ConnectedSolutions

Solar+Storage+Electrification

A CLEAN ENERGY EQUITY MODEL FOR MASSACHUSETTS

CleanEnergyGroup

Olivia Tym | March 2025

About This Report

This report, prepared by Clean Energy Group, outlines the history and structure of the Cape & Vineyard Electrification Offering (CVEO), a program developed and administered by the Cape Light Compact in the Commonwealth of Massachusetts. The Cape Light Compact is an energy services organization serving more than 200,000 customers and operated by the 21 towns on Cape Cod and Martha's Vineyard. The CVEO is a comprehensive strategic electrification and energy optimization pilot program designed to promote and increase equitable access to clean energy and energy-efficient technologies through targeted incentives.

This is one in a series of reports produced by Clean Energy Group that addresses energy storage policy and programs in Massachusetts and New England. Related reports can be found on Clean Energy Group's website at www.cleanegroup.org/initiatives/energy-storage-policy-and-regulation/connectedsolutions. Learn more about Clean Energy Group's broader work on energy storage policy at www.cleanegroup.org/initiatives/energy-storage-policy-and-regulation.

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Contents

Executive Summary

In response to Massachusetts' evolving clean energy policies, Cape Light Compact (the "Compact"), a municipal energy services aggregator serving 210,000 customers on Cape Cod and Martha's Vineyard, developed the Cape & Vineyard Electrification Offering (the "CVEO") to promote whole-home decarbonization and electrification for low- and moderate-income (LMI) households. Cape Light Compact is one of several program administrators (sponsors) of the Mass Save program—the Commonwealth's nation-leading energy efficiency initiative—and was approved to facilitate the CVEO pilot as part of its energy efficiency offerings. Through the CVEO, the Compact aims to expand access to clean energy technologies such as solar photovoltaic (PV) systems, battery storage, heat pumps, and electric or induction stoves, specifically targeting LMI households that currently rely on oil, propane, or electric resistance heating. The CVEO Program was approved by the Massachusetts Department of Public Utilities (DPU) in January 2023.

The CVEO aims to serve 100 households, comprising of 80 deed-restricted and 20 non-deed-restricted properties across low-income (earning below 60 percent of the area median income) and moderate-income (61%-80% of the area median income) levels.[1] Of the 80 deed-restricted households, the Compact aimed to serve 50 low-income and 30 moderate-income households. The 20 non-deed- restricted properties were assumed to be moderate-income households. Participation in the program requires that the property owners completely replace any existing fossil-fuel-based heating, cooling, and cooking appliances, in addition to making sure that the property is in a suitable condition for the installation of heat pumps and solar PV.

The initial proposed budget for the program included supplying batteries for all the participants; however, due to the budget reductions imposed by the DPU, the Compact reduced the number of batteries provided to 25 participants, at no or reduced cost. These 25 batteries were installed at properties where it was feasible within the space limitations inside of the property and where the installation would be eligible for the local distribution utility's (Eversource) simplified interconnection application to connect the batteries to the grid. Additionally, the batteries were installed in locations where they would be able to provide a level of resiliency during power outages, to power critical electric loads. The Compact aims to install batteries in the homes of 25 participants, prioritizing low-income households that may be more vulnerable to, and less capable of recovering from, power outages. Batteries can both lower peak electric demand during normal conditions and provide backup power to the home during electric grid outages.

Participants who receive batteries provided by the Compact will be automatically enrolled in the Massachusetts ConnectedSolutions program, a statewide advanced demand response initiative offered through Mass Save. Low-income customers will receive the batteries free of charge, while moderate-income customers can finance the battery installation by utilizing the zero percent interest Mass Save HEAT Loan, which is available to help customers manage the capital costs of efficiency measures.

[1] Deed restrictions are special conditions placed on a property that can limit certain aspects of use, appearance, and/or resale. Deed-restricted communities require properties to maintain the provisions defined by a homeowner's association (HOA) for the purpose of keeping property values high or upholding community preferences. Deed restrictions can be used in affordable housing developments to limit price and use.

The CVEO program has faced some challenges due to its comprehensive whole-home electrification requirements, with some participants choosing not to move forward with the CVEO program at various stages of the process. Continued evaluation of the program will address barriers to participation and seek a deeper understanding of the experiences of both participants and installers. This evaluation by CVEO will also include an impact study that will report on customer utility bill impacts and experience, along with interviews with program staff and contractors. This final report will be submitted to the Massachusetts DPU by August 1, 2025.

The Compact is advancing Massachusetts' clean energy goals by lowering electricity costs statewide and enhancing climate resilience for the residents of Cape Cod and Martha's Vineyard through its focus on equitable access to clean and resilient energy, and its unique combination of solar PV and energy storage with electrification and traditional efficiency measures. By providing the only LMI battery offering from a program administrator/sponsor as part of the larger Mass Save initiative, the Compact advances a scalable and replicable model that can be expanded within Massachusetts and adopted by other states. Policymakers and energy efficiency program administrators can look to the CVEO as a model for integrated, sustainable, and inclusive distributed energy programs that can help to ensure that underserved communities share in the transition to a clean energy future.

