OCTOBER 13, 2023

CETWG-GMAC Joint Meeting

Distribution and Transmission Planning

Agenda

- Eversource Electric Sector Modernization Plan (ESMP) Overview
- Transmission Planning Overview
- Transmission Upgrades Necessary for ESMP
- DER Impact on Transmission
- Interregional Transmission Needed to Deliver Clean Energy Generation

MA DPU 24-10: Electric Sector Modernization Plan (ESMP)

Eversource Summary Overview

Climate Law Requirements and ESMP Contents

The Grid Modernization Advisory Council (GMAC) and Electric Sector Modernization Plan (ESMP) system was set in place by “An Act Driving Clean Energy and Offshore Wind” (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:

- Improve grid reliability, communications, and resiliency;
- Enable increased, timely adoption of renewable energy and DERs;
- Promote energy storage and electrification technologies for decarbonization;
- Prepare for climate-driven impacts on T&D systems;
- Accommodate transportation and building electrification, and other new loads; and
- Minimize or mitigate impacts on ratepayers, including environmental justice communities

ESMP Contents

ESMP Process

ESMP Approval Process

Sep. 1st, 2023
File Draft ESMP with GMAC

Oct. 2023
ESMP Listening Session

Nov. 2023
Stakeholder Workshops

Jan. 30th, 2024
File final ESMP with DPU

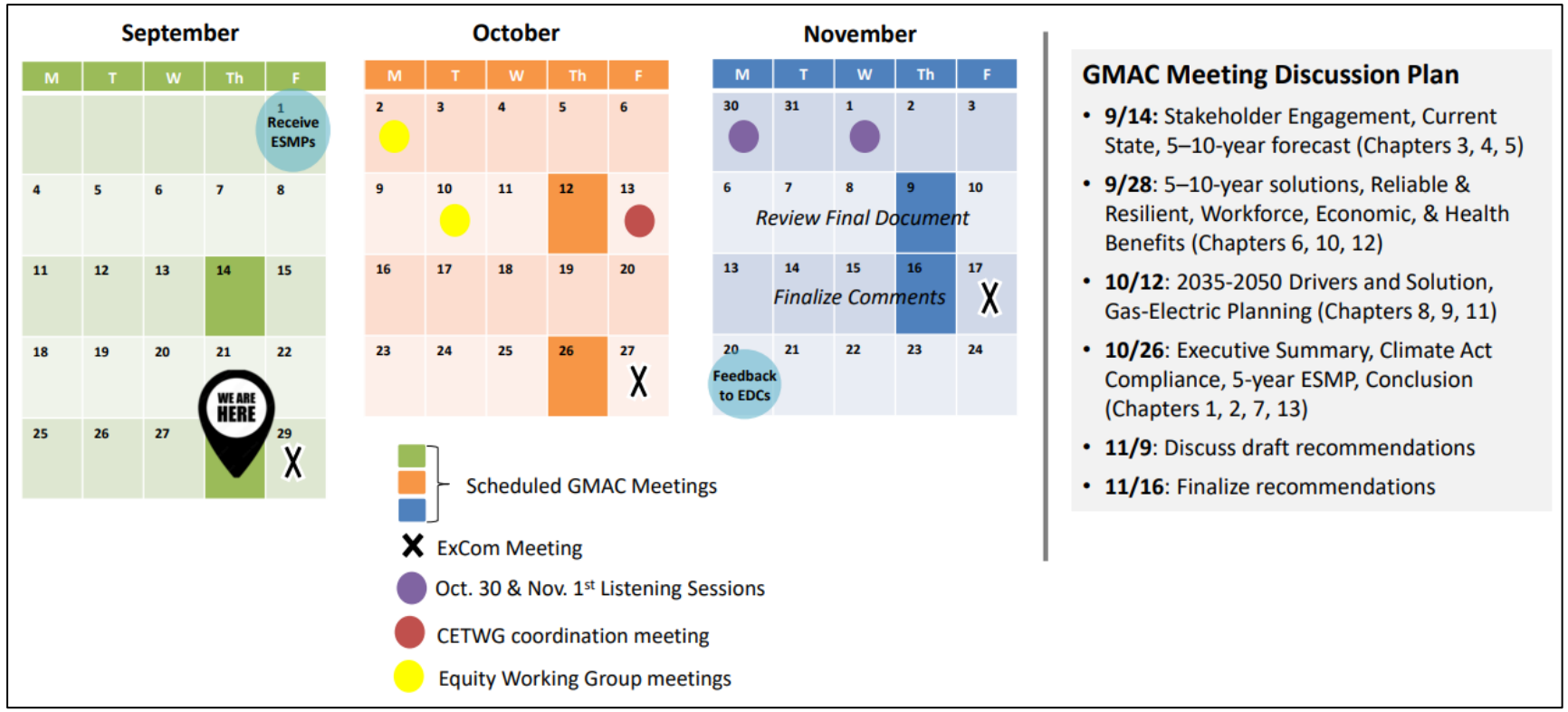
Feb. – Jun. 2024
Discovery, briefs, & hearings

Aug. 2024
DPU Decision

Nov. 2024
Finalize Community Engagement Framework with CESAG

Jan. 2025
Implement the ESMP

ESMP Feedback Process



Links to GMAC

GMAC Home Page - https://www.mass.gov/info-details/grid-modernization-advisory-council-gmac

GMAC Public Listening Session #1: October 30, 2023, 6-7:30 PM

- Webinar and registration link: https://zoom.us/webinar/register/WN_6LIjJzIRRe20GhZk-KYuug

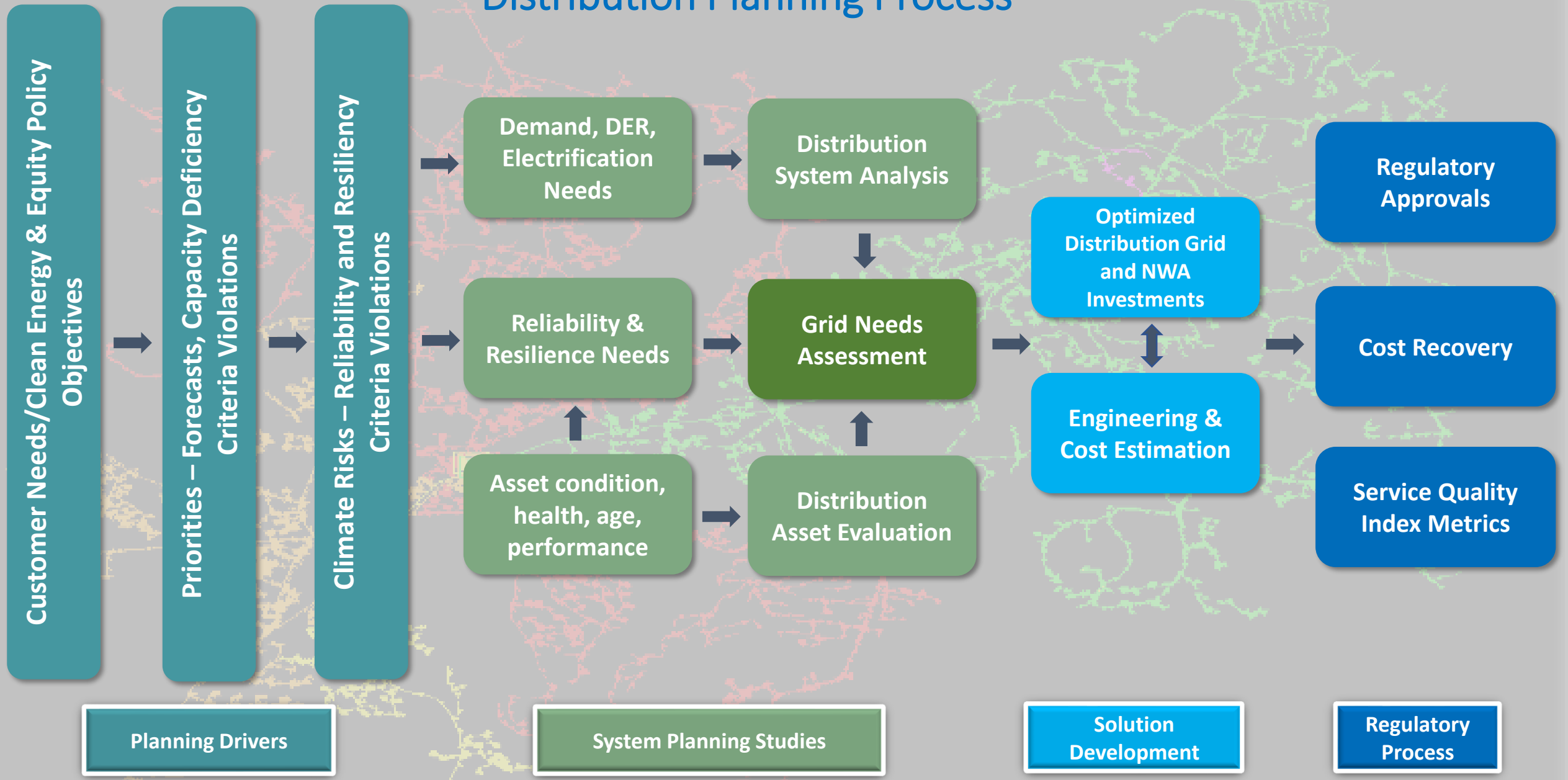
GMAC Public Listening Session #2: November 1, 2023, 12-1:30 PM

