Creating A Clean, Affordable, Equitable and Resilient Energy Future For the Commonwealth

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES

Grid Modernization Advisory Council

October 12, 2023

DOER
Massachusetts Department of Energy Resources

Agenda

Item	Time
Welcome, Agenda, Roll call	1:00- 1:05
Meeting minutes review and voting	1:05 – 1:10
ESMP Review Period Reminders	1:10 – 1:15
EDC Stakeholder Plan for Technical Sessions	1:15 – 1:25
Continued Day 2 Discussion	1:25 – 1:45
Section 8: 2035-2050 Policy Drivers	1:45 – 2:25
10-minute Break	*2:25 – 2:35*
Section 9: 2035-2050 Solution Set	2:35 – 3:25
Section 11: Gas-Electric Planning	3:25 – 3:57
Close	3:57 – 4:00

Meeting Minutes

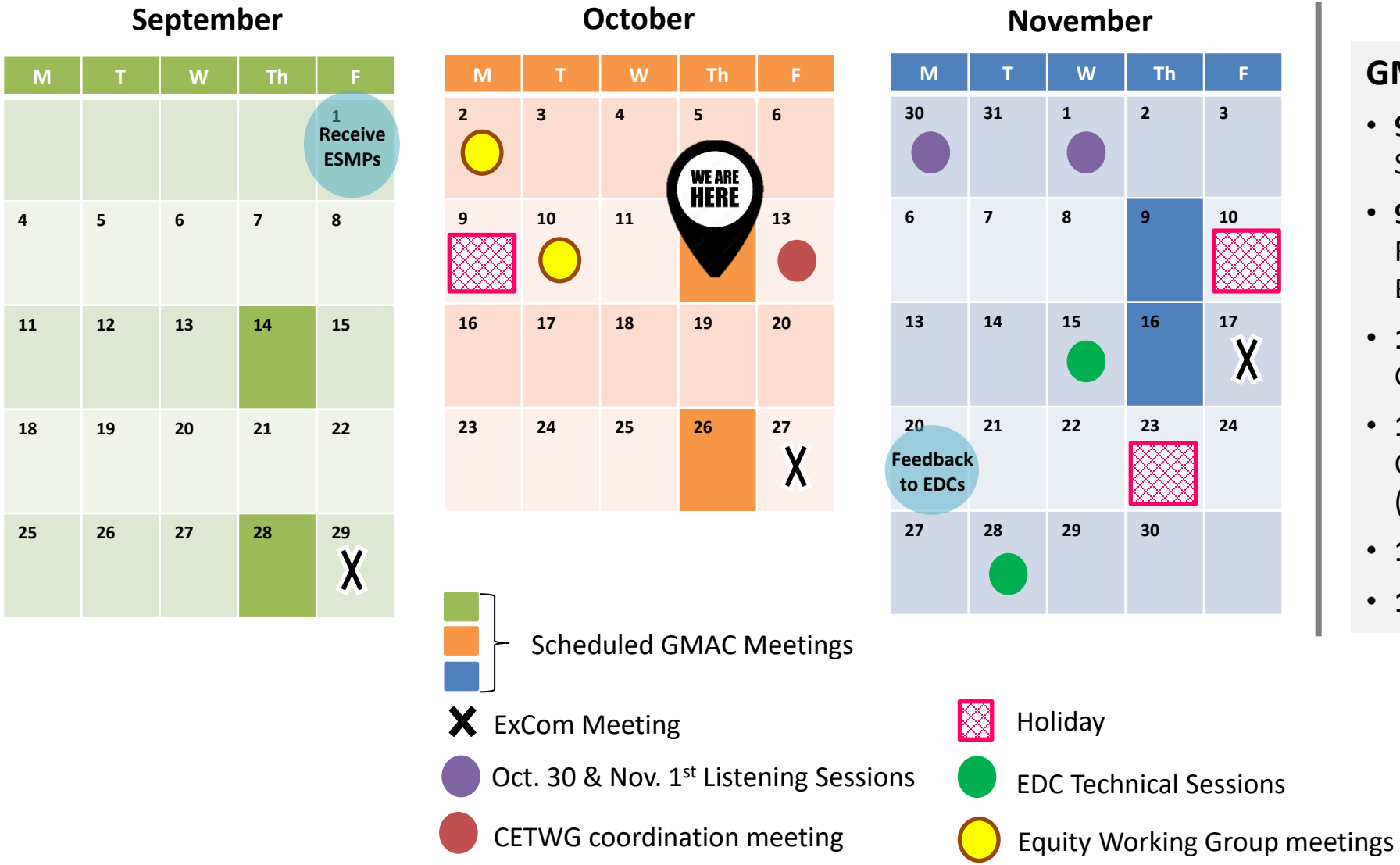
- Calling for vote to finalize:
  - September 28th GMAC minutes
  - September 29th Executive Committee minutes

- *Motion to approve the September 28th minutes [as distributed/as corrected]?*
- *(ExCom Only) Motion to approve the September 29th Excom minutes [as distributed/as corrected]?*

ESMP Review Period Reminders

- **Joint GMAC-CETWG Meeting Tomorrow**
  - GMAC members should have received a Zoom panelist invite for this meeting from the DPU on 10/10
    - Please delete or ignore the calendar hold sent out by DOER
- **Listening Sessions**
  - Two sessions have been scheduled with language interpretation services available on an as-needed basis.
    - Monday 10/30 at 6:00 - 7:30 PM
    - Wednesday 11/1 at 12:00 – 1:30 PM
  - GMAC members have been sent Zoom invitations for these sessions.
  - Consultant will take and circulate minutes.
  - 93 registrants.

Reminder of ESMP Review Timeline



GMAC Meeting Discussion Plan

- **9/14:** Stakeholder Engagement, Current State, 5–10-year forecast (Chapters 3, 4, 5)
- **9/28**: 5–10-year solutions, Reliable & Resilient, Workforce, Economic, & Health Benefits (Chapters 6, 10, 12)
- **10/12**: 2035-2050 Drivers and Solution, Gas-Electric Planning (Chapters 8, 9, 11)
- **10/26**: Executive Summary, Climate Act Compliance, 5-year ESMP, Conclusion (Chapters 1, 2, 7, 13)
- **11/9**: Discuss draft recommendations
- **11/16**: Finalize recommendations

ESMP Review Agendas

October 12th

1:00 – 1:25	Administrative Items
1:25 – 1:45	Continued Day 2 Discussion
1:45 – 2:25	**Section 8:** 2035 - 2050 Policy Drivers
2:25 – 2:35	**BREAK**
2:35 – 3:25	**Section 9:** 2035 - 2050 Solution Set
3:25 – 3:57	**Section 11:** Gas-Electric Planning
3:57 – 4:00	Close

~40 minutes for each Section
- 10 mins consultant
- 30 mins discussion
- Continued Day 2 discussion to include check on findings

October 26th

1:00 – 1:15	Administrative Items
1:15 – 1:55	Discussion of DPU process Continued Day 3 Discussion
1:55 – 2:30	**Section 7:** 5-Year ESMP
2:30 – 2:40	**BREAK**
2:40 – 3:20	**Section 13:** Conclusion & Metrics
3:20 – 3:57	**Section 1 & 2:** Executive Summary & Climate Act Compliance
3:57 – 4:00	Close

~40 minutes for each Section
- 10 mins consultant
- 30 mins discussion
- Continued Day 3 discussion to include check on findings and overall thoughts on ESMPs

November 9th

1:00 – 2:20	Administrative Items • Consultant Update • EWG Recommendations • Draft Rec. Discussion
2:20 – 2:30	**BREAK**
2:30 – 3:30	Draft Recommendations Discussion
3:30 – 3:50	
3:50 – 4:00	Close

- Draft Recommendations Review
- Include discussion time for Equity Working Group recommendations

November 16th

1:00 – 1:20	Administrative Items Consultant Update
1:20 – 2:20	**Final Recommendations:** Sec. 1 - 7
2:20 – 2:30	**BREAK**
2:30 – 3:30	**Final Recommendations:** Sec. 8 - 13
3:30 – 3:50	Final Revisions
3:50 – 4:00	Close

Final Recommendations Vote

ESMP Recommendations Sheet

- An additional column has been added to the aggregated feedback sheets that allows GMAC members to add their support or disagreement to submitted feedback and the EDCs to provide responses.
- See the next slide for an overview of the upcoming sheet due dates.

Grid Modernization Advisory Council ESMP Review Aggregated Recommendations

Feedback Pertaining to Review Meeting #1: September 14, 2023 (Sections 3, 4, and 5). Submitted September 22, 2023

ubmitted in accordance with current GMAC process, reserving the right to add, amend, or withdraw recommendations based on further review and other developments, including but not limited to GMAC review and meetings and other members' recommendations.

Subsection	Page Number	Area of Concern	Issue Area	Guiding Question	Recommendation or Question	Additional Comment	GMAC Member	Date Added	Additional Information Attachments
2	22	Stakeholdering	Stakeholder engagement		What is the purpose and audience for the Technical conference in November?		Sarah Bresolin Silver		
3.1	35	Stakeholder Engagement	Editorial guidelines	1.Does the ESMP section demonstrate equity, including increased transparency and stakeholder engagement in the grid planning process and an equitable distribution of impacts and benefits?	To ensure true equity, Eversource and all the ESMPs must relook at their definitons of equity.	There is a definition of equity provided, which all EDC ESMPs should address directly in their plans. Howveer the provided definition in the Eversource plan does not address issues of equity in terms of the acknowledgment of the issues that have histrorically created a disproporation and negative inpact on certain communities, nor does the defiition address a need to balance decisionmaking power and resources toward a reality where communities are impacting wholly by their own decsions and working with utilties on accountable outcomes. The impacts of discrimination and inequity must be addressed acknowledged first to fairly address them from the point of root causes. This includes the adoption of new policies, practices, attitudes, and cultural messages that affirm race, class, and gender justice.	Marybeth Campbell	9/24/2023	
	63	EJ Customer Mapping	Environmental justice community outreach	1.Does the ESMP section demonstrate equity, including increased transparency and stakeholder engagement in the grid planning process and an equitable distribution of impacts	Each of the utilities has a differing approach to talking about which different stakeholders should be engaged. Can their be uniformity across the sub-sections (e.g. consistently outlining how certain sub-segments will be reached and mapping EJC customers across the territory)? This will make it easier to compare across plans. Eversource maps their EJC customers on page 63.		Kathryn Wright	9/18/2023	

Overall Takeaways | Cleaned Data | Attachments | Raw Data | Review Schedule | Do Not Edit - Data Key

Upcoming Recommendations Sheet Deadlines

Chapters 3, 4, 5

- ✓ Individual GMAC member recommendations sheets in
- ❑ **By 10/13 (tomorrow)**: GMAC member review of compiled sheet and strong agree/disagree & EDC comments. Compiled sheet posted online week of 10/16.

