

Electric Sector Modernization Plan

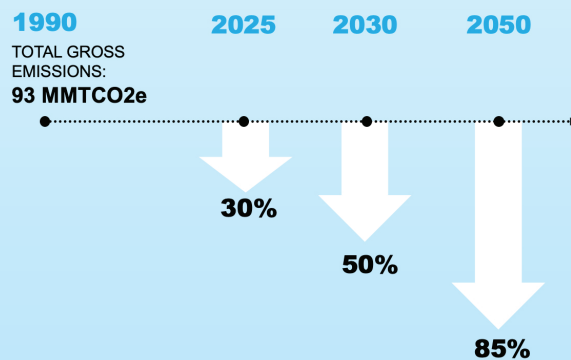
A Comprehensive Roadmap to Achieve Massachusetts' Clean Energy Goals



As part of its goals to confront climate change and reduce regional greenhouse gas emissions to zero by 2050, the Commonwealth of Massachusetts has established the Clean Energy Climate Plan, an ambitious roadmap designed to transform the region's power grid by increasing renewable energy production and electrifying the heating and transportation sectors. At Eversource, we recognize the crucial role the electric distribution system will play in this transformation, and the importance of providing a clean, equitable power grid for future generations.

This Electric Sector Modernization Plan (ESMP) lays out our vision for meeting these ambitious objectives by 2050 and includes the detailed steps we will take over the next five and ten years to ensure reliability and resiliency through the transition. Our 10-year plan helps achieve the Commonwealth's decarbonization milestones through 2040 by achieving a 180% increase in electrification hosting capacity, which will provide additional capacity to enable 2.5 million electric vehicles statewide, 1 million residential heat pumps within the Company's territory, and an incremental 2.2 GW of additional solar hosting capacity, which brings the total distributed energy resource (DER) hosting capacity systemwide to 5.8 GW.

MASSACHUSETTS' GOAL: Reduce carbon emissions by at least 85% by 2050



Eversource is committed to an equitable clean energy future, and our plan includes conversation and collaboration with the diverse communities we serve through the establishment of stakeholder meeting groups that will involve consumers in the decision-making process. Our ESMP presents a pathway to a clean energy future that delivers the environmental, health and economic benefits of the Commonwealth's

Eversource's Plan **ENHANCES THE GRID & ENABLES CLEAN ENERGY**



Increases available electrification hosting capacity by 180% over the next decade



Supports the adoption of 2.5 million electric vehicles statewide, 60% of the state's 2050 goals



Allows for the adoption of 1 million heat pumps, 70% state's 2050 goal in the Company's service territory



Enables 5.8 GW of solar, exceeding the state's 2040 goals, and reaching over 60% of the state's 2050 goals

decarbonization goals, with a focus on positive outcomes for historically marginalized communities.

This summary illustrates, in broad strokes, the fundamental priorities of our detailed and ambitious ESMP, and includes specifics on our vision for 2035, 2050 and beyond.

An Unprecedented Grid Transformation

The grid of tomorrow will look vastly different to the grid of today. Eversource’s peak electric demand is expected to increase 2.5-fold by 2050, and by 2035, that peak will shift from summer to winter driven by increased electrification of heating in the winter. By 2050, the average household will use almost three and a half times the amount of electricity on average than it did in 2023. The current electric distribution system will require significant infrastructure upgrades to support this increase in demand, and a targeted, data-driven approach to delivering these goals in a cost-effective way.

By 2050, the average household will use almost three and a half times the amount of electricity on average than it did in 2023.

Changes in the way our transmission and distribution systems deliver electricity are already underway and will continue to accelerate. As technologies like rooftop solar and battery storage become more efficient, more households will rely on these behind-the-meter resources for their electricity needs, and extra energy