Background

The Cape Light Compact ("the Compact"), a municipal energy services aggregator, serves as one of six program administrators/sponsors of the Mass Save program, which provides rebates, incentives, training, and resources to help Massachusetts residents and businesses make energy efficiency improvements. The other five sponsors are Berkshire Gas, Eversource, Liberty Utilities, National Grid, and Unitil. Mass Save empowers residents, businesses, and communities to make energy efficient upgrades by offering a wide range of services, rebates, incentives, training, and information. The Mass Save program administrators/ sponsors collaborate in developing and administering the Massachusetts Three-Year Energy Efficiency and Decarbonization Plan. This plan is reviewed by the Massachusetts Energy Efficiency Advisory Council (EEAC) and then submitted to the Commonwealth's Department of Public Utilities (DPU) for final approval.[2]

The Compact provides energy efficiency programs, renewable electricity supply, and consumer advocacy and energy education programs for residents and businesses that heat with electric, oil, or propane in its member communities. Established in 1997, the Compact operates under the guidance of the 21 towns on Cape Cod and Martha's Vineyard in Massachusetts, providing 210,000 customers with a comprehensive approach to energy services. The Compact proposed the Cape & Vineyard Electrification Offering (CVEO) in 2019 in response to Massachusetts' evolving clean energy legislation, which encourages the adoption of renewable energy and other clean energy technologies.[3] This legislation, including the 2019 Act Creating A Next Generation Roadmap for Massachusetts Climate Policy, also emphasized the integration of batteries with renewable energy sources.[4]

The CVEO program aims to achieve whole-home decarbonization and electrification by facilitating the installation of solar photovoltaic (PV) systems, battery storage, heat pumps, heat-pump water heaters, and electric or induction stoves. The Compact proposed the CVEO with a goal of ensuring equity in its decarbonization efforts and supporting the transition to electrification for LMI customers.[5] The program focuses on LMI residents who currently rely on oil, propane, or electric resistance heating systems.

Program History

Over a period of five years, the Compact submitted three iterations of the CVEO proposal to the DPU for approval.

CVEO 1.0

The first version of the CVEO was proposed as an addition to the 2019-2021 Massachusetts Three-Year Energy Efficiency Plan. In this first iteration of the Compact's proposal, battery installations would be free and

[2] Massachusetts Department of Public Utilities, "Petition of Cape Light Compact JPE for Approval of the Cape and Vineyard Electrification Offering Pursuant to St. 2022, c. 179, § 87A," D.P.U. 22-137, January 11, 2023, https://fileservice.eea.comacloud.net/FileService.Api/file/fileroom/16904859, accessed March 19, 2025.

[3] McCloskey, Stephen, "Cape Light Compact Program Overview: Cape and Vineyard Electrification Offering," available at https://www.cesa.org/wp-content/uploads/Stephen-McCloskey.pdf, accessed February 13, 2025.

[4] See Bill S.2995.

[5] McCloskey, Stephen, *supra* note 3.

required for all participants: 700 residential customers across all income sectors (see Table 1). All customers would also be enrolled in the Massachusetts ConnectedSolutions program for 10 years.[6] The proposed budget of the first proposal was $27.6 million.

Table 1 - CVEO 1.0 Proposed Participation Program Data

Participant Category	Number of Participants	Heat Pump Incentive	Solar Incentive	Battery Incentive	Notes
Income Eligible (DR) <60% SMI	175	100%	100%	100% Install Required	Participate in Connected Solutions 10 years
Moderate Income 61-80% SMI	175	100%	$5k + Heat Loan Financing	100% Install Required	Participate in Connected Solutions 10 years
Ex. Mod Income 81-120% SMI	175	Market Rate Rebate (Dependent on Fuel Type and HP Type)	No Incentive	100% Install Required	Participate in Connected Solutions 10 years
Market Rate	175	Market Rate Rebate (Dependent on Fuel Type and HP Type)	No Incentive	100% Install Required	Participate in Connected Solutions 10 years

Source: Stephen McCloskey, Energy Efficiency Analyst - Home Energy Services, Cape Light Compact

This proposal was rejected by the DPU on the grounds that its development did not include a full, robust stakeholder process. The DPU also felt that given the availability of other solar PV incentives and financing programs, it would not be appropriate for the Compact to finance solar PV offerings with ratepayer-provided Energy Efficiency program funds.[7]

CVEO 2.0

After the initial proposal was rejected, the Compact revised its plan and re-submitted it to the DPU in May 2020 (docketed as Cape Light Compact JPE, DPU 20-40).[8] The revision process included additional stakeholder input, as well as coordinating with the utility Eversource to conduct analysis to ensure that demand response enrollment through the ConnectedSolutions program would not adversely impact the reliability of the local distribution system. The Compact entered into an agreement with Eversource in late 2019 to facilitate this analysis. Additionally, the Compact issued a request for information (RFI) to solar and battery installers to seek input about program structure.

With the second iteration of the proposal, the Compact reduced the number of participants from a total of 700 customers of all incomes to 250 residential LMI customers (see Table 2). The budget was also reduced to $10.4 million.

[6] For more information on the Massachusetts ConnectedSolutions program, visit Clean Energy Group's webpage dedicated to providing details on this topic at https://www.cleanegroup.org/initiatives/energy-storage-policy-and-regulation/connectedsolutions.
[7] Massachusetts Department of Public Utilities, *supra* note 2.
[8] *Ibid*.