Chapters 6, 10, 12

- ✓ Individual GMAC member recommendations sheets due 10/6. Compiled sheets posted by 10/11 for GMAC member review.
- ❑ **By 10/20:** GMAC member review of compiled 6, 10, 12 sheet and relevant responses. Compiled sheet posted online week of 10/23.

Chapters 8, 9, 11

- ❑ **By 10/20:** Individual GMAC member recommendations 8, 9, 11 sheets due. Compiled and posted online week of 10/23.
- ❑ **By 11/1:** GMAC member review of compiled sheet and relevant responses. Compiled sheet posted online.

Chapters 1, 2, 7, 13

- ❑ **By 11/3:** Individual GMAC member recommendations sheets due. Compiled sheet posted by 11/7.
- ❑ Due to time constraints, a second review of compiled recommendations will not be possible.

October

M	T	W	Th	F
2	3	4	5	6
9 Holiday	10	11	12	13 ★
16	17	18	19	20 ★
23	24	25	26	27

November

M	T	W	Th	F
30	31	1 ★	2	3 ★
6	7	8	9	10 Holiday
13	14	15	16	17
20	21	22	23	24
27	28	29	30	

Other Updates for the GMAC

- Metrics
  - **First set of metrics:**
    - The EDCs provided their proposed stakeholder engagement metrics on 10/5. These are posted on the GMAC website and are provided in an appendix slide to this deck.
    - The Equity Working Group is discussing these metrics and proposing additional metrics as part of their process.
  - **Second set of metrics:**
    - The EDCs plan to provide the rest of their proposed metrics, along with a summary table of all other existing or under evaluation metrics, to the GMAC the week of 10/16.
  - The GMAC will discuss all metrics during our meeting on 10/26.

- The ExCom discussed and agreed that EDCs should respond to questions or make comments, time permitting, during GMAC discussion periods.

EDC Stakeholder Plan for Technical Sessions

- As required by law, the EDCs shall hold technical sessions to inform the public, appropriate state and federal agencies and companies engaged in the development and installation of distributed generation, energy storage, vehicle electrification systems, and building electrification systems.

  - **November 15th**
  - **November 28th**

- **ESMP Stakeholder Technical Sessions & Workshops**

EVERSOURCE nationalgrid Unitil

Overview of Requirements

An Act Driving Clean Energy and Offshore Wind

In developing a plan pursuant to subsection (a), an electric company shall: solicit input, such as planning scenarios and modeling, from the Grid Modernization Advisory Council established in section 92C, respond to information and document requests from said Council and ***conduct technical conferences and a minimum of 2 stakeholder meetings to inform the public, appropriate state and federal agencies, and companies engaged in the development and installation of distributed generation, energy storage, vehicle electrification systems and building electrification systems.***

PURPOSE/GOALS

- Those potentially impacted by this transition deserve to play a role in energy discussions that affect their lives or businesses.
- Everyone should receive fair and equitable access to the benefits of this clean energy transition
- Engaging stakeholders early and often is necessary to maximum participation and meaningful collaboration.
- Educate and familiarize as many on our ESMPs to ensure transparency

PARTICIPANTS

- Community based groups such as Equity and EJC advocates & organizations
- State agencies
- Companies engaged in the development & installation of:
  - DG, energy storage, EV systems, and building electrification systems

DATES

- **November 15**
- **November 28**

Proposed Workshop Overview

- **Participants**: Identify (with review from the GMAC and/or EWG) key groups and organizations to be included in the workshop per the statute. **30 total statewide representatives** to allow for broad range of stakeholders while ensuring meaningful participation
  - Invitations to additional stakeholders (plus open public invitation) to attend the workshops in listen mode and to provide written feedback on the ESMPs
- **Format**:
  - **Professionally designed and facilitated** by Janet Gail Besser & Dr. Jonathan Raab
  - Two separate **4-hour sessions** that build off one another, both with a clear agenda including targeted presentations on key ESMP followed by Q&A and structured feedback.
  - **Hosted on ZOOM platform**
- **Accessibility & Inclusiveness**:
  - **Notice the workshops in-advance** and in high traffic gathering places in communities (input from EWG encouraged)
  - Stakeholder workshop information and meeting materials **posted on company webpages and GMAC webpage**
  - **Simultaneous Language Interpretation** services will be available in multiple languages as required or upon request
  - Both **sessions will be recorded** and posted to company webpages and GMAC webpage
  - Members of the public or stakeholders who attend or watch the workshops will be able to **provide written feedback** to EDCs until 12/04/23.
  - All **recommendations** (from workshop participants as well as members of the public, or additional stakeholders) will be **tracked and a formalized feedback loop** will be developed for increased transparency

Proposed Panelist List (30)

Sector	Panelist Organization	Sector	Panelist Organization
CBO/EJC	EDF	**DG/DER Developers**	New Leaf
CBO/EJC	ARISE, Springfield	**DG/DER Developers**	NECEC
CBO/EJC	Making Opportunity Count (MOC)	**DG/DER Developers**	NextAmp
CBO/EJC	United Way of North Central Mass	**EV Developers/ Fleets**	Tesla
CBO/EJC	EJ Table (Recommend 1)	**EV Developers/ Fleets**	Mass DOT
CBO/EJC	Browning the Green Space	**C&I/Large Energy Users**	Mass General Hospital
Workforce/Labor	IBEW	**C&I/Large Energy Users**	MA Business Roundtable
Workforce/Labor	North Central MA Chamber of Commerce	**C&I/Large Energy Users**	Fitchburg State
Workforce/Labor	Franklin Cummings Tech	**C&I/Large Energy Users**	Lowell General Hospital
Workforce/Labor	Umass Lowell	**C&I/Large Energy Users**	Gillette Stadium
Muni	MA Municipal Association	**Housing/Building/ Business**	WMA Economic Development Council
Muni	MA Mayor's Association	**Housing/Building/ Business**	Fitchburg Housing Authority
Affordability	NCLC	**Housing/Building/ Business**	A Better City
Affordability	Mass Housing	**Housing/Building/ Business**	Lupoli Companies
State/Quasi State Agencies	Mass Development	**State/Quasi State Agencies**	Mass Life Sciences
State/Quasi State Agencies	MA Economic Development		

**Invitations to additional stakeholders to attend the workshops to listen, learn, and to provide written feedback on the ESMPs include but are not limited to:

- **Regulatory Assistance Project**
- **Clean Water Action**
- **Union of Concerned Scientists**
- **Mass Climate Action Network**
- **CLF**
- **ELM**
- **ACE**
- **GreenRoots**
- **Neighbor2Neighbor**
- **Groundwork Lawrence**
- **Slingshot**
- **Berkshire Environmental Action Team**
- **CAP Agencies**
- **AIM**
- **Hospitals**
- **Municipal & Elected Officials**
- **Trade Associations**
- **Unions**
- **Academic Institutions**
- **Real Estate Developers**
- **GMAC Members**

Questions?

EVERSOURCE nationalgrid Unitil

Continued Day 2 Discussion

Recommendations Section 6: 5- and 10- Year Solutions

Recommendation	Consultant	GMAC
The presented solutions should be accompanied by metrics, with baselines and targets, such as: • System-wide DER hosting capacity increases in MW • System-wide capacity increases in MW • System-wide reliability/resilience improvements (interruption & duration, with & without major events)	√	
The ESMPs should consider alternative solutions to EDC capital spending.	√	
The ESMPs should include stakeholder participation in investment plan development for future ESMPs, not merely evaluate plans.	√	
The EDCs should standardize approaches to developing ESMP components among utilities, such as benefit projections, revenue requirement (customer cost) projections, assigning value to risk reductions, assigning value to GHG reductions, establishing acceptable levels of risk to tolerate, etc.	√	
The EDCs should coordinate electric grid planning with gas grid planning (Section 11).	√	

Recommendations Section 6: 5- and 10- Year Solutions

Recommendation	Consultant	GMAC
The EDCs should clarify whether state decarbonization goals are accounted for and in what proportion in each EDC territory.		√
The ESMPs should include implied transmission level costs associated with distribution level investments		√
Comparisons between business-as-usual operating and capital costs vs. incremental costs should be added by the ESMPs throughout		√
The ESMPs should explicitly discuss energy efficiency and distributed generation to alleviate grid issues.		√
The EDCs should identify expected timeline for implementing and potential cost range Grid Compensation Fund		√
The ESMPs should map solutions more closely to projections and forecasts (from Section 5) to show how they can help reduce capital investment or increase DER adoption.		√
The ESMPs should integrate and describe how planning will evolve based on climate impacts		√

Recommendations Section 6: 5- and 10- Year Solutions

Recommendation	Consultant	GMAC
The ESMPs should explicitly discuss rate design and rate reform (i.e., differentiated rates for different customers).		√
The ESMPS should map out how to manage peak demand through non-wires alternative solutions.		√
The ESMPs should clarify how stakeholder engagement and community feedback will occur for all solutions presented.		√
Differentiate between distribution system upgrades and transmission system upgrades and share timelines and cost estimates		√

Recommendations Section 10: Reliable and Resilient Distribution System

Recommendation	Consultant	GMAC
The EDCs should estimate the (reliability) risk reduction value of solutions in dollars, enabling comparisons to costs (and to other competing Solutions). This can be applied to other types of risk (DER interconnection delay, EV charger delay, heat pump delay, etc.). • Risk reduction value ($) = reduction in adverse event likelihood (%) X consequence of adverse event ($)	√	
The EDCs should consider developing processes to help make difficult solution prioritization, selection, and deferral decisions.	√	
The ESMPs should have clearer details about climate impact measures LDCs will take.		√
The EDCs should incorporate local and regional modeling of heat islands into the plans.		√
National Grid and Unitil should make climate vulnerability assessments public.		√

Recommendations Section 10: Reliable and Resilient Distribution System

Recommendation	Consultant	GMAC
The EDCs should justify proposed investments with some type of quantification (such as benefit/cost ratio) for common actions across the plans.		√
The ESMPs should include the expected timelines for completing relevant frameworks and assessments.		√
The EDCs should standardize climate change risk and planning tools, as well as forecasting windows and parameters.		√
The EDCs should clarify the timeline for the climate vulnerability assessment framework.		√
The ESMPs should include how resilience priorities and the cost estimates of resilience investments		√