- Webinar and registration link: https://zoom.us/webinar/register/WN_0shCyey3Tu-Ta1sJXF_IZA

Eversource ESMP Key Themes

- The ESMP is Eversource's roadmap for building out the electric distribution system to **enable a just transition to a cleaner energy future** where the benefits of decarbonization are **equitably distributed, aligned with CECP**
- There is an **imminent need for infrastructure** build-out across the Eversource service territory to **enable clean energy objectives,** mostly driven by economic development in the near term
- Climate change is driving the need for **data-driven programs to improve reliability and resiliency**
- **Technology platforms will complement infrastructure build-out** by enabling optimization of DERs
- Base budget includes **reliability, new customer growth, capacity, AMI and clean energy CapEx**; Incremental proposed Capex in **resiliency, grid modernization technology, DER interconnections**
  - An innovative **OpEx** to promote **low-income solar ownership** proposed for cost recovery
- Company commitment to **robust and meaningful stakeholder engagement to guide decision-making**, with a focus on **incorporating feedback from our EJCs**; ESMP drives positive customer outcomes
- Eversource to continue playing an active role as future demands will continue to surge beyond 2034**, rate redesign, siting reform, energy policy, electric-gas planning, and technology enablement**

Distribution Planning Process

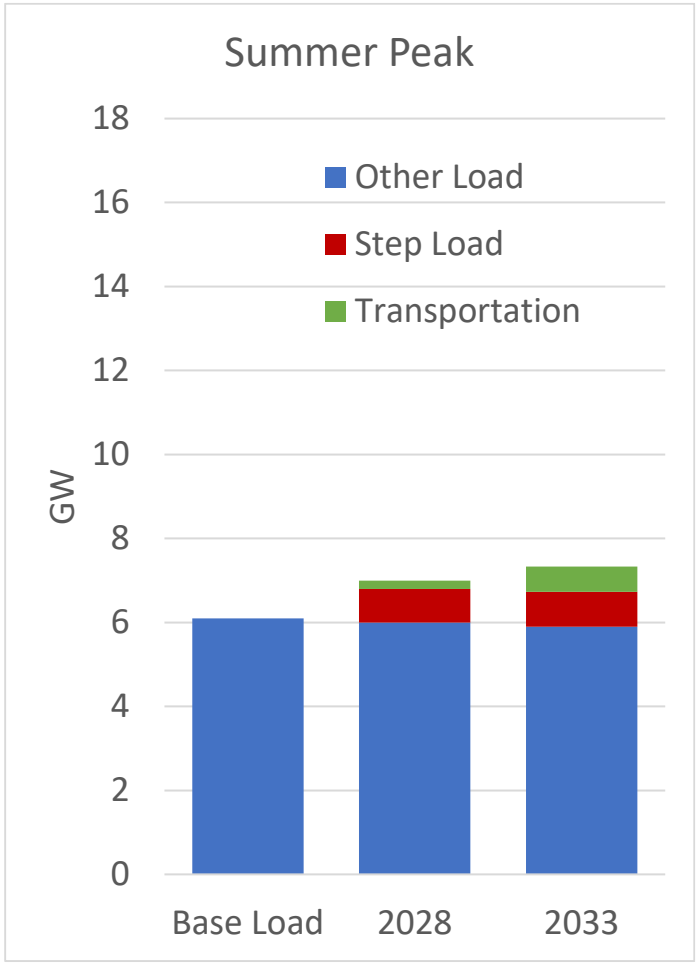


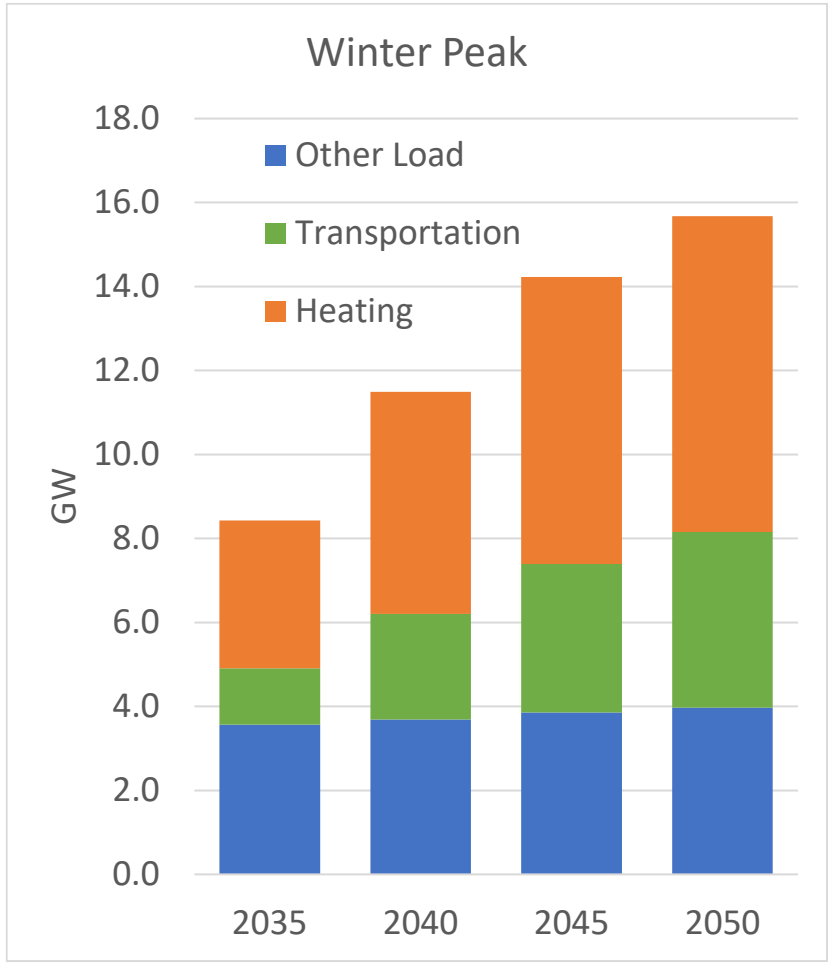
5-10 Year and 2050 Plan: Unprecedented Electrification Demand Growth

