



**EVERSOURCE**

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## Electric Sector Modernization Plan

### MA DPU Filing Overview



March 5<sup>th</sup>, 2024



# Climate Law Requirements and ESMP Contents

- The Grid Modernization Advisory Council (GMAC) and Electric Sector Modernization Plan (ESMP) system was set in place by Climate Law in 2022
- The Climate Law requires that the state's EDCs prepare ESMPs to proactively upgrade the distribution system and meet multiple objectives, including:
  1. Improve grid reliability, communications, and resiliency;
  2. Enable increased, timely adoption of renewable energy and DERs;
  3. Promote energy storage and electrification technologies for decarbonization;
  4. Prepare for climate-driven impacts on T&D systems;
  5. Accommodate transportation and building electrification, and other new loads; and
  6. Minimize or mitigate impacts on ratepayers, including environmental justice communities

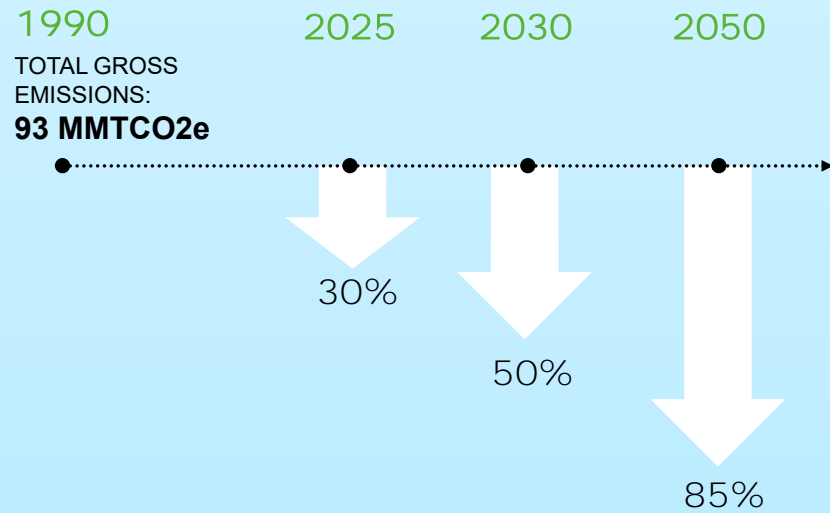
## ESMP Contents

- 1.0 Executive Summary
- 2.0 Compliance with the EDC requirements outlined in the 2022 Climate Act
- 3.0 Stakeholder Engagement
- 4.0 Current State of the Distribution System
- 5.0 5- and 10-Year Electric Demand Forecast
- 6.0 5- and 10-Year Planning Solutions: Building for the Future
- 7.0 5-year Electric Sector Modernization Plan
- 8.0 2035 - 2050 Policy Drivers: Electric Demand Assessment
- 9.0 2035 - 2050 solution set – Building a Decarbonization Future
- 10.0 Reliable and Resilient Distribution System
- 11.0 Integrated Gas-Electric Planning
- 12.0 Workforce, Economic, and Health Benefits
- 13.0 Conclusion
- 14.0 Appendix

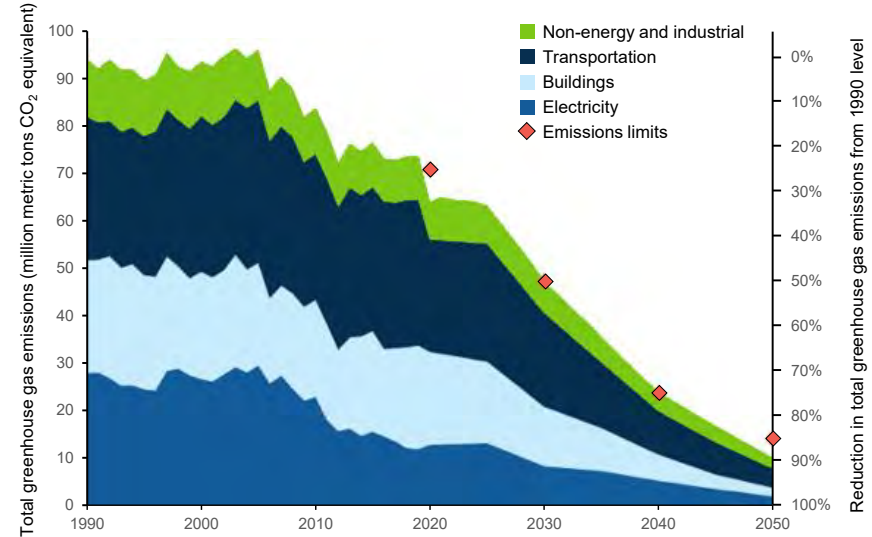


# Greenhouse Gas Emission Goal

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



Sector Greenhouse Gas Emission  
as Shares of Massachusetts Economywide Total



Note: 1990 through 2019 reflect full-year historical data.  
Source: Massachusetts Executive Office of Energy and Environmental Affairs