Recommendations Section 12: Workforce, Economic & Health Benefits

Recommendation	Consultant	GMAC
The EDCs should specifically present the incremental impacts of their proposals on workforce, jobs, GHG emissions, and health. This requires presenting one scenario with grid mod and one without.	√	√
Workforce benefits should be better integrated with economic analysis.	√	
The analysis of economic benefits should be a net analysis that accounts for rate impacts and job losses.	√	
The ESMPs should have additional detail and rigor regarding greenhouse gas emissions reduction benefits, showing incremental impacts of grid modernization and quantitatively how such investments help the EDCs meet the state's greenhouse gas emissions reduction targets.	√	√
The ESMPs should include metrics related to the training programs, ideally aligned with those produced by the Equity Working Group.		√

Recommendations Section 12: Workforce, Economic & Health Benefits

Recommendation	Consultant	GMAC
Identify specific strategies to address the lack of diversity in the energy sector.		√
Specify which types of jobs are expected to grow because of the ESMP, as well as what existing workers will be supported to transition to new jobs.		√
Establish a unified approach to a statewide workforce plan.		√
Include a workforce organization chart in the ESMP.		√
Leverage existing resources and infrastructure to integrate clean tech education, curriculum, and opportunities.		√

ESMP Section 8

2035 - 2050 Policy Drivers:

Electric Demand Assessment

Outline of Section 8

8.0 2035 - 2050 Policy Drivers: Electric Demand Assessment

- 8.1 Review of Assumptions and Comparisons across EDCs
- 8.2 Buildings: Heating electrification and energy efficiency assumptions and forecasts
  - 8.2.1 Technology assumptions
  - 8.2.2 Adoption propensity assumptions
  - 8.2.3 Building code assumptions
  - 8.2.4 Demand response scenarios – impacts on heating demand
- 8.3 Transport: Electric vehicle assumptions and forecasts
  - 8.3.1 Technology assumptions
  - 8.3.2 Adoption propensity assumptions
  - 8.3.3 Mileage, and time of day assumptions
  - 8.3.4 Managed charging scenarios – impacts on EV demand
- 8.4 DER: PV/ESS – State incentive driven assumptions and forecasts
  - 8.4.1 Technology assumptions
  - 8.4.2 Adoption propensity assumptions
  - 8.4.3 Time of day assumptions
- 8.5 Offshore wind forecasts (procurement mandates, GIA status, POIs)
- 8.6 Currently projected clean energy resource mix

Summary - Overview

- The ESMPs state that the forecasts “align” with the MA CECP and 2050 Roadmap’
- Generally, EDCs base assumptions on the “All Options” Pathway in 2050 Roadmap.
  - This is the “benchmark compliant,” least-cost decarbonization pathway, using midpoint assumptions across most technical parameters.
  - But they rely upon different scenarios for different technologies.
- All EDCs forecast significant peak growth:
  - Unitil projects a 263% increase in peak load between 2035-2050 (Unitil ESMP, pp. 62, 120)
  - National Grid estimates their load will more than double by 2050 (N. Grid ESMP, p. 326)
  - Eversource projects a 150% increase in peak demand by 2050 (Eversource ESMP, p. 398)
- All EDCs forecast winter morning peak to begin in the middle to late 2030s.
- The ESMP’s state that the forecasts are consistent with the short-term forecasts (presented in Section 5), with additional scenarios to account for increased uncertainty and greater reliance on policy objectives to determine future load.

Summary – Contributors to Load Growth

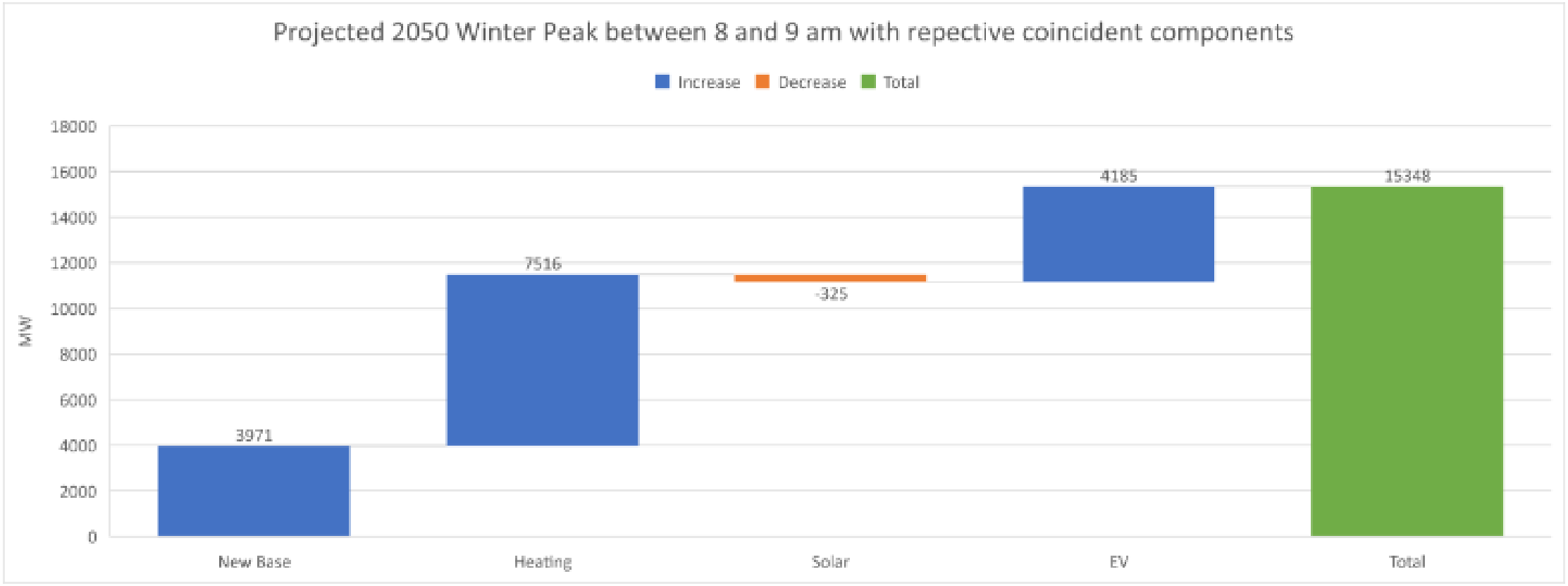


Figure 185: The 2050 Coincident Peak with Components

Source: Eversource ESMP p. 399

Summary – Solar Capacity Relative to Hosting Capacity

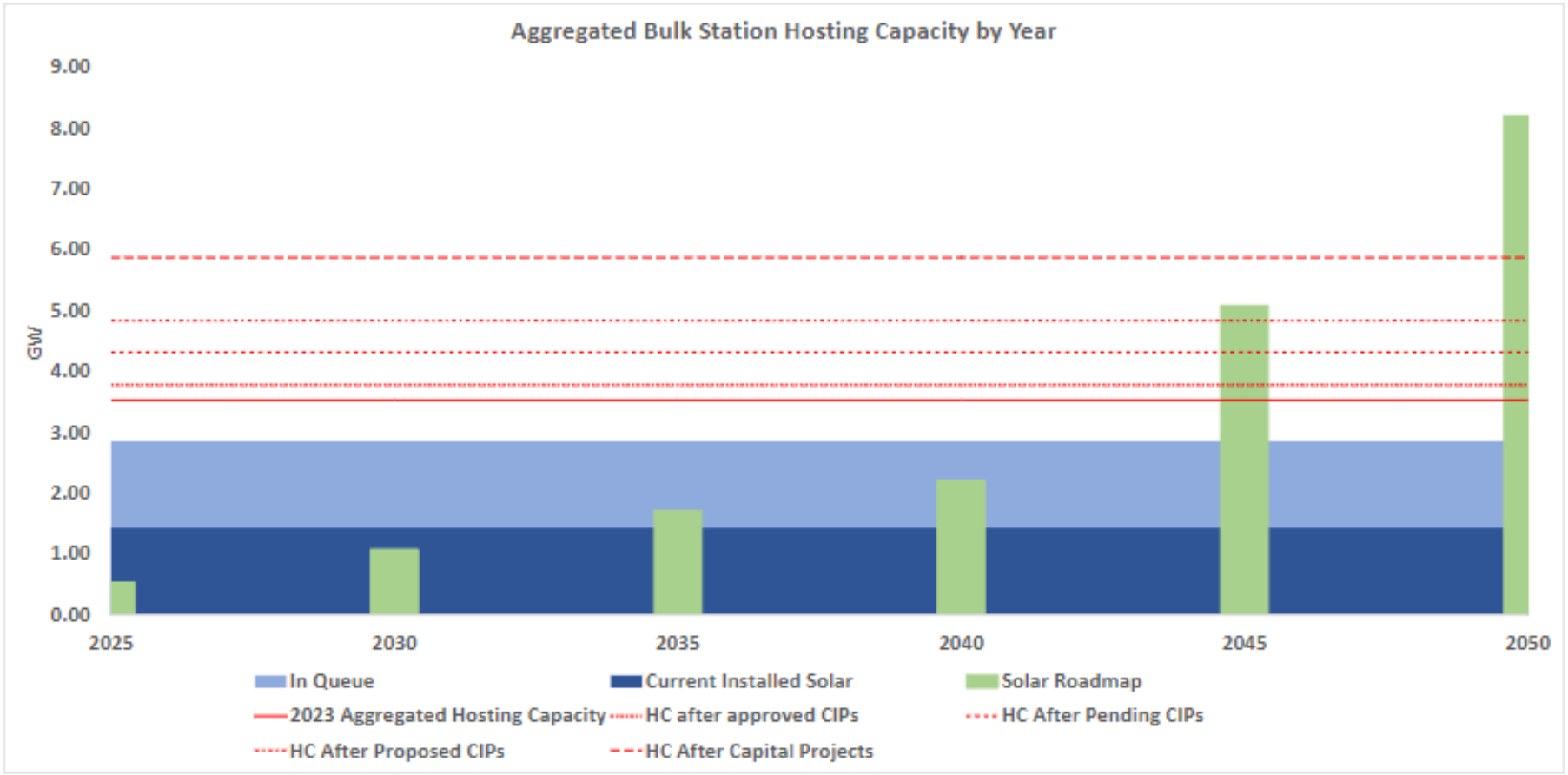
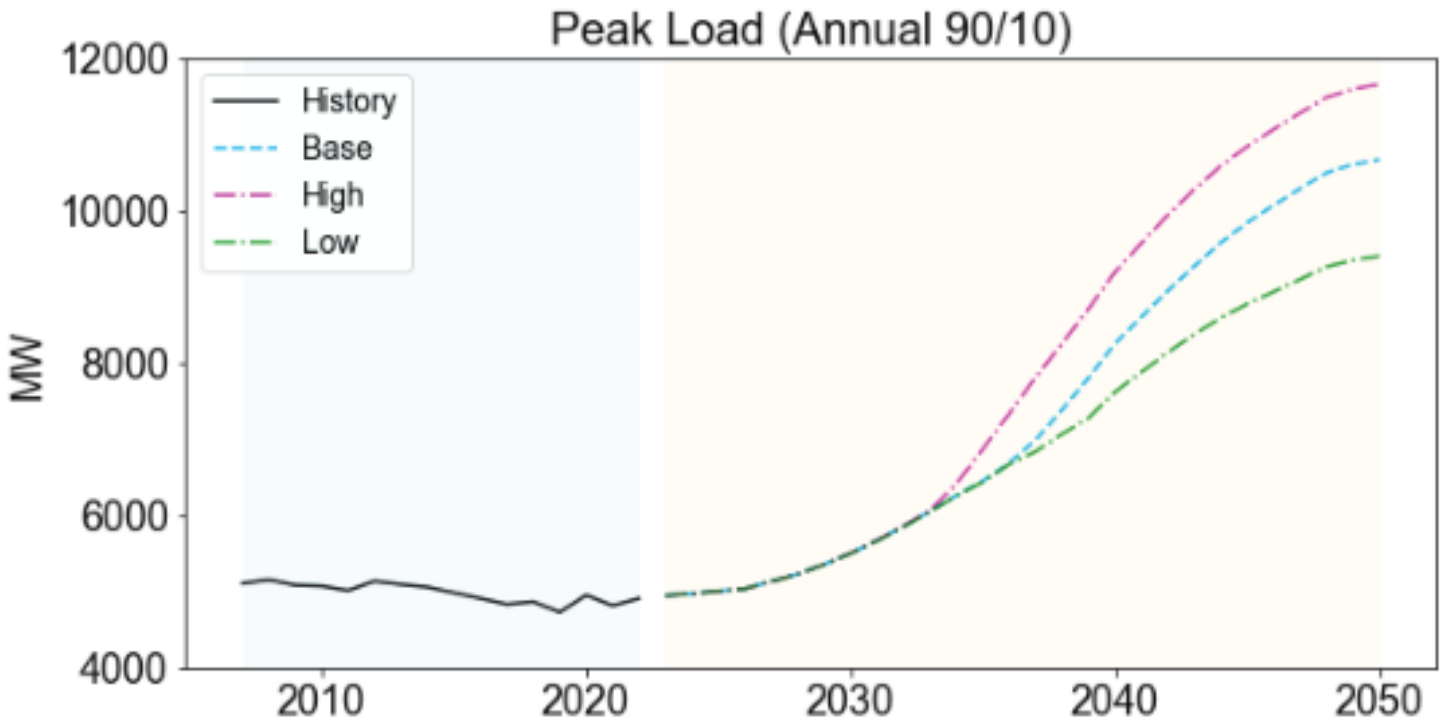