Electrification plans result in New England shifting to a winter peaking system by 2035 – increasing the demand on the grid by **20% by 2033** and **85% by 2040** – an overall increase of **5.3 GW by 2040** and **increasing demand by 150% by 2050**

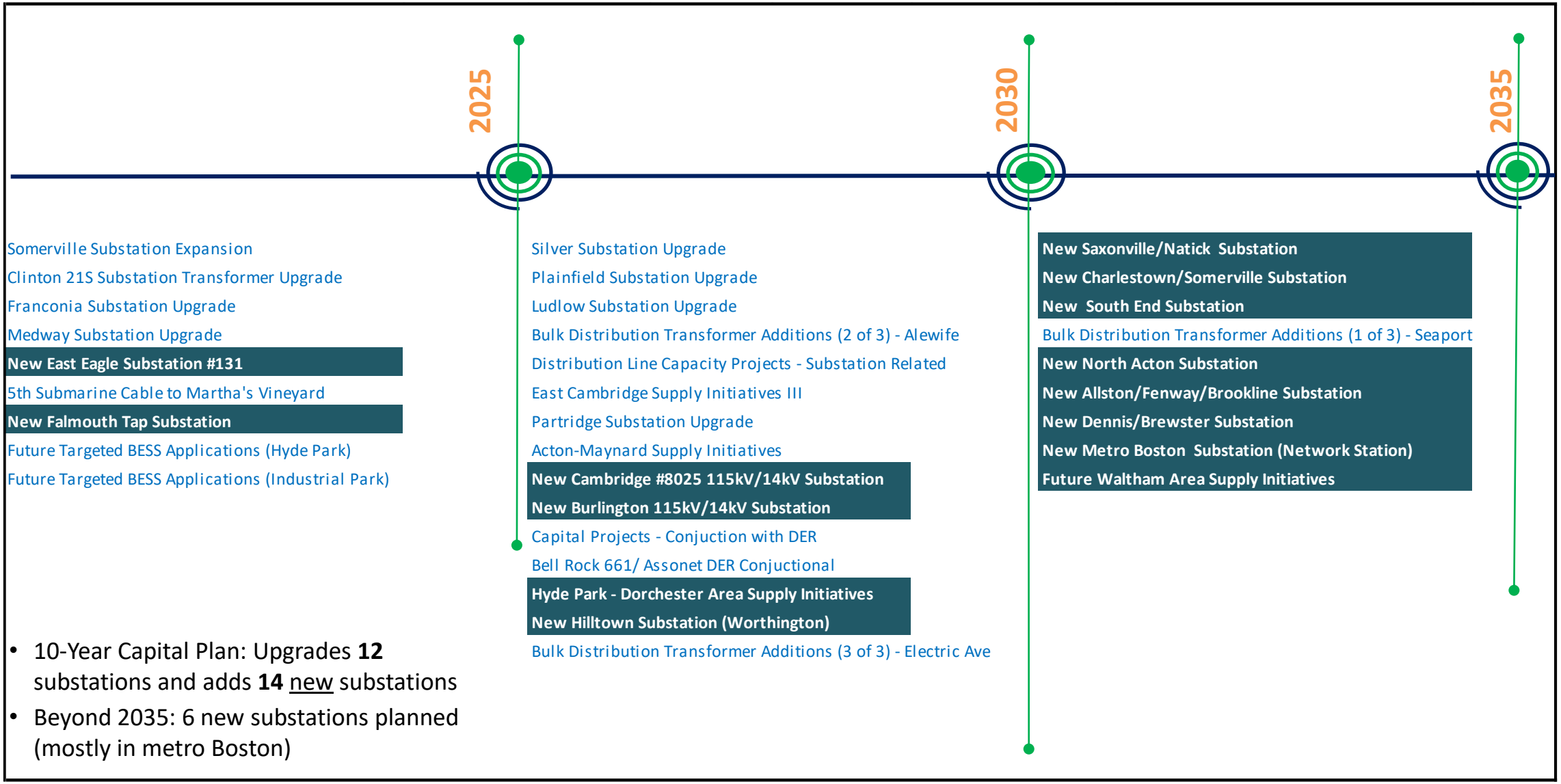
Increases in **electric vehicles** projected to add **1.3 GW of winter demand by 2035**

Increases in **zero-carbon heating** projected to add **3.5 GW of winter demand by 2035**



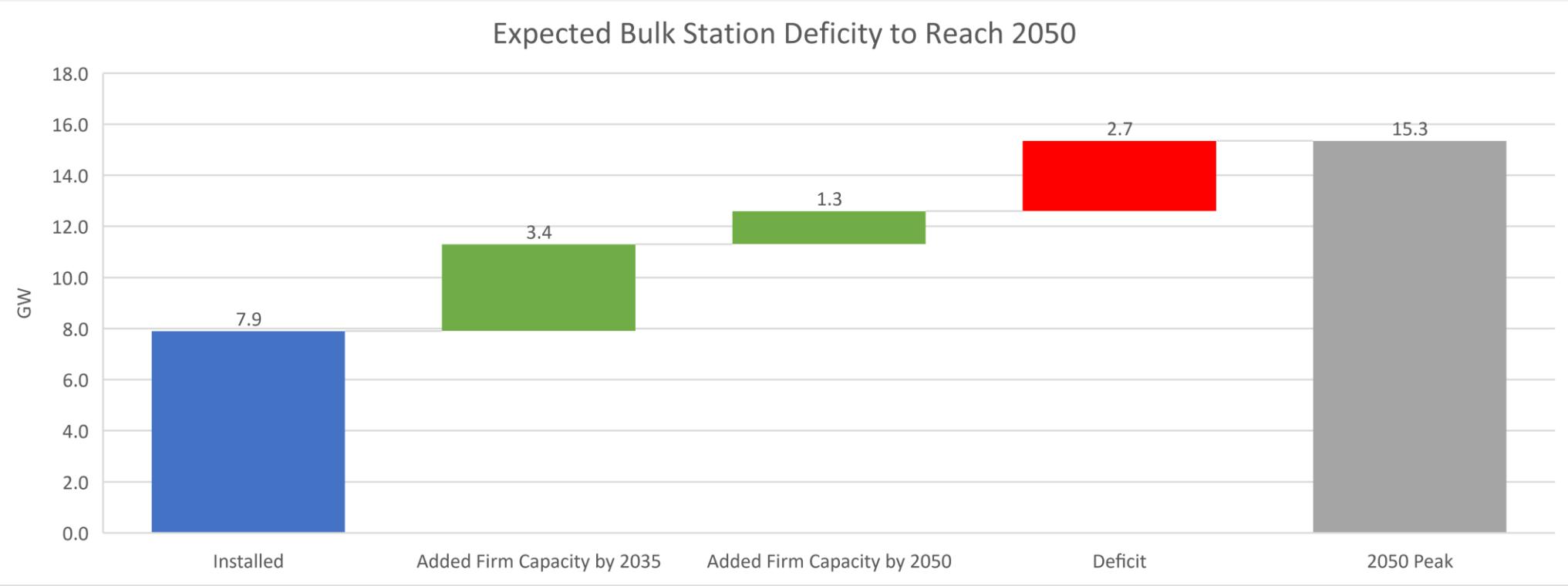


10-Year Infrastructure Plan – Major Projects



- 10-Year Capital Plan: Upgrades **12** substations and adds **14** new substations
- Beyond 2035: 6 new substations planned (mostly in metro Boston)