The Massachusetts DPU rejected this second proposal on January 31, 2022, finding that the manner of funding for the proposal was contrary to the laws of the Commonwealth. The DPU found that a distributed generation resource such as behind-the-meter (BTM) solar PV could not be classified as an energy efficiency resource, and thus programs relying on solar PV could not receive funding from the energy efficiency program budget. The DPU also found that ratepayer-provided energy efficiency funding could not be used to support the costs of installing battery energy storage as a backup generation resource for the purpose of supporting residential homes during electric grid outages.

The Compact appealed the DPU's denial to the Massachusetts Supreme Judicial Court. While the second proposal was still pending in court, the Compact filed a third, nearly identical proposal with the DPU as a proposed enhancement to the Commonwealth's 2022-2024 Three-Year Energy Efficiency Plan.

Table 2 - CVEO 2.0 Proposed Program Participation Data

Participant Category	Number of Participants	Heat Pump Incentive	Solar Incentive	Battery Incentive	Notes
Income Eligible (DR) <60% SMI	150	100%	100%	100% Install Required	Participate in Connected Solutions
Moderate Income 61-80% SMI	100	100%	75% of solar PV + battery storage---max copay of $5,000	75% of solar PV + battery storage---max copay of $5,000 Install Required	Participate in Connected Solutions

CVEO 2.0 reduced the number of participants from the original proposal and was submitted to the DPU for approval on May 15, 2020. It was rejected in January 2022. Source: Stephen McCloskey, Energy Efficiency Analyst - Home Energy Services, Cape Light Compact.

CVEO 3.0

On August 11, 2022, Massachusetts enacted the 2022 Clean Energy Act, officially titled "An Act Driving Clean Energy and Offshore Wind." Among its provisions, Section 87A grants electric energy efficiency program administrators the authority to propose offerings to the DPU specifically aimed at low- and moderate-income households.[9] These proposals focus on whole-building efficiency, electrification, and greenhouse gas (GHG) emission reductions for a limited number of participants within these customer groups, further advancing the state's commitment to clean energy and equitable decarbonization. The adoption of this provision would lead to the DPU's approval of the third CVEO program proposed by Cape Light Compact.

The third CVEO proposal was submitted by the Compact for DPU approval on October 27, 2022.[10] This plan included reduced participation levels, removed the third-party ownership structure from the solar and

[9] Session Law - Acts of 2022 Chapter 179, *MAlegislature.gov*, "An Act Driving Clean Energy and Offshore Wind," https://malegislature.gov/Laws/SessionLaws/Acts/2022/Chapter179.

[10] Massachusetts Department of Public Utilities, "Petition of Cape Light Compact JPE for Approval of the Cape and Vineyard Electrification Offering Pursuant to St. 2022, c. 179, § 87A, D.P.U. 22-137," Pre-Filed Testimony of Margaret T. Downey and Exhibits, October 27, 2022, https://fileservice.eea.comacloud.net/FileService.Api/file/fileroom//15678812.

battery storage agreement, and removed the explicit requirement for battery energy storage (see Table 3). It also required participants to commit to fully displacing any indoor fossil-fueled cooking appliances.

Table 3 - CVEO 3.0 Program Participation Data

	Income Level (SMI)		Customers			Heat Pump Incentive	Solar PV Incentive	Storage Incentive
			2023	2024	Total			
Deed Restricted	Low-Income	below 60%	15	35	50	100% (Statewide)	100%	100%
	Affordable	61-80%	9	21	30	100%	100%	100%
Non-Deed Restricted	Moderate- Income	61-80%	6	14	20	80% (max customer copay of $5,000, financed w/ Heat Loan)	$15,000 incentive. Finance balance w/ Heat Loan	Finance w/ Heat Loan
	Total Participants		30	70	**100**			

CVEO 3.0 was approved in December 2022. Source: Stephen McCloskey, Energy Efficiency Analyst - Home Energy Services, Cape Light Compact.

The new budget increased incentives for moderate-income customers living in deed-restricted properties. Home Energy Assistance Loan financing (from the Mass Save HEAT Loan program) would be available for non-deed restricted participants to help defray capital costs.[11] HEAT loans are provided by participating lenders and are available for qualified energy efficiency improvements for homes and businesses.

This third iteration of the CVEO received support from the Energy Efficiency Advisory Council in 2022 and was approved by the DPU in January 2023. To implement the plan, the Compact proposed a budget not to exceed $6,011,509 through the end of the current Three-Year Plan for 2022-2024. The DPU cited Section 87A numerous times in its approval Order on January 11, 2023, including the addition of a section within their analysis and findings that detailed the "Consistency with Section 87A" where the DPU found that "the proposed CVEO meets all design requirements of a Section 87A demonstration offering."[12] The Attorney General argued that, "pursuant to Section 87A, the Department is now authorized to approve the CVEO as an energy efficiency program that promotes adoption and installation of onsite renewable energy generation and storage."[13]

As part of its approval, the DPU imposed a prohibition on proposing similar programs for five years or until the results of the pilot have been fully assessed.