Typical Household Today: 700 kWh/month

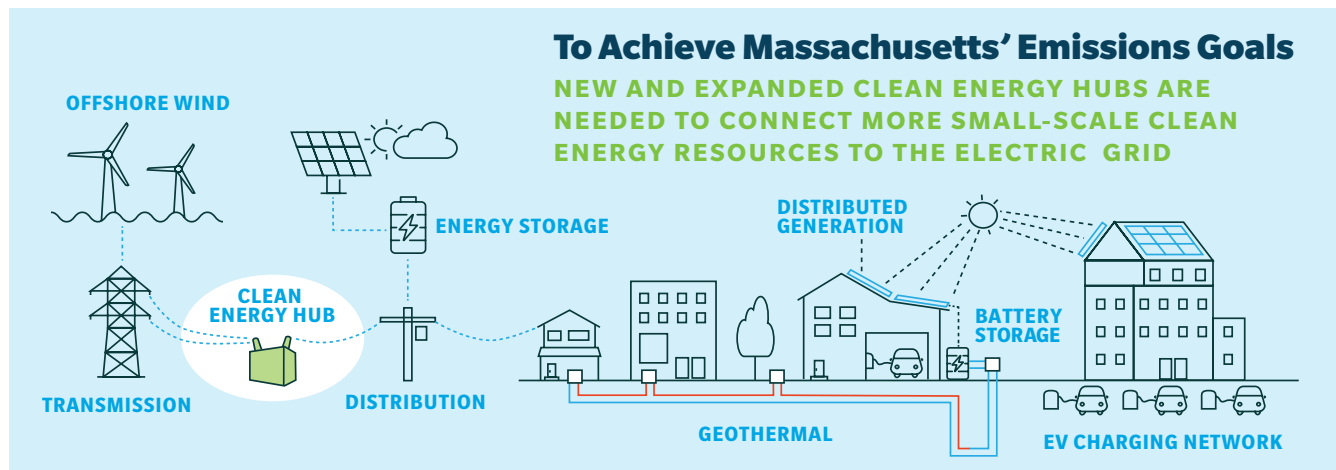
Lighting, appliances, air conditioning (seasonal) Heating likely from natural gas, oil or propane	700 kWh
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Future Typical Household: 1,400–2,400 kWh/month

Lighting, appliances, cooling with air-source heat pump (efficiency gain of -100 kWh by replacing AC)	600 kWh
First electric vehicle	400 kWh
Second electric vehicle	400 kWh
Summer Average Energy Consumption	1,400 kWh
Heat pump	1,000 kWh
Winter Average Energy Consumption	2,400 kWh

generated by these resources will flow back to the grid to supply other customers. The location and layout of generating resources will also change. Rather than a handful of large natural gas and nuclear plants, the grid of tomorrow will rely on an energy mix anchored by large scale offshore wind and hydropower, along with thousands of smaller, geographically diverse resources like solar and wind farms and battery storage. This more dispersed power grid will require a more complex and resilient distribution system.

Many elements of the current system are over 50 years old and are based on a simple transmission–substation–distribution model. In this model, resources generate electricity, which is routed to different areas using large transmission lines. Substations, also known as clean energy hubs, then lower the voltage of electricity from transmission lines to distribution lines for use by homes and businesses. The anticipated increase in DERs will strain the existing distribution system, and more clean energy hubs will become crucial as demand accelerates.



Clean energy hubs include substations and other infrastructure that enable clean energy resources and support strategic electrification, and at the distribution level, they lower voltage of the electricity moving from transmission lines to distribution lines for safe delivery to homes and businesses.

Preparing the Grid Today for Future Energy Needs

Our plan includes significant investment in upgrading our distribution system for the needs of a modernized grid. We have an established electric operations budget, supported by existing rate mechanisms, which includes investments in reliability, new customer growth, basic business, storm repairs, and capacity for peak load including economic growth, referred to as core capital programs. Significant investment in new clean energy hubs is anticipated in our core capital programs. Future clean energy hubs will better enable clean energy generation. Our vision for 2050 includes foundational investments to build 17 new and upgrade 26 existing clean energy hubs by 2035 and then applying a combination of additional infrastructure, technology deployment and policy changes thereafter to accommodate the increase in demand due to electrification and clean energy.

Several clean energy hub projects are expected in service by 2029 and others are in the planning stage for 2030-2034. These projects are the foundation of our roadmap to support the clean energy transition and are managed in coordination with our established energy efficiency and demand response programs, advanced metering infrastructure (AMI) implementation and capital investment projects (CIP).