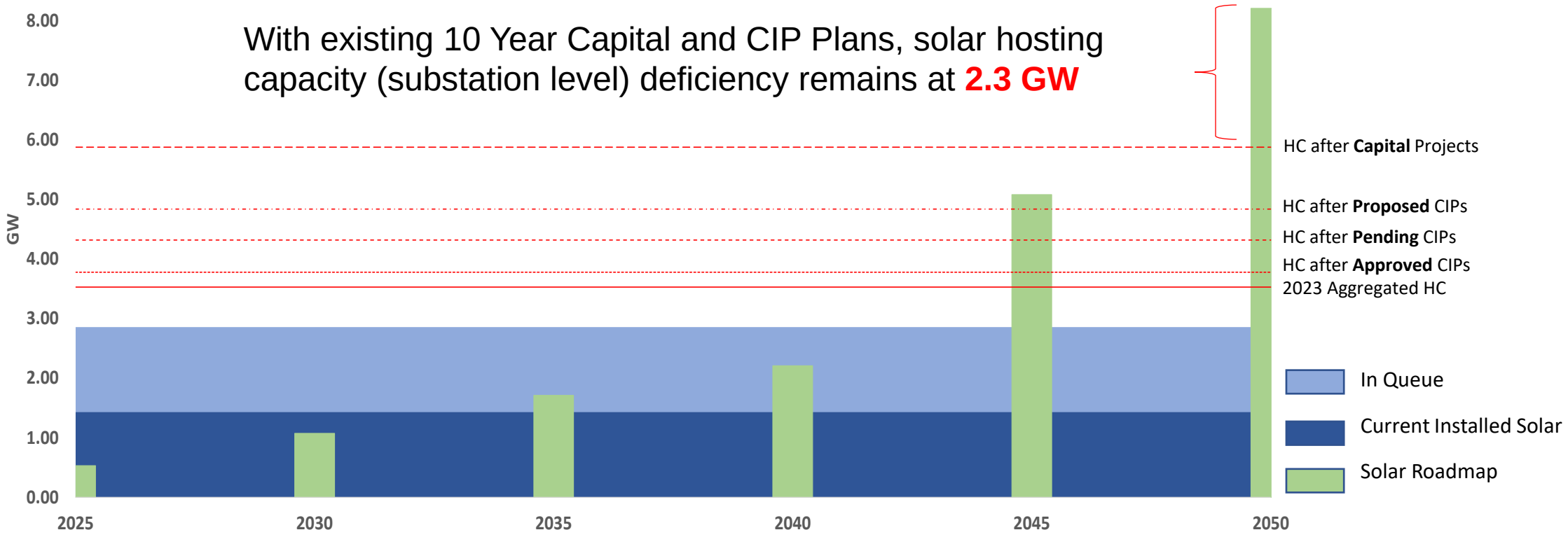
5-10 Year and 2050 Plan: System Wide Firm Capacity Needs and Solutions



- As of 2023 the bulk distribution substation system has a firm capacity of **~8 GW** and peak load of ~**6 GW**
- Over the next 10-years, system peak demand is forecasted to increase to **7.4 GW**
- 10 Year Capital Plan and projects planned beyond 2035 add incremental **4.7 GW** of firm capacity)

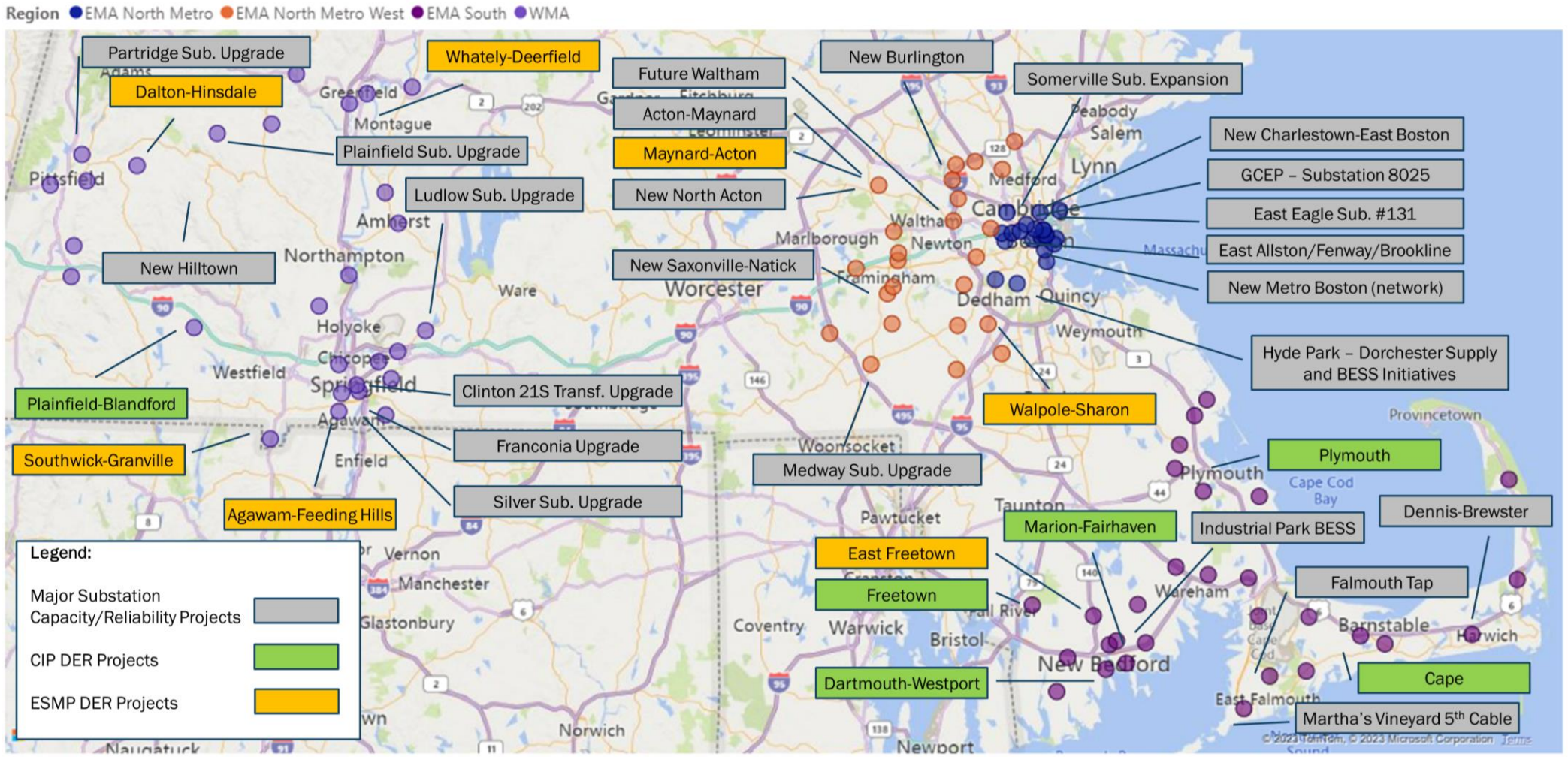
With existing 10 Year Capital Plan and 2050 solution set, system peak capacity deficiency remains at **2.7 GW**

5-10 Year and 2050 Plan: DER Hosting Capacity Needs and Solutions



- As of 2023, total DER hosting capacity is **~3.5GW** with installed solar generation of **~1.5GW**
- Over the next 10-years, solar generation is forecasted to increase to **~2.9GW**
- 10-Year CIP solutions (in addition to 10-Year Capital Plan solutions) adds incremental **~3 GW** of hosting capacity

10-Year DER Capital Investment Project (CIP) Solutions



- 17 new substations (14 Load, 3 CIPs)
- 26 substation upgrades (12 Load and 14 CIPs)

