratory 2021 study of BTM paired systems.[53]. According to Lawrence Berkeley Laboratory, BTM solar systems paired with storage, typically have storage-to-solar capacity ratios between 0.4 and 1.2.[54] To estimate the technical potential of storage that could be paired with BTM solar in Massachusetts across different suitability score grades, AEC applied a storage-to-solar capacity ratio of 0.43 (the mid-point of the minimum ratio from a Lawrence

[49] (1) "Electric Power Monthly" [Table 6.2.B], U.S. Energy Information Administration (EIA), November 2025, www.eia.gov/electricity/monthly/epm_table_grapher.php?t=table_6_02_b; (2) *Form EIA-861 [Net Metering, Non-Net Metering]*, U.S. EIA, 2024, www.eia.gov/electricity/data/eia861/.
[50] "Energy Technical Potential," NLR, www.nlr.gov/gis/re-potential.
[51] Knight et al., *Massachusetts Technical Potential of Solar*.
[52] *ACS 5-Year Estimates* [Table IDs: B03002, B19013, C16002], U.S. Census Bureau, 2023, https://data.census.gov/advanced?g=040XX00US25$1400000,25$1500000&y=2023.
[53] Barbose, G., Elmallah, S., and Gorman, W., *Behind-the-Meter Solar+Storage: Market Data and Trends*, prepared by Lawrence Berkeley National Laboratory on behalf of U.S. Department of Energy Solar Energy Technologies Office, 2021, https://eta-publications.lbl.gov/sites/default/files/btm_solarstorage_report_-_factsheet.pdf, Figure 2.
[54] Ibid.

Berkeley National Lab 2021 study[55] and the maximum ratio assuming all solar generated is stored). For more information on the development of AEC's storage-to-solar capacity ratio, see *Electrification with Equity, Part 1: The Opportunity for Behind-the-Meter Solar and Storage in Massachusetts.*[56]

To estimate technical potential of ground-mounted, rooftop, and canopy[57] solar in the Commonwealth, the MA DOER Solar Study assessed the feasibility and permissibility of building solar using publicly available Massachusetts tax parcel data.[58] In its assessment, DOER applied zoning setbacks and buffers around buildings and removed areas with angles or shapes that would be less likely to support solar installations. In addition, DOER removed locations where building solar would not be permitted (e.g., wetlands, protected and recreational open space, roads). For each tax parcel remaining after this initial screening process, DOER assigned grades ("A", "B" or "C") across six categories of suitability—agriculture, biodiversity, ecosystem services, embedded carbon, electric infrastructure, and slope/aspect.[59] For buildings with denser tree canopies or other structures that could limit sun exposure, DOER de-rated rooftop solar suitability.[60] It is important to note that there are several property characteristics that the MA DOER Solar Study technical potential estimates do not account for, for example: substation host capacity, electric panel capacity, and roof material.

AEC calculated solar potential for tax parcels located within Massachusetts EJ neighborhoods for each of DOER's main score grades (e.g., "All A," "Mostly A," "Mixed Suitability"). Mixed Suitability is assigned to tax parcels that receive grades across each of the six suitability categories that are not all or mostly A (see Table 2).[61] To DOER's analysis, AEC added an assessment of EJ populations and the EJ populations facing high energy burdens, heat risk, and heat vulnerability. EJ block groups were identified using U.S. Census Bureau 2023 ACS data.[62]

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[55] Barbose, G., Elmallah, S., and Gorman, W., *Behind-the-Meter Solar+Storage: Market Data and Trends*, prepared by Lawrence Berkeley National Laboratory on behalf of U.S. Department of Energy Solar Energy Technologies Office, 2021, https://eta-publications.lbl.gov/sites/default/files/btm_solarstorage_report_-_factsheet.pdf, Figure 2.

[56] Stasio, Stanton, and Castigliego, *Electrification with Equity, Part 1.*

[57] The MA DOER Solar Study defines canopy solar as solar installed above parking lots that also provide shade. See: Knight et al., *Massachusetts Technical Potential of Solar*, p. 3.

[58] "MassGIS Data: Property Tax Parcels," MassGIS, January 2026, www.mass.gov/info-details/massgis-data-property-tax-parcels.

[59] "Massachusetts Technical Potential of Solar: Methodology," Massachusetts DOER, 2023, https://technicalpotentialofsolar-ma-synapse.hub.arcgis.com/pages/methodology.

[60] Knight et al., *Massachusetts Technical Potential of Solar*, p. 48.

[61] "Massachusetts Technical Potential of Solar: Frequently Asked Questions," Massachusetts DOER, 2023, https://technicalpotentialofsolar-ma-synapse.hub.arcgis.com/pages/faqs.

[62] *ACS 5-Year Estimates* [Table IDs: B03002, B19013, C16002], U.S. Census Bureau, 2023, https://data.census.gov/advanced?g=040XX00US25$1400000,25$1500000&y=2023.

Table 2. MA DOER Solar Study suitability scoring rubric

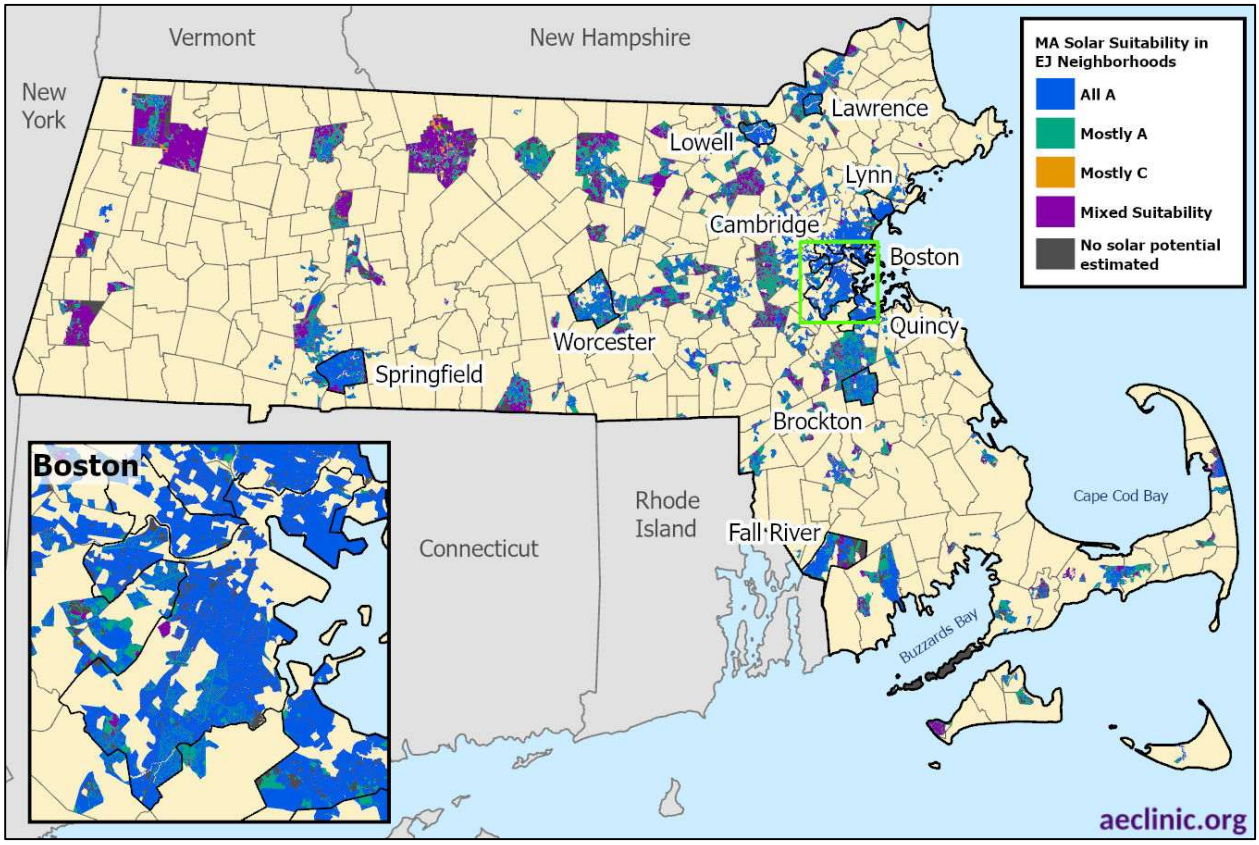
		Biodiversity	Agriculture	Other Ecosystem Services	Embedded CO_2e	Slope and Aspect	Grid Infrastructure
Grade	*A - Most Suitable*	Sum of local BioMap area and Core/CNL area within the object is less than 25% of the object area	Prime agricultural soil area covers less than 25% of the object area and parcel is not designated as farmland	Sum of area covered by Interim Wellhead Protection Area, Zone 2 wellhead protection area, ACECs, and Zone 1 wellhead protection area is less than 25% of the object area	No embedded CO_2e, as estimated in Clark University study, or contains up to 225 MT CO_2e/acre embedded and foregone CO_2e	≤10% grade, facing any direction	Parcel is within 2 miles of a substation
	B - More Suitable	Sum of local BioMap area and Core/CNL area within object is greater than or equal to 25% of the object area	Prime agricultural soil area covers greater than or equal to 25% of the object area and parcel is not designated as farmland	Sum of area covered by Interim Wellhead Protection Area, Zone 2 wellhead protection area, ACECs, and Zone 1 wellhead protection area is greater than or equal to 25% of the object area	Embedded and foregone CO_2e ranges from 226-275 MT CO_2e/acre	>10% grade and ≤20% grade, facing south, where "south" is defined as between 45° and 315°	Parcel is within 2 to 5 miles of a substation
	C - Less Suitable	Core/CNL area within object is greater than or equal to 25% of the object area	Parcel is coded as farmland (this is all or nothing for the parcel, so no % cutoff is needed)	Sum of area covered by ACECs and Zone 1 wellhead protection area is greater than or equal to 25% of the object area	Embedded and foregone CO_2e ranges from 276-363 MT CO_2e/acre	>10% grade facing north; >20% grade facing south	Parcel is more than 5 miles from a substation
Treatment by type of solar	*Ground mounted*	Above criteria applies	Above criteria applies	Above criteria applies	Above criteria applies	Above criteria applies	Above criteria applies
	Canopy	All objects rated as A	All objects rated as A	All objects rated as A	All objects rated as A	All objects rated as A	Above criteria applies
	Building mounted	All objects rated as A	All objects rated as A	All objects rated as A	All objects rated as A	All objects rated as A	Above criteria applies

Source: Reproduced from Massachusetts Technical Potential of Solar: Methodology, *Massachusetts DOER, 2023, https://technicalpotentialofsolar-ma-synapse.hub.arcgis.com/pages/methodology.*

In 2023, 2,406 out of 5,116 Massachusetts block groups were EJ neighborhoods according to the EEA criteria presented above (see Figure 3 above). Using data from the MA DOER Solar Study,[63] AEC identified 718,137 Massachusetts tax parcels within EJ neighborhoods (compared to 1,472,049 tax parcels that are not within EJ neighborhoods). Most of the EJ tax parcels (81 percent) were awarded with "All A" main solar suitability scores, meaning that these properties are highly suitable for canopy, building-mounted (rooftop), or ground-mounted solar installations (see Figure 5).

[63] Knight et al., *Massachusetts Technical Potential of Solar*.

Figure 5. Massachusetts EJ neighborhoods technical potential of BTM solar (2023)



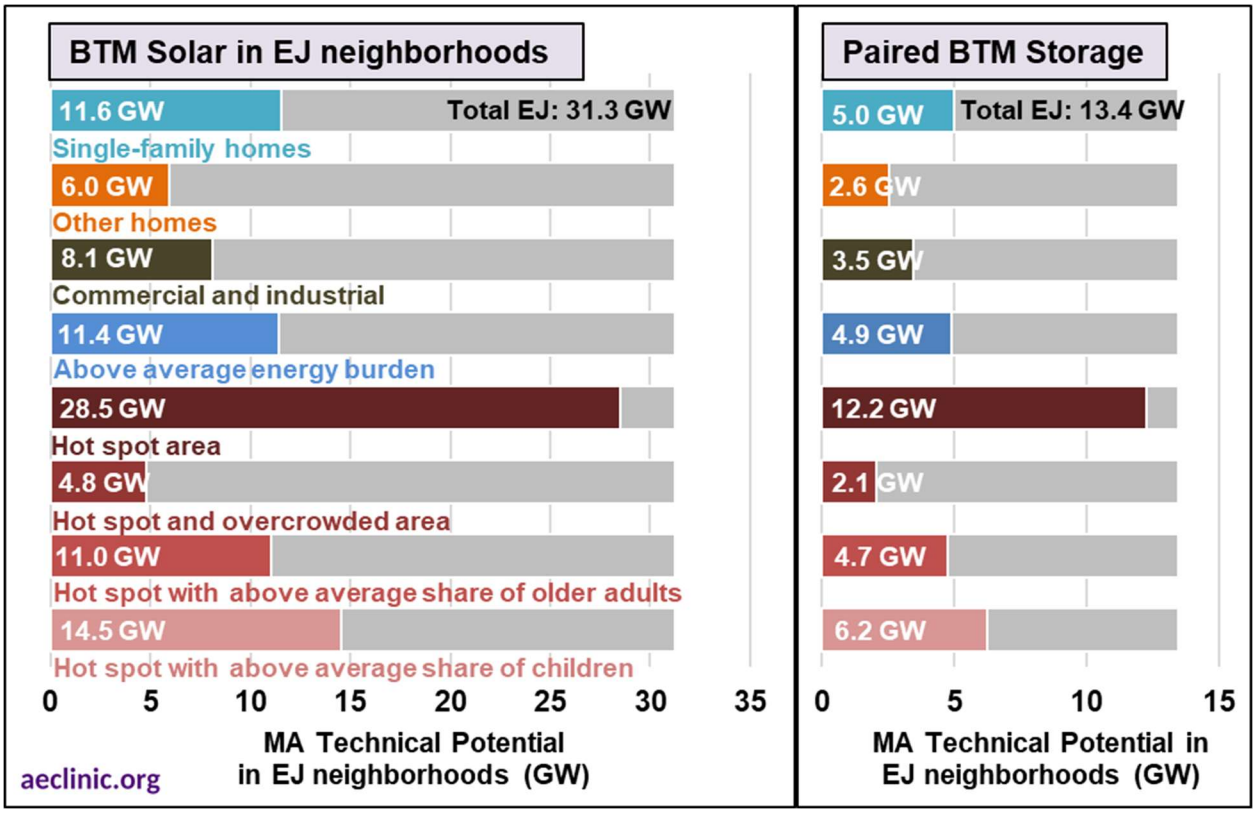
Tax parcels in Massachusetts EJ neighborhoods where the colors correspond to solar suitability grades as assigned in the MA DOER Solar Study, where "All A" indicates the properties that are highly suitable for canopy, rooftop, or ground-mounted solar installations.
Data source: (1) EJ Neighborhoods: U.S. Census Bureau. 2023. ACS 5-Year Estimates [Table IDs: B03002, B19013, C16002]; (2) Solar Suitability: Knight, P., Griot, O., Carlson, E., et al. July 2023. Massachusetts Technical Potential of Solar.

Main results: technical potential of BTM solar and storage in EJ neighborhoods

The technical potential of BTM solar and storage in Massachusetts EJ neighborhoods is 31.3 GW of solar paired with 13.4 GW of storage (see Figure 6 below), where 31.3 GW of BTM solar produces about 35,600 GWh of electricity, enough to power all of Massachusetts' almost three million homes (see *Appendix A: Main Results in GWh*).[64]

[64] In 2020, average annual electricity consumption for Massachusetts households was 0.007 GWh. See: *Annual household site end-use electricity consumption in the United States by state—averages, 2020*, U.S. EIA, 2023, www.eia.gov/consumption/residential/data/2020/state/pdf/ce4.6.el.st.pdf.

Figure 6. Massachusetts EJ neighborhood BTM solar and storage technical potential, in GW



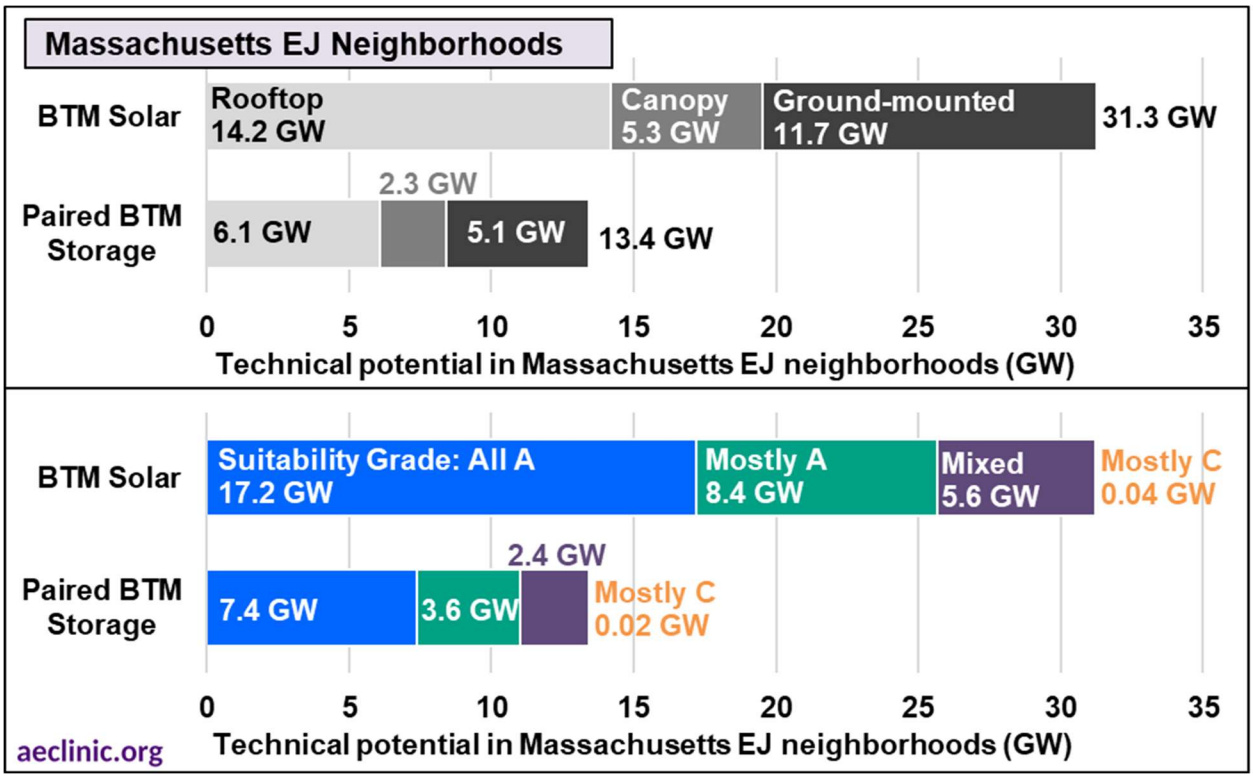
Estimated technical potential of BTM solar in Massachusetts EJ neighborhoods (left panel) and paired BTM storage (right panel)—assuming a storage-to-solar ratio of 0.43—across different property types and areas.
Data source: AEC calculation.

More than half of the 31.3 GW of technical EJ BTM solar potential is attributable to properties that are highly suitable for solar siting (see Figure 7) (i.e., tax parcel main suitability score is "All A" according to the MA Solar Study data). (For comparison, DOER estimates the technical potential of all of Massachusetts BTM solar to be 145 GW, 48 times the amount of installed BTM solar capacity as of 2025.[65]) As noted in the MA DOER Solar Study, additional suitability considerations not covered in the study's suitability assessment include rooftop age, building age, building tenure, rooftop material, and competition for rooftop space. These are important factors that impact suitability for building-mounted (rooftop) solar.[66]

[65] (1) Knight et al., *Massachusetts Technical Potential of Solar*, Table 1; (2) "Electric Power Monthly," U.S. EIA, December 2025, Table 6.2.B.

[66] (1) Knight et al., *Massachusetts Technical Potential of Solar,* p. 46-47; (2) Banton, S., *Grid Disparity Analyses in FirstEnergy Service Territory*, Interstate Renewable Energy Council, March 2025, https://irecusa.org/wp-content/uploads/2025/04/Grid-Disparity-Analyses-in-FirstEnergy-Service-Territory_FINAL-1.pdf.