Figure 220: Projected Solar in Eversource MA Territory Driven by State Objectives

Source: Eversource ESMP p. 447

Summary – Impacts of Heat Pumps on Loads

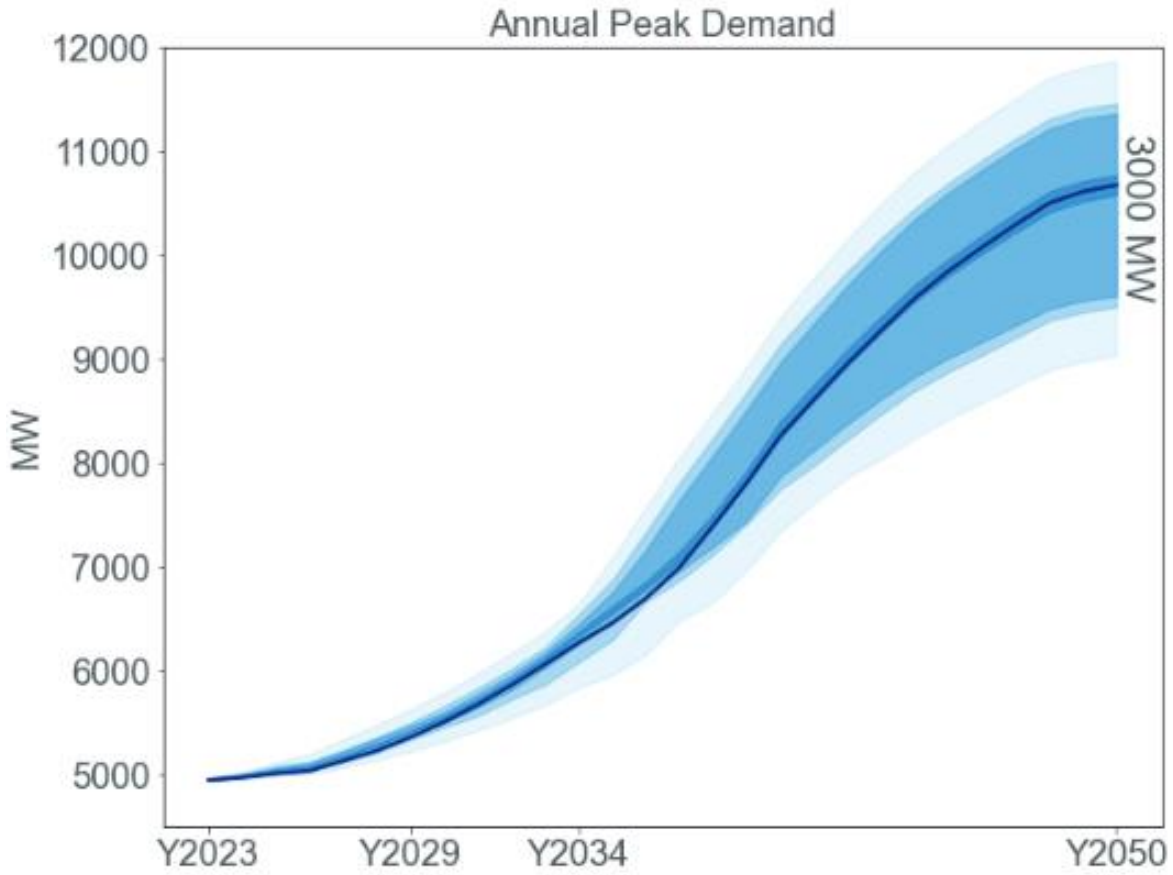
Exhibit 8.4: Estimated Peak Demand by Heat Pump Adoption Scenario