[11] "Creating a Greener Energy Future for the Commonwealth MA HEAT Loan Overview," *energy.gov*, https://www.energy.gov/sites/prod/files/2014/01/f6/f1-avers-ma_heat_loan_overview.pdf, accessed February 13, 2025.
[12] "Massachusetts Department of Public Utilities,– ORDER," January 11, 2023 at p. 26, https://fileservice.eea.comacloud.net/FileService.Api/file/fileroom//16904859, accessed March 19, 2025.
[13] *Ibid* at p. 22.

CVEO Program Details

The Cape & Vineyard Electrification Offering is a comprehensive strategic electrification and energy optimization pilot program designed to promote and increase equitable access to clean energy and energy-efficient technologies through targeted incentives. It supports the adoption of cold climate heat pumps, solar panels, battery storage, electric panel upgrades, and solutions for site-specific barriers. Additional eligible upgrades include electric/induction stoves, dryers, and heat-pump water heaters. The program aims to support a total of 100 households, prioritizing 80 low-income households with incomes below 60 percent of the area median income (AMI) and 20 moderate-income households earning between 61%-80% of the state median income (SMI) or AMI (whichever top-range income threshold benefits the customer).

Through the CVEO program, all deed-restricted households, whether low-income or moderate-income, are eligible to receive rooftop solar panels and heat pumps at no cost, as well as the 100 percent incentive on heat pumps, solar PV, and battery storage. Non-deed restricted moderate-income households are eligible to receive an 80 percent incentive on heat pumps, as well as a $15,000 incentive towards solar. Moderate-income participants can access the Mass Save HEAT Loan at zero percent interest for the remaining balance on the proposed rooftop solar PV system and battery energy storage, if feasible, for their home. For all low-income and moderate-income customers living in deed-restricted or non-deed-restricted housing, the CVEO provides an incentive of $1,000 to install electric, non-induction stoves. If a customer were to purchase a stove over this $1,000 incentive limit, the customer would be responsible for the difference in cost.

Battery installation is not required by the program, but the CVEO pilot aims to provide home batteries to 25 out of the 100 participants. Participating low-income households, when feasible, are eligible to receive up to two batteries at no cost, which ensures that they are able to operate their heat pumps as well as other electricity-dependent appliances during power outages. The Compact is limited by Eversource's 15-kilowatt Simplified Interconnection Threshold, meaning any system (solar+battery storage) could not exceed 15 kilowatts. The standard battery utilized in the CVEO has a power rating of 5.0 kilowatts and a capacity of 13.5 kilowatt-hours. The dual-battery approach mirrors Vermont utility Green Mountain Power's Home Energy Storage Program, which leases a pair of batteries to residential customers to create a whole-home resilient system with sufficient duration to last through most power outages.[14]

Households receiving batteries are also automatically enrolled in ConnectedSolutions, an active demand response initiative within Mass Save that is designed to manage and reduce electricity demand (loads) during regional peak demand periods. Typically, there are 30-60 peak demand events per year, each lasting a maximum of three hours between 3 p.m. and 8 p.m.[15] Residents who participate in ConnectedSolutions earn performance payments by allowing the Compact to use (dispatch) their stored battery energy during these peak demand times, contributing to overall grid stability and lowering costs for all ratepayers. However, participants who receive the 100 percent incentive for the installation of battery storage through the CVEO

[14] "Lease Energy Storage from GMP," *greenmountainpower.com*, http://greenmountainpower.com/rebates-programs/home-energy-storage/energy-storage, accessed March 4, 2025.

[15] Mass Save, Review of *Program Materials for ConnectedSolutions for Small Scale Batteries*, February 20, 2025. https://www.masssave.com/-/media/Files/PDFs/Save/Residential/ma_resi_battery_program_materials-2-20-25.pdf, accessed 3/19/2025.

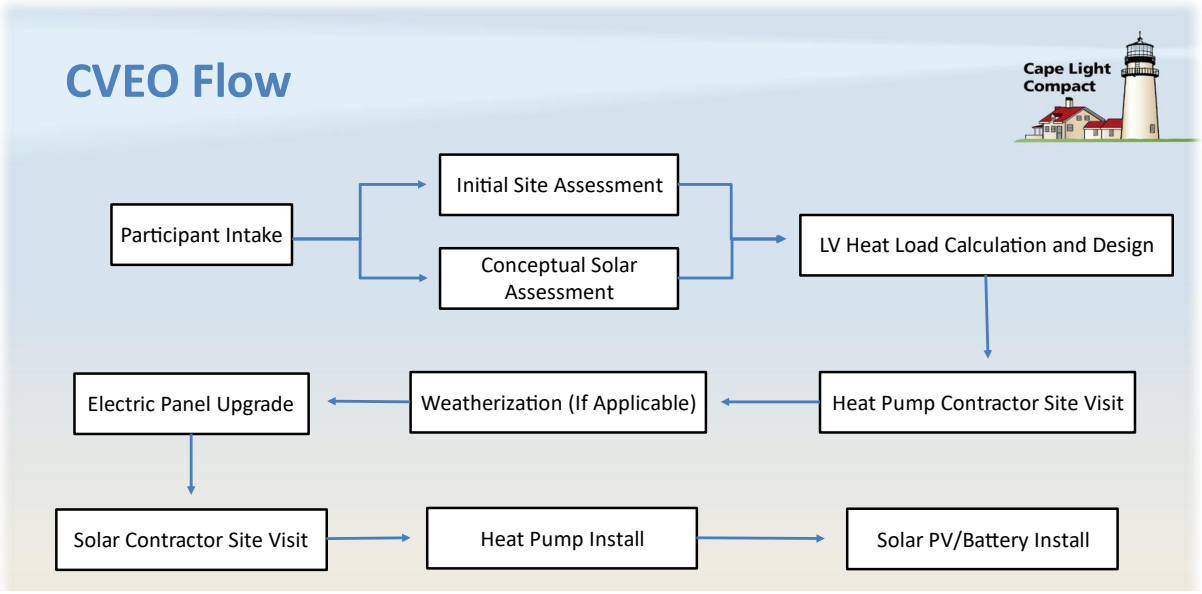
program are not eligible to receive performance payments provided through the ConnectedSolutions program, since this would be considered "double dipping." Instead, the performance payments earned by these participants would go to Cape Light Compact to help defray program costs.