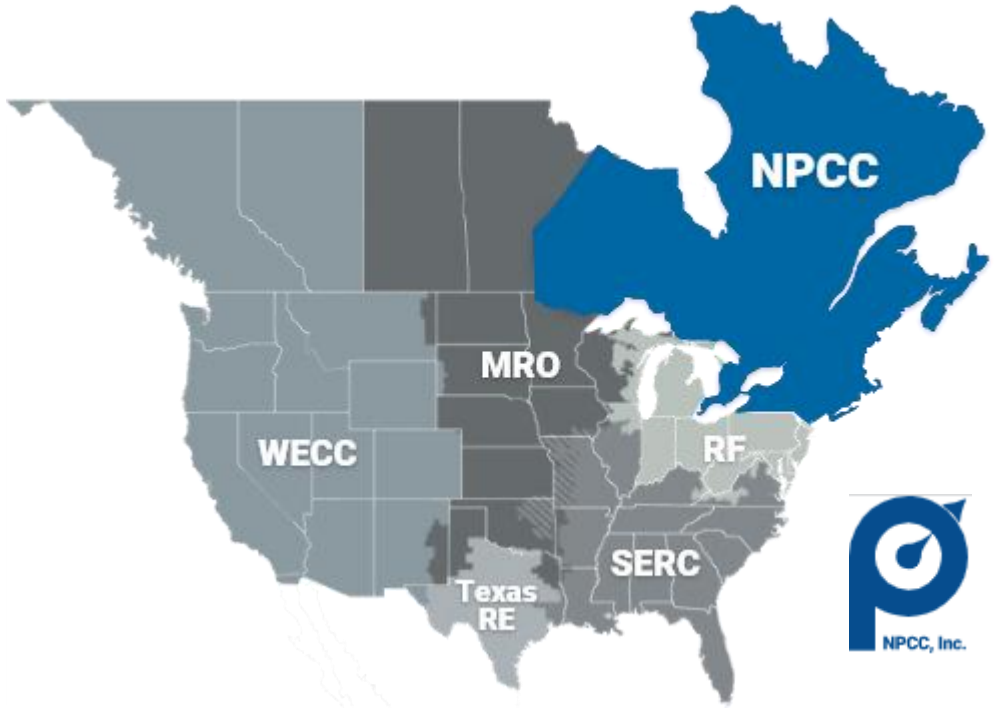
Transmission System Planning

General Overview

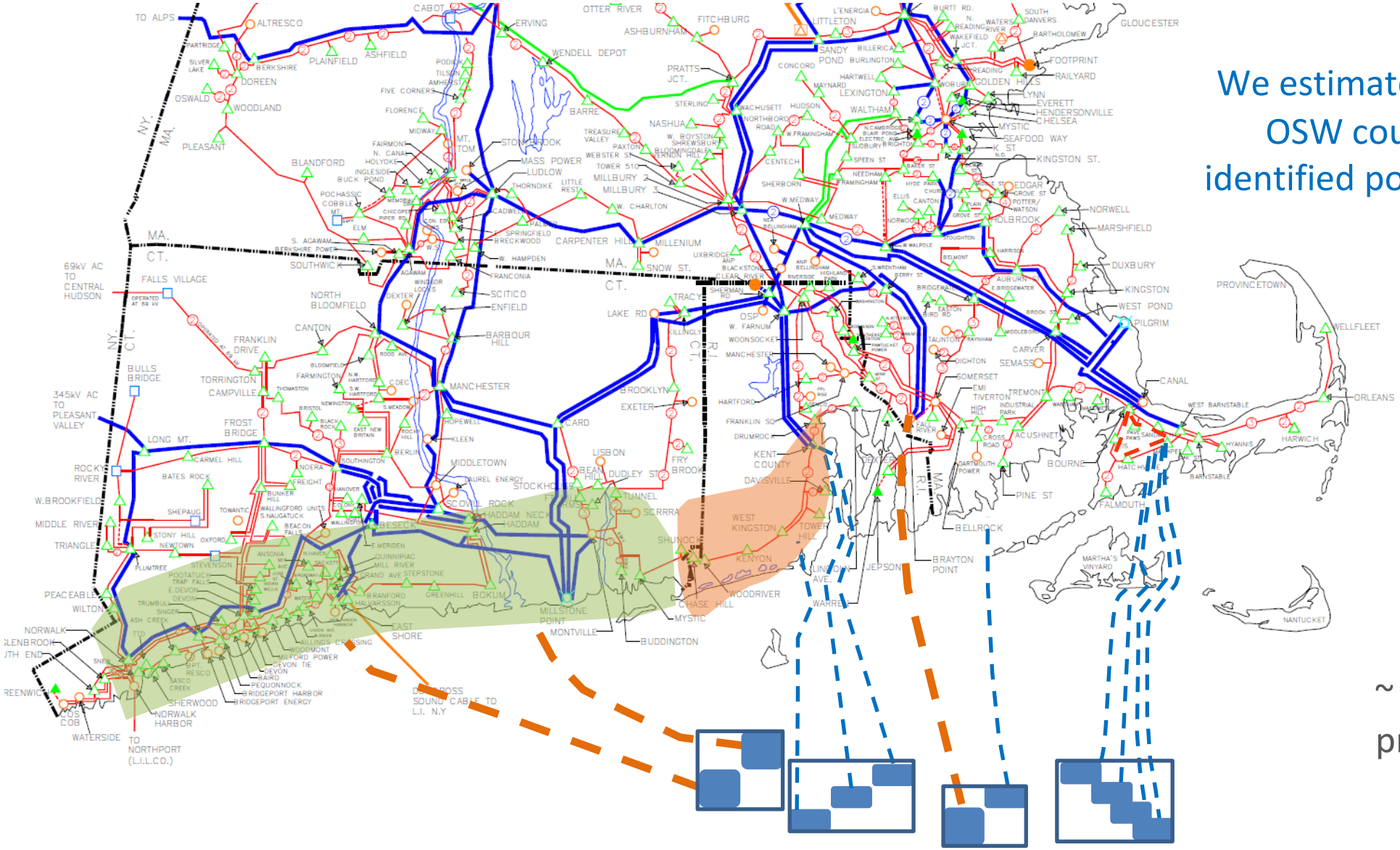
Brief Overview of Transmission System Planning

- A foundational function of Transmission System Planning is modeling future electric system behavior and performance to determine whether upgrades or modifications are needed for reliability pursuant to mandatory standards and criteria
- Transmission System Planning also studies the impacts to the system from customer requests, like proposed new generation
- ISO-NE also performs transmission planning functions for regional transmission facilities via “Needs Assessments” studies
  - Costs of upgrades identified by ISO-NE studies are usually shared across New England

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION



Offshore Wind Injection Points Continue to be Identified



We estimate that over **13 GW** of OSW could be connected at identified points of interconnection

~ 8.3 GWs Total States' procurement authority

Transmission Planning Initiatives Related to Clean Energy

Federally

- Federal Energy Regulatory Commission (FERC) has proposed transmission planning reforms in pending Docket RM21-17
  - Would mandate long-term scenarios with a **20-year planning horizon** that include **federal, state, and local laws that affect demand, demand response, decarbonization, and electrification**