The five-year plan also proposes five incremental ESMP investments needed to support and enable the clean energy transition:

- 1. Grid Modernization Technology.** With the sunset of our grid modernization plan in 2025, further technological support will be needed to enable the use of DER as grid assets.
- 2. Resiliency.** Recent findings on specific threats to infrastructure resulting from climate change have accelerated the need for an expanded program to harden the distribution grid.
- 3. Capital Investment Projects Expansion.** Building upon the established CIP cost allocation framework, which helps distributed generation facilities pay for electric system interconnection costs through a cost-sharing mechanism with all Eversource customers, we are proposing seven additional areas to support DER interconnections.
- 4. Electric Vehicle Infrastructure.** Continuing efforts to support electric vehicle charging infrastructure, we propose extending the existing make-ready program through the end of 2029.
- 5. Low Income Solar.** In order to better support underserved communities, we have developed an innovative proposal to encourage low-income ownership of solar generation.

Our Focus on Equity, Transparency and Engagement

Equity is a cornerstone of Eversource's vision for the future. In coordination with other regional electrical utilities, our plan includes the formation of a Community Engagement Stakeholder Advisory Group (CESAG), which will empower the communities we serve and prioritize environmental justice voices.

Deep and committed engagement requires the input of stakeholders with established, trusting relationships in the communities we serve.

Stakeholders will include representatives from groups that, due to socioeconomic barriers and inequality, have not historically participated in the planning process for the electrical grid. Deep and committed engagement requires the input of stakeholders with established, trusting relationships in the communities we serve. The CESAG will develop a Community Engagement Framework that can be used to plan new clean energy hubs and other projects before they are approved and built and will enable the communities hosting these projects to benefit directly from them. This will help ensure a just clean energy buildout for all.

We envision a future grid that facilitates progress. Urban areas seeking to add more electric buses will not be delayed by a lack of supporting infrastructure. Community solar projects in rural areas will be supported by an efficient interconnection process. Homeowners who want to install electric heat pumps will not need to wait for local grid upgrades. Customers looking to lower their electric bill will have greater access to information and efficiency programs. In

short, we envision a grid that will help *all* customers to benefit from the clean energy transition.



In addition, our proposal includes an innovative plan to support low-income ownership of solar generation, and seven newly proposed CIPs) that will help proactively build infrastructure to support solar growth in areas that are not currently designed to interconnect solar. Additionally, new technologies like Virtual Power Plants will help address system constraints in underserved communities. Eversource estimates that workforce development and economic growth related to this ESMP will deliver an incremental economic development benefit of \$2.9 billion to the Commonwealth over the next ten years.

Our equity-focused vision includes the following key components:

- **Planning processes that prioritize improving the worst performing circuits first.**
- **Electrification of heating and transportation to improve air quality.**
- **Pursuing lowest cost solutions when possible.**
- **Affordable access to EV and solar programs for low-to-moderate income customers.**
- **Recommending regulators consider rate design changes to prevent exponential increases in low-to-moderate income customers' bills through increases in electrification.**

A cleaner, more equitable grid must be a smarter, more modernized grid, driven by sound planning and real-time data.

A Smarter, Coordinated Approach to Infrastructure Investment

The increasing impacts of climate change, the evolution of new technology, and the need for a just clean energy transition create a complex set of challenges for grid transformation. We envision a sustainable, cost-effective path to 2050 that accounts for the interplay of these challenges. A cleaner, more equitable grid must be a smarter, more modernized grid, driven by sound planning and real-time data. Our plan maximizes benefits for associated costs and focuses on delivering the benefits of clean energy to all customers, especially those in marginalized communities.

Coordination between Gas and Electric Utilities

This smarter, modernized approach includes a more coordinated planning process between gas and electric utilities. Our collaborative plan includes the formation of a Gas-Electric Coordinated Integrated Planning Working Group to ensure infrastructure solutions are comprehensive and innovative. Non-pipe and non-wire alternatives like networked geothermal could provide answers to the complex infrastructure challenges facing both types of utilities in the coming decades, and a coordinated approach will be crucial to success. Targeted additions of ground sourced heat pumps, hybrid heating and deep energy retrofits could provide zero-carbon energy options for customers, offset the need for more home-based electric heat pumps, and reduce the scale of improvements needed on the distribution system.