# Household Electrification

## 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

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



## Enablement Overview

### 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

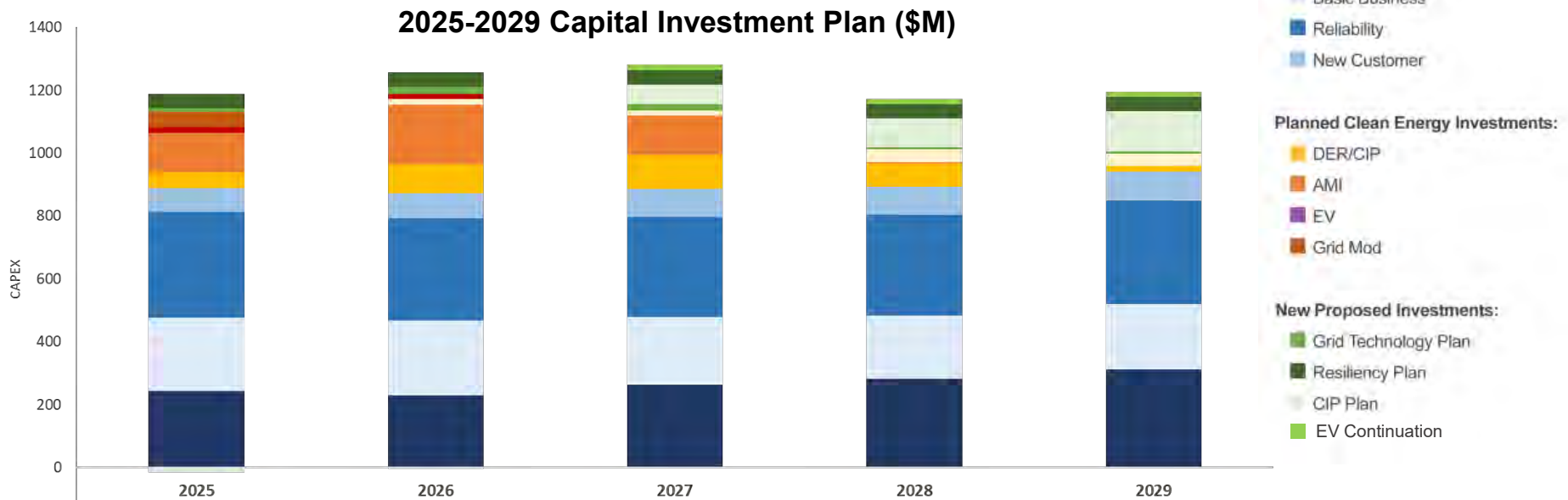


Enables **5.8 GW  
of solar, exceeding the  
state's 2040 goals**, and  
reaching over 60% of the  
state's 2050 goals