Source: National Grid ESMP p. 329

Summary – Sensitivities to Load Forecasts

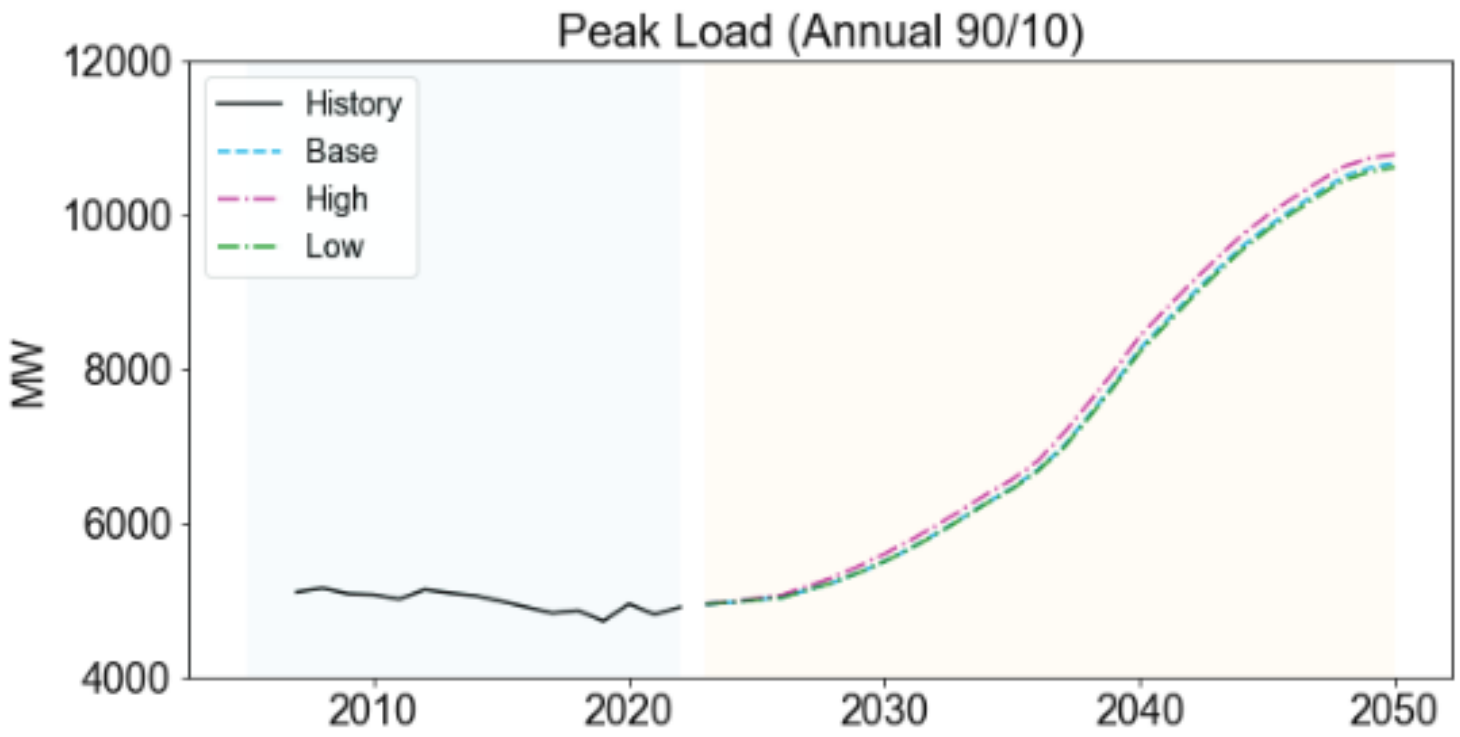
Exhibit 8.2: Winter Peak Load Forecast



Source: National Grid ESMP p. 327

Summary – Impacts of EVs on Loads

Exhibit 8.8: Estimated Peak Demand by EV Adoption Scenario



Source: National Grid ESMP p. 334

Summary – Multiple Drivers of Loads

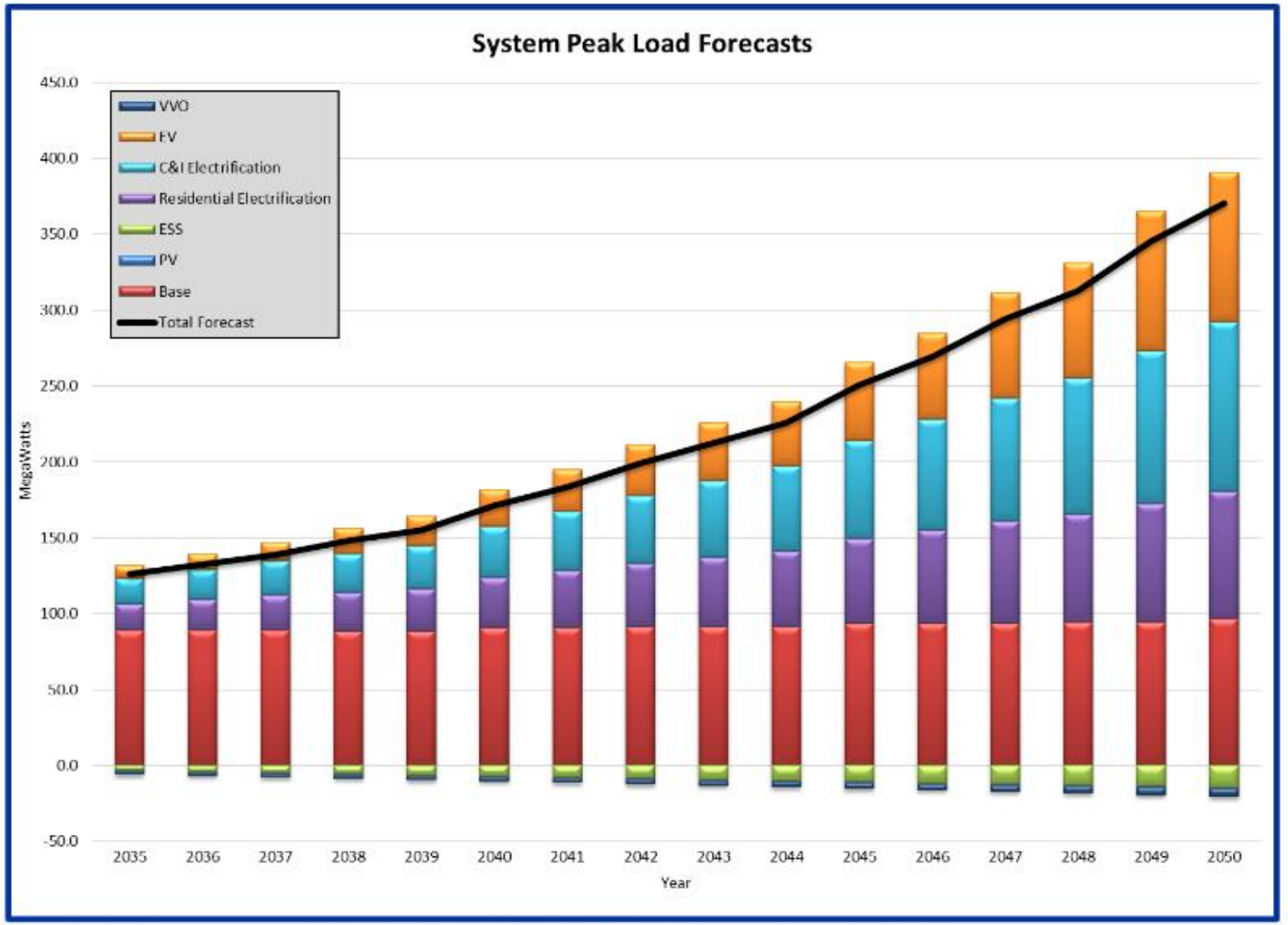


Figure 18 – Ten Year System Peak Load Forecast

Source: Unitil ESMP p. 119

Summary – Scaling from State Benchmarks

Sector	Description	State Benchmark	Units	Scaled Benchmark	Units	Company Forecast	Units
Transportation Sector (Note 2)							
	Light-Duty EV	5,000,000		46,976	vehicles	52,841	vehicles
	Medium/Heavy Duty EV	353,000		3,316	vehicles		
Building Sector (Note 2)							
	Residential air source heat pumps	2,000,000		18,790	heat pumps	21,201	heat pumps
	Residential Ground source heat pumps	195,000		1,832	heat pumps		
	Residential EE Retrofits	1,300,000		12,214	homes	0	
	Commercial air source heat pumps	1,500,000,000		14,092,698	sq. ft.	Note 3	
	Commercial ground source heat pumps	140,000,000		1,315,319	sq. ft.	Note 3	
Power Sector (Note 2)							
	Offshore Wind	23.0	GW	216	MW		
	Onshore Wind	1.0	GW	9	MW		
	Solar	27.0	GW	254	MW	254	MW
	Storage	5.8	GW	54	MW	60	MW

Note 1 Massachusetts Census Data 2020
https://malegislature.gov/Redistricting/MassachusettsCensusData/CityTown
Note 2 2050 Clean Energy and Climate Plan, Table 3-3
https://www.mass.gov/doc/2050-clean-energy-and-climate-plan/download
Note 3 Company forecasts are based on peak gas usage of gas C&I customers

Source: Unitil ESMP p. 118

Table 39 - Demand Assessment Assumption Comparison[30]

General Reactions

- There is a lack of standardization and transparency concerning which CECP/Roadmap scenarios are assumed and how these translate into specific forecast parameters.
  - This is true for both the technology adoption assumptions and the ultimate forecasts.
  - Different scenarios are applied to different technologies, without sufficient explanation for why.
- The ESMPs are not clear on whether (a) their assumptions were taken from the CECP/Roadmap assumptions or (b) whether their results were benchmarked to the CECP/Roadmap results.
- The ESMPs do not clearly explain how the long-term forecasts relate to grid mod investments in the near term, or to investment planning over the longer term.
- The inclusion of sensitivities by National Grid and Eversource is helpful.
  - But the sensitivities are not consistent across utilities and are not transparent.
- The long-term demand forecasts in Chapter 8 are not clearly aligned with the 10-year forecasts in Chapter 5. In terms of either the methods or the results.
  - Unitil's 10-year and long-term forecasting methods appear consistent.

Reactions: Relationship between 10-year and long-term forecasts

The 10-year forecast in Chapter 5 is not well integrated with the long-term forecasts in Chapter 8.

- The 10-year forecast should terminate where the long-term forecast begins – otherwise, there is an unexplained discontinuity between the forecasts.
- The treatment of uncertainty and use of scenarios/sensitivities should be consistent for both the 10-year forecast and the long-term forecasts.
- The 10-year forecasts appear to be more bottom up and based upon current EDC grid and customer conditions. Nonetheless even short-term projections should align with policy directives and with the CECP/Roadmap.
- Better integration of short-term and long-term forecasts would clarify the critical relationship between long-term forecasts and grid mod investment planning.
- There is no reason for the load forecasts to be presented in two separate chapters; Chapter 5 and Chapter 8 should be combined and better integrated.

Comparison of assumptions across EDCs and DERs

Utility	Eversource		National Grid		Unitil	
Assumptions	**Sources**	**Scenarios**	**Sources**	**Scenarios**	**Sources**	**Scenarios**
Buildings	2050 Roadmap, Future of Gas	(2050 Roadmap) All Options, Targeted Electrification, Networked Geothermal	2050 Roadmap, Future of Gas, CECP	(from CECP) Phased, Full Electrification, Hybrid	Not provided	Data on current customers
EVS	2050 Roadmap, Future of Gas	High electrification	Cal ACC II Rule and Advanced Clean Truck Rule w/ alignment (adoption), NHSTA data (adoption), ISO-NE study (temporal charging patterns)	Base and high scenarios	2050 Roadmap, ISO-NE EV Adoption Forecasts & EV Stock	(2050 Roadmap) All Options
EE	Assume historic trends					
DR	none	none	not provided	not provided	none	none
PV	Assume no impact on peak demand because peak occurs on winter mornings					
Other DERs	2050 Roadmap	All Options	2050 Roadmap	All Options	2050 Roadmap	All Options

Reactions: Energy Mix/Wind

- This section is light on detail across all utilities
- Eversource and National Grid acknowledge wind will play a big role, but don't consider in forecasts or discuss relevant assumptions
- Unitil doesn't factor in wind for forecasts or anticipate that it will be relevant for the Company in the future.

Recommendations

- The ESMPs should better integrate their 10-year and long-term forecasts.
  - The long-term load forecasts, while important, are less important than the short-term forecasts regarding how they drive grid mod investments.
- The ESMPs should clearly articulate how the long-term load forecasts affect the need for grid mod investments over the short- and long-term.
- The ESMPs should provide greater standardization across the demand assessments.
  - Including which 2050 Roadmap scenario the EDCs adopt for their demand assessments and why.
  - Including how the scenario details are translated into modeling parameters.
- The ESMPs should provide more robust sensitivity analysis.
  - Including more transparency on how they are designed.
- The ESMPs should evaluate scenarios with more ambitious energy efficiency, demand response, and energy storage assumptions to mitigate load growth.