Regionally

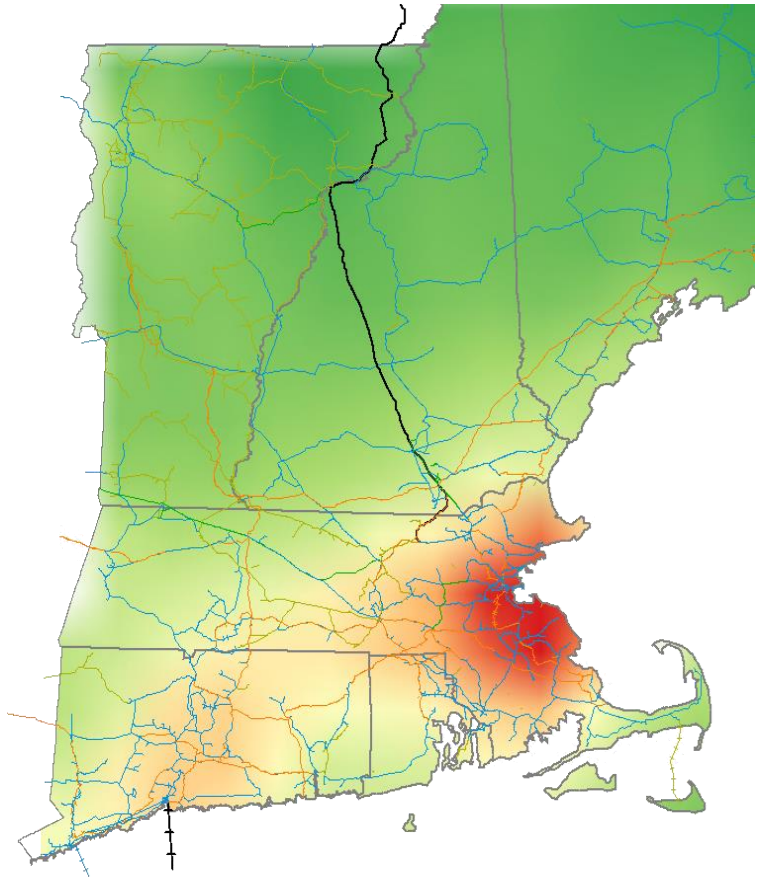
- ISO-NE annual load forecast process is incorporating more electrification
  - EV adoption forecast averages 43% higher than last year
- ISO-NE performing 2050 Study based on “All Options” pathway
  - ~50% of New England transmission lines overload in 2050, but **mostly addressed through rebuilding existing facilities and highly dependent on assumed location of new renewables**

Locally

- Eversource has developed **advanced long-range forecasting** to identify local reliability needs
- Eversource is a catalyst for grid modernization and clean energy (e.g., Provincetown microgrid BESS, Offshore wind, DERs)

Electric Load Transition

~30% increase in peak load by 2035

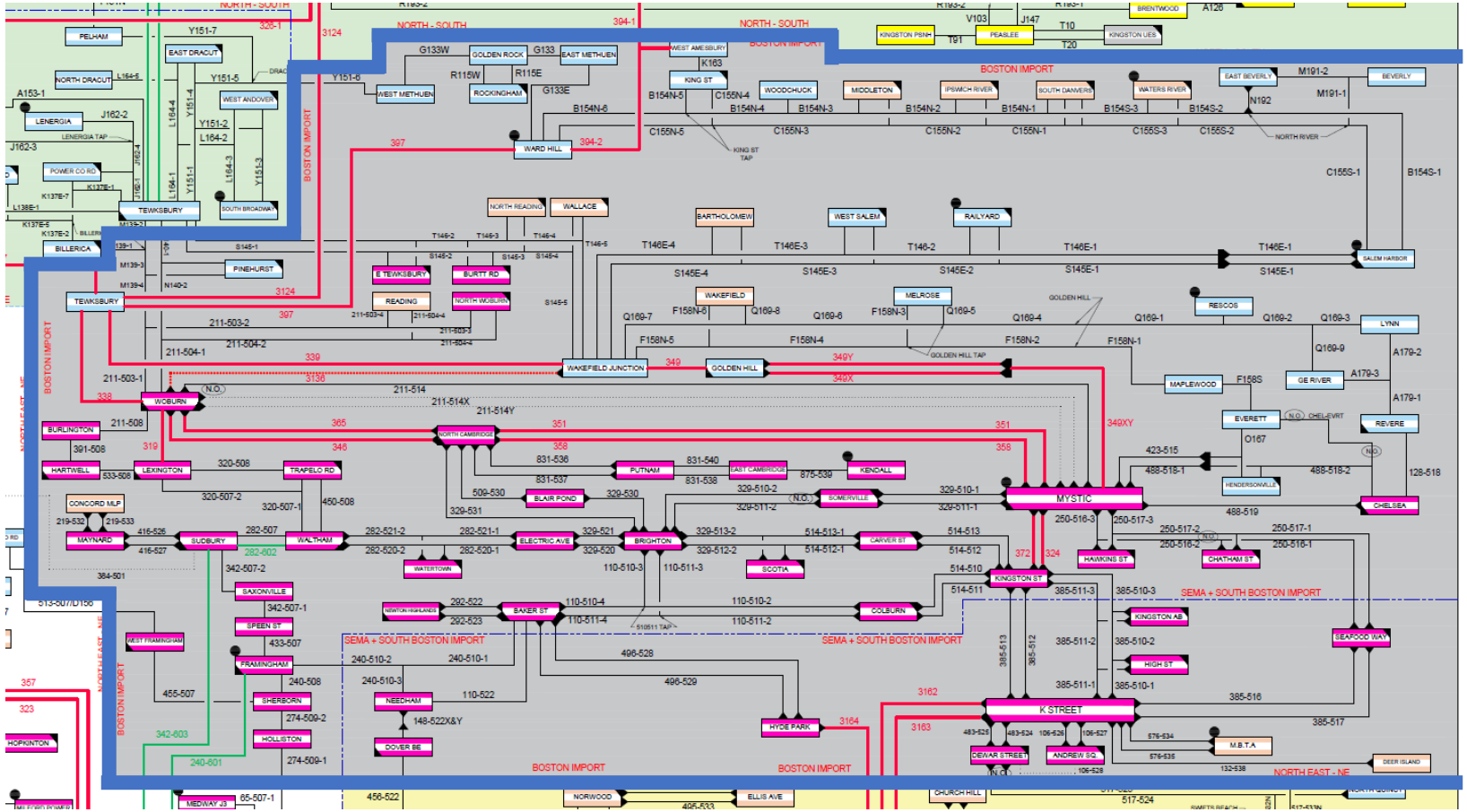


Transmission Upgrades Necessary for ESMP

Eversource Transmission Study of ESMP

- Eversource Transmission System Planning is currently analyzing the transmission system upgrades necessary for the ESMP
- Expected findings:
  - New transmission lines needed to supply new distribution stations,
  - Increased zonal transfer capacity needed to supply load pockets (e.g., increasing Boston Import Interface)