# Investment Plan

**FIVE-YEAR PLAN INCLUDES \$5.5B IN PLANNED AND \$0.6B IN PROPOSED INVESTMENTS**



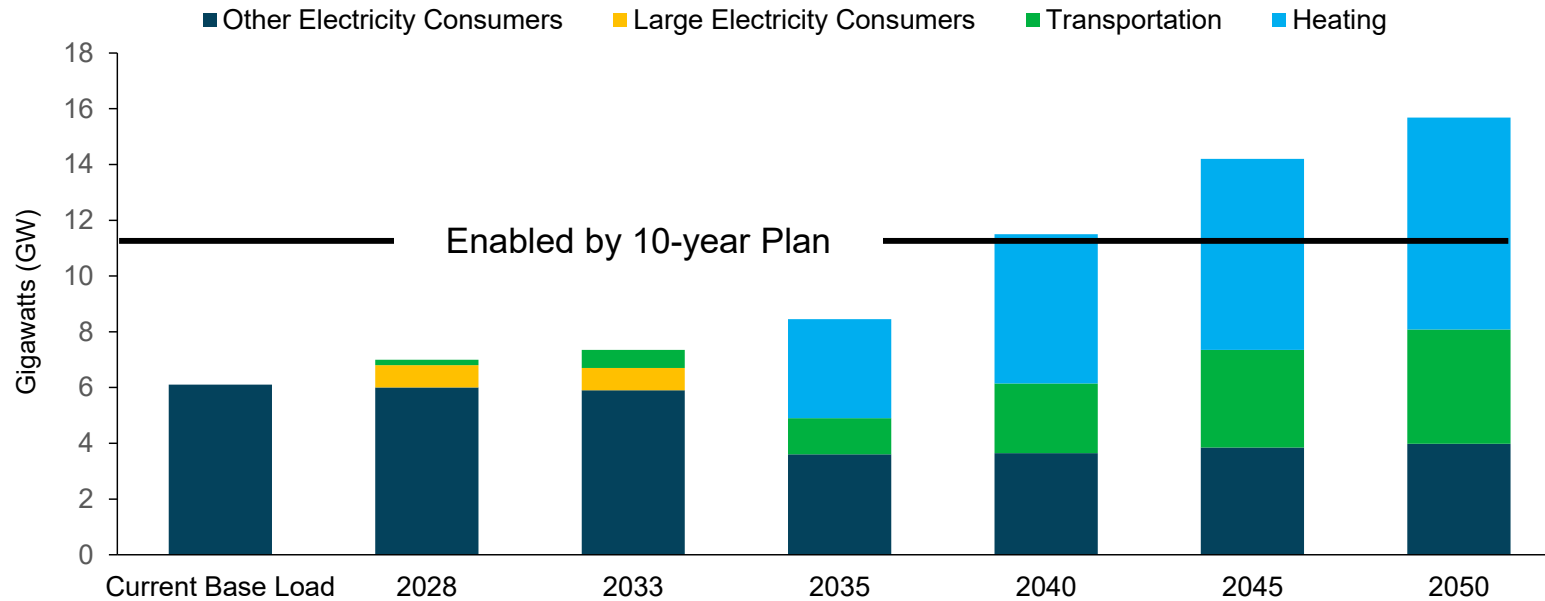
Note: Proposal also includes 5-year OPEX of \$44m for Grid Mod, \$117m for EV, and \$50m for low income solar



# ESMP Investment Drivers

**20% INCREASE IN DEMAND BY 2033 AND 150% BY 2050**

10-Year plan meets 85% of 2050 goals (no change relative to GMAC version)



## Scenario Forecasts

### PROVIDED NEW SCENARIOS OF LOAD, GENERATION, AND ENERGY STORAGE

In addition to All Options “Baseline” scenario submitted to GMAC in the initial draft

- Electric Vehicle scenarios include assessment of higher adoption rates and increasing range of managed charging from 20% to 75% with about 300 MW lower demand with 20% managed charging
- Heating electrification scenarios include assessment of slower adoption of heat pumps, various level of continued reliance on fossil fuel heating as well as demand response with about 2 GW lower electric demand with slower adoption of heat pumps and focused initially on partial heat pump solutions
- Overall goal is to provide increased transparency to stakeholders on demand and associated infrastructure costs
- Impact of storage more on increased solar enablement (~2 GW) than on demand reduction



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## Policy Recommendations

### ADDITIONAL POLICY RECOMMENDATIONS TO WORK IN CONCERT WITH INFRASTRUCTURE UPGRADES

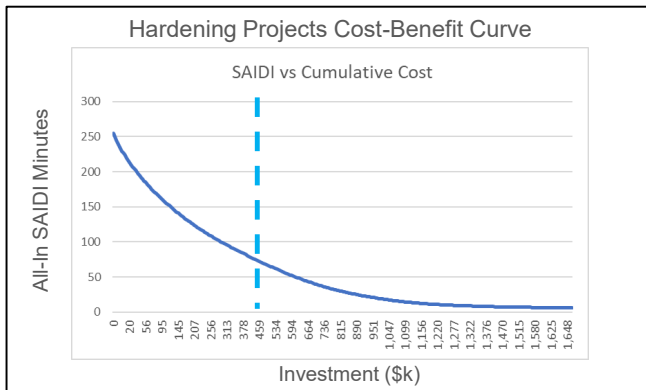
1. Increasing locational incentives to drive up at least 25% penetration of ground source heat pumps
2. Drive toward 100% deep-energy retrofits
3. Retain about 15% hybrid heating
4. Incentivize at-work charging and charge management programs to achieve at least 20% reduction in EV demand
5. Mandate solar plus storage installations with a minimum 25% curtailment of solar
6. Mandate future ground mounted solar growth in planned and proposed CIP infrastructure areas