Figure 7. Massachusetts BTM solar and storage potential in EJ neighborhoods



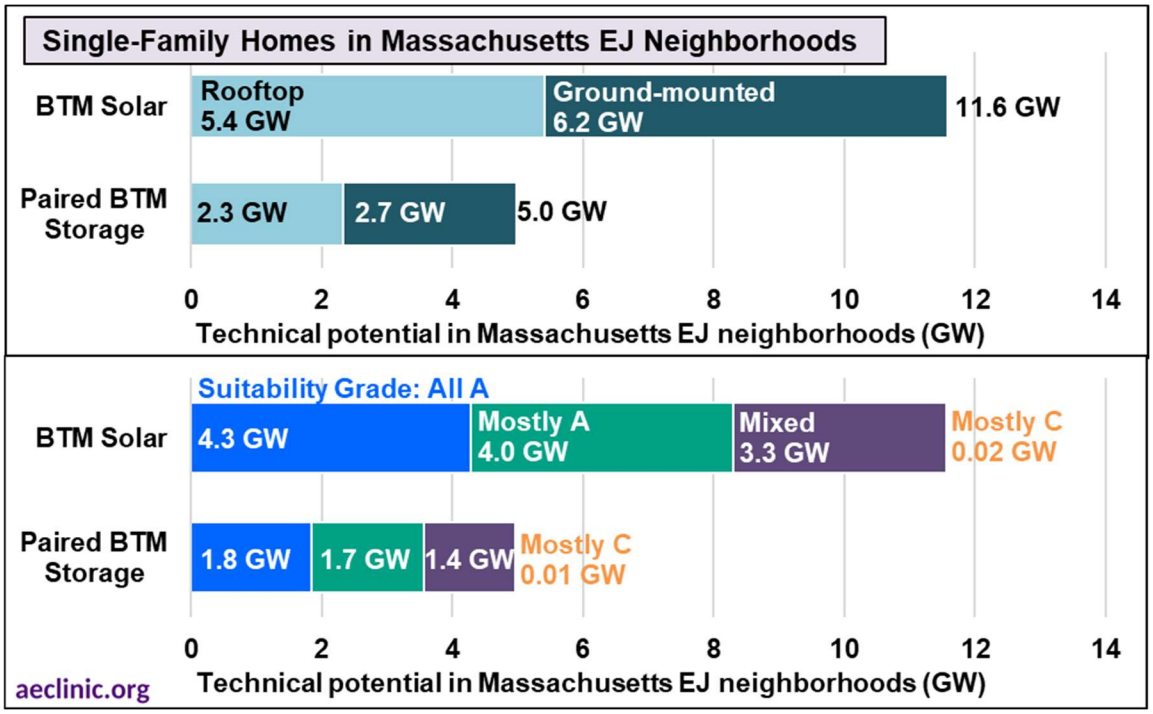
Technical potential of BTM solar and paired BTM storage in Massachusetts EJ neighborhoods by solar type (top panel) and solar suitability grade (bottom panel). A storage-to-solar ratio of 0.43 is used to estimate paired BTM storage. Data source: AEC calculation.

Residential technical potential for BTM solar paired with storage in Massachusetts EJ neighborhoods is 17.5 GW of solar paired with 7.5 GW of storage

The residential technical potential for BTM solar and storage in EJ neighborhoods is 17.5 GW of solar paired with 7.5 GW of storage. The technical potential for BTM solar and storage for single-family properties in EJ neighborhoods is 11.6 GW of BTM solar paired with 5.0 GW of storage (see Figure 8), whereas, the technical potential for BTM solar on other residential properties—including condos, multifamily homes, and mobile homes[67]—in EJ neighborhoods is 6.0 GW of BTM solar paired with 2.6 GW of storage (see Figure 8).

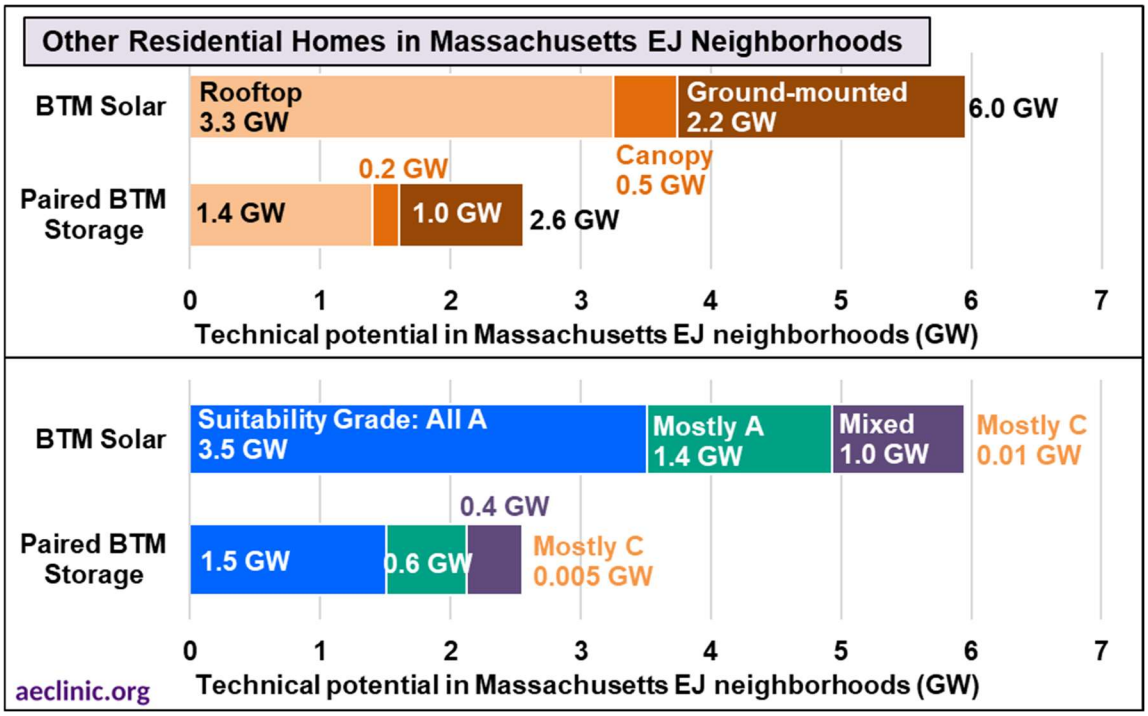
[67] MA DOER Solar Study data simplified parcel use codes from the Commonwealth's property tax data to include only two codes: single-family and other residential. Other residential includes condos, mobile homes, multifamily homes, non-transient group quarters and affordable housing. See: (1) "Property Type Classification Codes," Massachusetts Department of Revenue Division of Local Services, April 2019, www.mass.gov/doc/property-type-classification-codes-non-arms-length-codes-and-sales-report-spreadsheet/download; (2) "MA Parcel Suitability," Massachusetts DOER, 2023, https://technicalpotentialofsolar-ma-synapse.hub.arcgis.com/datasets/49388e675c5a493983a252d5acf64418/about.

Figure 8. Single-family BTM solar and storage potential in Massachusetts EJ neighborhoods



The technical potential of BTM solar and paired BTM storage for single-family homes in Massachusetts EJ neighborhoods by solar type (top panel) and solar suitability grade (bottom panel). A storage-to-solar ratio of 0.43 is used to estimate paired BTM storage. Data source: AEC calculation.

Figure 9. Other residential BTM solar and storage potential in Massachusetts EJ neighborhoods



The technical potential of BTM solar and paired BTM storage for other residential (i.e., non-single-family) homes in Massachusetts EJ neighborhoods by solar type (top panel) and solar suitability grade (bottom panel). A storage-to-solar ratio of 0.43 is used to estimate paired BTM storage. Data source: AEC calculation.

Most existing residential solar systems in Massachusetts are located on single-family lots.[68] This is partly because solar siting on manufactured homes, multi-family homes, and commercial apartment buildings is more difficult. Owners of manufactured or mobile homes may not own the underlying land, limiting homeowners' ability to install solar.[69] In addition, the roofs of manufactured and mobile homes may not be able to support traditional solar equipment, and mobile homes typically have limited roof space. There may also be a lack of motivation for multi-family properties to install BTM energy resources given the split incentive.[70]

Despite these challenges, multifamily homes can be good candidates for BTM solar paired with storage. For example, a multifamily building called "The Kenzi"—a fifty-unit age-restricted affordable housing project in Roxbury—received a one-time grant to switch the existing fossil fuel generator to a battery energy storage system paired with solar to act as an emergency backup system (a requirement in the Commonwealth for multifamily buildings with more than four floors).[71]

Due to these limitations not captured in the MA DOER Solar Study, the technical potential for BTM rooftop solar is likely overestimated, particularly in areas with higher concentrations of older buildings and renter-occupied units. Still, the technical potential estimates provided in this report show that there is substantial opportunity for scaling BTM deployment in EJ neighborhoods. In 2023, 52 percent of Massachusetts housing units in EJ neighborhoods were occupied by renters, compared to 37 percent statewide. In addition, more than half of housing units in EJ neighborhoods were built before 1960 (see Figure 10), compared to 42 percent of housing units statewide.[72] In total, EJ neighborhoods likely face more barriers to BTM solar and storage installation due to higher shares of renter-occupied and older buildings.

[68] Knight et al., *Massachusetts Technical Potential of Solar.*

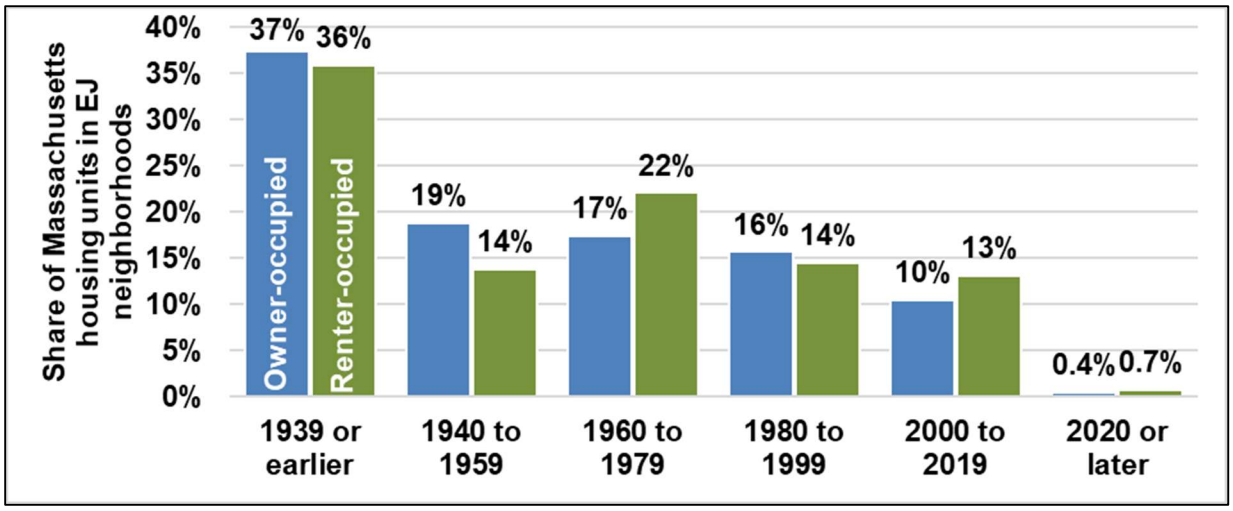
[69] Donalds, S., *Solar for Manufactured Homes: The Next Frontier for Energy Equity*, Clean Energy States Alliance, June 2021, www.cesa.org/solar-for-manufactured-homes.

[70] Multifamily and property owners are responsible for paying for clean energy installations on their properties but the benefits of these systems, including lower energy bills, would be realized by the tenants, removing the incentive for these property owners and leaving renters/condo-owners unable to reap the benefits from on-site clean energy. For multifamily properties that are master metered (i.e., utilities are paid by the property owner not the tenants), there is no split-incentive, however, the benefits of solar/storage may not be realized by the tenants.

[71] (1) "Battery Backup in Multifamily Housing: A Case Study in Code Compliance," MassCEC, www.masscec.com/resources/battery-backup-multifamily-housing-case-study; (2) "The Kenzi at Bartlett Station," Clean Energy Group, www.cleanegroup.org/initiatives/technical-assistance-fund/featured-installations/kenzi.

[72] "American Community Survey 5-Year Estimates Subject Tables [TableID: S2504]," U.S. Census Bureau, 2023.

Figure 10. 2023 Massachusetts housing units in EJ neighborhoods by tenure and building age



The share of Massachusetts housing units in EJ neighborhoods by the year the building was built and by tenure.
Data source: U.S. Census Bureau. 2023. American Community Survey 5-Year Estimates Subject Tables [TableID: S2504].

Commercial and industrial technical potential for BTM solar and storage in Massachusetts EJ neighborhoods is 8.1 GW of solar paired with 3.5 GW of storage

As discussed in Section I above, BTM solar and storage installations at or on commercial and industrial lots in EJ neighborhoods can provide important resiliency benefits for the local community.[73] BTM solar paired with storage can have black-start capability, providing customers with access to electricity during power outages, reducing impacts on local businesses and the surrounding neighborhoods. For example, BTM solar paired with storage at a food pantry could power the facility during grid disruptions caused by extreme weather events and simultaneously allow it to serve as a "resilience hub"[74] for residents to cool off, warm up, charge electronics, and the like. Resilience hubs are being developed across the country, including in Medford, MA, in anticipation of growing need due to climate change.[75]

AEC estimates the technical potential for BTM solar and storage on commercial and industrial properties[76] in Massachusetts EJ neighborhoods, excluding multifamily apartment buildings, is 8.1 GW of solar paired with 3.5 GW of storage (see Figure 11).

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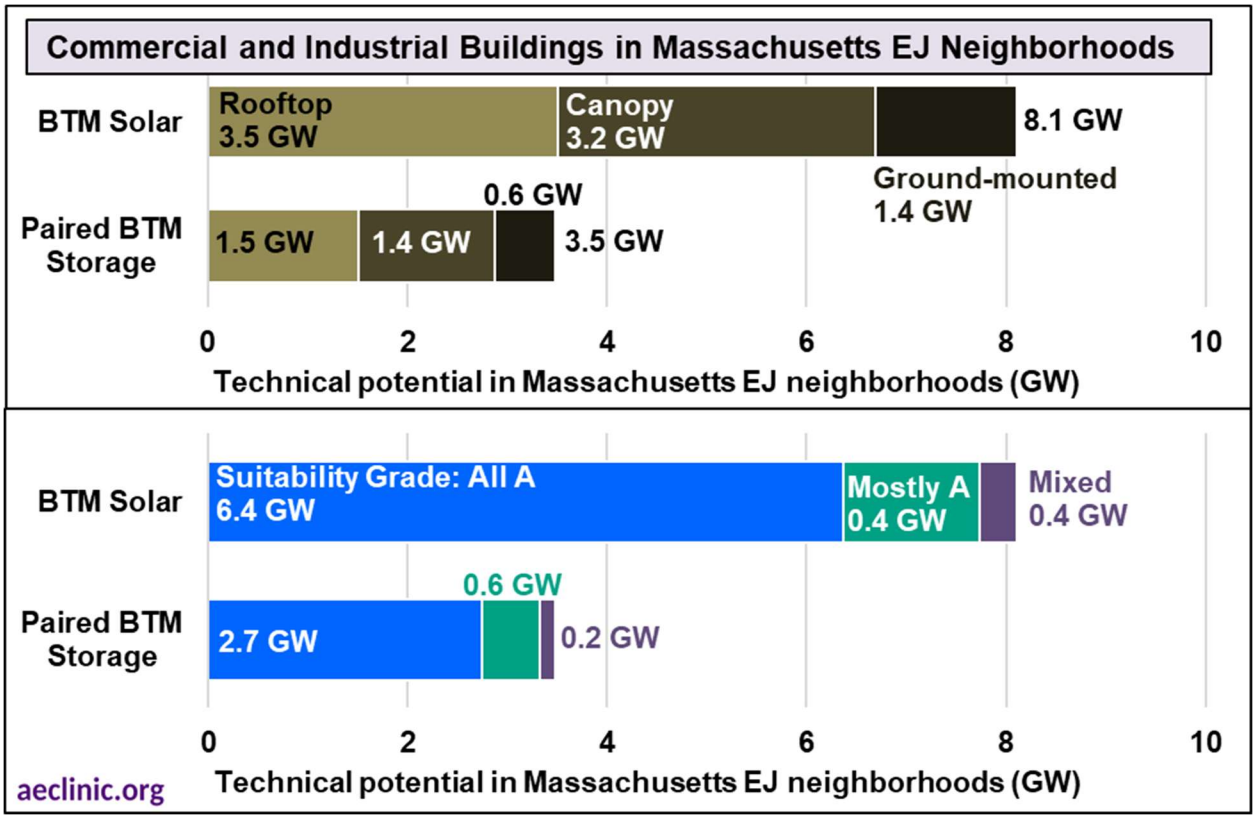
[73] *Maximizing the Benefits of Onsite Renewable Energy Generation Using Onsite Energy Storage*, U.S. DOE, October 2024, https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/IntegrationPrimer.pdf.
[74] "Shelter in the storm: How resilience hubs use solar to protect their communities," Solar United Neighbors, https://solarunitedneighbors.org/news/shelter-in-the-storm-how-resilience-hubs-use-solar-to-protect-their-communities.
[75] Grunwald, B., Reback, M., Warsing, R., *Weathering Climate Disasters with Resilience Hubs*, Rocky Mountain Institute, October 2022, https://rmi.org/weathering-climate-disasters-with-resilience-hubs.
[76] Commercial and Industrial properties include (1) any commercial, business, retail, trade, service, recreational, agricultural, artistic, sporting, fraternal, governmental, educational, medical or religious enterprise for non-profit purposes, and (2) property used for manufacturing, milling, converting, producing, processing, extracting or fabricating materials; the mechanical, chemical or electronic transformations; storage, transmitting and generating of utilities. For more information, see: *Property Type Classification Codes*, Massachusetts Department of Revenue, April 2019.

Figure 11. Commercial and industrial BTM solar and storage potential in Massachusetts EJ neighborhoods



The technical potential of BTM solar and paired BTM storage for commercial and industrial buildings in Massachusetts EJ neighborhoods by solar type (top panel) and solar suitability grade (bottom panel). A storage-to-solar ratio of 0.43 is used to estimate paired BTM storage.
Data source: AEC calculation.

Like residential buildings, installation of BTM solar and storage resources is more difficult for commercial and industrial buildings that are older and, therefore, more likely to have aging roofs or require electric system or other physical upgrades. According to the National Laboratory of the Rockies' (formerly National Renewable Energy Laboratory (NREL)) *2019 Commercial Building Inventory*, the average year built for Boston's 5,889 commercial and industrial buildings is 1945.[77] Similarly, commercial buildings in other Massachusetts cities like Cambridge, Fall River, New Bedford, Quincy, Springfield, and Worcester were built pre-1960 on average,[78] suggesting that expanding BTM solar on rooftops in Massachusetts' major cities may require roof or electric panel replacements, or other upgrades.

[77] "City and County Commercial Building Inventories," NLR, 2019, https://data.openei.org/submissions/906.
[78] Ibid.

III. Energy Burden Assessment

Like energy efficiency and weatherization upgrades, installing BTM solar and storage can reduce household energy burden—the share of household income spent on energy costs—through on-site generation together with financial incentives offered by the Commonwealth (see *Appendix B: Massachusetts Energy and Housing Programs* for information on Massachusetts incentives).[79] This in turn can improve human health outcomes by making health-related energy costs, such as air conditioning during heat waves, more affordable.[80]

Lower income households typically face higher energy burdens and households that face higher energy burdens are less likely to have the funds to support installation of BTM solar and storage systems. The American Council for an Energy-Efficient Economy (ACEEE) has found that low-income, Black, and Hispanic households face higher energy burdens on average, with 25 percent of low-income households spending more than 15 percent of their income on energy bills.[81] By contrast, according to the U.S. Department of Energy (DOE) Low-Income Energy Affordability Data (LEAD) tool, Massachusetts average energy burden is three percent, meaning that on average, Massachusetts households spent three percent of their income on household energy costs (space heating, water heating and electricity).[82] Over 60 percent of Massachusetts EJ neighborhoods (1,471 out of 2,406 census block groups) face average household energy burdens greater than three percent, and these neighborhoods are located across the Commonwealth, both in major cities and rural areas (see Figure 12).[83]

[79] (1) Kerby, J. Hardy, T. Twitchell, J. O'Neil, R. and Tarekegne, B., "A targeted approach to energy burden reduction measures: Comparing the effects of energy storage, rooftop solar, weatherization, and energy efficiency upgrades," *Energy Policy (184)* (2024), www.sciencedirect.com/science/article/pii/S0301421523004524; (2) McNamara, W. and Olinsky-Paul, T., *Bridging the Gap: How Emerging State Policies are Making Energy Storage Affordable and Accessible*, Clean Energy States Alliance and Sandia National Laboratories, December 2024, www.cesa.org/resource-library/resource/bridging-the-gap-state-policies-making-energy-storage-accessible, p. 8.

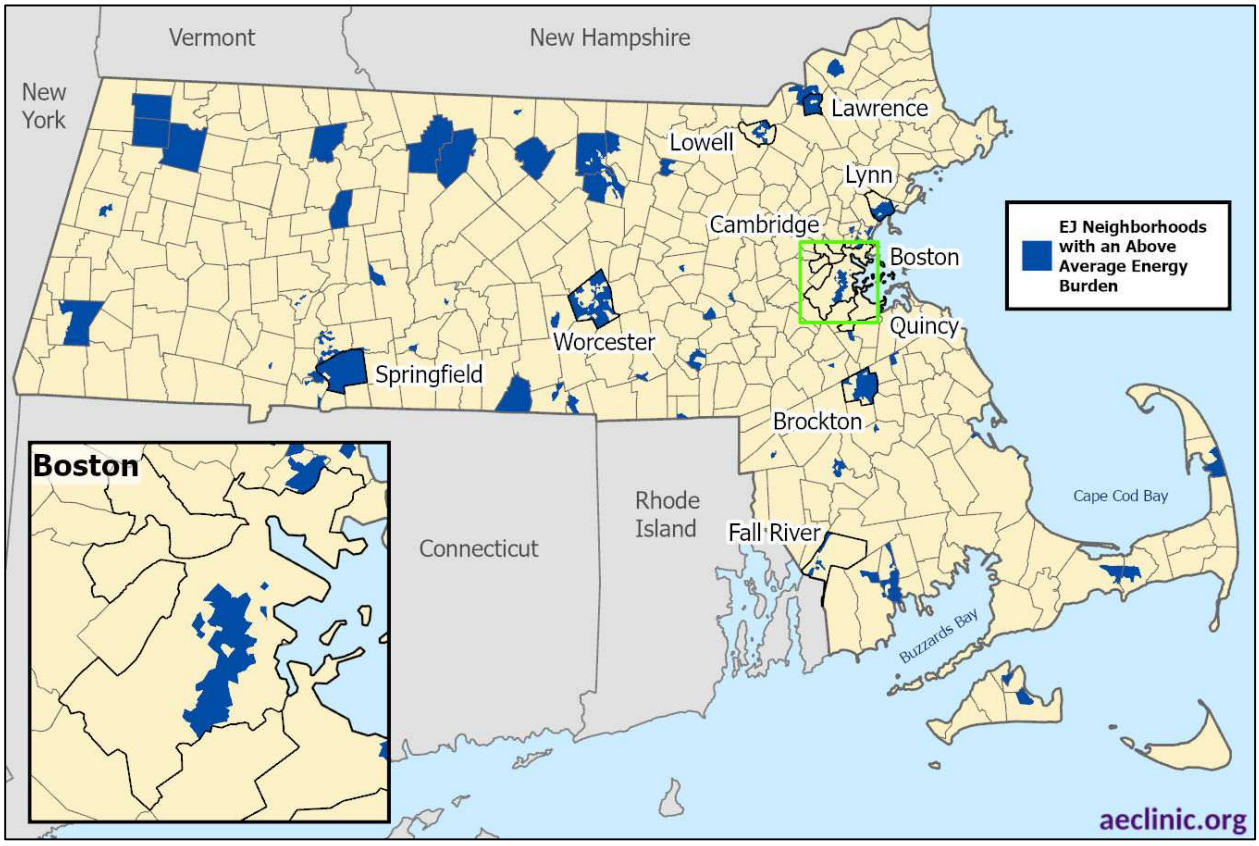
[80] Kerby, J., Rojas, D. R., Tarekegne, B., "Rooftop solar and energy storage programs can remediate energy-limiting behaviors of energy insecure households in the United States," *Communications Earth & Environment* (2025), www.nature.com/articles/s43247-025-02517-5.