Break

Please be ready to start again in ~10 minutes

After the break…

- *Section 9: 2035-2050 Solution Set*
- *Section 11: Gas-Electric Planning*
- *Close and Next Steps*

Section 9

2035 – 2050 Solution Set

Preview of Section 9 Discussion

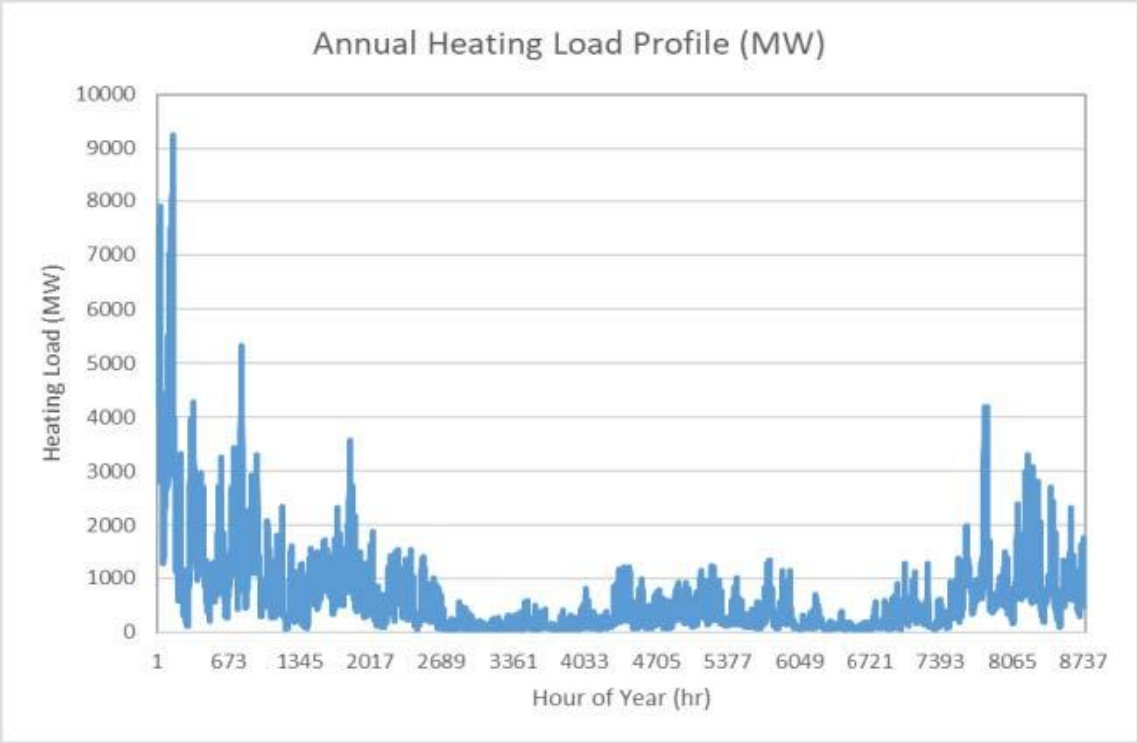
- Summary of ESMP Section 9's common to all EDCs
- Top observations, reactions, and concerns on common Issues
- Summary of Eversource-specific ESMP Section 9 issues and reactions
- Recommendations

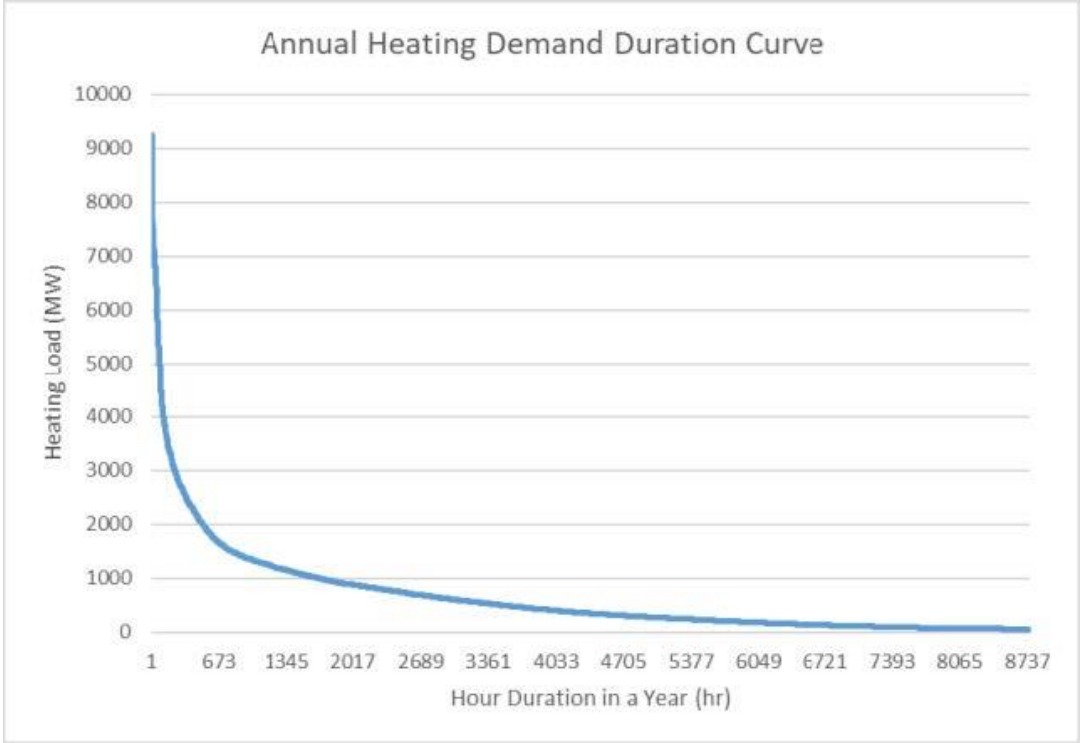
Summary of Section 9s Common to All EDC ESMPs

- Continued increase in demand from EV and HP requires continued capacity construction in all subregions as peaks transition from summer to winter
- Increased focus on managing peak demand (relative to Section 6)*
  - Rate designs (Introducing demand charges to residential rates; time-of-use rates with a critical peak pricing feature)
  - Customer Programs (like demand response)
  - Managed EV and storage charging and discharging
  - Electric heating options (hybrid fossil-fueled for coldest days; GSHP vs. ASHP)
- Additional discussion on non-wire alternatives (exclusively storage, only as a temporary solution, generally EDC-owned)
- References to outreach and programs for EJ & low- to moderate-income (LMI) customers (but no specifics)

* If appropriate 2035-2050, why not 2025-2034?

Reaction: ASHP Drives Extreme Winter Peaks, Capacity Construction





The top 2% of electric heat demand hours in a year (175 hours) appear responsible for 50% of the increase in system peak (and associated capacity construction costs)

(Eversource ESMP, page 406)

Reaction: Electric Heating Choices will Drive Peak Demand Growth

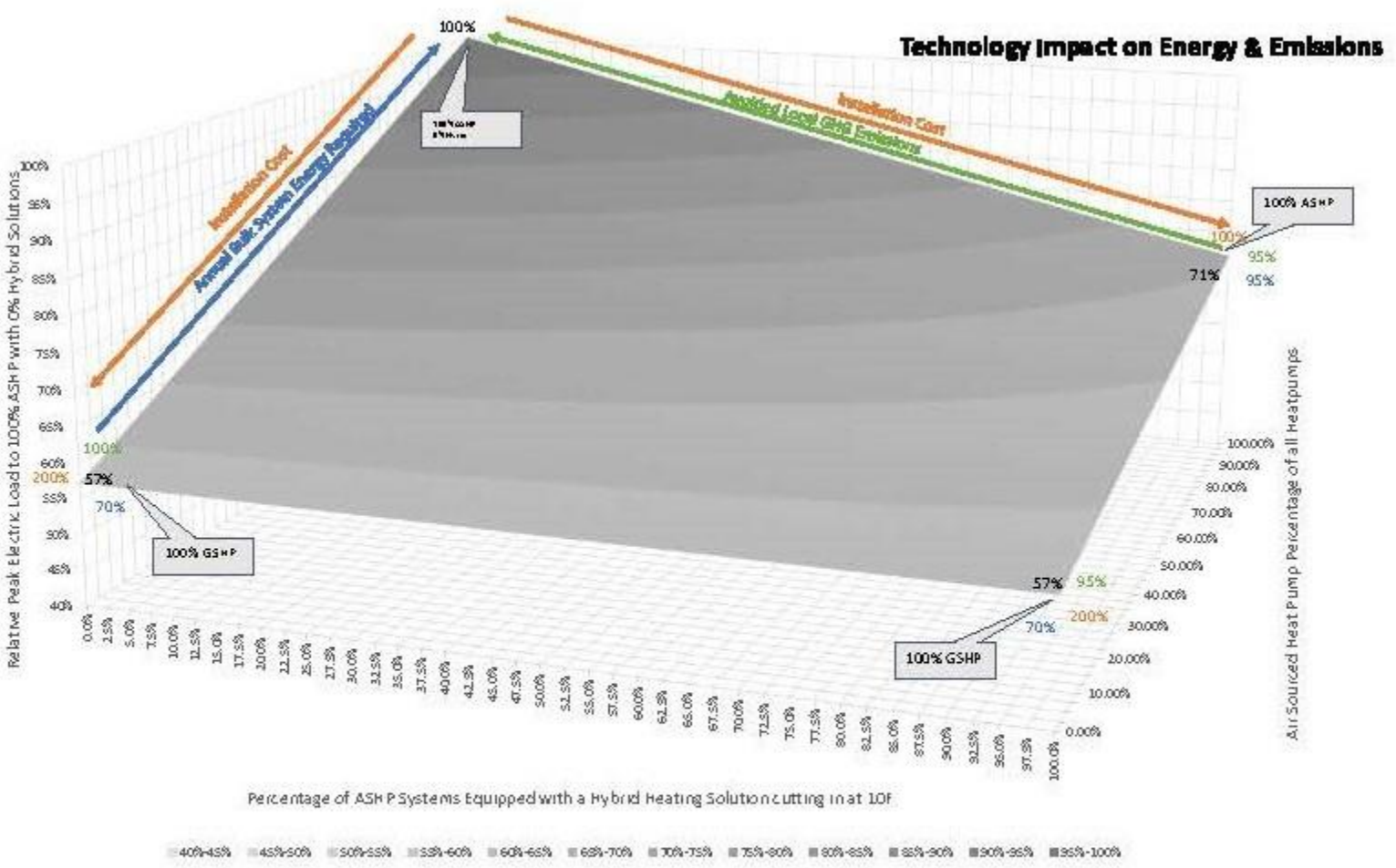


Figure 197: Technology assumptions impact on system peak demand, local GHG reductions, bulk system energy need, and upfront installation cost of the heating solution

- Capacity needed for GSHP is just 57% of that needed for ASHP.
- Capacity needed for hybrid ASHP/fossil fuel heat systems is just 71% of that needed for ASHP.
- Hybrid ASHP/fossil fuel heat systems deliver 95% of GHG reductions available from ASHP.
- GSHP and hybrid cost much more to install than ASHP

How do we balance grid capacity costs vs. heating system costs?