Improved Insight and Savings Using Demand Response

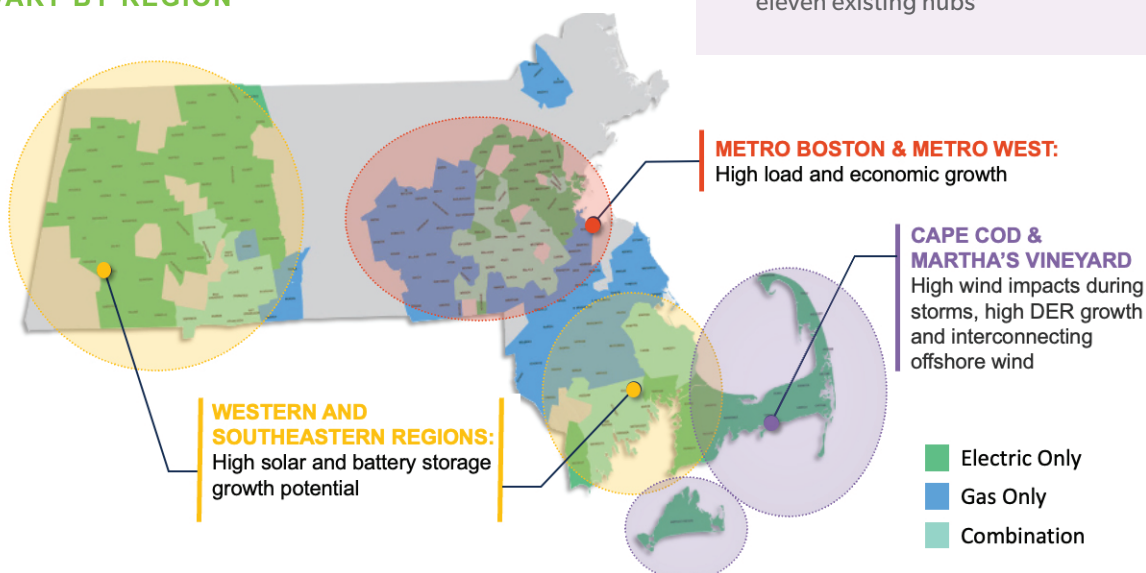
Another key component of this more responsive, real-time future grid is the introduction of AMI, which will provide every customer with greater insights into their usage information and more opportunities for energy savings. Automated tools like demand response can help customers identify nonpeak times to charge their electric vehicles, for example, which will place less stress on the grid and allow customers to take advantage of energy savings. AMI allows for more frequent and accurate communication with customers during outages and storm restoration, as well as high bill alerts in multiple languages, options to finance solar projects through their electric bill, and information about more direct clean energy options.

Vision for 2035

With a projected 20% increase in net demand over the next ten years as well as DER penetration, our vision for 2035 includes the construction of 17 new clean energy hubs and upgrades to 26 existing clean energy hubs. Our plan also includes new battery storage in Metro Boston and Southeast regions, upgrades to the undersea cable to Martha's Vineyard, and construction of a second cable in the same location. The emissions reductions that will result from our 2024-2035 infrastructure upgrades exceed the Commonwealth's goals for 2040.

Our vision for 2035 also includes a new planning framework for the construction of DERs like new solar, wind and battery resources. Each new clean energy hub will include thoughtful engagement with local communities to ensure site selection, design and construction are equitable. Recognizing that climate change will continue to accelerate the intensity and frequency of storms in the region, we are planning an increase in underground cables and other projects that will improve resiliency and decrease customer outage minutes by at least 14% over today's levels.

Infrastructure Investment Needs VARY BY REGION



One of our most important investments over the next decade is the deployment of AMI. By 2028, all customers will have greater insights into their usage information and more tools to engage in demand response and clean energy programs.

Our comprehensive vision includes targeted infrastructure improvements and strategies for each region, including the following:

Metro Boston

- Seven new clean energy hubs and upgrades to four existing hubs
- Collective approach to the electrification of steam district heating, reducing overall demand.

Southeast

- Greater coordination with the region's gas providers to ensure an efficient deployment of heating electrification.
- Four new clean energy hubs and upgrades to seven existing hubs

Metro West

- Incentivizing the use of Metro Boston as an alternative EV charging location for area commuters during their workday to meet increased demand more efficiently.
- Four new clean energy hubs and upgrades to four existing hubs

WMA

- Two new clean energy hubs and upgrades to eleven existing hubs

Vision for 2050

Growth in demand between 2035 and 2050 will eclipse that of the previous decade. By 2050, Eversource's winter peak morning demand will reach 15.2 GW, a 150% increase over today's peak demand, which currently occurs on summer evenings. In order to support this unprecedented growth in demand, our vision for 2050 includes the construction of five new clean energy hubs beyond those already in the ten-year plan (2025-2034). The order of construction of these hubs will be driven primarily by which areas have the greatest need, since rapid electrification presents different challenges for different regions of our service territory.