[81] "Energy Burden Research," ACEEE, 2024, www.aceee.org/energy-burden.

[82] "Low-Income Energy Affordability Data - LEAD Tool - 2022 Update," U.S. Department of Energy, 2022, https://data.openei.org/submissions/6219.

[83] AEC calculation.

Figure 12. Massachusetts EJ neighborhoods facing higher energy burden



Massachusetts EJ neighborhoods with average energy burden—the share of household income spent on energy bills—greater than the statewide average of 3.0 percent.
Data source: (1) EJ neighborhoods: U.S. Census Bureau. 2023. ACS 5-Year Estimates [Table IDs: B03002, B19013, C16002]; (2) U.S. DOE. 2022. "Low-Income Energy Affordability Data - LEAD Tool - 2022 Update."

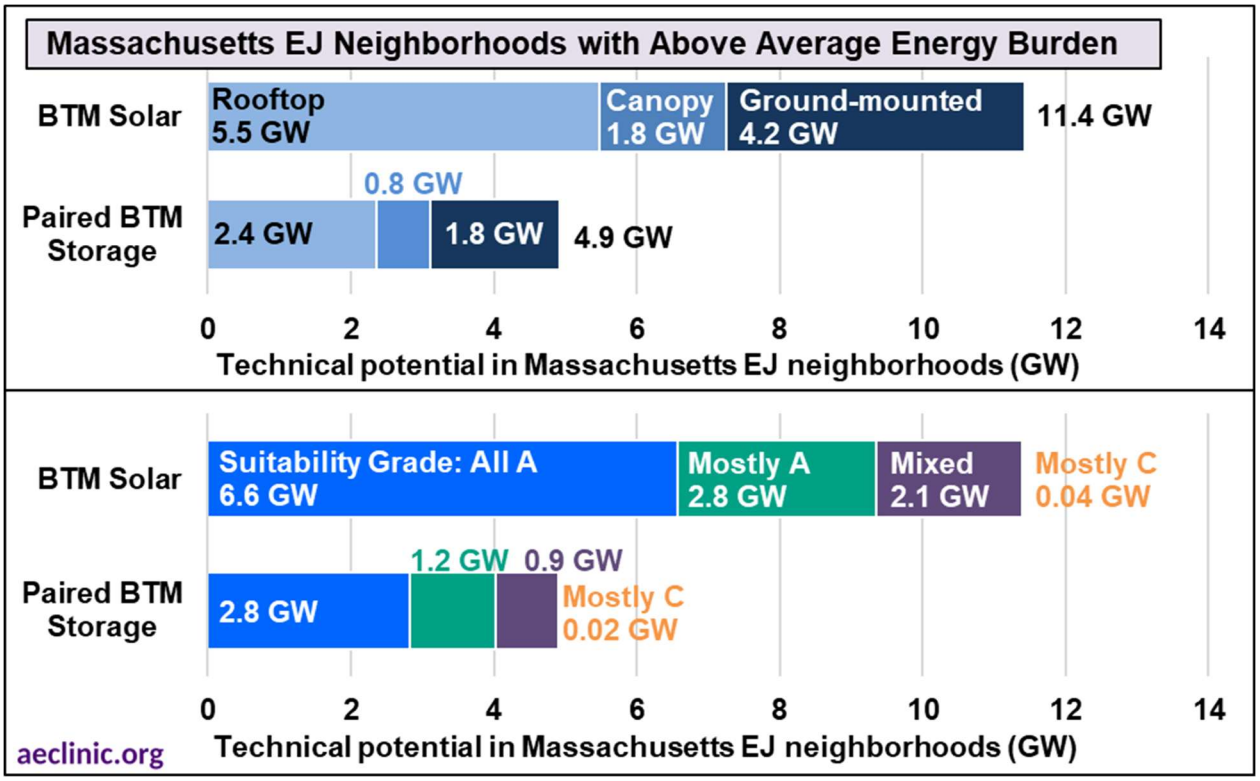
The technical potential for BTM solar and storage in Massachusetts EJ neighborhoods facing higher energy burdens is 11.4 GW of solar paired with 4.9 GW of storage, more than a third of total EJ potential

Using data from the MA DOER Solar Study, ACS,[84] and LEAD,[85] AEC finds that the technical potential of BTM solar and storage in Massachusetts EJ neighborhoods within census tracts facing higher than the statewide average 3.0 percent energy burden is 11.4 GW of solar paired with 4.9 GW of storage (see Figure 13) where:

- 4.0 GW BTM solar paired with 1.7 GW of storage could be located on single-family lots (see Table 3), and
- 2.6 GW BTM solar paired with 1.1 GW of storage could be located on other residential lots (see Table 4).

[84] *ACS 5-Year Estimates* [Table IDs: B03002, B19013, C16002], U.S. Census Bureau, 2023.
[85] "Low-Income Energy Affordability Data - LEAD Tool - 2022 Update," U.S. Department of Energy, 2022, https://data.openei.org/submissions/6219.

Figure 13. BTM solar and storage potential in Massachusetts EJ neighborhoods with above average energy burden



The technical potential of BTM solar and paired BTM storage in Massachusetts EJ neighborhoods facing above average energy burden by solar type (top panel) and solar suitability grade (bottom panel). A storage-to-solar ratio of 0.43 is used to estimate paired BTM storage. Data source: AEC calculation.

Table 3. Single-family BTM solar and storage potential within Massachusetts EJ neighborhoods with above average energy burden

Main suitability score	Residential single-family BTM solar technical potential within EJ neighborhoods with above average energy burdens (GW)				Paired BTM Storage Potential
	Building-Mounted	Canopy	Ground-Mounted (small, < 1 GW)	BTM Solar Total	
All A	1.5	0	0.1	**1.6**	**0.7**
Mostly A	0.3	0	0.9	**1.2**	**0.5**
Mixed Suitability	0.1	0	1.0	**1.1**	**0.5**
Mostly C	0.002	0	0.02	**0.02**	**0.01**
Total	2.0	0	2.0	4.0	1.7

Data source: AEC calculation.

Table 4. Other residential BTM solar and storage potential within Massachusetts EJ neighborhoods with above average energy burden

Main suitability score	Other residential BTM solar technical potential within EJ neighborhoods with above average energy burdens (GW)				Paired BTM Storage Potential
	Building-Mounted	Canopy	Ground-Mounted (small, < 1 GW)	BTM Solar Total	
All A	1.4	0.1	0.1	1.5	0.7
Mostly A	0.1	0.04	0.4	0.6	0.2
Mixed Suitability	0.03	0.02	0.4	0.5	0.2
Mostly C	0.001	0.001	0.01	0.01	0.004
Total	1.5	0.1	0.9	2.6	1.1

Data source: AEC calculation.

IV. Hot Spot Assessment

Extreme heat[86] and heat waves—a stretch of two or more days with high humidity and temperatures above 95 degrees Fahrenheit—are becoming more common across the United States due to climate change.[87] Moreover, according to Massachusetts EEA's *2022 Massachusetts Climate Assessment*, the Commonwealth's summers are expected to be warmer on average in the coming decades, with more frequent periods of extreme heat.[88] During extreme heat events, residents and workers, especially children, older adults, and those working outdoors are at increased risk of heat-related illnesses like heat stroke. [89] According to the U.S. Center for Disease Control and Prevention (CDC), extreme heat events increase hospital admission rates for heat-related illnesses as well as cardiovascular and respiratory disorders.[90]

The Commonwealth has made a commitment to addressing climate change impacts, including extreme heat,[91] and has published online guidance materials to inform the public on extreme heat risks and short-term extreme heat mitigation strategies. For example, the Massachusetts Department of Labor Standards has published guidance on preventing indoor heat illness at

[86] Dahl, K., Spanger, E., Licker, R., Caldas, A., Cleetus, E., Udvardy, S., Declet-Barreto, J., and Worth, P., *Killer Heat in the United States*, Union of Concerned Scientists, 2019, www.ucs.org/resources/killer-heat-united-states-0.

[87] "Extreme Heat," U.S. Environmental Protection Agency, www.epa.gov/climatechange-science/extreme-heat.

[88] *Massachusetts Climate Change Assessment*, Massachusetts EEA, 2022, www.mass.gov/doc/2022-massachusetts-climate-change-assessment-december-2022-volume-ii-statewide-report/download, p. 18.

[89] (1) "Extreme heat can impact our health in many ways," U.S. CDC, www.cdc.gov/climate-health/media/pdfs/EXTREME-HEAT-Final_508.pdf; (2) *Climate Vulnerability in Greater Boston Technical Documentation*, MAPC, 2019, https://climate-vulnerability.mapc.org/assets/data/MAPC_ClimateVulnerability_Technical-Documentation_2019-12-10.pdf; (3) Hansen, J., "Experts discuss how extreme heat affects vulnerable populations – and how communities and health care systems can respond," Stanford University, 2023, https://news.stanford.edu/stories/2023/08/heat-affects-vulnerable.

[90] "Extreme heat can impact our health in many ways," U.S. CDC.

[91] *ResilientMass Plan: 2023 Massachusetts State Hazard Mitigation and Climate Adaptation Plan,* Commonwealth of Massachusetts, 2023, www.mass.gov/doc/resilientmass-plan-2023/download.

work[92] and the Department of Public health's *Massachusetts Extreme Heat Resource Guide*[93] provides educational resources, including fact sheets for residents (Extreme Heat Events,[94] Heat and Drought[95]) and workers (Heat Illness,[96] Heat Stress and Hydration[97]) to help protect themselves from heat-related illnesses. Despite Massachusetts' commitment to addressing extreme heat, the Commonwealth does not require or provide incentives for municipalities to employ the extreme heat strategies shared in its guidance materials, and Massachusetts has not published a statewide heat resiliency plan or heat emergency response plan.[98]

The effects of extreme heat are especially severe for those in cities due to the urban heat island effect, a phenomenon that occurs in areas with more concrete structures and impervious surfaces like buildings and roads, which absorb and re-emit heat from the sun into the surrounding area.[99] Low-income and BIPOC communities are often located in dense urban areas and neighborhoods that lack green spaces[100] and are, therefore, disparately exposed to the urban heat island effect compared to neighborhoods that are less densely populated and have not been impacted by redlining.[101] For example, the Wicked Hot Boston project[102] found previously redlined[103] neighborhoods in the Greater Boston Area tend to experience higher temperatures compared to non-redlined neighborhoods.[104] Low-income and BIPOC communities are also more likely to live

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[92] "Preventing Indoor Heat Illness at Work," MA Department of Labor Standards, August 2023, www.mass.gov/news/preventing-indoor-heat-illness-at-work.

[93] *Massachusetts Extreme Heat Resource Guide*, Massachusetts Department of Public Health, July 2024, www.mass.gov/doc/extreme-heat-resource-guide-pdf/download.

[94] *Extreme Heat Events,* Massachusetts Department of Public Health, www.mass.gov/doc/extreme-heat-events-pdf/download.

[95] *Heat and Drought,* Massachusetts Department of Public Health, www.mass.gov/doc/heat-and-drought-pdf/download.

[96] (1) *Heat Illness,* Massachusetts Department of Labor Standards, www.mass.gov/doc/heat-illness-prevention-for-employees/download; (2) *Heat Exhaustion Versus Heat Stroke*, Massachusetts Department of Labor Standards, www.mass.gov/doc/heat-exhaustion-versus-stroke/download; (3) *Heat Illness Prevention for Employers*, Massachusetts Department of Labor Standards, www.mass.gov/doc/heat-illness-prevention-for-employees/download.

[97] *Heat Stress: Hydration*, U.S. CDC, 2017, www.cdc.gov/niosh/mining/userfiles/works/pdfs/2017-126.pdf.

[98] For more information on Massachusetts extreme heat impacts and recommendations for strengthening existing policies, see AEC's 2024 report: Stasio, T., Seliga, E., Burt, J., McNamee, L., and Stanton, E.A., *Tackling Extreme Heat: Recommendations for Strengthening Massachusetts Policy,* prepared by Applied Economics Clinic on behalf of A Better City, December 2024, https://aeclinic.org/publicationpages/12/2024/tackling-extreme-heat-recommendations-for-strengthening-massachusetts-policy.

[99] "Learn About Heat Islands," U.S. EPA, www.epa.gov/heatislands/learn-about-heat-islands.

[100] Baik, S., Hines, J. F., Sim, J., "Racial disparities in the energy burden beyond socio-economic inequality," *Energy Economics, 27(A), 107098* (2023),https://doi.org/10.1016/j.eneco.2023.107098.

[101] Redlining refers to urban communities historically outlined in red on maps by government agencies and lenders as an indication that the areas were considered high risk for mortgage lending. See: (1) Hsu, A., Shandas, V., Manya, A., Vecellio, D. J., "Urban Heat Hot Spots," Climate Central, 2023, www.climatecentral.org/climate-matters/urban-heat-islands-2023; (2) Hoffman, J. S., Shandas, V., and Pendleton, N., "The Effects of Historical Housing Policies on Resident Exposure to Intra-Urban Heat: A Study of 108 US Urban Areas," *Climate* 2020, *8*(1), 12 (2020), https://doi.org/10.3390/cli8010012; (3) "Heat Islands and Equity," U.S. EPA, www.epa.gov/heatislands/heat-islands-and-equity.

[102] "Wicked Hot Boston," Museum of Science, July 2019, www.mos.org/case-study/wicked-hot-boston.

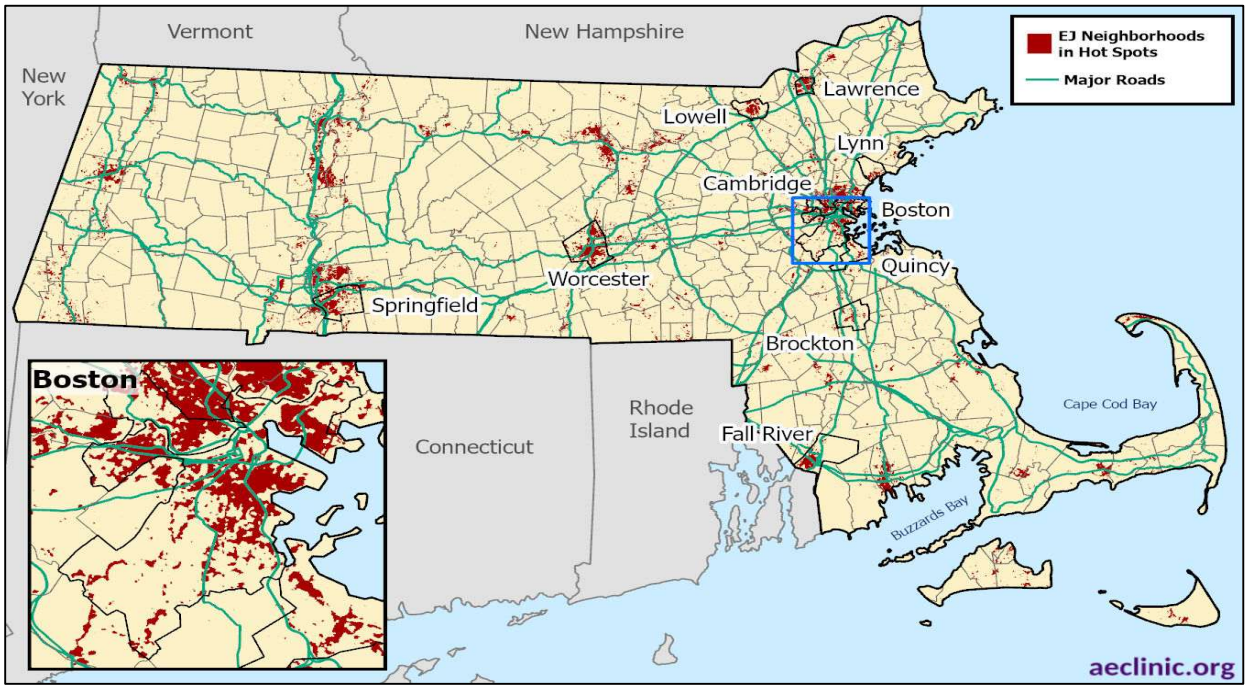
[103] Redlining is a discriminatory practice whereby particular areas or households are denied access to services (e.g., mortgages, loans, etc.) solely based on their racial or ethnic demographics. See: "Redlining," Cornell Law School Legal Information Institute, www.law.cornell.edu/wex/redlining.

[104] (1) Gambill, I., *Case Studies: How Boston Organizations and Institutions Can Engage in Community Heat Resilience Initiatives*, A Better City, May 2023, www.abettercity.org/docs-new/extreme%20heat%20case%20studies%2051123.pdf; (2) Gambill, I., *Addressing Extreme Heat in Boston: Engaging the Business Community in Heat Resilience Solutions*, A Better City, May 2023, abettercity.org/docs-new/extreme heat primer 51123.pdf.

in homes that have inefficient heating and cooling systems, costing these households more in energy costs.[105] Moreover, medically, financially, and socially vulnerable residents face greater harms from prolonged grid outages caused by extreme weather, like extreme heat events.[106]

In Massachusetts, an astounding 86 percent of EJ neighborhoods are in hot spots—defined as the five percent of surface area with the highest Land Surface Temperature Index in each Massachusetts region.[107] Surface temperatures are higher in hot spot areas due to differences in tree canopy coverage, prevalence of impervious land surfaces (e.g., concrete), and other physical characteristics. As such, Massachusetts' EJ neighborhoods in hot spots are clustered in urban areas (e.g., Ayer, Boston, Fitchburg, Lawrence, Lowell, New Bedford, Pittsfield, and Springfield) along highway interstates like Route 91 that runs north from Springfield, and along the Commonwealth's western border (see Figure 14).

Figure 14. Massachusetts EJ neighborhoods in hot spot areas



Massachusetts EJ neighborhoods located in hot spot areas (the 5 percent of surface area with the highest Land Surface Temperature Index in each Massachusetts regional planning region). The LST Index is based on surface temperature from days in 2018 – 2020 when the high temperature exceeded 70 degrees Fahrenheit. For more information, see hot spot data source.
Data sources: (1) ACS 5-Year Estimates [Table IDs: B03002, B19013, C16002] - EJ Neighborhoods, U.S. Census Bureau, 2023; (2) "Hot Spots," Massachusetts Executive Office of Energy and Environmental Affairs, https://mass-eoeea.maps.arcgis.com/home/item.html?id=6ef24687f7bf443085e22a1b65017354; (3) "MassGIS Data: MassGIS-MassDOT Roads," MassGIS, 2025, www.mass.gov/info-details/massgis-data-massgis-massdot-roads.

[105] Stasio, T. Seliga, E., Stanton, E. A., *Boston Tree Equity Analysis*, prepared by Applied Economics Clinic on behalf of GreenRoots and Speak for the Trees, 2022, https://aeclinic.org/publicationpages/2022/10/11/boston-tree-equity-analysis.
[106] Do, V., McBrien, H., Flores, N. M. Northrop, A. J., Schlegelmilch, J., Kiang, M.V., Casey, J.A., "Spatiotemporal distribution of power outages with climate events and social vulnerability in the USA," *Nature Communications, 14,* 2470 (2023), www.nature.com/articles/s41467-023-38084-6.
[107] "Hot Spots," Massachusetts Executive Office of Energy and Environmental Affairs, https://mass-eoeea.maps.arcgis.com/home/item.html?id=6ef24687f7bf443085e22a1b65017354.

During an extreme heat event, lower-income residents may be faced with the difficult decision of whether to cool their homes to a safe temperature or avoid cooling to save on energy costs.[108] BTM solar and storage on residential properties can reduce the impact of extreme heat events by lowering energy costs and providing backup power during grid disruptions,[109] while solar and storage in community buildings and shelters can provide the larger community with sustained access to cooling in instances of power loss due to extreme heat. In addition, a 2022 study in the *Journal of Solar Energy Engineering* found that across three different temperature zones in the United States, rooftop solar panels reduce cooling needs of buildings in the warmer months.[110]

The technical potential for BTM solar and storage in Massachusetts EJ neighborhoods in hot spot areas is 28.5 GW of solar paired with 12.2 GW of storage

Almost all (91 percent) of Massachusetts' total BTM solar and paired BTM storage potential in EJ neighborhoods is within a hot spot area. Using data from the MA DOER Solar Study, ACS,[111] and Massachusetts EEA,[112] AEC finds that the technical potential of BTM solar and storage in Massachusetts EJ neighborhoods in hot spots is 28.5 GW of solar paired with 12.2 GW of storage (see Figure 15). More than half of the 28.5 GW of BTM solar potential is on residential lots:

- AEC estimates the technical potential of BTM solar paired with storage on single-family lots is 9.6 GW of solar paired with 4.1 GW of storage (see Table 5), and
- The technical potential of BTM solar paired with storage on other residential lots is 5.6 GW of solar paired with 2.4 GW of storage (see Table 6).