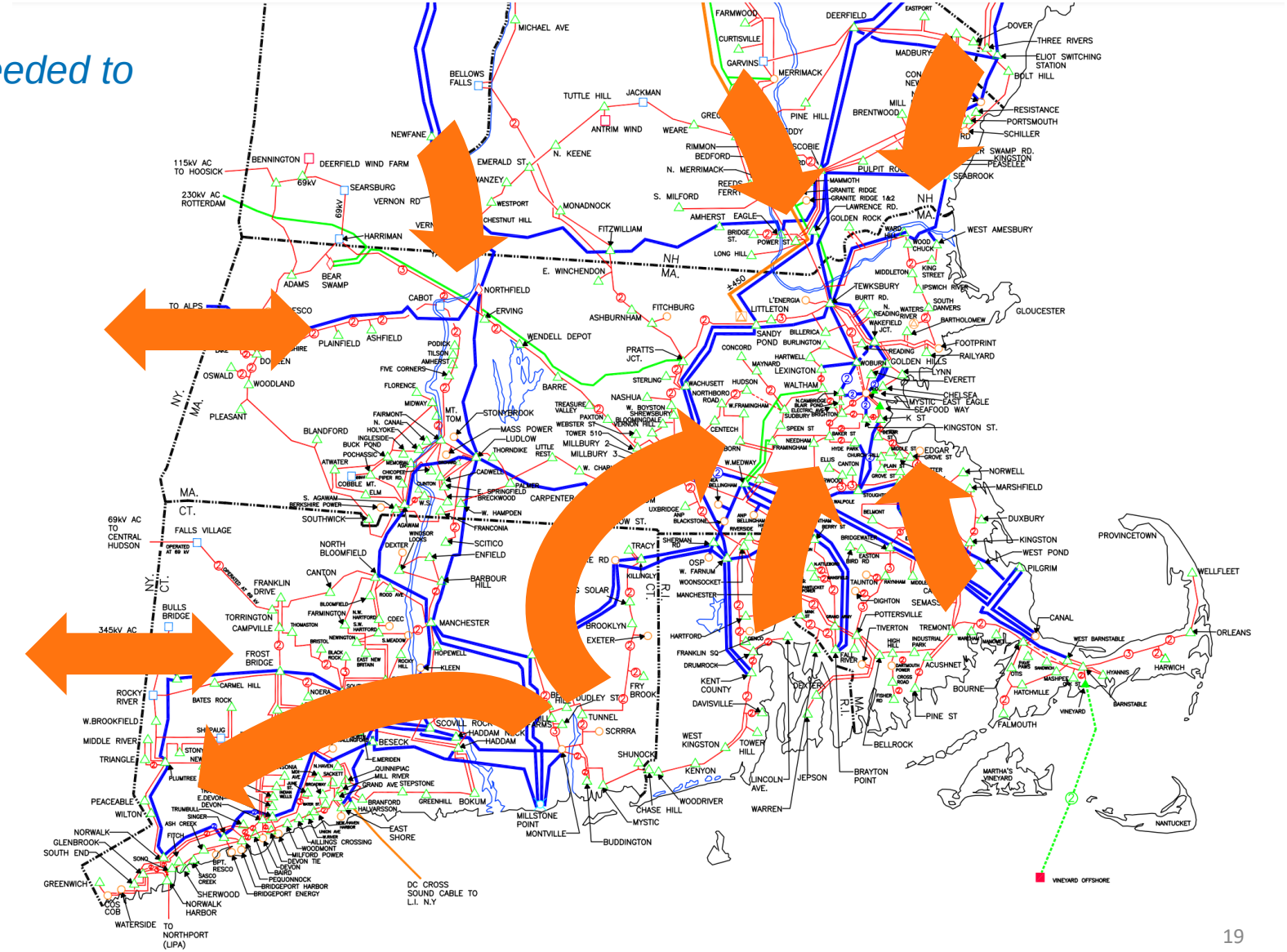
Boston Import Interface



Transmission Study Combines New Clean Energy Resources with ESMP

Additional Transmission Capacity Needed to Deliver Clean Energy

- "No Regrets" themes have emerged from various analyses that indicate where new transmission capacity will likely be needed across multiple future scenarios
- Largely driven by locations of new generation and increased need for interregional transfers



DER Impact on Transmission

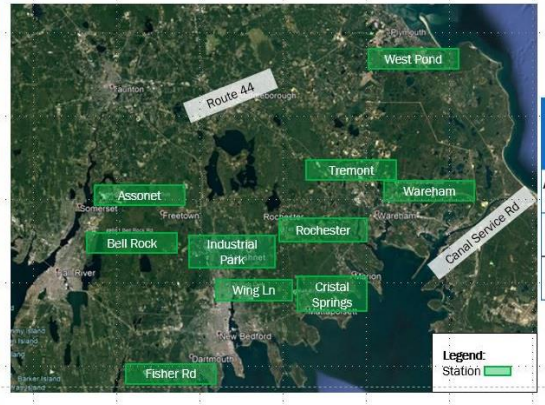
Distribution System Changes Increasingly Triggering Transmission Upgrades

Capital Investment Projects (CIPs)

Group Study Area	Stations
1. Marion-Fairhaven	*Arsene 654
	* Crystal Springs 646
	Rochester 745
	Wing Lane 624
2. Plymouth	* Brook St 727
	* Kingston 735
	* Manomet 721
	Tremont 713
	* Wareham 714
	West Pond 737
3. Cape	Valley 715
	Falmouth 933
	Harwich 968
	* Hatchville 936
	Hyannis Junction 961
	* Otis 915
	* Sandwich 916
	Mashpee 946
	Oak St 920
4. Freetown	Bell Rock 661
5. Dartmouth-Westport	Cross Road 651
	Fisher Road 657
6. New Bedford	Industrial Park 636

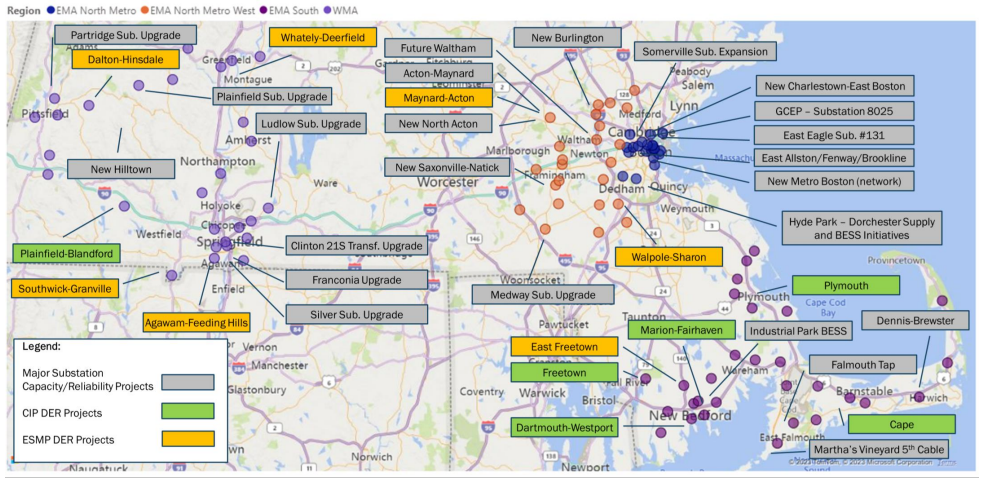
*Single Bank Substation

Cape: Potential addition of Mashpee # 946 and Oak St #920 in the future

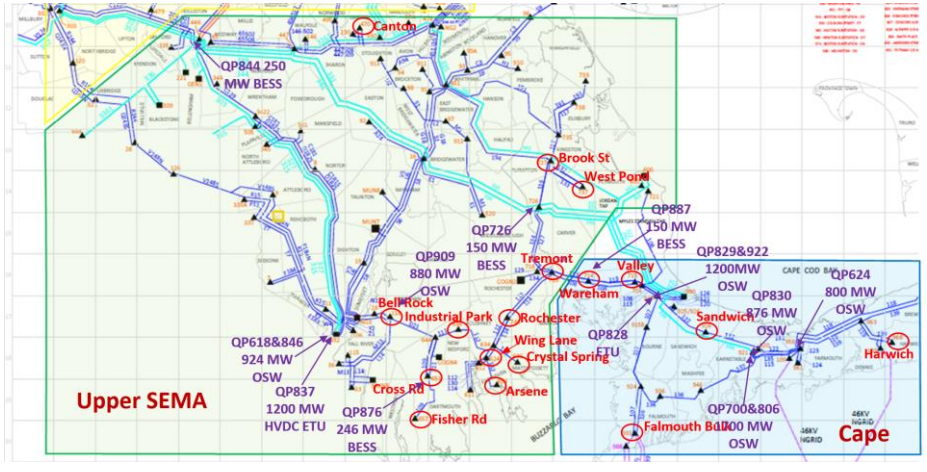


Group Study Area	Stations
Acushnet Center 7.	Acushnet 612
	Pine St 611
Outer Cape 8.	Wellfleet 976
	Orleans 975
Marshfield 9.	Duxbury738
	Marshfield739