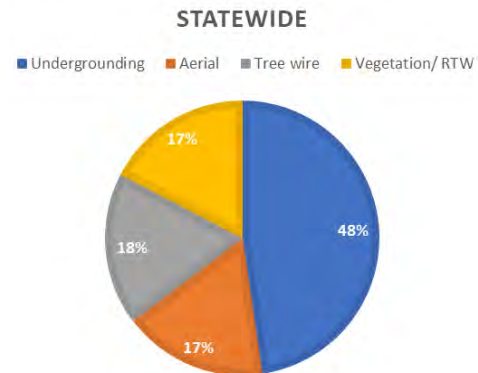
# Resiliency

## INCLUDES NEW METRIC, PLAN, AND QUANTITATIVE BENEFIT ASSESSMENT

- Adoption of All-In SAIDI metric, \$45M/year ten-year – hardening circuit prioritization based on zones most impacted by outages over a four-year period (over 21k events)



Hardening targeted at zones that derive the largest reduction in All-In SAIDI



Range of hardening plans specific to impacted zones

Scenario	ERP Cat	Peak Out	Crews	Low	High
1	1	700,000	2,000	22,975,687	91,902,748
2	1	400,000	800	10,095,581	40,382,325
3	2	300,000	1,000	13,070,143	26,140,285
4	2	150,000	500	6,287,578	12,575,156
5	3	100,000	600	4,115,980	20,579,901
6	3	75,000	400	4,430,399	22,151,995
7	4	50,000	350	1,881,929	18,819,290
8	4	25,000	200	432,357	4,323,568

Detailed quantification of storm cost and customer interruption avoidance savings

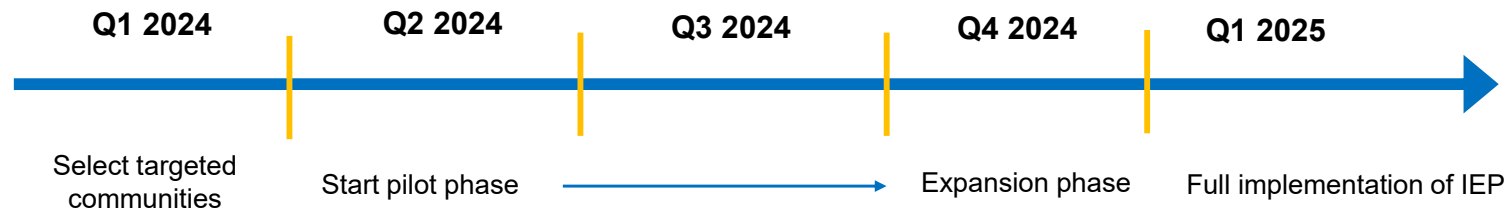
20 Year Benefit Range: **\$418M - \$1.5B**



# Gas Electric Coordinated Planning

## PROPOSED NEW TEN STEP INTEGRATED ENERGY PLAN (IEP)

- Electrification feasibility assessment includes a phased approach to integrated energy planning
- Community decarbonization plan central to successful implementation
- LDC/EDC joint working group within Eversource will be expanded to include National Grid and Unifil in subsequent phases
- Detailed modeling-based ten-step electrification feasibility assessment includes: selection of study area, identification of specific gas investments for deferral, detailed electric system planning studies, identification of planning solutions, and targeted community based clean energy programs

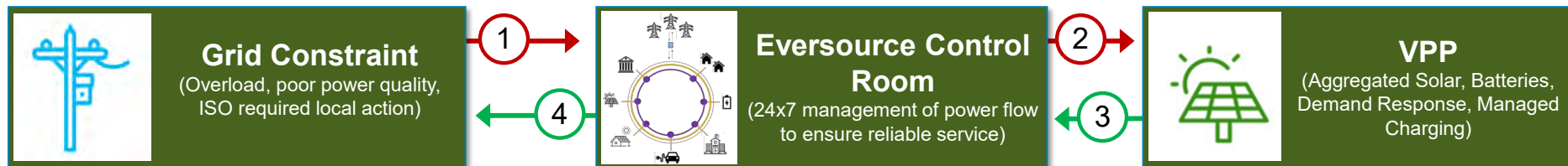




## DER Providing Grid Services

### DER CONTROLLED BY EVERSOURCE TO ADDRESS REAL TIME GRID NEEDS IN VIRTUAL POWER PLANT (VPP) CONFIGURATION

- 1. Real Time Grid Constraint.** Local load at risk due to overload, or over/under voltage or ISO requires local DER dispatch to address transmission constraints
- 2. Coordinated Dispatch.** Eversource dispatcher calls upon VPP in the affected local area
- 3. VPP Responds.** Discharge Battery, call Demand Response or reduce charging demand, change Inverter settings to provide voltage, current or frequency support
- 4. Constraint Alleviated.** VPP action addresses issue