[108] García, P., Chavez, M., Esquivia Zapata, C., Lopez Gamboa, V. R, et al., *Visioning Armourdale's Affordable Energy Future*, Union of Concerned Scientists, RiSE for Environmental Justice, and Science and Community Action Network, September 2025, https://doi.org/10.7910/DVN/5JISRF.

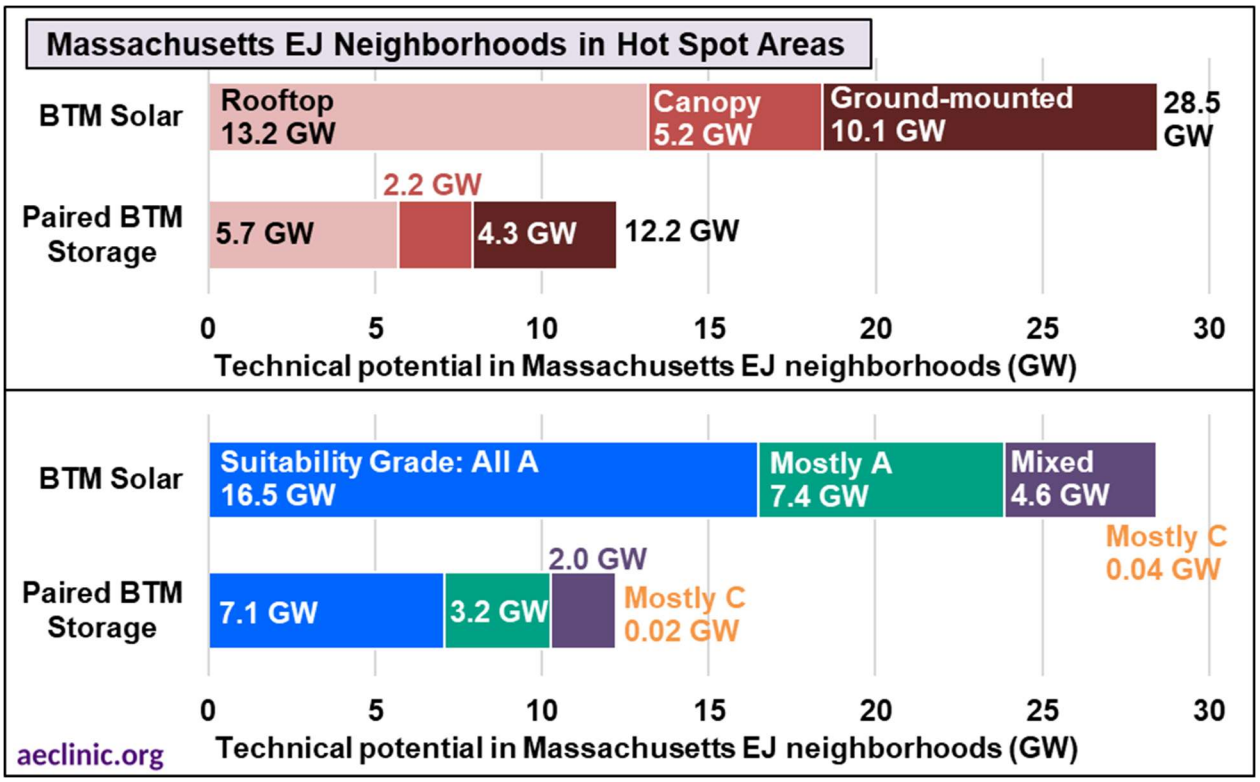
[109] (1) "Solar and Storage Stability: How America Can Maintain Energy Security Through Severe Weather," Solar Energy Industries Association, 2025, https://seia.org/blog/solar-and-storage-stability; (2) Hancock, S., "Harnessing Heatwaves: Solar's Crucial Role in Climate Solutions," American Solar Energy Society, 2024, https://ases.org/harnessing-heatwaves.

[110] Alasadi, H., Choi, J., & Mulford, R. B., "Influence of Photovoltaic Shading on Rooftop Heat Transfer, Building Energy Loads, and Photovoltaic Power Output," *Journal of Solar Energy Engineering, 144*(6) (2022), https://doi.org/10.1115/1.4054710.

[111] *ACS 5-Year Estimates* [Table IDs: B03002, B19013, C16002], U.S. Census Bureau, 2023.

[112] "Hot Spots," Massachusetts Executive Office of Energy and Environmental Affairs, https://mass-eoeea.maps.arcgis.com/home/item.html?id=6ef24687f7bf443085e22a1b65017354.

Figure 15. BTM solar and storage potential in Massachusetts EJ neighborhoods in hot spot areas



Note: Technical potential of BTM solar and paired BTM storage for Massachusetts EJ neighborhoods in hot spot areas by solar type (top panel) and solar suitability grade (bottom panel). A storage-to-solar ratio of 0.43 is used to estimate paired BTM storage.
Data source: AEC calculation.

Table 5. Single-family BTM solar and storage potential within Massachusetts EJ neighborhoods in hot spot areas

Main suitability score	Residential single-family BTM solar technical potential within EJ neighborhoods in hot spot areas (GW)				Paired BTM Storage Potential
	Building-Mounted	Canopy	Ground-Mounted (small, < 1 GW)	BTM Solar Total	
All A	3.4	0	0.3	3.8	1.6
Mostly A	0.8	0	2.4	3.3	1.4
Mixed Suitability	0.3	0	2.2	2.5	1.1
Mostly C	0.002	0	0.02	0.02	0.01
Total	4.6	0	4.9	9.6	4.1

Data source: AEC calculation.

Table 6. Other residential BTM solar and storage potential within Massachusetts EJ neighborhoods in hot spot areas

Main suitability score	Other residential BTM solar technical potential within EJ neighborhoods in hot spot areas (GW)				Paired BTM Storage Potential
	Building-Mounted	Canopy	Ground-Mounted (small, < 1 GW)	BTM Solar Total	
All A	2.9	0.3	0.2	3.4	1.5
Mostly A	0.2	0.1	1.0	1.3	0.6
Mixed Suitability	0.1	0.04	0.8	0.9	0.4
Mostly C	0.001	0.001	0.01	0.01	0.005
Total	3.1	0.5	2.0	5.6	2.4

Data source: AEC calculation.

Technical potential for BTM solar and storage in Massachusetts EJ neighborhoods with vulnerability to extreme heat

Several factors influence a community or household's vulnerability to extreme heat, including physical housing characteristics (i.e., insulation, cooling technologies, etc.), tree canopy coverage, access to green space or cooling centers, and more.[113] In addition to identifying EJ neighborhoods in hot spot areas, key factors assessed in this analysis to represent vulnerability to extreme heat events are overcrowding and more older adults and children.

Overcrowding: According to evidence-based studies published in the journals *Temperature* and *Sustainability*, overcrowded housing units face hotter indoor temperatures resulting in a higher energy demand for cooling and higher energy bills.[114] On average by census block, six percent of Massachusetts households (and seven percent in EJ census blocks) live in housing units with more than one occupant per room.[115] Of Massachusetts' 5,116 census block groups, 2,406 are designated as EJ neighborhoods; of that number, 515 have a higher than average share of overcrowded housing units—those with more than one occupant per room. AEC estimates the technical potential for BTM solar in Massachusetts EJ communities in hot spots with above average statewide over-crowdedness is 4.8 GW and the technical potential of paired BTM storage is 2.1 GW (see Table 7).

[113] "Heat and health," World Health Organization, May 2024, www.who.int/news-room/fact-sheets/detail/climate-change-heat-and-health.

[114] (1) Kenny, G. P., Flouris, A. D., Yagouti, A., and Notley, S. R., "Towards establishing evidence-based guidelines on maximum indoor temperatures during hot weather in temperate continental climates," *Temperature*, *6*(1), 11–36 (2018), https://doi.org/10.1080/23328940.2018.1456257; (2) Zarco-Periñán, P. J., Zarco-Soto, I. M., & Zarco-Soto, F. J., "Influence of the Population Density of Cities on Energy Consumption of Their Households." *Sustainability, 13(14),* 7542 (2021), https://doi.org/10.3390/su13147542.

[115] *ACS 5-Year Estimates* [Table ID: B25014], U.S. Census Bureau, 2023.

Table 7. BTM solar and storage potential in Massachusetts EJ neighborhoods in hot spots with above average overcrowdedness

Main suitability score	BTM solar technical potential within EJ neighborhoods in hot spots with above average overcrowdedness (GW)				Paired BTM Storage
	Rooftop	Canopy	Ground-Mounted (small, < 1 GW)	BTM Solar Total	
All A	2.3	0.9	0.3	3.5	1.5
Mostly A	0.2	0.2	0.6	0.9	0.4
Mixed Suitability	0.06	0.04	0.3	0.4	0.2
Mostly C	0.0001	0	0.001	0.001	0.0004
Total	2.5	1.1	1.2	4.8	2.1

Data source: AEC calculation.

Older adults and children: Access to BTM solar paired with storage in the event of a grid disruption is crucial for maintaining health and well-being for households with children and older adults, especially those with electricity-dependent medical equipment.[116] In addition to increased risk of heat stress or stroke, extreme heat can exacerbate pre-existing health conditions (e.g., cardiovascular disease, asthma).[117] Certain populations, including but not limited to older adults, infants and children are most at risk for heat-related illnesses like heat exhaustion or heat stroke.[118] In Massachusetts, 18.7 percent of the population are older adults and 19.0 percent are children on average.[119] Massachusetts EJ neighborhoods include a slightly larger share of children (20.1 percent) and a lower share of older adults (14.3) percent .[120]

AEC finds that the technical potential of BTM solar and storage in Massachusetts EJ neighborhoods with an above statewide average child population is 14.5 GW of solar paired with 6.2 GW of storage (see Table 8). Relatedly, the technical potential of BTM solar and storage in Massachusetts EJ neighborhoods in hot spots with an above average older adult population is 11.0 GW of solar paired with 4.7 GW of storage (see Table 9).

[116] (1) Mango, M. and Tym, O., *Equitable Resilience: Opportunities to Advance Solar Paired with Battery Storage in Historically Marginalized Communities,* Clean Energy Group, January 2025, www.cleanegroup.org/publication/equitable-resilience-solar-storage-in-marginalized-communities; (2) Adamsson, A. and Mango, M., *Optimizing Energy Resilience to Support Medically Vulnerable Residents in Multifamily Affordable Housing*, Clean Energy Group, February 2025, www.cleanegroup.org/publication/optimizing-energy-resilience-medically-vulnerable-multifamily.

[117] "Heat and Health," World Health Organization, May 2024.

[118] (1) "Who Is Most At Risk To Extreme Heat?" National Integrated Heat Health Information System, www.heat.gov/pages/who-is-at-risk-to-extreme-heat; (2) "Extreme Heat and Your Health," U.S. CDC, June 2024, www.cdc.gov/extreme-heat/about/?CDC_AAref_Val=https://www.cdc.gov/disasters/extremeheat/heat_guide.html.

[119] *ACS 5-Year Estimates* [Table ID: DP05], U.S. Census Bureau, 2023, https://data.census.gov/table/ACSDP1Y2024.DP05?g=040XX00US25.

[120] AEC calculation using ACS census block group data.

Table 8. BTM solar and storage potential in Massachusetts EJ neighborhoods in hot spots with above average child population

Main suitability score	BTM solar technical potential within EJ neighborhoods in hot spots with above average child population (GW)				Paired BTM Storage
	Rooftop	Canopy	Ground-Mounted (small, < 1 GW)	BTM Solar	
All A	5.4	1.9	0.8	**8.1**	**3.5**
Mostly A	0.9	0.5	2.4	**3.9**	**1.7**
Mixed Suitability	0.3	0.2	2.0	**2.5**	**1.1**
Mostly C	0.002	0.0004	0.02	**0.02**	**0.01**
Total	**6.6**	**2.6**	**5.3**	**14.5**	**6.2**

Data source: AEC calculation.

Table 9. BTM solar and storage potential in Massachusetts EJ neighborhoods in hot spots with above average older adult population

Main suitability score	BTM solar technical potential within EJ neighborhoods in hot spots with above average older adult population (GW)				Paired BTM Storage
	Rooftop	Canopy	Ground-Mounted (small, < 1 GW)	BTM Solar	
All A	3.3	1.2	0.6	**5.1**	**2.2**
Mostly A	0.7	0.4	2.2	**3.4**	**1.4**
Mixed Suitability	0.3	0.1	2.2	**2.6**	**1.1**
Mostly C	0.002	0.001	0.02	**0.02**	**0.01**
Total	**4.3**	**1.7**	**5.0**	**11.0**	**4.7**

Data source: AEC calculation.

EJ neighborhoods with overlapping heat vulnerabilities (i.e., hot spot with above average over-crowdedness **and** above average population shares of children and older adults) meeting these combined characteristics (34 census block groups) are located in 17 Massachusetts towns: Acton, Ayer, Barnstable, Boston, Brockton, Chelsea, Fall River, Haverhill, Holyoke, Lexington, Lowell, Lynn, Orange, Springfield, Sterling, Tewksbury, and Worcester.

V. Addressing Gaps in Existing Offerings

The above sections show that there is substantial potential for additional BTM solar and storage in the Commonwealth's EJ neighborhoods and most of this potential is in hot spot areas. The scale at which BTM solar paired with storage systems can be realized in Massachusetts and provide additional economic, environmental, equity, and resiliency benefits to the Commonwealth's most vulnerable residents depends on efforts to address the existing barriers and challenges to adoption. AEC—together with Clean Energy Group, the Union of Concerned Scientists, and Vote Solar, and input from the advisory committee—identified nine barriers to BTM deployment in EJ neighborhoods that, if addressed, would help close the gap between the existing BTM resource level and its technical potential in EJ neighborhoods (see Table 10).

Table 10. Program and policy gaps in addressing barriers to BTM deployment in EJ neighborhoods

Barriers to BTM deployment		Existing programs or policy
1	**Insufficient targeted financial incentives**	Massachusetts offers rebates and loan programs to reduce the cost of BTM solar and storage systems, and on-bill incentives, but lacks targeted provisions to successfully incentivize community solar or adoption in low-income areas
2	**Electric system or building upgrades**	Massachusetts' loans and grants for electric system and building upgrades are not targeted at BTM readiness or EJ neighborhoods
3	**Workforce limitations**	MassCEC and Mass Save offer insufficient workforce training grants and assistance to organizations to support clean energy careers in EJ neighborhoods, tribes and underrepresented groups, and to support retraining for fossil fuel workers. Trainees from these programs face uncertainty in successfully finding employment opportunities.
4	**Lack of incentives for renters and/or condo owners**	Existing programs do not address the lack of incentives for renters and condo owners
5	**Complexity and lack of program coordination**	Participating in Massachusetts programs is complicated and available guidance materials are not written for a general audience or available in multiple languages
6	**Lack of trust**	Massachusetts lacks programs or policies to improve trust between customers and utilities and solar and storage developers/installers
7	**Interconnection issues**	Interconnection costs and delays deter BTM solar and storage deployment in the Commonwealth
8	**Solar panel and battery recycling and disposal**	Existing programs do not address end-of-life management for solar panel or battery components, raising environmental concerns for disposal of these materials
9	**Lack of broadband access**	There are no current efforts to distribute information on programs that support BTM deployment at in-person events, via mail, or other means that do not require internet access

To address the identified barriers and gaps in existing offerings, AEC offers 18 recommendations to strengthen Massachusetts' existing portfolio of clean energy and housing programs (see Table 11). These recommendations will assist the Commonwealth in realizing a greater share of the technical potential for BTM solar and storage in EJ neighborhoods in line with Massachusetts' commitment to fulfilling its clean energy requirements while advancing an equitable clean energy transition. (Note: Some of the barriers and recommendations provided in this report are also included in the companion to this report, *Electrification with Equity, Part 1: The Opportunity for Behind-the-Meter Solar and Storage in Massachusetts*.[121])

Table 11. Recommendations to support BTM deployment in Massachusetts EJ neighborhoods

Insufficient targeted financial incentives	**#1:** Establish equity participation targets for statewide programs to ensure financial assistance is flowing to EJ neighborhoods
	#2: Expand SMART, Clean Peak Standard, ConnectedSolutions to include more incentives for equitable deployment
	#3: Require state program budget carve-outs for BTM systems in low-income and EJ neighborhoods
	#4: Implement a Solarize Mass Plus program that supports BTM solar and storage deployment in EJ neighborhoods
Electric system or building upgrades	**#5:** Offer zero-interest financing for BTM readiness electric/building upgrades and grants for projects that benefit households in EJ neighborhoods
	#6: Establish a state-funded stretch and specialized code for BTM solar and storage readiness in new construction
Workforce limitations	**#7:** Assess workforce trends and identify opportunities for expanding existing workforce training programs to secure employment for trainees
Lack of incentives for renters and/or condo owners	**#8:** Expand budget for community solar and storage and invest in educational materials and outreach to support community-led solar development
	#9: Investigate opportunity for plug-in solar paired systems
	#10: Conduct a technical study to inform the development of a multifamily solar and storage incentive program
Complexity and lack of program coordination	**#11:** Establish incentive mechanisms for renters and condo owners to invest in BTM solar and storage
	#12: Create educational resources and an outreach plan for EJ neighborhoods
	#13: Ensure existing program materials are comprehensive and accessible
	#14: Establish a statewide whole-home electrification and backup power program based on the Cape and Vineyard Electrification Offering
Lack of trust	**#15:** Establish outreach and transparency requirements for clean energy solicitors
Interconnection and permitting issues	**#16:** Set maximum interconnection costs that can be charged by utilities to project developers
Solar panel and battery recycling and disposal	**#17:** Investigate recycling and reuse requirements for solar and storage systems
Lack of broadband access	**#18:** Require utilities to host workshops in EJ neighborhoods for customers to learn about and sign up for existing programs

[121] Stasio, Stanton, and Castigliego, *Electrification with Equity, Part 1.*

Massachusetts' existing programs and policies that support BTM solar and storage

Massachusetts offers programs and incentives that either (1) directly support BTM deployment through grants, financial assistance, on-bill incentives, rebates, performance payments, and tax credits for installations or (2) indirectly support BTM solar and/or storage by addressing pre-conditions and barriers to deployment such as a lack of trust amongst customers and utilities, or a lack of internet access to learn about existing offerings (see Table 12 and short descriptions for each program in *Appendix B: Massachusetts Energy and Housing Programs*).

Table 12. Massachusetts programs that support BTM solar and storage deployment

On-bill incentives
Solar Massachusetts Renewable Target Program
Clean Peak Energy Standard
Municipal Light Plant Net Metering Programs
Massachusetts Net Metering Program
Grants
Accelerated Repair Program
Affordable Housing Decarbonization Grant Program
Boston's Equitable Emissions Investment Fund
Climate Leader Communities Accelerator Grants
Climate Ready Housing
Equity Workforce Training Implementation Grants
Green School Works
Intervenor Support Grant Program
Low-Income Home Energy Assistance Program
Low-Income Services Solar Program
Merrimack Settlement Fund
Workforce Training Grant
Rebates and Tax Credits
Clean Electricity Investment and Production Tax Credits
ConnectedSolutions
Municipal Solar Rebates
Residential Energy Credit (MA)
Loans
Energy Saver Home Loan Program
HEAT Loan Program
Massachusetts Community Climate Bank
Property Assessed Clean Energy
Pilots and Past Programs
Cape and Vineyard Electrification Offering
Mass Save Solar Loan Program
REALIZE-MA
Solarize Massachusetts
Other programs
Building Electrification and Transformation Accelerator
Massachusetts Energy Savings Finder
Residential Retrofit Program
Solar Technical Assistance Retrofit Program

Data sources: see Appendix B: Massachusetts Energy and Housing Programs.

However, despite the Commonwealth's wide array of energy and housing programs, participation in BTM clean energy in EJ neighborhoods remains extremely low. For example, despite the overall success of the program at facilitating the growth of solar and storage, just 0.1 percent of SMART BTM units that have come online from 2018 through 2025—comprising just one percent of SMART BTM solar capacity—are located on low-income properties.[122] As a result, the Commonwealth's most vulnerable residents are not benefiting from statewide efforts to support an equitable clean energy transition.

Barrier: Insufficient targeted financial incentives

Policy gaps: Massachusetts offers rebates and loan programs to reduce the cost of BTM solar and storage systems, and on-bill incentives, but lacks targeted provisions to successfully incentivize community solar or adoption in low-income areas

Rebates and loan programs offered in the Commonwealth are not sufficient to make the cost of installing BTM solar and storage systems affordable for many Massachusetts households. As of late 2025, the average cost of a 5-kW solar panel installation in Massachusetts was $15,510, and the average price for storage was $1,690 per kWh, or $21,970 for a 13 kWh storage system.[123] Massachusetts' solar tax credit reduces this cost by 15 percent of the price paid (up to $1,000).[124] This leaves customers responsible for at least 85 percent of upfront costs of solar and 100 percent of upfront costs of storage, a significant financial barrier to BTM resource installations for some customers, particularly low-income households, customers who lack access to credit, and households that have net zero or positive tax outcomes (i.e., customers that do not owe taxes in a given year are unable to take advantage of tax credits available for BTM solar and storage installations). Lastly, existing on-bill incentives are not sufficient to increase historically low BTM deployment in low-income communities (see Table 13).[125]

Table 13. Insufficient financial incentives recommendations

#1: Establish equity participation targets for statewide programs to ensure financial assistance is flowing to EJ neighborhoods
#2: Expand SMART, CPS, ConnectedSolutions to include more incentives for equitable deployment
#3: Require state program budget carve-outs for BTM systems in low-income and EJ neighborhoods
#4: Implement a Solarize Mass Plus program that supports BTM solar and storage deployment in EJ neighborhoods

[122] "SMART Solar Tariff Generation Units," Massachusetts DOER, January 2026, www.mass.gov/doc/smart-solar-tariff-generation-units.