Participants are responsible for disposing of their battery energy storage systems when they have reached the end of their lifespan.

Program Eligibility

To be eligible for the CVEO program, a participant needs to qualify as low income (below 60 percent of SMI) or as moderate income (61%-80% of SMI or AMI). All participants must live in a home that is heated with oil, propane, or electric resistance heat, although customers who installed heat pumps during the 2022-2024 Three-Year Energy Efficiency Plan are also eligible to participate. Homes with heat pumps installed before 2022, during the prior Three-Year Plan, are not eligible to participate. Additionally, customers must have participated in an energy efficiency audit within the past two years (or undergo a home efficiency audit as part of the CVEO process) and have completed all the recommended efficiency upgrades, including replacing fossil-fuel appliances such as heating, cooling, and cooking appliances (excluding outdoor grills). The site must also be suitable and in proper condition for the installation of heat pumps and solar PV systems (or make necessary upgrades, such as roof replacement, through the CVEO). Lastly, customers must agree to install both heat pumps and solar PV systems to fully benefit from the program offering. See Figure 1 for details about the steps through the CVEO for customers.

Figure 1 - CVEO Process Flow Chart



Source: Stephen McCloskey, Energy Efficiency Analyst- Home Energy Services, Cape Light Compact

Program Benefits

The program offers significant benefits both to its participants and to all Eversource ratepayers. Benefits to LMI participants include the following:

- No-cost batteries, solar panels, and heat pumps for low- and moderate-income households
- Low-cost financing through a Mass Save HEAT Loan
- Enhanced energy efficiency
- Lower energy costs
- Improved indoor air quality
- Clean backup power in the event of an electric grid outage
- Ownership of all installed technologies

Benefits to all ratepayers include

- Increased energy efficiency
- Increased use of renewable energy
- Reduced reliance on fossil fuels
- Enhanced climate resilience
- Energy cost savings through reduced peak demand

The program also supports Massachusetts in achieving its energy equity and decarbonization goals. The increased electricity usage due to the changeover from fossil-fuel heating to electric heat pumps is intended to be offset by the electricity generated from onsite solar PV, thereby avoiding additional load to the electric grid. The addition of batteries in some participating homes will further reduce ratepayer costs by reducing the region's peak demand and increasing onsite use of solar-generated electricity.[16] The reduction in wholesale electricity price that occurs when overall demand is reduced (and especially peak demand) lowers electricity costs for all ratepayers. This phenomenon is known as Demand Reduction Induced Price Effects (DRIPE), which results from energy efficiency programs, demand response programs, or increases in distributed energy resources that reduce the need for high-cost, often fossil-fuel-based peaker plants and allow less expensive generating resources to meet the remaining load.[17]

Budget

The total CVEO budget is capped at approximately $6 million for two years. This includes the following:

- $6,000 for marketing and advertising
- $5,472,509 for participant incentives
- $333,000 for sales, technical assistance, and training
- $300,000 for evaluation and market research

[16] Cape Light Compact, "*Cape & Vineyard Electrification Offering Overview, Massachusetts Department of Public Utilities Docket DPU 20-40,"* https://www.capelightcompact.org/wp-content/uploads/2020/07/CVEO-General-Talking-Points-AAE1_DG1.pdf, accessed March 17, 2025.

[17] U.S. Department of Energy, *Demand Reduction Induced Price Effects (DRIPE): Wholesale and Retail Impacts of Energy Efficiency and Demand Response*, July 2021, https://www.energy.gov/sites/default/files/2021-07/SEEAction-DRIPE.pdf.

The initial budget for evaluation and market research was set at $200,000, but in February 2023, the Compact submitted a request for approval to the DPU for a supplemental evaluation budget of $100,000.[18] The Compact proposes to use $3.1 million of the DPU approved income-eligible sector budget for the 2022-2024 Three-Year Energy Efficiency Plan term to fund the CVEO for low-income participants and $2.9 million to fund the CVEO for moderate-income participants.