Rethinking Rate Design and Public Policies in an Electrified Future

In addition to these upgrades, Eversource recommends that regulators and stakeholders explore a shift in rate-design to ensure that customers lowering their individual household's contribution to emissions through the electrification of their heating and transportation are not unduly penalized for their higher electricity usage. The current volumetric method of rate design, which bills customers by kilowatts per hour, could be replaced by a demand charge rate design, which assesses rates based on a household's highest period of demand in a given period. This rate design would encourage off-peak usage and could present a more equitable rate-design structure than current designs. We recommend the exploration and analysis of different rate-design structures over the next decade and beyond.

In parallel with grid infrastructure investments, we propose that additional policy changes be considered to better position Massachusetts to meet

its 2050 greenhouse gas emissions goals. These changes would range from incentivizing the installation of ground source heat pumps and at-work electric vehicle charging and charge management programs to mandating solar plus storage with minimum solar curtailment limits.

Conclusion: Delivering Economic, Health and Economic Benefits to All Customers

Eversource is committed to a cleaner, more inclusive energy future. This ESMP presents our comprehensive roadmap to enabling the environmental, health and economic benefits of decarbonization for all Massachusetts communities.

Our comprehensive vision includes targeted infrastructure improvements and strategies for each region, including the following:

- **UPGRADE AND EXPAND** infrastructure to handle demand growth and enable large amounts of new clean energy
- **STRENGTHEN** the distribution system to withstand more frequent storms
- **MODERNIZE** with smart technologies that empower customers to have more control over their energy use and costs
- **DEVELOP AND REFINE** a 10-year capital plan to identify current grid capabilities and needs
- **INCORPORATE** the region's anticipated demand growth assumptions for EV adoption and electric heating
- **FOCUS** first on lowest-cost options and non-wires alternatives
- **LEVERAGE** a formal stakeholder engagement process to seek communities' perspectives before projects proceed to siting

Our plan delivers the following benefits to Eversource's 1.47 million customers:

Increased safety

Our investments replace aging infrastructure with newer technology, reducing the risk inherent in older equipment. All improvements will conform to our rigorous guidelines to ensure worker and public safety.

Greater transparency

A robust engagement process will allow a diverse group of interested stakeholders to have a voice in the clean energy transition, including environmental justice communities.

Improved grid reliability and resiliency

Reliability investments and resiliency programs will reduce customer outages and blunt the impact of major storm events and flooding, ensuring underserved communities are not disproportionately affected by the impacts of climate change.

Increased electrification of buildings and transportation

Major investments in infrastructure, increases in energy efficiency and demand response programs, and the introduction of AMI as a tool to empower customers will ensure the electrification of the grid is as efficient as possible.

Greater Integration of distributed energy resources

Our interconnection initiatives will add an incremental 1.9 GW of bulk station hosting capacity and upgrades to enable faster DER interconnection,

so that new solar, wind and battery projects can connect to the grid more efficiently. Underserved communities will be given particular focus in this process.

Reduced renewable energy curtailment

Improved DER interconnection and other infrastructure improvements will reduce the hours that renewable production must be taken offline due to overproduction, allowing the grid and customers to take full advantage of added clean energy technology.

Reduced greenhouse gas emissions and air pollutants

Our five- and ten-year plans will directly and indirectly contribute to the Commonwealth's greenhouse gas emission reduction goals.

Minimal land use impacts

Eversource promotes diverse native habitats through land management and preservation, and our plan minimizes the environmental impacts of infrastructure improvements within transmission and distribution rights of way (ROWs).

Minimization of impacts on ratepayers

Eversource recognizes the financial impact of electricity costs on customers, and we are focused on improving infrastructure while optimizing costs, supplementing improvements with smart technology solutions, deploying solutions like AMI to help customers manage their usage, and ensuring costs are equitably shared among ratepayers.

The goals of the clean energy transition are ambitious, but they are attainable. As a company of individuals invested in an equitable grid for future generations, we look forward to robust and transparent engagement with the communities we serve. Our vision delivers a modernized electric grid that meets the Commonwealth's goals while maintaining the resiliency and reliability Eversource customers have come to expect throughout our company's history.