[123] (1) "The cost of solar panels in Massachusetts (2025)," EnergySage, November 2025, www.energysage.com/local-data/solar-panel-cost/ma/; 2) "How much do storage systems cost in Massachusetts in 2025?" EnergySage, December 2024, www.energysage.com/local-data/energy-storage-cost/ma/.

[124] "830 CMR 62.6.1: Residential Energy Credit," Massachusetts Department of Revenue, December 2016, www.mass.gov/regulations/830-CMR-6261-residential-energy-credit.

[125] Stasio et al., *Energy Storage Equity: An Assessment of Three Massachusetts Programs*.

Recommendation #1: Establish mandatory equity participation targets for statewide programs to ensure financial assistance is flowing to EJ neighborhoods

Neither CPS nor ConnectedSolutions include targeted financial incentives, goals, or requirements to support deployment of storage resources in EJ neighborhoods. In addition, despite the overall success of SMART at facilitating the growth of solar and storage across the Commonwealth, just 0.1 percent of SMART BTM units brought online from 2018 through 2025 were low-income units, with just one low-income BTM unit paired with storage, suggesting that the per kWh adder is not sufficient to incentivize low-income BTM adoption.[126]

To promote transparency and increase participation in clean energy programs from households living in low-income or EJ communities, policymakers should establish equity participation targets for statewide programs, including online tracking tools to enable residents and businesses to stay up to date on progress and identify municipalities with lower participation rates. Specifically, statewide programs should be required to reach a 50 percent participation target for households living in EJ neighborhoods by a selected year (for context, 47 percent of Massachusetts block groups are designated as EJ neighborhoods.[127]). The Commonwealth's electric utilities should be required to include strategies employed to achieve these targets within their Electric Sector Modernization Plans that are submitted to the DPU every five years.[128]

Recommendation #2: Expand SMART, CPS, and ConnectedSolutions to include more incentives for equitable deployment

In its September 2024 report, *Energy Storage Equity: An Assessment of Three Massachusetts Programs*, AEC assessed the SMART, CPS, and ConnectedSolutions program' provisions for improving equity outcomes and found that all three energy programs lack mandates, targets and reporting requirements to support the Commonwealth's commitment to equitable access to clean and efficient energy.[129] In that report, AEC made eight recommendations to promote equitable storage deployment in Massachusetts (see Table 14).

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[126] "SMART Solar Tariff Generation Units," Massachusetts DOER, January 2025, www.mass.gov/doc/smart-solar-tariff-generation-units.

[127] *Environmental Justice Maps Update 2022 Frequently Asked Questions*, Massachusetts Executive Office of Energy and Environmental Affairs, 2022, www.mass.gov/doc/environmental-justice-maps-update-2022-frequently-asked-questions/download.

[128] "Background and procedural requirements on electric sector modernization plans," Massachusetts DPU, 2026, www.mass.gov/info-details/background-and-procedural-requirements-on-electric-sector-modernization-plans.

[129] Stasio et al., *Energy Storage Equity: An Assessment of Three Massachusetts Programs*.

Table 14. Recommendations for improving equity in Massachusetts storage programs

	Recommendation
Equity Performance Metrics	**1.** Require participation data for energy storage programs to be publicly available online together with detailed information regarding the income status of the households served, and the quantity and capacity of resources supported through the program.
	2. Develop specific income-eligible enrollment and capacity targets for energy storage programs and require detailed data on each program's progress towards these targets to be easily accessible and publicly available online.
	3. Create a stakeholder-informed outreach and enrollment plan for addressing low participation in EJ and/or low-income areas and launch targeted utility EJ community and low-income customer outreach and education programs.
Expanded and Increased Equity Incentives	**4.** Add Clean Peak Energy Standard financial incentives for retail electric suppliers supplying energy (or offsetting load) from qualifying clean peak resources in income-eligible areas.
	5. Increase the incentive rates for income-eligible customers enrolled in the ConnectedSolutions and SMART programs and offer up-front rebates and/or on-bill payments to increase low-income participation.
	6. Add financial incentives for other vulnerable households such as households that rely on uninterrupted electric supply to power life-saving medical devices and critical facilities serving state-designated EJ communities.
	7. Add an additional SMART resiliency adder for sustainable community microgrids serving state-designated EJ communities and/or low-income households.
	8. Add an additional SMART fossil fuel replacement adder for SMART solar plus storage units installed to replace existing fossil fuel plants located within Massachusetts EJ communities.

Source: Reproduced from: Stasio, T., Seliga, E., Woods, B., Stanton, E.A. 2024. Energy Storage Equity: An Assessment of Three Massachusetts Programs.

Increasing ConnectedSolutions performance payments and expanding SMART adders and capacity set asides for solar and storage systems located in EJ neighborhoods—especially those in hot spot areas, or at resilience hubs or cooling centers—would support more equitable program participation. In addition, to encourage BTM solar systems paired with storage, AEC recommends restoration of the SMART 2.0 energy storage adder for small projects less than or equal to 25 kW to support BTM solar paired with storage adoption (a Tesla Powerwall, for example, has a capacity range between 5 and 11.5 kW[130]). Moreover, SMART-enrolled customers that wish to install storage systems to be paired with existing SMART solar systems should be eligible for the energy storage adder. Lastly, Massachusetts should raise the SMART per kWh bill incentive adder of $0.07 per kWh for community solar systems to $0.08 per kWh (in line with the adder for canopy and dual-use agricultural units).

[130] "How Powerwall Works," Tesla, www.tesla.com/support/energy/powerwall/learn/how-powerwall-works.

Recommendation #3: Require state program budget carve-outs for BTM systems in low-income and EJ neighborhoods

Program budgets for SMART, CPS, and ConnectedSolutions should be commensurate with equity participation goals, and incentive budget carve-outs should be instituted to ensure program benefits are flowing to low-income and EJ neighborhoods. For example, at present 10 percent of SMART program year capacity is set aside for low-income property generation units and 15 percent is set aside for community shared solar generation units, and the program now requires shared projects to serve a minimum threshold of low-income customers, but there is no mechanism to ensure that reserved capacity is actually utilized, and unused set-aside capacity is not reallocated to ensure low-income and community goals are met.[131] This 10 and 15 percent capacity set aside should also be increased to incentivize additional low-income and community solar adoption. Beyond including a budget carveout for low-income and community shared generation that is at least in proportion to any targets set, there should be a 50 percent program budget carveout specifically for participation from EJ neighborhoods.

Recommendation #4: Implement a Solarize Mass Plus program that supports BTM solar and storage deployment in EJ neighborhoods

MassCEC's now-ended Solarize Massachusetts program successfully reduced installation costs for small-scale solar in 85 communities across the Commonwealth by providing education, marketing and resources, and procurement of installers.[132] The Solarize Mass Plus program, also now closed to new projects, expanded on Solarize Massachusetts to incorporate other technologies including heat pumps, battery storage, electric vehicles, and solar hot water systems. Implementing a new Solarize Mass Plus program to support BTM solar and storage deployment in EJ neighborhoods and hot spot areas would increase equity participation and reduce installation costs for residents in these areas.

Barrier: Electric system or building upgrades

Policy gap: Massachusetts' loans and grants for electric system and building upgrades are not targeted at BTM readiness or EJ neighborhoods

Certain building characteristics may limit the feasibility and cost of siting BTM resources, including electric system characteristics, building age, and roof load limitations.[133] While Massachusetts offers several loan and grant programs (see *Appendix B: Massachusetts Energy and Housing Programs*) that can be used for electric system and building upgrades, these funds are limited and not specifically targeted at ensuring that properties are BTM-ready (see Table 15).

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[131] "225 CMR 28.00: Solar Massachusetts renewable target (SMART) program 3.0," Massachusetts DOER, September 2025, www.mass.gov/regulations/225-CMR-2800-solar-massachusetts-renewable-target-smart-program-30.

[132] "Solarize Mass," MassCEC, 2020, www.masscec.com/program/solarize-mass.

[133] (1) Daigle, J., Jungers, B., *Enhancing the Customer Experience of Upgrading an Electric Service Panel*, Building Decarbonization Coalition and Source, 2023, https://buildingdecarb.org/wp-content/uploads/BDC-Panel-Upgrade-Report.pdf; (2) Heeter, J., Sekar, A., Fekete, E., Shah, M., Cook, J.J., *Affordable and Accessible Solar for All: Barriers, Solutions, and On-Site Adoption Potential*, National Renewable Energy Laboratory, 2021, www.nrel.gov/docs/fy21osti/80532.pdf.

Table 15. Electric system and building upgrades recommendations

#5: Offer zero-interest financing for BTM readiness electric/building upgrades and grants for projects that benefit households in EJ neighborhoods
#6: Establish a state-funded stretch and specialized code for BTM solar and storage readiness in new construction

Recommendation #5: Offer zero-interest financing for BTM readiness electric/ building upgrades as well as grants for projects that benefit households in EJ neighborhoods

Massachusetts' HEAT Loans provide zero-interest financing for energy efficiency upgrades and battery storage systems enrolled in ConnectedSolutions (up to $25,000).[134] HEAT Loans can also be used for pre-weatherization barriers including knob and tube wiring upgrades (up to $7,000).[135] Expanding the HEAT Loans program to include a zero-interest loan specifically designed for households in EJ neighborhoods and supporting electric and building upgrades for BTM solar and storage readiness would increase access to zero-interest financing for those that need it most. This effort should be marketed in several languages,[136] online, and at local events. Any loan program designed for low-income households should also include longer payback periods to allow borrowers to stretch their payments out over a longer period of time.

Recommendation #6: Establish a state-funded stretch and specialized code for BTM solar and storage readiness in new construction

Massachusetts has three levels of building codes: the Base Code (required), Stretch Code (municipality opt-in), and Specialized Code (municipality opt-in).[137] Amending the Stretch and Specialized codes to include solar paired with storage provisions and overall electrification readiness better aligns the stretch code policy with the Commonwealth's decarbonization strategies. Currently, the residential and commercial Stretch code and Specialized opt-in code include solar ready provisions but lack language for solar paired with storage readiness in new construction.[138] The Commonwealth should ensure that funding is available to support this program so that municipalities and affordable housing providers/administrators are not responsible for bearing the brunt of the costs.

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[134] "0% Interest Financing," Mass Save, 2025, www.masssave.com/residential/rebates-offers-services/financing.

[135] "Mass Save HEAT Loan," Mass Save, www.myheatloan.com/landingpage.

[136] The top three most spoken languages in Massachusetts other than English: Chinese, Spanish, and French/Haitian/Cajun. See: *American Community Survey* [Table ID: B16002], U.S. Census Bureau, 2024, https://data.census.gov/table/ACSDT1Y2024.B16002?q=Language+Spoken+at+Home&g=040XX00US25&y=2024&moe=false.

[137] "2025 Massachusetts Building Energy Codes," Massachusetts DOER, 2025, www.mass.gov/info-details/2025-massachusetts-building-energy-codes.

[138] (1) *MA 2025 Residential Stretch code and Specialized Opt-in code (IECC2021 with MA amendments),* Massachusetts DOER, December 2024, www.mass.gov/doc/stretch-specialized-code-residential/download; (2) *MA 2025 Commercial Stretch code and Specialized Opt-in code (IECC2021 with MA amendments),* Massachusetts DOER, December 2024, www.mass.gov/doc/stretch-specialized-code-commercial/download.

Barrier: Workforce limitations

Policy gap: MassCEC and Mass Save offer insufficient workforce training grants and assistance to organizations to support clean energy careers in EJ neighborhoods, Tribes and underrepresented groups, and to support retraining for fossil fuel workers. Trainees from these programs face uncertainty in successfully finding employment opportunities.

MassCEC's 2023 report, *Powering the Future: A Massachusetts Clean Energy Workforce Needs Assessment*, projects that the clean energy workforce will need to grow by almost 37 percent to achieve the Commonwealth's decarbonization goals.[139] Employers within the clean energy technologies field cite lack of experience, training, or technical skills as the most common reason for hiring difficulties across all segments of the industry, including electric power generation, transmission, distribution, and storage, and energy efficiency.[140] In a 2023 assessment, MassCEC found that lack of information about clean energy careers was a major barrier to workforce development in the area, particularly amongst women and Black populations.[141] According to MassCEC's 2024 Clean Energy Industry Report, the Commonwealth's clean energy industry is disproportionately male; 67 percent of the clean energy workforce is male compared to 51 percent of the statewide workforce. Interestingly, the clean energy industry employs a higher share of BIPOC populations compared to the state as a whole; 16 percent of the clean energy industry workforce is Hispanic/Latino compared to 12 percent statewide, and 25 percent of the clean energy industry workforce is nonwhite, compared to 21 percent statewide.[142]

MassCEC and Mass Save offer workforce training grants and assistance to organizations that can support clean energy careers in EJ neighborhoods, Tribes,[143] underrepresented groups, and fossil fuel workers but the need for training is greater than the offering. Grant applicants are encouraged to design programs that, among other recommendations, address workforce barriers including language barriers, lack of internet access, lack of affordable childcare, and distrust (see Table 16).

Table 16. Workforce limitations recommendation

#7: Assess workforce trends and identify opportunities for expanding existing workforce training programs to sercure employment for trainees

[139] *Powering the Future: A Massachusetts Clean Energy Workforce Needs Assessment*, MassCEC, July 2023, www.masscec.com/resources/massachusetts-clean-energy-workforce-needs-assessment.
[140] (1) *United States Energy & Employment Report 2024*, U.S. DOE, 2024, www.energy.gov/sites/default/files/2024-10/USEER%202024_COMPLETE_1002.pdf; (2) "Workforce Development," IREC, 2024, https://irecusa.org/census-workforce-development.
[141] *Powering the Future: A Massachusetts Clean Energy Workforce Needs Assessment*, MassCEC, July 2023, www.masscec.com/resources/massachusetts-clean-energy-workforce-needs-assessment.
[142] *2024 Massachusetts Clean Energy Industry Report*, MassCEC, 2024, https://app.box.com/file/2136782742123.
[143] Tribes is inclusive of Tribal governments and all American Indians recognized as having a special status relationship with the Commonwealth. Additional Indigenous peoples also include individual Indians as defined in federal law and urban Indian organizations.

Recommendation #7: Assess workforce trends and identify opportunities for expanding existing workforce training programs to secure employment for trainees

Existing workforce training offerings could be strengthened by assessing workforce trends in the context of EJ neighborhoods to identify areas where training is most needed and ensure these areas are benefiting from existing state offerings. In particular, the study should investigate how training efforts could be expanded to see trainees through to gain employment in the clean energy industry. For example, participants in Illinois' *Climate and Equitable Jobs Act* workforce training programs are connected to clean energy employers looking to hire staff or apprentices.[144]

Barrier: Lack of incentives for renters and/or condo owners

Policy gap: Existing programs do not address the lack of incentives for renters and condo owners

Renters and condo owners lack the ownership rights necessary to install on-site BTM resources, and building owners who are not responsible for renter energy costs have no incentive to make clean energy investments on their properties.[145] Massachusetts lacks specific programs or policies that seek to expand incentives for BTM installations for renter-occupied homes or condos (see Table 17).

Table 17. Renters and condo owner incentive recommendations

#8: Expand budget for community solar and storage and invest in educational materials and outreach to support community-led solar development
#9: Investigate opportunity for plug-in solar paired systems
#10: Conduct a technical study to inform the development of a multifamily solar and storage incentive program
#11: Establish incentive mechanisms for renters and condo owners to invest in BTM solar and storage

Recommendation #8: Expand budget for community solar and storage and invest in educational materials and outreach to support community-led solar development

Community solar and storage resources can provide access for households and businesses that are unable to install their own BTM solar or storage due to physical or financial reasons (for example, renters or condo-owners that lack the ownership rights to install BTM energy resources on-site). Massachusetts should increase available funds dedicated to community solar deployment in, and for, EJ neighborhoods. In order to publicize these opportunities, the

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[144] *DCEO CEJA Programs*, Illinois Department of Commerce and Economic Opportunity, 2024, https://ilworkforceacademy.com/wp-content/uploads/2024/10/climate_and_equitable_jobs_act_a_model_for_equitable_workforce_training.pdf

[145] Thoubboron, K., "Community solar pros and cons: An overview," EnergySage, October 2023, www.energysage.com/community-solar/pros-and-cons-of-community-solar.

Commonwealth should invest in educational materials, available in multiple languages and formats (handouts, websites, email, etc.), to educate local community organizations and other entities on how to invest in community solar and storage, the benefits of these systems, and what financial incentives exist for Massachusetts residents and businesses. Local events to present these materials in EJ neighborhoods will encourage more equitable adoption of community solar and storage while increasing overall awareness of the Commonwealth's offerings. Materials should be available in multiple languages, including the top three most spoken languages in Massachusetts other than English: Chinese, Spanish, and French/Haitian/Cajun.[146]

Recommendation #9: Investigate opportunity for plug-in solar paired systems

Plug-in (also called "balcony" or "portable") solar paired with storage is simpler to install and more affordable than traditional rooftop solar paired systems, making it a more accessible solar option for renters and condo owners. Over a decade ago, the Fraunhofer Center for Sustainable Energy Systems developed a plug-and-play PV system that is simple to install—requiring less than 10 work-hours of labor and able to be delivered, installed, and commissioned in one day—and automatically self-tests and requests utility interconnection.[147] Ten years later, Utah and Maine became the first and second U.S. states[148] to allow residential plug-in solar systems.[149] Other states, including Pennsylvania, New York, and Massachusetts, are considering similar legislation.[150] In California, Bright Saver's Backyard Solar with Battery pilot program offers a smart, plug-in solar plus storage system from $2,399.[151] Massachusetts DPU should launch an investigation into the opportunity for plug-in solar, both stand-alone and paired with storage, including identification of any potential issues connected with widespread deployment, including safety and consumer protection.[152]

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[146] *American Community Survey* [Table ID: B16002], U.S. Census Bureau, 2024, https://data.census.gov/table/ACSDT1Y2024.B16002?q=Language+Spoken+at+Home&g=040XX00US25&y=2024&moe=false.

[147] "Plug and Play Solar PV for American Homes," U.S. Department of Energy, www.energy.gov/eere/solar/plug-and-play-solar-pv-american-homes.

[148] Drugmand, S., "Plug-In Solar Power Could Be Coming to a Balcony Near You," Sierra Club, November 2025, www.sierraclub.org/sierra/plug-solar-power-could-be-coming-balcony-near-you.

[149] *Solar Power Amendments*, Utah State Legislature House Bill No. 340, (2025), https://le.utah.gov/~2025/bills/static/HB0340.html Maine L.D. 1730 https://legislature.maine.gov/bills/getPDF.asp?paper=SP0676&item=5&snum=132.

[150] (1) Pennsylvania General Assembly House Bill No. 1971, (2025), *An Act amending Title 66 (Public Utilities) of the Pennsylvania Consolidated Statutes, in restructuring of electric utility industry, further providing for definitions and providing for portable solar generation systems,* www.palegis.us/legislation/bills/2025/hb1971; (2) New York State Senate Bill No. S8512A, (2025), *Relates to portable solar generation devices*, www.nysenate.gov/legislation/bills/2025/S8512/amendment/A; (3 Massachusetts House Bill 5151, (2026), *An Act Relative to Energy Affordability, Clean Power, and Economic Competitiveness*, https://malegislature.gov/Bills/194/H5151; (4) Maine Senate Bill 676, (2025), *An Act Regarding the Beneficial Electrification Policy of the State*, https://legislature.maine.gov/billtracker/#Paper/1730?legislature=132.

[151] "Backyard Solar with Battery," Bright Saver, www.brightsaver.org/backyard-solar-with-battery.

[152] For example, UL Solutions has released a testing and certification framework for safer plug-in solar in the United States. See: "UL Solutions Debuts Testing and Certification Framework for Safer Plug-In Solar Across the United States," UL Solutions, January 2026, www.ul.com/news/ul-solutions-debuts-testing-and-certification-framework-safer-plug-solar-across-united-states

Recommendation #10: Conduct a technical study to inform the development of a multifamily solar and storage incentive program

Massachusetts lacks a coordinated effort towards supporting solar and storage expansion for residents living in multifamily housing. Massachusetts should facilitate a study of multifamily solar and storage programs offered in the United States. For example, in California, the Solar on Multifamily Affordable Housing Program (SOMAH) aims to install 300 MW of solar through 2030 and is administered by a team of nonprofit organizations.[153] In addition, the study should review available guidance on best practices for multifamily program design and implementation[154] and be developed with input from EJ communities. Findings from this study should be used to inform the development of a program in the Commonwealth to reduce the barriers to solar and storage adoption for those living in multifamily housing units.

Recommendation #11: Establish incentive mechanisms for renters and condo owners to invest in BTM solar and storage

Massachusetts offers several incentives for BTM solar and storage adoption but renters and condo owners lack property rights to install these systems and have little incentive to participate in state programs. The Commonwealth should explore innovative incentive mechanisms for renters and condo owners within current programs (e.g., SMART, ConnectedSolutions), in addition to expanding and supporting existing community solar offerings. This incentive mechanism should include added financial incentives for systems benefitting or located in EJ neighborhoods and hot spot areas.