The Compact will enroll heat pumps installed through the CVEO with Massachusetts Department of Energy Resources (DOER) in the Massachusetts Alternative Portfolio Standard (APS), which provides incentives for heat pumps meeting certain technology requirements, and it will also enroll the systems in the New England Power Pool Generation Information System.[19] Revenues from the APS will be paid to the Compact and be used to offset energy efficiency program costs. The Compact estimates that CVEO participants could generate roughly $180,000 through their enrollment in the APS. See Table 4 for the heat pump budget.

Table 4 - Heat Pump Program Budget

Heat Pump total proposed budget: $1,916,967	
Participant incentives	$1,884,800
HEAT Loan interest	$32,167

This budget assumes total costs for heat pumps range from $13,000 to $25,000 per installed system. Source: Massachusetts Department of Public Utilities, "Petition of Cape Light Compact JPE for Approval of the Cape and Vineyard Electrification Offering Pursuant to St. 2022, c. 179, § 87A, D.P.U. 22-137," October 27, 2022.

The solar vendor will enter into a participant agreement with qualified solar installers. The Compact proposes to aggregate and sell any renewable energy credits (RECs) associated with the CVEO solar installation under the Commonwealth's Renewable Portfolio Standard; estimated annual revenues over ten years are roughly $31,200. These revenues will offset energy efficiency program costs. See Table 5 for the solar PV budget.

Table 5 - Solar PV Budget

Solar PV total proposed budget: $2,973,376	
Participant incentives	$2,610,000
HEAT Loan interest	$102,376

The solar budget assumes a cost of $28,875 per installation. Source: Massachusetts Department of Public Utilities, "Petition of Cape Light Compact JPE for Approval of the Cape and Vineyard Electrification Offering Pursuant to St. 2022, c. 179, § 87A, D.P.U. 22-137," October 27, 2022.

[18] "Massachusetts Department of Public Utilities, "Supplemental Testimony of Margaret T. Downey on Behalf of The Cape Light Compact JPE." D.P.U. 22-137, February 27, 2023.

[19] Massachusetts' Alternative Portfolio Standard is a program that requires electricity suppliers to source a certain percentage of their power from eligible alternative energy sources (e.g., combined heat and power, flywheel storage, renewable thermal energy technologies). The APS incentivizes energy efficiency and innovation by providing Alternative Energy Certificates that can be traded to meet compliance requirements. See Alternative Energy Portfolio Standard | Mass.gov.

The lead vendor will enter into participant agreements with qualified battery storage installers. Installation of battery storage is not required for participation in the CVEO, and the Compact assumes 25 percent of customers in each group will install storage. See Table 6 for the battery storage budget.

Table 6 - Battery Storage Budget

Battery storage total proposed budget: $835,167	
Participant incentives	$39,537
HEAT Loan interest	$72,000

This budget assumes a cost of $18,000 per installation. Source: "Massachusetts Department of Public Utilities, "Petition of Cape Light Compact JPE for Approval of the Cape and Vineyard Electrification Offering Pursuant to St. 2022, c. 179, § 87A, D.P.U. 22-137," October 27, 2022.

Program Funding

The CVEO program will be funded through the Commonwealth's Three-Year Energy Efficiency Plan, using $3.1 million from the Compact's DPU-approved, income-eligible allocations under the 2022-2024 Three-Year Plan budget. This funding approach minimizes the financial impact on ratepayers while helping the program meet the minimum low-income expenditure requirements outlined in G.L. c.25 § 19(c).[20] Additionally, the Compact will apply all Alternative Portfolio Standard (APS) incentives and Renewable Portfolio Standard (RPS) revenues generated by installed CVEO technologies will be utilized to offset any program costs that would otherwise be collected from ratepayers.

Ratepayer Impact

When approving the use of ratepayer funds for energy efficiency programs, the DPU must consider utility bill impacts and prioritize equity and affordability. To meet this requirement, the Compact submitted a bill impact analysis for both participating and non-participating customers under two scenarios: (1) the full proposed budget, including both residential and income-eligible sectors, and (2) only the residential-sector portion of the proposed budget. The DPU approved $3.1 million for the income-eligible sector of the 2022-2024 Three Year Plan budget to fund the CVEO, while the remaining $2.9 million was allocated for moderate-income residential customers.

Based on these budgets, residential customers will experience modest CVEO-related bill increases in 2023 and 2024, while bills for income-eligible and commercial and industrial customers will remain unchanged.

In an analysis of the program, the DPU found that the program has a positive Benefit-Cost Ratio of 2.3. Battery performance had a high Benefit-Cost Ratio of 13.6. See Table 7 for a summary of the savings and cost-effectiveness of the CVEO by technology.[21] After review, the DPU concluded that the bill impacts are

[20] Massachusetts Department of Public Utilities, *supra* note 2.

[21] Massachusetts Department of Public Utilities, *supra* note 10.

reasonable and that the benefits of the program justify the costs for both participating and non-participating customers.