(Eversource ESMP, p. 415)

Reaction: Reducing Demand through Demand Charges Will be Difficult

- Introducing Demand (kW) Charges to Residential Rates*
- Current Res Format: (Fixed Monthly Service Fee, $7) + (Energy Charge, about 46¢/KWh, x kWh used)
- Demand Format: (Fixed Monthly Service Fee) + (Demand Charge, $12.50/kW, x kW) + (Energy Charge, 28¢/kWh, x kWh)
- Pro: Increases the attractiveness of storage and GSHP (however, both are costly and unavailable to many, especially EJC/LMI customers)
- Con 1: Reduces the attractiveness of energy efficiency and PV solar for residential customers
- Con 2: Demand charges are difficult for EJC/LMI customers to manage down, particularly with electric heat

* Eversource proposes; Unitil hints at; National Grid's position not discernable

Reaction: Managing Demand through TOU Rates Will be Difficult

- Time-of-Use rates without a critical peak pricing component will have little effect on peaks.
- Time-of-Use rates with critical peak pricing are much more effective, but highly problematic.
  - CPP charges an extremely high price for a limited number of events (12?) and hours (12 per event?) per year.
  - Customers are notified of CPP events one day ahead (text, robo call, e-mail, mass media, social media, etc.).
  - CPP is seen as a penalty and extremely unpopular; most customers will simply shop for a rate without a CPP.*
  - EJC/LMI customers, especially those with electric heat, will be least able to reduce demand during CPP events.
- Peak-Time Rebate programs are an attractive alternative to Time-of-Use rates with CPP.
  - Peak-time rebates are incentives to reduce demand, rather than penalties for failing to reduce demand (like CPP).
  - Can be offered by EDC regardless of electricity supplier, and does not require switching to a specific rate design.

* EJC/LMI customers with poor credit are least able to get good rates through shopping

Reaction: EDC Plans Favor Capacity Construction Over Demand Reduction

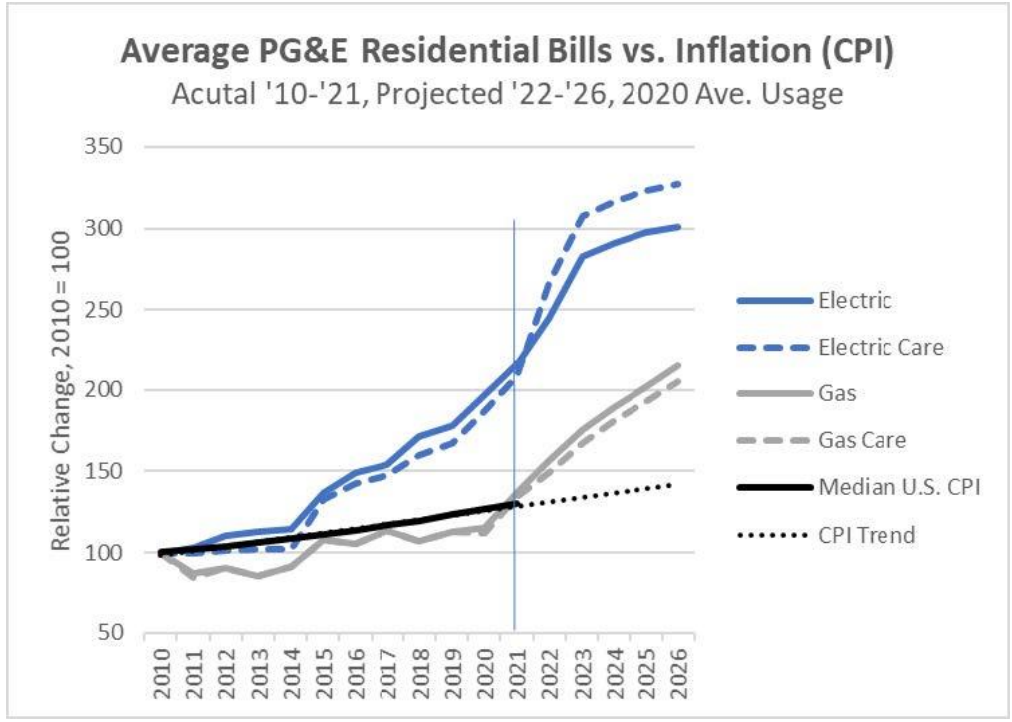
- Types of demand reduction programs mentioned (in addition to rate designs):
  - Demand response programs (paying customers to reduce demand when called upon)
  - Managed EV charging programs
  - Management of customer-owned battery charging and discharging
- Demand reduction is generally less costly than capacity construction.
- The demand reduction program impacts included in forecasts may be too low, leading to capacity construction plans that may be earlier and more significant than necessary.
- There is no reason to wait until 2035 to pilot, and begin implementing, demand reduction programs.

Reaction: Non-Wire Alternative Roles/Processes/Benefits Are Ill-defined

- EDCs continue to describe NWA as temporary options to defer capacity construction rather than permanent solutions to avoid new capacity construction entirely.
- EDCs continue to describe NWA as EDC-owned.
- EDCs define NWA as “big storage” at substations (or co-located with large DER).
- The tension/competition between NWA as a system-wide capacity resource (ISONE) and NWA as a local distribution capacity resource (EDC) is clear.
- In our experience, storage is not less costly than capacity construction (yet!)
- In our experience, EDC ownership is more costly than third-party service agreements.

Reaction: EJC/LMI Outreach & Programs Are Not an Affordability Silver Bullet

- The value of financial assistance programs can be limited. In a California study, of millions of energy bills sent in one year to 1.7 million families at the federal poverty level, LIHEAP covered just 277,000.[1]
- The value of low-income rates can be transitory. Our research in California indicates low-income rates typically rise just as much over time as standard rates.[2]
- High energy costs reduce employment. A survey of eight studies on the impact of electric rates on jobs indicates that for every 1% increase in electricity rates, total employment fell from 4.5 to 363 jobs per 100,000.[3]
- Given ASHP sensitivity to extreme cold, weatherization of EJC/LMI housing stock is critical to Affordability.



1) California 2021 Home Energy Affordability Gap Fact Sheet. Fisher Sheehan & Colton. Available via internet at www.homeenergyafordabilitygap.com/03a_affodabilityData.html.
2) California PUC A.21-06-021. Testimony of Paul Alvarez and Dennis Stephens dated June 10, 2022. Page 13.
3) Metcalf GE. *The Relationship Between Electricity Prices and Jobs in Missouri*. Tufts University. February 27, 2013. Exhibit 1.

Reactions: Eversource Section 9 Comments, Part 1

Eversource Section 9 Comment (paraphrased)	Consultant Reaction
"Given long lead times . . . we must plan, develop, and build far in advance of need" (p. 463).	Plan in advance? Of course. Develop in advance? Some (e.g., buy property to preserve construction options). Build in advance? No. Wait until forecasted need for capacity indicates an appropriate time for proceeding with construction.
"Electrifying Boston steam plant boilers (served by transmission grid) will provide distribution capacity headroom" (p. 455).	These are likely multi-hundred-million-dollar projects. Alternatives should developed and evaluated on technical, economic, risk, and operational measures, and compared to Eversource proposals to make informed decisions.
"A new underground substation in Cambridge is the long-term solution to reliability and capacity issues" (p. 312-313).	
"Demand response for heat pumps is not effective" (p. 457).	ASHP response may not be as great as AC, but the amount to be expected needs study. Also, customers may have both ASHP *and storage* (which they can use to respond).
"C&I customers do not respond to demand response events in winter" (p. 457-458).	Based on a single winter event. C&I customers/DR aggregators have a decade of experience responding to peak events in summer. With time and experience, response to winter events will improve.

Reactions: Eversource Section 9 Comments, Part 2

Eversource Section 9 Comment (paraphrased)	Consultant Reaction
"Solar is of little help in managing demand" (p. 199-201).	Solar can reduce demand when paired with storage.
"Solar owners/developers have insufficient incentive to install storage" (p. 472).	Some incentive exists today (interconnection costs increase with DER capacity), and more can be appropriately added. We endorse replacing CIP cost allocation with ongoing distribution fees for exporting DER.
"NWA can defer, but never replace, a traditional project" (p. 473).	Available alternatives include demand response, GSHP, hybrid ASHP-fossil for coldest days, rate design, managed EV/storage charging/discharging, third-party-owned storage, etc.
"An NWA owned by a third party could change hands, or the third party could go bankrupt" (p. 474).	A right of first refusal (to match a potential purchaser's bona fide offer) could be added to a service contract between an EDC and a third-party NWA owner to address these issues.
"The DPU cannot regulate third-party NWA performance and cost" (p. 474).	EDCs are responsible for contractor performance and cost, and the DPU regulates the EDCs. Thus, DPU should count on EDCs to manage third parties, and need not regulate third parties directly. Further, prudence dictates that an NWA that is less costly for customers and meets requirements must be adopted by an EDC.

All Section 6 & 10 Recommendations Are Reinforced by Section 9s

- Consider requiring that ESMPs:
- Include metrics, with baselines and targets, for the intended outcomes of ESMP Solutions.
- Include evaluations of alternatives to EDC-proposed capital spending Solutions.
- Be developed with stakeholder participation from the outset.
- Employ standardized approaches to evaluating proposed Solutions (such as benefit estimates).*
- Provide evidence of co-ordination with gas grid planning (Section 11).
- Estimate the (reliability) risk reduction value of proposed Solutions in dollars, thereby enabling comparisons to costs (and to other Solutions competing for available funding).
- Employ standardized processes for making difficult Solution prioritization, selection, and deferral decisions when faced with constraints.

(Please note that these recommendations have been slightly reworded from the September 28 presentation to constitute ESMP recommendations rather than recommendations to the GMAC)

* Woolf and Schwartz et al. *Benefit-Cost Analysis for Utility-Facing Grid Modernization Investments*. U.S. DOE Report. February 2021.

Section 9 ESMP Recommendations (Part 1)

The ESMPs should:

- Specify Mass Save/electric heating programs that will reduce demand on coldest days.
  - Provide incentives that favor GSHP/district GSHP over ASHP wherever more cost-effective in long term.
  - Provide incentives that favor fossil-fueled supplement/hybrid ASHP over pure ASHP.
- Avoid residential demand charges, particularly for EJC/LMI customers. At a minimum, careful study and appropriate EJC/LMI accommodations are required.
- Include plans for peak-time rebate programs available to all residential distribution grid customers (with a smart meter) regardless of energy supplier.
- Avoid EDC administration of customer programs intended to manage demand.
- To the extent EDC administration of demand management programs is permitted, Include plans for piloting and implementing such programs well in advance of 2035.
- Include more significant impacts from demand reduction programs as appropriate.