Barrier: Complexity and lack of program coordination

Policy gap: Participating in Massachusetts programs is complicated and available guidance materials are not written for a general audience or available in multiple languages

Most residents, businesses, and policymakers lack usable information on clean energy benefits and awareness of the programs offered. For example, a 2024 Siemens' survey of 100 decision-makers in the United States and Canada suggests that customer hesitation to share information, lack of information about location and behavior of BTM technology, program inflexibility and a lack of interest and awareness from customers are top barriers to increasing enrollment in BTM and demand-side management programs.[155] Massachusetts and its investor-owned utilities provide information on available programs and policies to support BTM solar and storage online, but these resources are often written in English and for a technical audience and are not accessible to a general audience, households who lack internet access, or limited-English speaking households. Lastly, Massachusetts energy, housing and climate resilience programs do not coordinate, leaving customers responsible for signing up for each program separately (see Table 18).

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[153] (1) "The Solar on Multifamily Affordable Housing (SOMAH) Program," California Public Utilities Commission, www.cpuc.ca.gov/somah; (2) *Solar on Multifamily Affordable Housing Program Handbook (Second Edition)*, AEA, 2020, https://aea.us.org/wp-content/uploads/2020/08/SOMAH_Handbook.pdf.

[154] For example, see: Bourg-Meyer, V. and O'Connell, K. *Multifamily Affordable Housing Solar and Solar + Storage*, Clean Energy States Alliance, August 2023, www.cesa.org/resource-library/resource/multifamily-affordable-housing-solar-and-solarstorage-solar-for-all-greenhouse-gas-reduction-fund-program-design-options-for-states.

[155] *Seeing behind the meter,* prepared by Oxford Economics for Siemens, 2024, https://assets.new.siemens.com/siemens/assets/api/uuid:92b96afd-8953-4689-9f4d-8ef42c311e95/Seeing-behind-the-meter-report.pdf.

Table 18. Program complexity and lack of coordination recommendations

#12: Create educational resources and an outreach plan for EJ neighborhoods
#13: Ensure existing program materials are comprehensive and accessible
#14: Establish a statewide whole-home electrification and backup power program based on CVEO

Recommendation #12: Create educational resources and an outreach plan for EJ neighborhoods

Low-income and environmental justice communities face additional barriers and challenges to BTM deployment. To promote more equitable clean energy deployment, Massachusetts EEA should create educational resources, including factsheets, online tools, and an annual targeted outreach plan (planned events, social media outreach, etc.) for EJ communities to increase program participation as a collaborative effort with existing community-based organizations. Following the development of this targeted outreach plan, Massachusetts EEA should also execute it alongside community-based organizations. EJ community-focused educational resources and outreach planning will expand participation in programs while building trust within these communities. User interface and outreach materials should be made available in multiple languages and formats (via website, mail, email, at local community events).

Recommendation #13: Ensure existing program design and guidance are comprehensive and accessible

Massachusetts' online and printed materials with information on energy program design and application instructions should be reviewed to ensure that they include information on (1) how different types of households can participate in existing offerings; (2) what additional incentives exist for low-income households and other groups; (3) the estimated upfront cost and monthly benefit for installing solar or solar paired with storage; and (4) the resiliency and climate benefits of participation. All materials should be available in plain, non-technical language, in multiple languages, and distributed in several formats (via mail, email, at local community events).

Recommendation #14: Establish a statewide whole-home electrification and backup power program based on CVEO

The Cape Light Compact Cape and Vineyard Electrification Offering (CVEO) program—discussed in more detail in *Appendix B: Massachusetts Energy and Housing Programs*—provided whole-home electrification including heat pumps, solar, storage, electric appliances and electric upgrades, at low- to no-cost for households earning less than 80 percent of the state median income. The program specifically targeted low and moderate-income residents in Cape Cod and Martha's Vineyard heating with oil, propane, or electric resistance systems. A statewide CVEO program should be launched, emulating the CVEO and incorporating lessons learned. This would create a one-stop shop for whole-home electrification—including BTM solar and storage—for low-income households.[156]

[156] McCloskey, S., *Cape Light Compact Program Overview: Cape and Vineyard Electrification Offering*, Clean Energy States Alliance, June 2024, www.cesa.org/wp-content/uploads/Stephen-McCloskey.pdf

Barrier: Lack of trust

Policy gap: Massachusetts lacks programs or policies to improve trust between customers and utilities and solar and storage developers/installers

A March 2025 order by Massachusetts DPU documents negative public opinion of Massachusetts electric utilities due to billing failures and errors.[157] Online ratings of Massachusetts' utilities show poor customer service.[158] In addition, several recent studies report a lack of trust between households and solar energy suppliers.[159] Massachusetts recently passed legislation, *An Act Promoting a Clean Energy Grid, Advancing Equity and Protecting Ratepayers*, that creates a fund for stakeholders to intervene in the utility siting process to help tackle the lack of trust.[160] This measure is just the start of needed actions to improve trust in utilities and solar and storage developers/installers. (See Table 19).

Table 19. Recommendations to address lack of trust amongst customers, utilities, and solar and storage developers

#15: Establish outreach and transparency requirements for clean energy solicitors

Recommendation #15: Establish outreach and transparency requirements for clean energy solicitors

Massachusetts provides a publicly available statewide library of trusted solar and storage installers to support consumer confidence and trust in these companies.[161] Massachusetts policymakers should establish outreach and transparency requirements for clean energy solicitors to ensure that customer interests and benefits are protected. For example, provisions that require information to be shared in multiple languages and for full disclosure of short- and long-term system costs, bill impacts, financial incentives, and contractors with open cases with consumer protection agencies. These qualifications could serve as requirements for inclusion on MassCEC's installer list.[162]

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[157] *Letter Order - Failure to Issue Timely Bills*, Massachusetts DPU, March 2025, www.mass.gov/doc/dpu-national-grid-letter-order-march-2025/download.

[158] "Reviews for Eversource," MA Energy Ratings, August 2025, www.maenergyratings.com/read-reviews/eversource.

[159] For example, see: (1) Breger, D., Strong, R., Hernandex, J., Musalem, N., and Gill, E., *Rooftop Solar in Lawrence, MA: Community Perspectives, Deceptive Practices, and Financing Options*, National Renewable Energy Laboratory, 2024, https://docs.nrel.gov/docs/fy25osti/89428.pdf; (2) "Competitive Electric Supply," Massachusetts Office of Attorney General, www.mass.gov/competitive-electric-supply.

[160] (1) Massachusetts General Laws Chapter 239, Section 109 (2024), *An Act Promoting a Clean Energy Grid, Advancing Equity and Protecting Ratepayers*, https://malegislature.gov/Laws/SessionLaws/Acts/2024/Chapter239; (2) *Staff Straw Proposal: Intervenor Support Grant Program*, Massachusetts Energy Facilities Siting Board and Department of Public Utilities Division of Public Participation, 2024, www.mass.gov/doc/2024-ca-isgf-proposal/download

[161] "Who to Hire," MassCEC, https://goclean.masscec.com/installers/

[162] Ibid.

Barrier: Interconnection issues

Policy gap: Interconnection costs and delays deter BTM solar and storage deployment in the Commonwealth

Interconnection—the process of integrating, or connecting, a resource to the larger electric grid—can be a barrier to BTM deployment if it presents a difficult, costly or lengthy application process to customers, requires too much effort for utilities to process applications, or allows BTM interconnections that may cause system issues.[163] Larger projects also face additional interconnection barriers, for example, in a 2023 report prepared on behalf of Clean Energy Group, AEC investigated interconnection issues in Massachusetts by interviewing key stakeholders in the energy industry and policy community and found that while there are hundreds of proposed solar paired with storage systems in the interconnection queue each year, very few were authorized to interconnect to the grid.[164]

In addition to delays, project owners may be responsible for any costs associated with interconnecting a distributed generation facility, including any necessary upgrades of the electric system, creating an additional barrier to deployment. Massachusetts DPU's Provisional System Planning Program (D.P.U. 20-75-B) begins to address this traditional "cost causation" model, which assigned all grid upgrade costs to the project causing the need for the upgrade. Under the DPU's provisional system, cost responsibility may be shared more equitably for eligible projects. Where a grid upgrade enables multiple solar or clean energy facilities to interconnect, not just a single project, the upfront costs are initially funded by all distribution customers through a Reconciling Charge (a small per-kilowatt-hour fee on utility bills). Interconnecting customers then repay their proportional share of those costs through Capital Investment Project (CIP) Fees based on their facility's size. This shared cost structure is capped at $500/kW for interconnecting customers, and distribution customers are effectively reimbursed over time as future projects interconnect and pay their share (see Table 20).[165] However, if the utility elects not to file a CIP, distribution upgrade cost allocation reverts to the traditional cost causation model.

Table 20. Interconnection recommendations

#16: Set maximum interconnection costs that can be charged by utilities to project developers

Recommendation #16: Set maximum interconnection costs that can be charged by utilities to project developers

To encourage BTM deployment and reduce costs, the Commonwealth should set strict limits on the maximum interconnection costs that utilities can charge to project developers with a lower maximum set for small-scale project developers. According to a 2018 National Renewable Energy Laboratory study, California and Utah have policies in place to increase interconnection cost certainty and limit cost liability for developers.[166] Development of these limits should be done in collaboration with developers.

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[163] *Behind-The-Meter Battery Energy Storage: Frequently Asked Questions*, NREL, 2021, https://www.nrel.gov/docs/fy21osti/79393.pdf.

[164] Lala, C., Burt, J., Peddada, S., *The Interconnection Bottleneck: Why Most Energy Storage Projects Never Get Built*, Applied Economics Clinic and Clean Energy Group, May 2023, www.cleanegroup.org/publication/the-interconnection-bottleneck-why-most-energy-storage-projects-never-get-built.

[165] "Provisional System Planning Program Guide," Massachusetts EEA, www.mass.gov/guides/provisional-system-planning-program-guide.

[166] Manning, D., and McAllister, R., *Review of Interconnection Practices and Costs in the Western States*, NREL, 2018, https://docs.nrel.gov/docs/fy18osti/71232.pdf.

Barrier: Solar panel and battery recycling and disposal

Policy gap: Existing programs do not address end-of-life management for solar panel or battery components, raising environmental concerns for disposal of these materials

While solar and storage systems produce less waste and have less environmental impacts compared to fossil-fuel generators,[167] some customers may be hesitant to invest in a system without a clear path for recycling or disposal of the unit. Recycling technologies for some solar panel components (e.g., glass, aluminum frame, copper wire) are well-established, but for other solar components and battery storage are less established.[168] In addition, there are serious technical, economic, regulatory and social challenges to recycling lithium-ion batteries.[169] Households living in EJ neighborhoods that are disparately exposed to pollution and hazardous waste from energy-related activities, may be hesitant to install equipment with no clear route to disposal and recycling.

Massachusetts policymakers have not passed any legislation or launched any programs to support research on end-of-life management of solar and storage components. However, in August 2023, the Massachusetts Department of Environmental Protection, together with MassCEC, and the DOER RecyclingWorks program, published a discussion draft on solar panel recycling that summarizes solar system recycling practices and challenges, recycling programs and policy in other jurisdictions, and potential next steps for advancing recycling infrastructure in Massachusetts (see Table 21).[170]

Table 21. Solar and storage recycling and disposal recommendation

#17: Investigate recycling and reuse requirements for solar and storage systems

Recommendation #17: Investigate recycling and reuse solutions for solar and storage systems

Massachusetts should build on its 2023 discussion draft[171] and conduct an updated study that summarizes current recycling and reuse practices being employed in the Commonwealth and in other states and identifies solutions (e.g., programs or recycling requirements) that will facilitate sustainable end-of-life management for BTM systems in the Commonwealth while keeping consumer costs low. Future programs or recycling requirements should be developed in collaboration with key stakeholders, including solar and storage developers, installers and recycling businesses. In addition, requirements should be developed in line with existing research, policy, and programs in other jurisdictions. For example, according to the EPA, California, Hawaii, New Jersey, North Carolina, and Washington have enacted policies related to solar panel

[167] Mirletz, H., Hieslmair, H., Ovaitt, S. et al. "Unfounded concerns about photovoltaic module toxicity and waste are slowing decarbonization," *Nature Physics, 19,* 1376–1378 (2023), https://doi.org/10.1038/s41567-023-02230-0.
[168] "Solar Panel Recycling," U.S. EPA, www.epa.gov/hw/solar-panel-recycling.
[169] Chacana-Olivares, J., Peceño, B., Grageda, M. et al., "Lithium-ion battery recycling: a perspective on key challenges and opportunities," *npj Materials. Sustainability, 3(38)* (2025), https://doi.org/10.1038/s44296-025-00083-7.
[170] *Solar Panel Recycling: A Review of Existing Markets and Practices Discussion Draft*, Massachusetts Department of Environmental Protection, August 2023, www.mass.gov/doc/discussion-draft-solar-panel-recycling-a-review-of-existing-markets-practices-august-2023/download.
[171] Ibid.

waste.[172] Moreover, in May 2023, U.S. EPA published a memorandum on lithium battery recycling regulations, encouraging recycling of lithium-ion batteries.[173] Currently, the EPA is working on a Report to Congress on best practices for battery recycling.[174]

Barrier: Lack of broadband access

Policy gap: There are no current efforts to distribute information on programs that support BTM deployment at in-person events, via mail, or other means that do not require internet access

Information on the Massachusetts programs that provide financial incentives and technical support to households and businesses interested in installing BTM systems is primarily available online, creating a barrier to BTM deployment for households that lack broadband access. As of 2024, four percent of Massachusetts households (110,476 households) lack internet access.[175] The Residential Retrofit Program of the Massachusetts Broadband Institute (MBI) improves access to the internet for low-income households by providing grants for fiber optic cabling for Internet Service Providers that install, own, and maintain the equipment.[176] MBI's RANGE Program provides grants to housing operators participating in the Residential Retrofit Program for investment in digital navigation, digital literacy and education, public space improvements, and device distribution for residents (see Table 22).[177]

Table 22. Broadband access recommendation

#18: Require utilities to host workshops in EJ neighborhoods for customers to learn about and sign up for existing programs

Recommendation #18: Require utilities to host workshops in EJ neighborhoods for customers to learn about and enroll in existing programs

Massachusetts utilities serve customers without broadband access by hosting events to help customers manage their energy bills and direct low-income customers to available electric and fuel assistance programs.[178] Utilities should offer similar in-person events or workshops to provide customers with information on the benefits of BTM solar and storage, available educational resources, and information on programs that incentivize BTM deployment (e.g., SMART, ConnectedSolutions). Requiring utilities to host regular local workshops in EJ neighborhoods, with materials available in multiple languages, will facilitate higher program participation rates from these communities and increase access to information for households lacking access to the internet.

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[172] "End-of-Life Solar Panels: Regulations and Management," U.S. EPA, www.epa.gov/hw/end-life-solar-panels-regulations-and-management.
[173] Hoskinson, C., "Lithium Battery Recycling Regulatory Status and Frequently Asked Questions," U.S. EPA, May 2023, https://rcrapublic.epa.gov/files/14957.pdf.
[174] "Battery Collection Best Practices," U.S. EPA, August 2025, www.epa.gov/electronics-batteries-management/battery-collection-best-practices.
[175] *American Community Survey 1-Year Estimates Detailed Tables* [Table ID: B28011], U.S. Census Bureau, 2024, https://data.census.gov/table/ACSDT1Y2024.B28011?g=040XX00US25.
[176] "Residential Retrofit Program," Massachusetts Broadband Institute (MBI), 2024, https://broadband.masstech.org/retrofit.
[177] "Retrofit Ancillary Grantee (RANGE) Program," MBI, 2025, https://broadband.masstech.org/RANGE.
[178] See, for example: (1) "Customer Assistance Events," National Grid, 2025, www.nationalgridus.com/customer-assistance-events; (2) "Bill Help Events and Webinars," Eversource, 2025, www.eversource.com/residential/account-billing/payment-assistance/bill-help-events-webinars.

VI. Conclusion

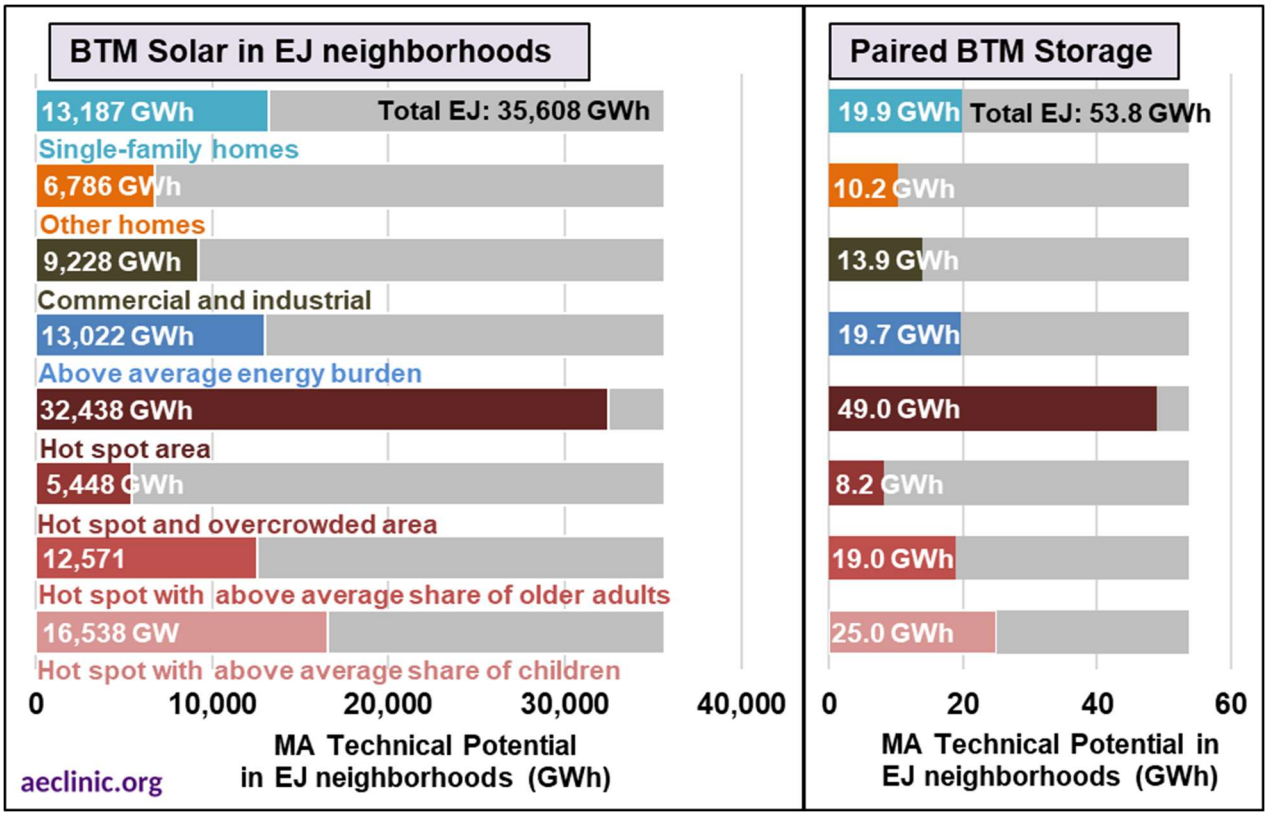
BTM solar and storage offer unique economic, environmental, equity and grid resiliency benefits to EJ communities (see Table 1 above) that will not be realized if Massachusetts does not prioritize equitable BTM deployment as a key strategy for achieving its decarbonization goals. Expanding BTM solar and storage deployment in EJ neighborhoods will support the Commonwealth's commitment whereby "all Massachusetts residents can fully access and participate in the transition to a low-carbon economy" and "differences in income-level, location, English proficiency, and previous marginalization" do not prevent anyone from participating in the benefits created by a new, low-carbon economy.[179]

AEC estimates the technical potential of BTM solar and storage in Massachusetts EJ neighborhoods to be 31.3 GW of solar paired with 13.4 GW storage, assuming a storage-to-solar ratio of 0.43. As of December 2025, there was just 3.1 GW of BTM solar and just 0.2 GW of BTM storage in Massachusetts.[180] Together with input from Clean Energy Group, the Union of Concerned Scientists, and Vote Solar, and the advisory committee, AEC makes 18 recommendations to strengthen Massachusetts' existing offerings to expand clean energy access to the Commonwealth's most vulnerable areas (see Table 11 above). These recommendations will assist the Commonwealth in realizing a greater share of the technical potential for BTM solar and storage in EJ neighborhoods in line with Massachusetts' commitment to an equitable clean energy transition.

[179] *Massachusetts Clean Energy and Climate Plan for 2025 and 2030*. p.11, Massachusetts EEA, 2022.
[180] (1) "Electric Power Monthly" [Table 6.2.B], U.S. EIA, November 2025, www.eia.gov/electricity/monthly/epm_table_grapher.php?t=table_6_02_b; (2) "Form EIA-861 [Net Metering, Non-Net Metering]," U.S. EIA, 2024, www.eia.gov/electricity/data/eia861/.

Appendix A: Main Results in GWh

Figure 16. Massachusetts EJ neighborhood BTM solar and storage technical potential, in GWh



Estimated technical potential of BTM solar in Massachusetts EJ neighborhoods (left panel) and paired BTM storage (right panel)—assuming a storage-to-solar ratio of 0.43 and a storage duration of 4-hours—across different property types and areas.
Data source: AEC calculation.

Appendix B: Massachusetts Energy and Housing Programs

Grants and financial assistance

Twelve current Massachusetts' grants and financial assistance programs provide funding for BTM systems, and/or address one or more of the barriers to deployment (see Table 23).