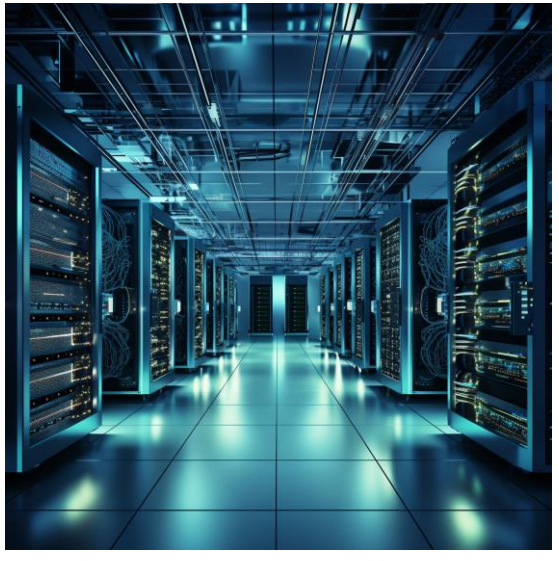
ESMP



Affected System Operator (ASO) Studies



Large Single Spot Loads



Another example: ISO-NE's Boston 2033 Needs Assessment

Mid-day net loads may approach *zero* in mid-2030s

Transmission still essential to deliver clean energy from resource-rich areas to load pockets

ISO-NE Load Modeling Details for Study Year 2033

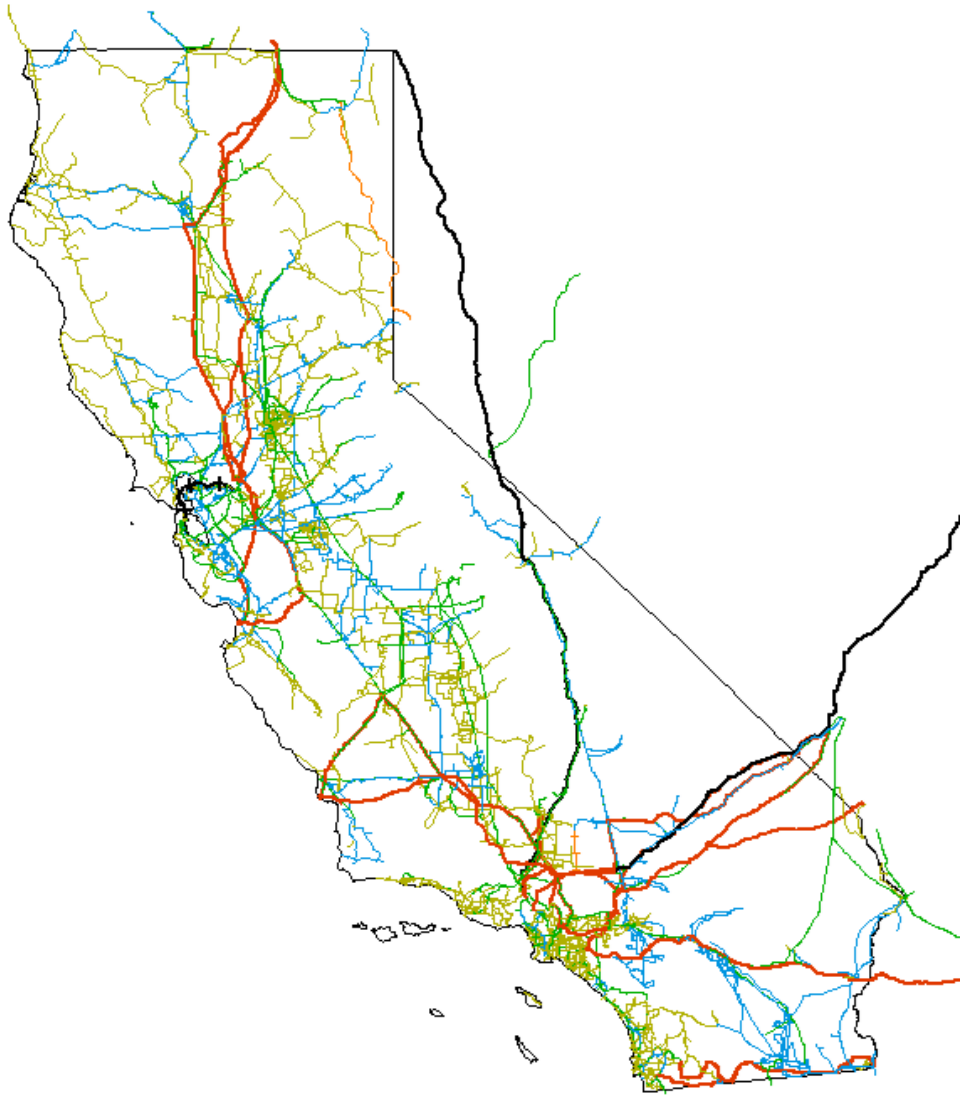
	Summer Mid-day Peak High Renewables (MW)	Summer Mid-day Peak Load Low Renewables (MW)	Summer Evening Peak Load (MW)	Mid-day Minimum Load (MW)	Nighttime Minimum Load (MW)
Draft CELT 2023 90/10 Gross Load Forecast	32,765	32,765	32,765	N/A	N/A
Fixed New England load	N/A	N/A	N/A	11,723	7,503
NE Load Reduction base on Assuming Mills OOS	N/A	N/A	N/A	-25	-25
Non-CELT Manufacturing load in New England	319	319	319	0	0
Available FCA 17 ADCR (modeled as negative load)	-525	-525	-525	0	0
Available draft 2023 CELT EE Forecast for study year (modeled as negative load)	-2,219	-2,219	-2,219	0	0
Available draft 2023 CELT PV Forecast for study year (modeled as negative load)	-8,129	-5,002	-3,251	-11,257	0
Net load modeled in New England (Excludes Station Service)	**22,211**	**25,338**	**27,089**	**441**	**7,478**

Interregional Transmission Needed to Deliver Clean Energy

New England Must Expand Interregional Transfer Capability

Must Increase Intertie Capacity to other Regions to Deliver and Fully Utilize Clean Energy Resources

- Massachusetts Decarbonization Roadmap identified the need for new transmission lines to Canada and New York
  - "…additional high-voltage interstate transmission, is required to reliably operate a cost-effective, ultra-low emissions electricity grid based on variable renewable resources."
  - Need was observed in *all* scenarios examined
- As an example, CAISO's system peak load is roughly 50 GW (which is similar to New England's 2050 projections)
  - The sum of the Total Transfer Capability (TTC) of each individual CAISO intertie is over 44,000 MW
  - New England's existing sum of TTC is merely around 10,000 MW
- The Western Energy Imbalance Market (EIM)
  - Utilizing existing Interregional Transmission Capacity, EIM resulted in nearly $800 million in benefits during first half of 2023



Challenges to Overcome

- Transmission and Distribution System Planning are identifying the electric upgrades necessary to meet the emissions limits outlined in the Clean Energy and Climate Plans
- However, to successfully execute on the significant volume of projects anticipated over the next few decades, each step in the transmission/distribution project development lifecycle should be evaluated for potential efficiency enhancements
    - For example, over the past 10 years it has taken on average 27 months to obtain Energy Facilities Siting Board (EFSB) Decisions
    - Moreover, in recent years this duration has continued to increase, with filings over the past 3 years taking on average 38 months to approve
- MA Executive Order 620 created the Commission on Clean Energy Infrastructure Siting and Permitting
- It is imperative that future Transmission Siting decisions be rendered in **expeditiously and with clear timelines**
- Additionally the EFSB should develop ways to parallel process multiple filings concurrently since the volume of projects will dramatically increase