Table 7 - 2023-2024 CVEO Savings and Cost-Effectiveness

2023-2024					
Savings and Cost-Effectiveness	**Heat Pumps**	**Solar PV**	**Battery Technology**	**Battery Performance**	**Total**
Savings					
Participants	100	100	25	5	100
Annual MWh	(403)	833	-	(1)	429
Lifetime MWh	(7,069)	20,815	-	(1)	13,745
Annual MMBtu	2,762	5,503	-	(8)	8,257
Lifetime MMBtu	54,361	120,940	-	(8)	175,293
Summer kW	(18)	568	-	99	649
Winter kW	(84)	-	-	-	(84)
2025 Total Avoided CO2e (Metric Tons)	323	156	-	-	479
2030 Total Avoided CO2e (Metric Tons)	356	89	-	-	444
Cost-Effectiveness ($M)					
Benefits	$ 2.6	$ 9.9	$ -	$ 0.05	$ 12.6
TRC Costs	$ 2.0	$ 2.7	$ 0.9	$ 0.00	$ 5.5
Net Benefits	$ 0.7	$ 7.2	$ (0.9)	$ 0.05	$ 7.0
Benefit-Cost Ratio	1.3	3.7	-	13.6	2.3
CLC Budget	$ 1.9	$ 3.2	$ 0.8	$ 0.00	$ 5.9

Source: "Massachusetts Department of Public Utilities, "Petition of Cape Light Compact JPE for Approval of the Cape and Vineyard Electrification Offering Pursuant to St. 2022, c. 179, § 87A, D.P.U. 22-137," October 27, 2022.

CVEO Program Preliminary Results

The CVEO program was projected to provide annual electricity savings of 929 megawatt-hours and heat savings of 8,257 BTUs.[22] At the time of this report, results of actual annual electricity savings have not yet been publicized.

The Compact engaged with 184 interested, prospective participants, of which 64 were approved for the CVEO. Of the approved participants, 55 moved forward in the program, and of those, 20 percent received battery storage. See Table 8 for current participant installation data and Figure 2 for an overview of participant information by location and home ownership status.

Table 8 - CVEO Participant Installation Data

Participant Type	Number of Participants	Heat Pump Installations	Solar Installations	Battery Storage Installations
Deed-Restricted Affordable/Moderate-Income	16	14	16	3
Deed Restricted Low-Income	31	28	31	9
Deed-Restricted Total	**47**	**42**	**47**	**12**
Non-Deed-Restricted Affordable/Moderate-Income	8	2	8	0
Total Participants	**55**	**44**	**55**	**12**

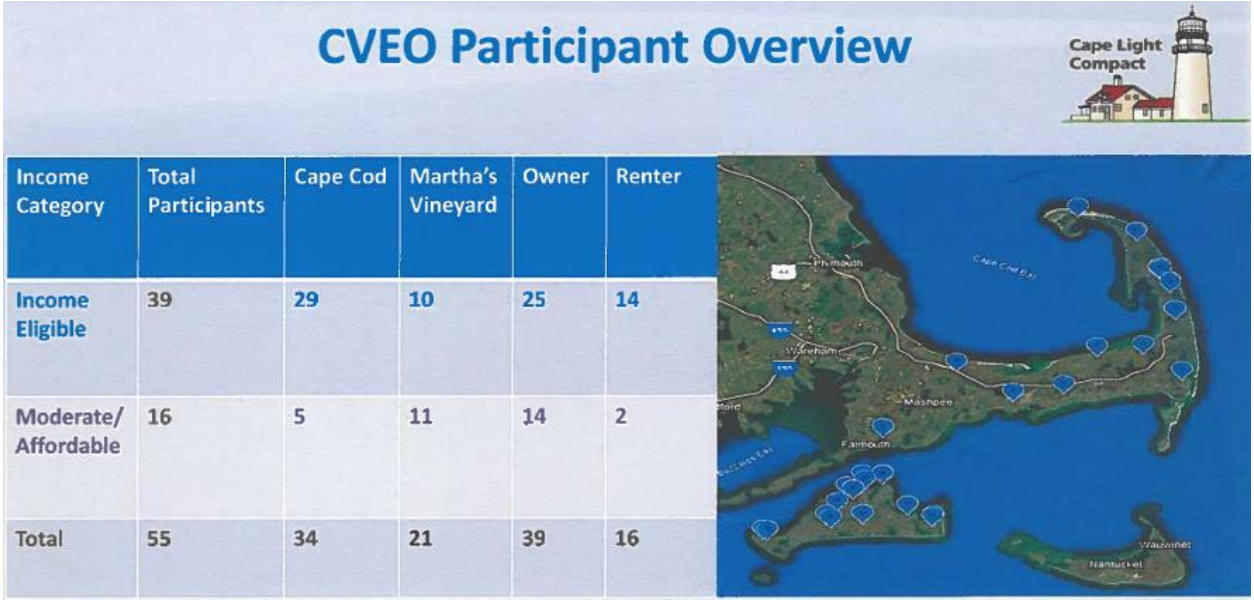
"Moderate/Affordable" refers to participants that are "moderate-income" and earn 61-80% of SMI or AMI (whichever top-range income threshold benefits the customer). Source: Skinner, Miranda, 2025. Energy Efficiency Strategy and Regulatory Analyst, Cape Light Compact.