Table 23. Grants and financial assistance available to Massachusetts residents or businesses that support BTM deployment

Grants/Financial Assistance	Description	Grant Value
Accelerated Repair Program	Provides Massachusetts school districts with funding for electrification, energy efficiency, and/or roof repair projects	$300 million for two years worth of projects
Affordable Housing Decarbonization Grant Program	Provides funding for deep energy retrofits and decarbonization projects in the affordable housing sector benefiting low- and moderate-income residents	Has provided over $96 million over two rounds of funding, with almost $47 million awarded in the third round
Boston's Equitable Emissions Investment Fund	Provides funding to nonprofits proposing projects aimed at reducing building emissions in Boston, with priority given to work serving EJ neighborhoods	Up to $250,000
Climate leader Communities Accelerator Grants	Supports municipality decarbonization projects	$52 million in total funding
Climate Ready Housing	Provides funding for deep energy retrofits in existing multifamily affordable housing and funding for unfinanced incremental costs from the retrofit (at least 25 percent of housing occupants must have incomes below 60 percent of the area median income)	$16 million annually, leveraged to support 10-15 projects
Equity Workforce Training Implementation Grants	Provides grant funding to organizations that are positioned to develop career pathways in climate-critical priority occupations, with the intention of increasing access to training opportunities for underrepresented populations	$1.2 million, leveraged across 2-3 years
Green School Works	Provides funding to K-12 schools to install clean energy infrastructure	$50,000 to $5 million per award
Intervenor Support Grant Program	Provides financial assistance to community groups and small municipalities that are unable to participate in DPU AND EFSB proceedings due to financial hardship.	A maximum of $3.5 million annually for grant funding
Low-Income Home Energy Assistance Program (LIHEAP)	Provides financial assistance to income-eligible homeowners and renters to cover a portion of household heating costs	Between $120-$1,500 (dependent on household income)
Low-Income Services Solar Program	Provides grants to nonprofits that serve lo-income and EJ neighborhoods to install solar and optional battery systems	Grants for facility installation vary in amount
Merrimack Settlement Fund	Funds projects that remove barriers to energy efficiency and increase access to clean energy	$56 million
Workforce Training Grant	Provides annual funding for energy efficiency certification or training with prioritization for those in EJ neighborhoods	$7,500 per individual and up to $50,000 per organization

Data source: See text below.

The Massachusetts School Building Authority (MSBA) administers need- and urgency-based grants through the **Accelerated Repair Program (ARP)** for existing schools seeking weatherization, roof replacement, and heat pump conversions. Schools selected for this grant will undergo a feasibility study to consider options for roof replacement or roof restoration, and this study will include an assessment to determine the building's solar readiness.[181] As of 2024, MBSA has awarded just over $220 million to 65 schools across 35 districts.[182]

Massachusetts' Department of Energy Resources (DOER) administers the **Affordable Housing Decarbonization Grant Program**, which provides funding for deep energy retrofits and decarbonization projects for affordable housing.[183] Over $96 million in funding was awarded to select grantees during the first two rounds of funding, and the third round of funding has allocated almost $47 million. DOER has stated that the projects awarded funding under this grant program will improve energy efficiency, install solar panels, make building envelope and electrical system improvements, install heat pump-based technology, and electrify appliances. Any projects seeking more than $1 million in funding are required to build in dedicated opportunities for the local workforce, addressing a variety of barriers to BTM deployment.[184]

Boston's Equitable Emissions Investment Fund—initially funded with $3.5 million from the City and now funded from fines and alternative compliance payments from Boston's Building Emissions Reduction and Disclosure Ordinance (BERDO)—was developed to fund projects proposed by nonprofits with a goal of reducing building emissions in Boston. The Fund prioritizes nonprofit organizations that serve Environmental Justice (EJ) communities. To receive funding, a project must "advance a public purpose and include a building carbon mitigation component, with priority given to those offering additional co-benefits," where "co-benefits" are described as benefits to affordable housing, tenants, labor and workforce development, outdoor air quality, indoor air quality and quality of life, climate resilience benefits, and energy justice benefits.

While the eligibility criteria leave room for a variety of project types, the Fund has the capacity to address several barriers to BTM deployment, including electric system or building upgrades, workforce limitations, high upfront costs, or lack of education, awareness, and outreach.[185] For example, the EquiSol: Blue Line Solar Access Program—a 2024 project from Green Energy Consumer's Alliance—aims to address high costs to low- and moderate-income customers by working with local organizations, land trusts, landlords, and homeowners to develop rooftop solar across 10 sites along the MBTA Blue Line.[186] In addition, the 2024 Dorchester Bay Solar for

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[181] "Accelerated Repair Program Statement of Interest Process Overview," Massachusetts School Building Authority, www.massschoolbuildings.org/building/SOIs/ARP_Process_Overview.

[182] Accelerated Repair Program," Massachusetts School Building Authority, www.massschoolbuildings.org/programs/Accelerated_Repair.

[183] "Affordable Housing Decarbonization Grant Program," Massachusetts DOER, 2025, www.mass.gov/info-details/affordable-housing-decarbonization-grant-program.

[184] Ibid.

[185] "Equitable Emissions Investment Fund," City of Boston, 2025, www.boston.gov/departments/environment/equitable-emissions-investment-fund.

[186] *BERDO Review Board Meeting & Public Hearing,* Building Emissions Reduction and Disclosure Ordinance (BERDO), September 9, 2024, www.boston.gov/sites/default/files/file/2024/09/1.%20BERDO%20RB%20Meeting%20Presentation%209.9.2024.pdf#page=29 , p. 3

Residents project included solar installations on nine buildings with a focus on low-income tenants, with the goal of emissions reduction, electricity savings, and mitigating the upfront cost of solar.[187] Participants would receive on-bill electricity credits, and the project was designed such that electricity savings would be reinvested into a nonprofit-owned housing development to continuously improve housing quality.[188]

The Massachusetts Housing Partnership and MassHousing jointly administer the **Climate Ready Housing** program on behalf of the Executive Office of Housing and Livable Communities to provide funding for deep energy retrofits in existing multifamily affordable housing. Each year, $16 million in state funding is allocated among 10 to 15 projects that meet eligibility requirements. Among these eligibility requirements: the project approach must include heat pump technology for space heating and cooling; maximize renewable energy systems; and support BTM adoption, particularly for those who may otherwise face high upfront costs of purchasing and installing BTM resources for their own properties.[189]

DOER's **Climate Leader Community Accelerator** grant provides $52 million in total funding to municipalities in the Commonwealth for decarbonization projects, including BTM solar and storage, and are required to participate with state programs like SMART.[190]

The **Equity Workforce Training Implementation Grants** implemented by MassCEC provide increased access to training opportunities for organizations that help develop careers in climate-critical priority occupations, specifically aimed at supporting individuals from EJ neighborhoods and low-income communities, as well as members of Tribal communities, current fossil fuel workers, and other underrepresented populations. The grants are intended to leverage $1.2 million across two to three years. Projects proposed must demonstrate an ability to address barriers for the aforementioned populations.[191] For instance, the Greater Lawrence Technical School, a 2024 awardee, intended to increase training opportunities for students through upgrades to electricity equipment within the Electrical Department, including high efficiency electrified equipment and rooftop and ground mounted solar.[192] A solar rooftop system would also be installed atop a weatherization training lab for students.[193] (Note: In addition to the Equity Workforce Training Implementation Grants, MassCEC offers several other grants that could be used to support BTM solar and storage deployment or workforce development in EJ neighborhoods.[194]

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[187] *BERDO Review Board Meeting & Public Hearing,* Building Emissions Reduction and Disclosure Ordinance (BERDO), September 9, 2024, www.boston.gov/sites/default/files/file/2024/09/1.%20BERDO%20RB%20Meeting%20Presentation%209.9.2024.pdf#page=29 , p. 3

[188] Ibid, pp. 45-47.

[189] "Climate Ready Housing: An EOHLC/MHP/MassHousing Partnership," LISC Massachusetts, 2025, www.lisc.org/massachusetts/our-work/green-homes/climate-ready-housing-program/.

[190] (1) "Climate Leader Communities," Massachusetts DOER, www.mass.gov/info-details/climate-leader-communities#climate-leader-communities-grants; (2) "Climate Leader Communities Decarbonization Accelerator Grant Program Opportunity Notice, Bid Solicitation Number: BD-25-1041-ENE01-ENE01-110103," Massachusetts DOER, 2024, www.commbuys.com/bso/external/bidDetail.sda?docId=BD-25-1041-ENE01-ENE01-110103&external=true&parentUrl=close.

[191] "Equity Workforce Training Implementation Grants," MassCEC, www.masscec.com/program/equity-workforce-training.

[192] "FY24 Equity Workforce Training, Equipment, and Infrastructure Grants," MassCEC.

[193] Ibid.

[194] "MassCEC Funding," MassCEC, www.masscec.com/funding.

For fiscal year 2026, MassCEC's **Green School Works** program will distribute up to $19 million in funding—$50,000 to $5 million per award—available to public K-12 schools to install or maintain clean energy infrastructure such as BTM solar and storage systems. In addition, this grant program will prioritize schools and districts with a higher share of students from low-income families.[195]

The **Intervenor Support Grant Program**, which was established by the 2024 Climate Act Provisions, aims to provide financial assistance to eligible community groups and smaller municipalities who would otherwise be unable to participate in Department of Public Utilities and Energy Facilities Siting Board proceedings.[196] The grants are intended to cover fees for attorneys, expert witnesses, community experts, and administrative expenses.[197] While this program does not directly support BTM deployment, it works towards reducing mistrust between Massachusetts residents and businesses and their electric and gas utilities.

The Executive Office of Housing and Livable Communities within DOER administers the **Low-Income Home Energy Assistance Program** (LIHEAP), which provides financial assistance to income-eligible homeowners and renters (including renters whose rent encompasses heating costs) covering a portion of household heating costs. Eligibility requirements for the program state that household income—based on household size and the combined gross annual income of household members—cannot exceed 60 percent of Massachusetts' State Median Income (i.e., a household size of four cannot exceed a household income of $99,573).[198] For fiscal year 2026, the benefit amount for households with income up to 60 percent of the State Median Income ranges from $250 to $430, and up to $600 for households earning at or below 100 percent of the Federal Poverty Level.[199] LIHEAP does not provide assistance for BTM solar or storage but can help reduce the barriers to BTM adoption by reducing household financial burdens.

The **Low-Income Services Solar Program** provides grants to Massachusetts-based nonprofit organizations serving low-income and EJ neighborhoods for the installation of solar energy systems with optional battery storage.[200] This program is administered by DOER, with technical and application assistance performed by CET. The program aims to reduce the cost of energy, enhance energy resilience, and support sustainability for nonprofits that offer community DOER-approved services such as food security, housing, and emergency shelters. Each year, the Low-Income Services Solar Program awards a minimum of 10 grants to nonprofits throughout the state. Funding is dependent upon the size of the project and is capped at $500,000 per installation, including battery storage, for MassSave eligible projects and $50,000 for Municipal

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[195] *Request for Proposals: Green School Works FY26 Funding,* MassCEC, 2025, www.masscec.com/sites/default/files/documents/RFP_-_Green_School_Works_Implementation_Grants_FY26%20%281%29.pdf.

[196] *DPU & EFSB Intervenor Support Grant Program* [PowerPoint], Massachusetts Department of Public Utilities & Energy Facilities Siting Board, November 3, 2025, www.mass.gov/doc/intervenor-support-pch-slides/download.

[197] *DPU & EFSB Intervenor Support Grant Program* [PowerPoint], Massachusetts Department of Public Utilities & Energy Facilities Siting Board, November 3, 2025, www.mass.gov/doc/intervenor-support-pch-slides/download.

[198] "Learn about home Energy Assistance – HEAP," Massachusetts DOER, 2025, www.mass.gov/info-details/learn-about-home-energy-assistance-heap.

[199] *Fiscal Year 2026 Home Energy Assistance Program (HEAP) Income Eligibility and Benefit Levels,* Massachusetts DOER, 2025, www.mass.gov/doc/fy-2026-income-eligibility-benefit-chart-june-2025/download.

[200] "Low-Income Services Solar Program," CET, www.cetonline.org/programs/low-income-services-solar-program/.

Light Plant (MLP) projects (subject to MLP approval and limited to one project per applicant) regardless of the project size. [201]

Following the 2018 Merrimack Valley gas explosions, the Baker-Polito Administration and the Attorney General's office reached a settlement agreement of $56 million with Columbia Gas. As part of this settlement, $41 million was allocated to customer programs in communities directly impacted by the explosions, also referred to as the Merrimack Valley Renewal Fund (MVRF)—$21 million of this allocation is directed to removing barriers to energy efficiency, and to increasing access to clean energy resources for low- to moderate-income (LMI) households.[202] For example, North Andover directed $500,000 of **Merrimack Settlement Funds** to Henry Sanborn Elementary School for rooftop solar.[203] Overall, this funding will address several barriers to BTM adoption including physical infrastructure upgrades and financial support for low-income customers via debt forgiveness.[204]

Mass Save offers a **Workforce Training Grant**, which provides funding to energy efficiency training and certification programs while prioritizing residents living in EJ neighborhoods—up to $7,500 per individual and up to $50,000 per organization annually. This grant is available to residents and organizations who are enrolling in an energy efficiency certification or training or that currently offer energy efficiency certification or trainings, respectively.[205]

On-bill incentives

Three Massachusetts programs provide on-bill incentives for solar and storage systems (see Table 24).

Table 24. Massachusetts on-bill incentives for solar and storage systems

Program	Description	Incentive Value
Clean Peak Energy Standard	Provides Clean Peak Certificates to retail electricity suppliers for deploying clean peak resources during peak periods	N/A
Net Metering	Provides per kWh credits for electricity generated in excess by customers	Dependent on net excess kWh generation and specific rate class charges
Solar Massachusetts Renewable Target Program	Provides incentives for owners of solar generating units through bill credits	Base compensation rate factors: 110% to 230% Adder values: $0.01 to $0.08/kWh

Data source: See text below.

[201] *Low Income Services Solar Program Manual*, Massachusetts DOER, 2025, www.cetonline.org/programs/low-income-services-solar-program/.
[202] "Merrimack Valley Clean Energy & Energy Efficiency Programs," Massachusetts DOER and Office of the Attorney General, October 22, 2020, www.mass.gov/info-details/merrimack-valley-clean-energy-energy-efficiency-programs.
[203] "AG's Office, DOER Celebrate Large-Scale Energy Efficient Project Funded by Settlement With Columbia Gas for Its Role in the Merrimack Valley Gas Explosions," Office of the Attorney General. October 26, 2022, www.mass.gov/news/ags-office-doer-celebrate-large-scale-energy-efficient-project-funded-by-settlement-with-columbia-gas-for-its-role-in-the-merrimack-valley-gas-explosions.
[204] "Merrimack Valley Clean Energy & Energy Efficiency Programs," Massachusetts DOER and Office of the Attorney General, October 22, 2020, www.mass.gov/info-details/merrimack-valley-clean-energy-energy-efficiency-programs.
[205] "Mass Save Workforce Training Grant," Mass Save, www.masssave.com/trade-partners/workforce-training-grant.

The **Clean Peak Energy Standard (CPS)** encourages the use of clean resources, including solar and new solar paired with energy storage,[206] during periods of peak electricity demand by requiring retail electricity suppliers to procure Clean Peak Certificates (CPCs), which are earned when eligible clean peak resources are deployed during designated peak periods. [207]

The 2018 *Act to Advance Clean Energy*[208] required the DOER to develop a program requiring retail electricity providers (entities that sell electricity to end-use customers,[209] such as Eversource and National Grid) to meet a baseline minimum percentage of sales with qualified clean peak resources that dispatch or discharge electricity to the electric distribution system during seasonal peak periods, or alternatively, reduce system load at peak.[210] The required minimum percentage of electricity sales met with CPCs increases annually; the required percentage has risen from 0 percent in 2019 to 34 percent in 2034, after which there will be an annual 1.5 percent increase until the program ends in 2050. DOER was also charged with defining peak periods for each season. The seasonal peak periods are defined as all business days in each clean peak season at the following times:

- Spring: March 1 through May 14, 5PM to 9PM
- Summer: May 15 through September 14, 4PM to 8PM
- Fall: September 15 through November 30, 4PM to 8PM
- Winter: December 1 through February 28, 4PM to 8PM[211]

DOER held stakeholder listening sessions, held public hearings and requested public comments on draft regulations, and in 2020 filed the final regulation (225 CMR 21.00), which took effect in August 2020. In 2024, DOER conducted a CPS programmatic review, filing an emergency rulemaking in October adjusting the summer peak periods definition and the Alternative Compliance Payment (ACP) rate, or dollar amount per CPC required to obtain an Alternative Compliance Credit, which a utility may submit to DOER in lieu of a CPC. The ACP rate is $45 through 2025, $65 from 2026 to 2032, and $45 thereafter until the end of the program. DOER is required to conduct programmatic reviews at least once every four years starting in 2024.[212]

In line with the 2008 Act Relative to Green Communities,[213] Massachusetts' **Net Metering** policy

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[206] *Clean Peak Resource Eligibility Guideline*, MA DOER, September 2021, www.mass.gov/doc/clean-peak-resource-eligibility-guideline/download.

[207] *225 CMR 21.00: Clean Peak Energy Portfolio Standard (CPS),* MA DOER, October 2024, www.mass.gov/doc/cps-emergency-rulemaking-redline-10-11-24/download.

[208] *An Act Establishing the Act to Advance Clean Energy*, Massachusetts General Laws Chapter 227 (AACE), Section 13 (2018), https://malegislature.gov/Laws/SessionLaws/Acts/2018/Chapter227.

[209] *225 CMR. § 14.02 – Definitions*, MA DOER, effective 2022, www.law.cornell.edu/regulations/massachusetts/225-CMR-14-02.

[210] "Clean Peak Energy Standard History of Program Development," Commonwealth of Massachusetts, www.mass.gov/info-details/clean-peak-energy-standard-history-of-program-development.

[211] *225 CMR 21.00: Clean Peak Energy Portfolio Standard (CPS),* MA DOER, October 2024, www.mass.gov/doc/cps-emergency-rulemaking-redline-10-11-24/download.

[212] *225 CMR 21.00: Clean Peak Energy Portfolio Standard (CPS)*, MA DOER, October 2024.

[213] *An Act Relative to Green Communities,* Massachusetts General Laws Chapter 169 (2008), https://malegislature.gov/Laws/SessionLaws/Acts/2008/Chapter169.

provides financial incentives to Eversource, National Grid, and Unitil customers with rooftop solar by allowing them to receive credit for excess energy generated and sold back to the grid. The policy also supports community solar projects, "Neighborhood Net Metering Facilities."[214] Signed into law in 2024, *An Act Promoting a Clean Energy Grid, Advancing Equity and Protecting Ratepayers* requires DPU to investigate expanding access to net metering.[215] The Commonwealth sets a maximum aggregate capacity of net metering based on the peak load of the distributor. This cap started at 1 percent in 2008 and has since been raised four times; the most recent increase occurred in 2016—up to 7 percent for private and 8 percent for public electric customers.[216]

There are 50 cities and towns in Massachusetts served not by the Commonwealth's investor-owned utilities (i.e., Eversource National Grid, and Unitil) but by Municipal Light Plants.[217] Municipal Light Plants may offer their own net metering programs, for example, Peabody Municipal Light and Concord Municipal Light Plant offer net metering programs.[218].[219] Similarly, Concord Municipal Light Plant customers are able to participate in a net metering program, where they receive bill credits for excess generation based on ISO-NE's real time prices for all hours between 9 a.m. and 4 p.m. in the previous month. The net credit offered to customers for generation in September 2025 was $0.02955 per kWh.[220]

DOER launched the **Solar Massachusetts Renewable Target (SMART)** program in 2018, replacing the Solar Carve-out Program (SREC) and Solar Carve-out II Program (SREC II) to support the Commonwealth's climate and environmental protection targets by encouraging the development of solar technology across the state as a way to reduce peak demand, address distribution congestion and system losses, and mitigate the need for new non-renewable resources.[221] To support energy storage, the SMART program provides an energy storage adder—i.e. higher dollar-per-kWh incentive—to solar units co-located with an energy storage system.[222] The value of the adder differs depending on the ratio of storage capacity to solar capacity and duration of storage.[223]

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[214] *220 CMR 18.00: Net Metering,* Massachusetts DPU, 2017, www.mass.gov/files/220_cmr_18.00_final_12-1-17_1.pdf.
[215] Specifically, the policy requires DPU to "investigate expanding access to net crediting solutions for net metering facilities and solar facilities eligible to receive bill credits under any program established pursuant to section 11 of chapter 75 of the acts of 2016." See: "Net metering laws and regulations," Massachusetts EEA, 2025, www.mass.gov/info-details/net-metering-laws-and-regulations.
[216] *An Act Establishing the Act Relative to Solar Energy*, Massachusetts General Laws Chapter 75, Sections 5-6 (2016), https://malegislature.gov/Laws/SessionLaws/Acts/2016/Chapter75.
[217] "Massachusetts municipally-owned electric companies," Massachusetts DPU, www.mass.gov/info-details/massachusetts-municipally-owned-electric-companies.
[218] (1) "Solar & Renewable Energy," Peabody Municipal Light Plant, www.pmlp.com/257/Solar-Renewable-Energy; (2) "Solar Net Metering Credit," Town of Concord, Massachusetts, August 2025, https://concordma.gov/536/Solar-Net-Metering-Credit.
[219] (1) "FAQs," Peabody Municipal Light Plant,www.pmlp.com/Faq.aspx?TID=21; (2) "PMLP's Net Metering Procedure," Peabody Municipal Light Plant, 2015, www.pmlp.com/DocumentCenter/View/176/Net-Metering-Policy-PDF?bidId=.
[220] "Solar Net Metering Credit," Town of Concord, Massachusetts, August 2025, https://concordma.gov/536/Solar-Net-Metering-Credit.
[221] (1) *Solar Massachusetts Renewable Target (SMART) Program Summary* [PowerPoint], Massachusetts DOER, 2018 www.mass.gov/doc/smart-launch-and-program-overview/download, p. 1; (2) Massachusetts DOER 225 CMR 20.00. *SMART Program*. p. 1; (3) "Solar Carve-out and Solar Carve-out II Program Information," Massachusetts DOER, www.mass.gov/guides/solar-carve-out-and-solar-carve-out-ii-program-information.
[222] Ibid, p. 16.
[223] *SMART Program Summary* [PowerPoint], Massachusetts DOER, 2018, p. 10.