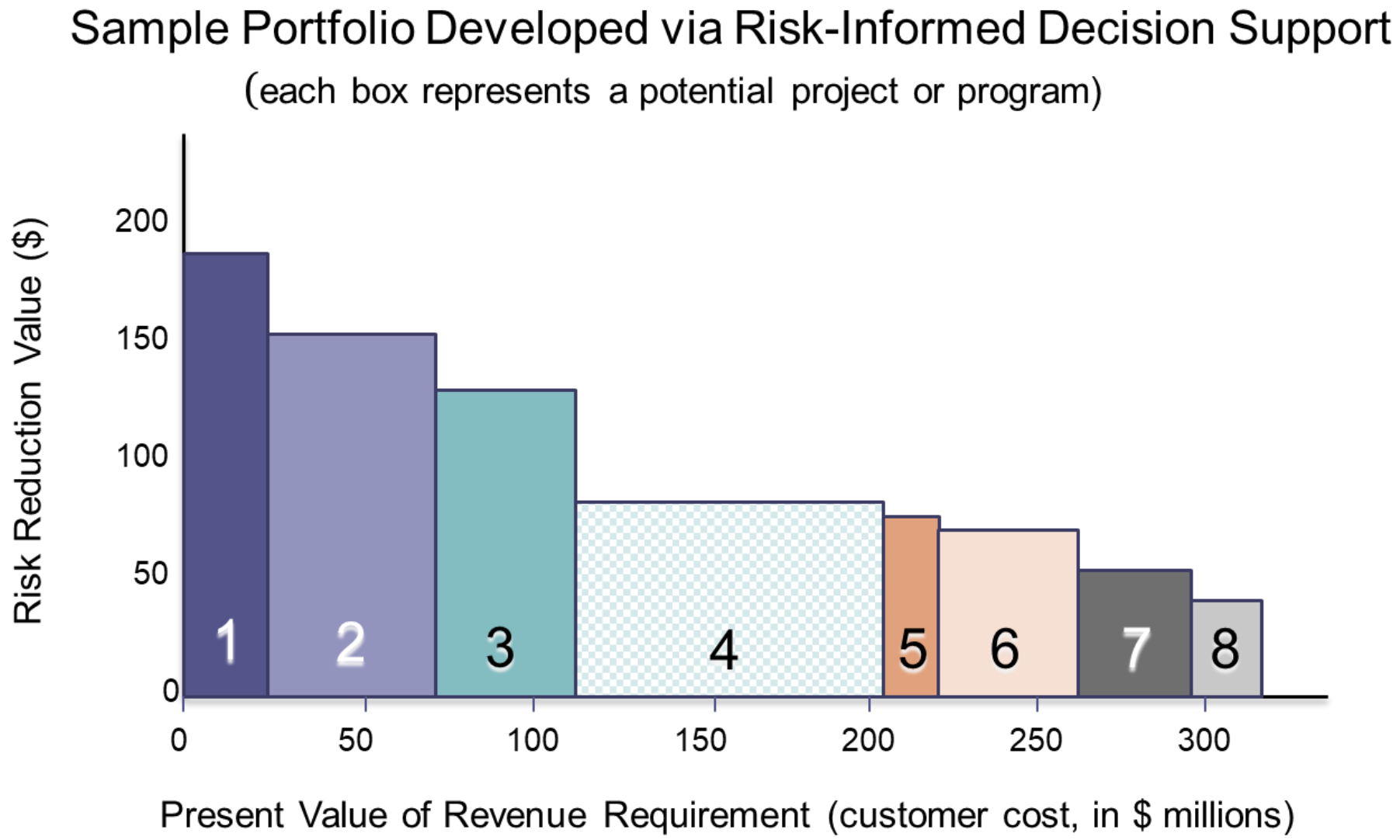
Section 9 Recommendations (Part 2)

The ESMPs should:

- Include plans for strengthening Mass Save/weatherization programs for EJC/LMI housing, and for combining them with electric heat incentives (both to reduce demand on coldest days, and to improve long-term ASHP affordability for EJC/LMI customers).
- Include plans for moderating capital spending as a way to improve Affordability (because outreach and programs for EJ/LMI customers are not an Affordability silver bullet).
- Include plans for replacing the CIP cost allocation approach with ongoing fees for large, exporting DER as a customer class. (This will increase the incentive for DER developers to add storage to their projects; reduce DER interconnection cost uncertainty; reduce developer need to finance up-front interconnection costs; and provide a new revenue source for EDCs.)
- Include support for EDC claims that appear self-serving (i.e., claims that, if accepted at face value, will favor EDC capital spending).

Section 9 APPENDIX

Risk-Informed Decision Support Example



ESMP Section #11

Integrated Gas-Electric Planning

Outline of Section 11

11.0 Integrated Gas-Electric Planning

- 11.1 Challenges in considering integrated gas-electric planning
- 11.2 Transparent electric sector modernization plan
- 11.3 Coordinated gas-electric planning process
- 11.4 Safe and reliable gas infrastructure
- 11.5 Alternative gas infrastructure
- 11.6 Gas-electric coordinated planning working groups (goals, objectives, actions and timelines)
- 11.7 Next Steps

Summary of Section 11

- This section is nearly identical across the three EDCs.
- The ESMPs articulate the need for planning for both gas and electric systems to manage decarbonization effectively
  - Targeted electrification can provide alternative to leak prone pipe replacement, solution where constraints on gas, and avoid gas network reinforcements
- The ESMPs note that gas and electric planning usually done in isolation from each other with limited service territory overlap between gas and electric
- Important program design questions remain on how to organize demand-side electrification in an orderly way
- Note: this section does not reference or consider the Future of Gas Study, CECP, or Climate Roadmap

Summary of Section 11 - Continued

- ESMPs note that they are the first step in transparent gas-electric planning process
- The ESMPs articulate the need for EDC/LDC data exchange process
- The ESMPs explain that the EDCs will establish a Joint Working Group with the goal of coordinated long-range capital planning
  - Will also look to research and compile best practices and create a framework
- ESMPs emphasize need for near-term gas maintenance/investment for safety and reliability

Consultant Reactions

- The EDCs do not say much about whether EDCs plan to take other steps beyond the ESMPs to advance integrated gas-electric planning (and enhance transparency thereof).
- There is very little detail in this chapter.
  - E.g., nothing on how the EDCs plan to downsize gas system/reduce spending on gas infrastructure
- EDCs face major challenges:
  - In educating and encouraging customer-side transition in an orderly/efficient way
  - In unifying gas and electric sides of companies that have worked in isolation
- The ESMPs do not explain how the EDCs plan to assess or leverage best practices from other utilities in the US.

Recommendations

- The ESMPs should provide much more detail on how integrated energy planning will be undertaken in the future.
- The ESMPs should provide much more detail on how the integrated energy planning will be used to comply with the Climate Act and align with the forecasts in the CECP/Roadmap.
- The Joint Utility Planning Working Group should focus on short- and long-term capital investment plans for both electric and gas utilities.
- When estimating net benefits from grid mod, the ESMPs should account for the costs and benefits to gas utility customers.
- When estimating how grid mod will mitigate rate impacts, the ESMPs should account for the rate impacts on gas utility customers.

Close and Next Steps

- Next GMAC Meeting: October 26th, 2023, from 1-4 PM.
- Topics for next meeting
  - Continued October 12th Discussion and Review of Key Chapter Findings
  - Section 1: Executive Summary,
  - Section 2: Climate Act Compliance
  - Section 7: 5-year ESMP
  - Section 13: Conclusion
- Joint GMAC/CETWG Meeting: October 13th, 2023, from 9-11 AM.
- Listening Sessions:
  - Monday 10/30 at 6:00 - 7:30 PM
  - Wednesday 11/1 at 12:00 – 1:30 PM

Appendix: EDC Proposed Stakeholder Process Metrics

- The number of outreach and involvement meetings **about the respective EDCs ESMP filing** with stakeholders, including EJCs, municipal leaders, community-based organizations and customers (i.e., residential, commercial and industrial, as well as DER customers).
- The number of outreach and involvement meetings **about specific ESMP infrastructure projects** with stakeholders, including EJCs, municipal leaders, community-based organizations, and customers (i.e., residential, commercial and industrial, as well as DER customers).
- The number and category of **requests made as part of stakeholder feedback on specific ESMP infrastructure projects, classified into visual mitigation, access accommodations, work hours, right-of-way maintenance, informational accommodations, engineering accommodations, and damage prevention, as well as the EDC's response to these requests** classified as under consideration, implemented, not accepted with reason, and other.

- The third proposed stakeholder metric reflects the general categories of feedback the EDCs have received during stakeholder engagement processes on specific infrastructure project proposals:
  - **Visual mitigation**: shrubs/tree planting or relocating objects out of a specific line of sight.
  - **Access accommodations:** adjusting work zones to allow for continuity of access for school bus, elderly services, or regional transit.
  - **Work hours:** adjusting work hours to accommodate traffic/pedestrian management or construction noise.
  - **Right-of-way maintenance:** backfilling and repaving based on feedback from stakeholders, usually public way managers such as DPW or DOT.
  - **Informational accommodations:** using local feedback to tailor outreach methods such as timing of meetings, translation of content into appropriate languages, and ADA access.
  - **Engineering accommodations:** adjusting engineering design, to the extent practicable, to address stakeholder concerns.
  - **Damage Prevention:** identifying conditions prior to construction to ensure the integrity of adjacent utilities, businesses, residents, and structures.
- The EDCs may be able to implement the third proposed metric during the pre-permitting phase of project development (i.e., prior to formal regulatory filings seeking approval of projects), and during the permitting phase, pending further discussion about the methodology by which stakeholder feedback is proposed to be obtained.

Appendix: Full Process – October 12th Meeting

Meeting today to discuss Chapters 8, 9, and 11

A. **Tuesday before GMAC meeting, 10/10**: **Consultant team** provides summary slides of selected chapters (posted on GMAC website)

B. **GMAC meeting, 10/12**: **Consultant presentation** to summarize Chapters and GMAC discussion

C. **Tuesday after GMAC meeting, 10/17: Consultant team** includes Chapter take-aways in meeting minutes for GMAC member review, inclusive of key discussion points from meeting

D. **Friday (8 days) after GMAC meeting, 10/20:** GMAC members submit their Recommendations sheet for Chapters 8, 9 ,11.

E. **Tuesday before next GMAC meeting, 10/24**: **Consultant team** updates Chapter take-aways and groups GMAC member recommendations for discussion at opening of next GMAC meeting. Post updates on GMAC website. (E from Day 2 ESMP Review occurred on 10/10)

F. **Next GMAC meeting, 10/26:** GMAC discusses updated chapter take-aways and grouped recommendations from last meeting Chapters (F from Day 2 ESMP Review occurs on 10/12)

G. **Friday (15 days after GMAC meeting, 10/27)**: GMAC members indicate strong agreement/disagreement in newly submitted aggregated recommendations spreadsheet. EDCs add any responses to newly submitted aggregated recommendations spreadsheet.

October

M	T	W	Th	F
2	3	4	5	6
9 Holiday	10 E/A	11	12 F/B	13
16	17 C	18	19	20 D
23	24 E	25	26 F	27 G