## Value of Grid Flexibility

### FOUR USE CASES FOR DER CONTROLLED BY EVERSOURCE TO ADDRESS REAL TIME GRID NEEDS

	Bridge to Wires	Non-Traditional Infrastructure	Flexible Interconnection	Grid Services Solution
Distribution Line Deferral	X	X		X
Volt VAR Optimization				X
Lower Interconnection Cost			X	
Increase Hosting Capacity			X	
Reduce Real-Time Operations Risk	X	X		X
Microgrid Support				X



# Net Benefits Analysis

## WEST MONROE PARTNERS ANALYSIS DETAILS BENEFITS OF INCREMENTAL ESMP INVESTMENTS

*Quantified benefits for new CIP, EV expansion, Low-Income Solar and Resiliency; and provided qualitative benefits for Grid Mod Technology*

<b>MONETIZED</b> <i>The benefits to which financial benefit or savings value can be quantified and attributed.</i>	<b>QUANTIFIED</b> <i>The benefits for which quantified value can be determined.</i>	<b>QUALITATIVE</b> <i>The benefits that are produced by the investment but for which incomplete or insufficient data or experience exists to quantify with certainty.</i>
Eversource captured the following monetized benefits: <ul style="list-style-type: none"><li>• Reduced GHG emissions &amp; air pollutants</li><li>• Facilitation of the electrification of transportation and buildings</li><li>• Minimization or mitigation of customer bill impacts</li></ul>	Eversource captured the following quantitative benefits: <ul style="list-style-type: none"><li>• Reduced GHG emissions &amp; climate change mitigation</li><li>• Facilitation of the electrification of transportation and buildings</li><li>• Minimization or mitigation of customer bill impacts</li><li>• Indirect jobs impact (via RIMS model)</li><li>• Economic development and workforce investment (via RIMS model)</li></ul>	Eversource captured the following qualitative benefits: <ul style="list-style-type: none"><li>• Safety</li><li>• Grid Reliability and Resiliency</li><li>• Facilitation of the electrification of transportation and buildings</li><li>• Integration of DERs</li><li>• Avoided renewable energy curtailment</li><li>• Reduced GHG emissions &amp; climate change mitigation</li><li>• Avoided land use impacts</li><li>• Minimization or mitigation of customer bill impacts</li></ul>

Results to date indicate a positive net benefit based largely on reduced carbon emissions enabled by proposed investments

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## Stakeholder Engagement Overview

### Build Shared Understanding

- Establish a foundation of understanding regarding the electric grid, the Commonwealth's net zero goals, and the overall need for clean energy infrastructure and upgrades to our grid.
- Recognize and understand historical inequalities and ongoing disparities by listening to the voices of our most vulnerable customers and communities

### Develop Collaboration and Trust

- Enable conversations with stakeholders to discuss the insights and initiatives required to deliver the next generation grid and clean energy transition in ways that are relevant to and benefit them.
- Work to ensure our stakeholders feel respected, find ways to positively engage with communities, and improve our processes to better understand and serve the needs of our customers.

### Continuous Outreach and Engagement

- Tailor stakeholder engagement plans around specific clean energy infrastructure projects and elicit feedback and identify priorities of the host communities.
- Continue to engage with stakeholders about necessary upgrades to the grid and discuss the outcomes and benefits they will deliver

## Empowering our Communities

### Community Engagement Stakeholder Advisory Group



- Co-chaired by an EDC and a CBO (voted upon by CESGAG members)
- Meetings will be professionally facilitated

- **Co-Develop a Community Engagement Framework** with communities to guide the EDCs for large clean energy projects that will include best ways to engage communities about proposed projects and solicit their feedback.
- Help to **facilitate an evolving feedback loop** with communities and **prioritize the voices of disadvantaged communities** in clean energy project decisions that impact them.
- **Enable continuous constructive engagement** geared towards making the process of implementing the ESMP **more transparent and increasing EDC accountability** to impacted stakeholders
- **Ensure historical obstacles to stakeholder engagement** such as language barriers or the location/time of engagement sessions **are acknowledged and addressed** to ensure the widest possible level of community participation