From 2023 to 2025 DOER conducted a review of the SMART program, resulting in the final regulation (225 CMR 28.00) effective September 2025 and SMART 3.0.[224] The shift to SMART 3.0 comes with a few prominent changes, including compensation rates and capacity limits now being re-evaluated each year.[225] In addition, the prior energy storage provisions were adjusted such that:

- Solar projects under 25 kW are no longer eligible for the energy storage adder. Solar projects under 25 kW are still eligible for "off-taker" based compensation rate adders (i.e., community shared, low-income property, public entity pollinator, and solar tracking adders).[226]
- Solar projects with a capacity of 1 MW or greater (up from 500 kW) are required to build an energy storage system.[227]
- Community Shared Solar projects are now required to serve at least 40% low-income customers, or 15% low-income customers at no cost.
- "Alternative CSS projects" like municipal aggregation must serve 100% low-income customers.

For program year 2025, base compensation rates ranged from $0.17 to $0.28 per kilowatt-hour (kWh) for solar tariff generation units with a capacity ranging from 25 kW to 5,000 kW, with a flat incentive rate of $0.03 per kWh added to the base rate for projects under 25 kW. For projects under 25 kW serving low-income customers, the flat incentive rate is $0.06 per kWh, much lower than the compensation rate for larger systems.[228]

Loans

Four Massachusetts programs provide financing options, including zero interest loans, for solar and storage systems (see Table 25).

[224] (1) *Solar Massachusetts Renewable Target (SMART) Program 3.0,* Massachusetts DOER, September 2025, www.mass.gov/doc/225-cmr-2800-redline/download; (2) "SMART 3.0 Program Details," Massachusetts DOER, www.mass.gov/info-details/smart-30-program-details.

[225] *SMART 3.0 Regulations* [PowerPoint], Massachusetts DOER, October 2025, www.mass.gov/doc/smart-30-overview/download.

[226] *Solar Massachusetts Renewable Target (SMART) Program 3.0*, Massachusetts DOER, September 2025.

[227] *SMART 3.0 Regulations* [PowerPoint], Massachusetts DOER, October 2025.

[228] *Solar Massachusetts Renewable Target 3.0 Annual Program Year Report: Program Year 2025*, Massachusetts DOER, August 2025, www.mass.gov/doc/smart-program-year-2025-annual-report/download, PDF pp. 8-10.

Table 25. Massachusetts loan programs that support energy investments

Loans	Description	Loan Range
Energy Saver Home Loan Program	Providing financing to support energy-related home improvements	Loans between $10,000 and $100,000 at fixed interest rates
HEAT Loan	Provides financing to homeowners for assistance with energy efficiency upgrades (insulation, heat pumps, batteries, etc.)	0 percent interest financing on up to $25,000
Massachusetts Community Climate Bank	Provides financing to low- and moderate-income households and environmental justice communities for new construction of decarbonized housing, clean energy retrofits, and housing-related clean energy projects	Has an initial $50 million in dedicated funds from the Commonwealth
Property Assessed Clean Energy (PACE)	Provides a financing mechanism to property owners to make energy improvements for existing facilities, multifamily residential properties (5+ units), or buildings owned by a nonprofit over a term of up to 20 years	A loan for the value of energy upgrades, paid off by savings from the upgrades over 20 years

Data source: See text below.

The Massachusetts Community Climate Bank's **Energy Saver Home Loan Program (ESHLP)** helps eligible Massachusetts homeowners cut their energy use and reduce or eliminate their reliance on fossil fuels. ESHLP provides second mortgage loans at low interest rates to support a variety of energy-related home improvements with financing at the start of the project and no cash down or waiting for rebates or incentives. The program also offers free end-to-end support throughout the home improvement, loan closing, and post-construction processes and helps homeowners identify and coordinate for all available incentives, rebates, and other credits.[229]

ESHLP offers loans of between $10,000 and $100,000 at a fixed interest rate of 0.5 percent for household incomes below 80 percent of the area median income (AMI), and 2 percent for household incomes below 135 percent of the AMI.[230] Both are second mortgage loans for 20-year periods with no down payment. For the first 18 months of the loan, only interest payments are due—no principal.

The Mass Save **HEAT Loan program** provides 0 percent interest loans with terms up to seven years for certain energy efficiency home improvements, such as heat pumps, insulation and other types of weatherization measures, hot water equipment, windows, and battery storage.[231]

Administered by MassHousing, the **Massachusetts Community Climate Bank** provides financing to low- and moderate-income households and households in EJ neighborhoods for certain eligible projects, including new construction of decarbonized housing, clean energy retrofits, and

[229] "Energy Saver Home Loan Program (ESHLP)," MassHousing, www.masshousing.com/mass-community-climate-bank/energy-saver-home-loan.

[230] *Energy Saver Home Loan Program Guide*, MassHousing, www.masshousing.com/-/media/MCCB/ESHLP-Program-Guide.pdf, p. 5.

[231] (1) "Mass Save HEAT Loan," Mass Save, www.myheatloan.com/landingpage; (2) "0% Interest Financing," Mass Save, 2025, www.masssave.com/residential/rebates-offers-services/financing.

housing-related clean energy projects. The Commonwealth has provided an initial fund of $50 million to begin making investments in the decarbonization of the building sector.[232]

The MassDevelopment Finance Agency, together with DOER, offers a **Property Assessed Clean Energy** financing mechanism in the form of a loan for commercial and industrial property owners to support building energy improvements in projects involving new construction (i.e., new building, substantial additions or alterations, or change of use to an existing building). Notably, project applications are only approved if the savings outweigh the costs of investment in energy improvements. In addition, eligible projects must reduce energy consumption and include the installation of renewable energy systems, supporting BTM adoption in new construction.[233]

Rebates

Four Massachusetts programs offer rebates for solar and/or storage installations (see Table 26).

Table 26. Massachusetts rebate programs for solar and storage

Rebates	Description	Rebate Value
ConnectedSolutions	Provides incentives to residential owners of qualifying battery storage units and smart thermostats for managing energy use during periods of peak electricity demand	Battery storage: $275/kW Smart thermostats: $50 or $100 enrollment incentive and $20 annual reward
Municipal Solar Rebates	Provides rebates for solar installations on a per-kW basis	$625/kW to $1,200/kW

Data source: See text below.

Residential customers served by Eversource, National Grid, or Cape Light Compact that are enrolled in **ConnectedSolutions** through Mass Save with qualifying battery storage units and smart thermostats can earn incentives for managing energy use during periods of peak electricity demand.[234] Battery storage system owners can receive $275 per kW for a battery's average contribution during summer events.[235] Smart thermostat owners can earn a $50 or $100 enrollment incentive and a $20 annual reward per thermostat connected to a central air conditioner or heat pump. For smart thermostat enrollees, Mass Save will automatically send a signal to precool the home before a peak demand event, then increase the temperature by no more than 4°F during the event.[236] Each of these events occurs between 3 and 8 PM on non-holiday weekdays between June 1 and September 30, and there are typically about 15 peak events per summer lasting two to three hours. For battery storage enrollees, the window for peak demand events is the same as for thermostat enrollees. Mass Save will draw on the battery system no more than 60 times per summer. For a typical battery capable of a 5-kW continuous

[232] "A Greener Future Starts with Homes," MassHousing, www.masshousing.com/mass-community-climate-bank.
[233] "Commercial PACE – Property Assessed Clean Energy," Massachusetts DOER, 2025, www.mass.gov/info-details/commercial-pace-property-assessed-clean-energy.
[234] "ConnectedSolutions," Mass Save, https://www.masssave.com/en/residential/rebates-offers-services/connectedsolutions.
[235] "Battery Storage," Mass Save, www.masssave.com/en/residential/rebates-offers-services/battery-storage-and-evs/batteries.
[236] "Enroll Your Smart Thermostat(s)," Mass Save, www.masssave.com/en/residential/rebates-offers-services/connectedsolutions/connectedsolutions-thermostat.

contribution during peak demand events, customers could receive up to $1,375 per year in compensation.[237]

In addition, some Municipal Light Plants offer solar rebates, for example:

- **Concord Municipal Light Plant** provides rebates for solar installations on a per-kW basis. The rebate is set at $625 per kW of installed capacity and is capped at $3,125 per services address. Eligible residential installations are capped at 167 kW of capacity whereas commercial installations of any size are eligible for the rebate.[238]
- **Wakefield Municipal Gas and Light** offers a rebate for residential and commercial solar installations. Eligible solar projects receive a one-time rebate of up to $0.80 per watt for the cost of installation. Eligible residential projects may not exceed 10 kW of installed capacity; commercial systems are capped at 25 kW. To be eligible, solar projects must be owned by the customer, installed at specific angles (between 90° and 270°), and have accompany shade reports showing annual access is not below 80 percent.[239]
- **Wellesley Municipal Light Plant Solar Rebate** provides qualifying residential and commercial customers a per-kW rebate for solar installation. The rebate is equal to $1,200 per installed kW-direct current of solar capacity (set not to exceed 50 percent of the total installed cost, excluding tax), with a maximum rebate of $12,000 for residential customers and $15,000 for Small General Service customers. WMLP has partnered with EnergySage to provide customers interested in the program with educational resources, cost calculators, and a marketplace to shop for solar. Participants of the rebate program are also eligible for WMLP's net metering program, which provides on-bill credit for energy exported to the gird at the wholesale rate. Participation in net metering is limited to customers with installed systems which have a nameplate capacity of 15 kW-alternating current or less.[240]

Tax Credits

Two federal tax incentives and one Massachusetts tax credit support solar and/or storage installations (see Table 27). (Note: Federal tax credits for solar have been or will be phased out under the federal *One Big Beautiful Bill Act*. The Clean Electricity Investment Credit and Clean Energy Production Credit will still be available to compensate for new storage facilities.[241])

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[237] "Battery Storage," Mass Save, www.masssave.com/en/residential/rebates-offers-services/battery-storage-and-evs/batteries

[238] "Solar Panels," Town of Concord, Massachusetts, August 2025, https://concordma.gov/2029/Solar-Panels.

[239] "Solar Rebate Form," Wakefield Municipal Gas and Light Department, https://wmgld.com/residential/solar-rebate-form/.

[240] "Go Solar," Town of Wellesley, Massachusetts, July 2025, www.wellesleyma.gov/1929/Go-Solar.

[241] *One Big Beautiful Bill Act*, 119th Congress (2025-2026), www.congress.gov/bill/119th-congress/house-bill/1.

Table 27. Clean Energy tax credits available to Massachusetts residents or businesses

Tax Credits	Description	Credit
Clean Electricity Investment Credit	Provides an emissions-based incentive for qualifying clean electricity technologies	Investment credit starting at 6 percent up to 30 percent
Clean Electricity Production Credit	Provides an emissions-based incentive for qualifying clean electricity facilities and energy storage technology	Production credit starting at 0.3 cents/kWh, can be increased by 20 percent under certain criteria
Residential Energy Credit (MA)	Provides owners or tenants with a solar energy credit on income taxes	Tax credit of 15 percent of net spending or $1,000 (whichever is less)

Data source: See text below.

The federal **Clean Electricity Investment Credit** is an emissions-based incentive for qualifying clean electricity technologies placed into service after December 31, 2024. The base credit is 6 percent of the qualified investment, increased by up to:

- five times (total of up to 30 percent) for facilities meeting prevailing wage and registered apprenticeship requirements,[242]
- 10 percentage points for facilities meeting certain domestic content requirements for steel, iron, and manufactured products, and[243]
- 10 percentage points if located in an Energy Community—census tracts (and adjacent tracts) that have had coal mine closures since 2000 or coal retirements after 2009, and metropolitan statistical areas and non-metropolitan statistical areas with higher fossil fuel-dependent jobs that also face higher unemployment rates.[244]

In addition, facilities located in a low-income community or on Indian Land are eligible for a bonus credit up to 20 percent.[245] Taxpayers cannot claim both investment credits and production credits for the same facility.[246]

The **Clean Electricity Production Credit** is an annual emissions-based incentive for qualifying clean electricity facility and energy storage technology placed into service after December 31, 2024. The base amount of the credit is 0.3 cents per kWh of electricity produced at a qualified facility and sold to an unrelated entity. A higher base rate of 1.5 cents per kWh applies to facilities with a maximum output of less than 1 MW, which also meet the prevailing wage and

[242] "Prevailing wage and apprenticeship requirements," U.S. Internal Revenue Service (IRS), www.irs.gov/credits-deductions/prevailing-wage-and-apprenticeship-requirements.
[243] "Domestic content bonus credit," IRS, www.irs.gov/credits-deductions/domestic-content-bonus-credit.
[244] "Internal Revenue Bulletin: 2023-29," IRS, July 2023, www.irs.gov/irb/2023-29_IRB#NOT-2023-29.
[245] "Clean Electricity Low-Income Communities Bonus Credit Amount Program," IRS, March 2026, www.irs.gov/credits-deductions/clean-electricity-low-income-communities-bonus-credit-amount-program.
[246] "Clean Electricity Investment Credit," IRS, www.irs.gov/credits-deductions/residential-clean-energy-credit.

registered apprenticeship requirements. Both rates are adjusted for inflation. The base rates can be increased by:

- 10 percent for facilities meeting domestic content requirements for steel, iron, and manufactured products
- 10 percent if located in an Energy Community.

Facility owners can claim annual credit based on either kWh of clean energy a qualified facility generates, metric tons of qualified carbon dioxide captured and sequestered, or kilograms of qualified clean hydrogen produced at a qualified facility and sold or used. Taxpayers cannot claim both investment credits and production credits for the same facility.[247]

Lastly, Massachusetts offers the **Residential Energy Credit** for solar and wind resources is equal to 15 percent of project cost or $1000, whichever value is lower.[248]

Other programs and incentives

An additional four programs or statewide resources support BTM solar and storage deployment in the Commonwealth using other methods (see Table 28).

Table 28. Other Massachusetts programs or resources that support BTM deployment

Other programs	Description
Building Electrification and Transformation Accelerator (BETA)	Provides free, in-depth building audits to support commercial and multifamily residential (15+ units) building owners in planning electrification and decarbonization retrofits
Massachusetts Energy Savings Finder	Free search tool to help identify local, state, and federal energy efficiency and decarbonization rebates, incentives, and tax credits for Massachusetts homeowners and renters
Residential Retrofit Program	Provides residential retrofits for high quality, affordable broadband service in public and affordable housing developments
Solar Technical Assistance Retrofit Program (STAR)	Provides support grants and free technical analyses services to assess solar potential and financing options

Data source: See text below.

The **Building Electrification and Transformation Accelerator** program is a pilot program administered by MassCEC providing free, in-depth building audits to support commercial and multifamily residential (15+ units) building owners in planning electrification and decarbonization retrofits. The goal of each decarbonization plan is to lay out the steps to eliminate fossil fuels

[247] "Clean Electricity Production Credit," IRS, www.irs.gov/credits-deductions/clean-electricity-production-credit.
[248] "830 CMR 62.6.1: Residential Energy Credit," Massachusetts Department of Revenue, 2016, www.mass.gov/regulations/830-CMR-6261-residential-energy-credit.

from the building with replicable, cost-effective approaches to electrifying commercial buildings. MassCEC aims to create and test an assessment framework that is comprehensive yet flexible enough to address the wide variety in commercial buildings. The application period opened in Fall 2023 on a rolling basis through Winter 2027, with assessments ongoing. In Summer 2027, MassCEC will release market resources and guidance based on the findings of the pilot program.[249]

The **Massachusetts Energy Savings Finder** is a free-to-use web-based search tool to help identify local, state, and federal energy efficiency and decarbonization rebates, incentives, and tax credits for Massachusetts homeowners and renters. Several Massachusetts organizations and agencies support the operation of this tool, including the Massachusetts Community Climate Bank, MassCEC, the Executive Office of Energy and Environmental Affairs, and Massachusetts utilities, among others.[250]

The **Residential Retrofit Program** operated by the Massachusetts Broadband Institute provides retrofits in public and affordable housing developments to install high quality and affordable broadband service. The program relies on grants from the U.S. Department of Treasury Capital Projects Fund, which covers capital expenses for cabling construction.[251]

The **Solar Technical Assistance Retrofit Program (STAR)** is operated by the Local Initiatives Support Coalition, Massachusetts Association of Community Development Corporations, and Resonant Energy providing participants with support grants and free technical analysis services to assess solar potential and financing options. STAR has resulted in the installation of 13.6 MW of solar for over 19,000 residents.[252]

Pilots and past programs

Four no-longer-operational programs or pilots in Massachusetts supported solar and storage deployment in the past (see Table 29).

[249] "BETA: Project Planning," MassCEC, www.masscec.com/program/beta-project-planning.
[250] "MA Energy Savings Finder," Mass Save, www.masssave.com/massachusetts-energy-savings-finder.
[251] "Residential Retrofit Program," Massachusetts Broadband Institute, 2025, https://broadband.masstech.org/retrofit.
[252] "STAR Solar Program," LISC Massachusetts, 2025, www.lisc.org/massachusetts/our-work/green-homes/star/.

Table 29. Massachusetts pilot or past programs to support BTM solar and storage

Pilots and Past Programs	Description	Program Data
Cape and Vineyard Electrification Offering (CVEO)	Operated from 2023 to 2025, the offering provided weatherization services and clean energy technologies to low- and moderate-income households	The program reached 55 households and contributed over $108,000 in incentives
Solarize Massachusetts	Operated from 2011 to 2020, Solarize Mass supported communities with running grassroots campaigns and competitive soliciation processes to lower solar installation costs	25.66 MW of clean energy capacity across 3,700 residents and businesses in 85 communities
Mass Save Solar Loan Program	Operated from 2015 to 2020, the program worked with local banks and credit unions to provide income-based loan support for solar installations	Almost 5,800 loans for over 50 MW of solar projects
REALIZE-MA	Provides assistance to building owners to identify properties for deep energy retrofits and make connections with manufacturers, designers, and contractors	No current update on project success

Data source: See text below.

Launched in January 2023, **Cape and Vineyard Electrification Offering (CVEO)** was a strategic electrification and energy program that combined home weatherization with cold climate heat pumps, solar photovoltaics, battery storage, heat pump hot water heaters, and electric stoves for low- to moderate-income households. This program was created by Cape Light Compact, which provides electric service in 21 towns on Cape Cod and Martha's Vineyard and Dukes County. As of April 2025, all installations had been completed and the program closed. During the program period, 55 low- and moderate-income customers each received a mix of the above technologies to fully decarbonize their homes. In total, the program contributed $108,179 in incentives, offset 190 percent of historic electric usage using solar, and provides an estimated 46 million British Thermal Units (MMBtu) in annual energy savings.[253]

MassCEC's **Solarize Massachusetts** operated from 2011 to 2020 equipping communities with the support needed to run grassroots marketing campaigns and competitive solicitation processes to lower solar installation prices for homeowners. The program relied on partnerships with solar installation companies. MassCEC expanded the program to offer Solarize Mass Plus for technologies complementary to solar, such as heat pumps, battery storage, electric vehicles, and solar hot water systems. Ultimately, the program resulted in 25.7 MW of contracted clean energy capacity across 3,700 residences and businesses in 85 communities.[254]

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[253] (1) "What is the Cape and Vineyard Electrification Offering (CVEO)?" Cape Light Compact, www.capelightcompact.org/program/cveo/; (2) Tym, O., *Solar+Storage+Electrification: A Clean Energy Equity Model For Massachusetts*, Clean Energy Group, March 2025, www.cleanegroup.org/publication/solar-storage-electrification-cveo-massachusetts/.

[254] "Solarize Mass," MassCEC, www.masscec.com/program/solarize-mass.

The **Mass Save Solar Loan Program—**developed by DOER and MassCEC and operated from 2015 to 2020—worked with local banks and credit unions to provide income-eligible customers with loan support, interest rate buy-downs, and a loan loss reserve that reduced risk to lenders for solar installations. The program supported 5,800 loans for over 50 MW of solar projects, over half of which were for low- or moderate-income residents.[255]

Rocky Mountain Institute (RMI) developed **REALIZE-MA** supporting zero-carbon deep energy retrofits in existing buildings, focusing on affordable, low-income housing.[256] As part of REALIZE-MA, RMI started the 1,000 Apartment Challenge to have 1,000 multifamily apartment units in the Commonwealth under renovation by the end of 2024. The program assists building owners to identify ideal candidate properties suitable for deep energy retrofits and matches owners with manufacturers, designers, and contractors for project execution. The program does not provide direct capital support, but it does offer support during predevelopment for deep energy retrofits and helps owners identify sources of gap funding for construction through utility incentives and other sources. Deep energy retrofits completely decarbonize a building and can reduce energy consumption by 50 percent or more. Active projects are in Salem, Boston, and Easthampton.[257]

[255] "Mass Solar Loan," MassCEC, www.masscec.com/program/mass-solar-loan.
[256] "REALIZE-MA," Rocky Mountain Institute, https://rmi.org/our-work/buildings/realize/realize-ma/.
[257] "1,000 Apartment Challenge: REALIZE Massachusetts," Rocky Mountain Institute, https://rmi.org/our-work/buildings/realize/realize-ma/1000-apartment-challenge-realize-massachusetts/.

Electrification With Equity, Part 2

Scaling Behind-the Meter Solar+Storage in Massachusetts Environmental Justice Communities

MAY 2026

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Economic and Policy Analysis of Energy, Environment and Equity

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