The CVEO program's comprehensive whole-home retrofit requirements made it challenging for some customers to move fully through the program. Participants that were required to obtain financing for a portion of the CVEO program measures were less likely to move forward due to cost considerations; 13 residents, all of whom lived in non-deed restricted housing, decided not to move forward with the program after receiving their initial site assessments and learning what their out-of-pocket cost for solar would be. Additionally, the requirement that participants remove or fully displace their current fossil-fuel or electric baseboard heating systems in order to move forward with heat pump, solar, and battery installation proved to be a difficult hurdle for program participation. Some participants decided not to move forward with the

[22] Olinsky-Paul, Todd, and Gabe Epstein, "*Innovative Massachusetts Low-Income Battery Pilot Finally Wins Approval (for Now…)*," cleanegroup.org, March 31, 2023, https://www.cleanegroup.org/innovative-massachusetts-low-income-battery-pilot-finally-wins-approval-for-now.

full removal of their HVAC systems, and some said this was due to having recently installed high-efficiency propane heating systems or on-demand hot water heating systems.[23]

Figure 2 - CVEO Participant Overview



Income Category	Total Participants	Cape Cod	Martha's Vineyard	Owner	Renter
Income Eligible	39	29	10	25	14
Moderate/ Affordable	16	5	11	14	2
Total	55	34	21	39	16

"Income Eligible" refers to participants that are "low-income" and earn below 60 percent of SMI. "Moderate/Affordable" refers to participants that are "moderate-income" and earn 61-80% of SMI or AMI (whichever top-range income threshold benefits the customer). Source: Presentation on Cape & Vineyard Electrification Offering, Stephen McCloskey, 11/13/24, Cape Light Compact JPE Executive Committee & Governing Board Meeting.

Preliminary analysis by the Compact found that 34 out of the 55 approved participants had at least one significant barrier that needed to be addressed prior to moving forward in the program. Barriers included pre-weatherization work, pre-electrification work, and barriers to solar access, including the need for roof replacement.[24]

The Compact found that the cost of purchasing and installing batteries was higher than had been anticipated. The projected cost was $18,000 per battery, but the actual average cost for a single battery was $21,569.71. The price increase was due to fire codes that required fire-proof enclosures to be built for each battery if they were not already fire-proof, which added $3,000 per installation on average. Additionally, some customers installed two batteries, bringing the average cost per installation to $33,156.83.[25] See Table 9 for the average costs of each program measure.

[23] McCloskey, Stephen, "*Program Overview: Cape and Vineyard Electrification Offering,"* Presentation for the Cape Light Compact JPE Executive Committee & Governing Board Meeting, November 13, 2024, https://www.capelightcompact.org/wp-content/uploads/2024/11/Updated-November-13-2024-Board-Packet.pdf.
[24] *Ibid*.
[25] *Ibid*.

Table 9 - Average Cost of Each Program Measure

Program Measure	Average Cost per Participant
Pre-Weatherization Barriers	$16,157
Weatherization	$4,214.58
Electrical Services	$13,580.61
Heat Pump	$33,527
HVAC Removal	$1,600.27
Roof Replacement	$12,276.84
Hot Water Heater	$7,210.92
Solar PV	$28,800.91
Battery Energy Storage*	$33,156.83
Stoves	$1,110.00
Dryers	$878.17

**The average cost represents cost per property, not per battery. Some customers installed two batteries, and battery type and duration varied across installations. Source: Skinner, Miranda, 2025. Energy Efficiency Strategy and Regulatory Analyst, Cape Light Compact.*

Continued Evaluation

Per the DPU order, the Compact is conducting the CVEO program evaluation outside the standard Three-Year Energy Efficiency Plan evaluation framework, while collaborating with the EEAC's evaluation consultants by sharing the scope of work and draft findings for feedback. The evaluation is being performed by a third-party contractor and will address the following key questions:[26]

- What are the main barriers to participation during the onboarding process?
- What does the procurement of equipment and services and installation look like, and are there any potential concerns with the scalability of specific equipment or processes?
- What non-energy benefits (such as reliability) might be identified from installations?
- What is the cost and savings for the package of installed measures?

The Compact will also include an impact study within the final evaluation report that will provide details on customers' bill impacts and experience, as well as interviews with program staff and contractors. This final report will be submitted to the DPU by August 1, 2025. Subsequently, the DPU is required to file a report with the legislature by August 1, that will summarize the results of approved strategic electrification and energy optimization demonstration projects, as well as provide recommendations for any future statutory changes.

[26] Cape Light Compact JPE, "*Information Request DPU 2-1*," Massachusetts Department of Public Utilities, November 21, 2022, https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/15764902.

Conclusion

The CVEO program represents a groundbreaking approach to integrating residential LMI energy efficiency, electrification, solar+storage, and heat pumps in a single, cohesive program. As the only low- to moderate-income (LMI) battery offering from a program administrator as part of the larger Mass Save initiative, it sets a precedent for future energy efficiency initiatives, demonstrating both scalability and replicability across Massachusetts and beyond. With a significant number of households statewide eligible for similar support, expanding this model could drive widespread benefits. By addressing the challenge of load growth resulting from the electrification of the building sector, the CVEO pilot program highlights the importance of coordinating efficiency measures, renewables, and storage in a comprehensive customer offering, rather than treating them separately. This holistic approach maximizes impact, enhances grid stability, and ensures that the transition to clean energy is both equitable and effective. Policymakers and energy program administrators can look to the CVEO as a model for the future of sustainable, inclusive distributed clean energy programs.

Solar+Storage+Electrification

A CLEAN ENERGY EQUITY MODEL FOR MASSACHUSETTS

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