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

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES

Grid Modernization Advisory Council

October 26, 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
Discussion of DPU Process	1:15 – 1:30
Continued Day 3 Discussion	1:30 – 1:50
Section 7: 5-Year ESMP	1:50 – 2:35
10-minute Break	*2:35 – 2:45*
Section 13: Conclusion	2:45 – 3:30
Section 2: Compliance with the Climate Act	3:30 – 3:57
Close	3:57 – 4:00

Meeting Minutes

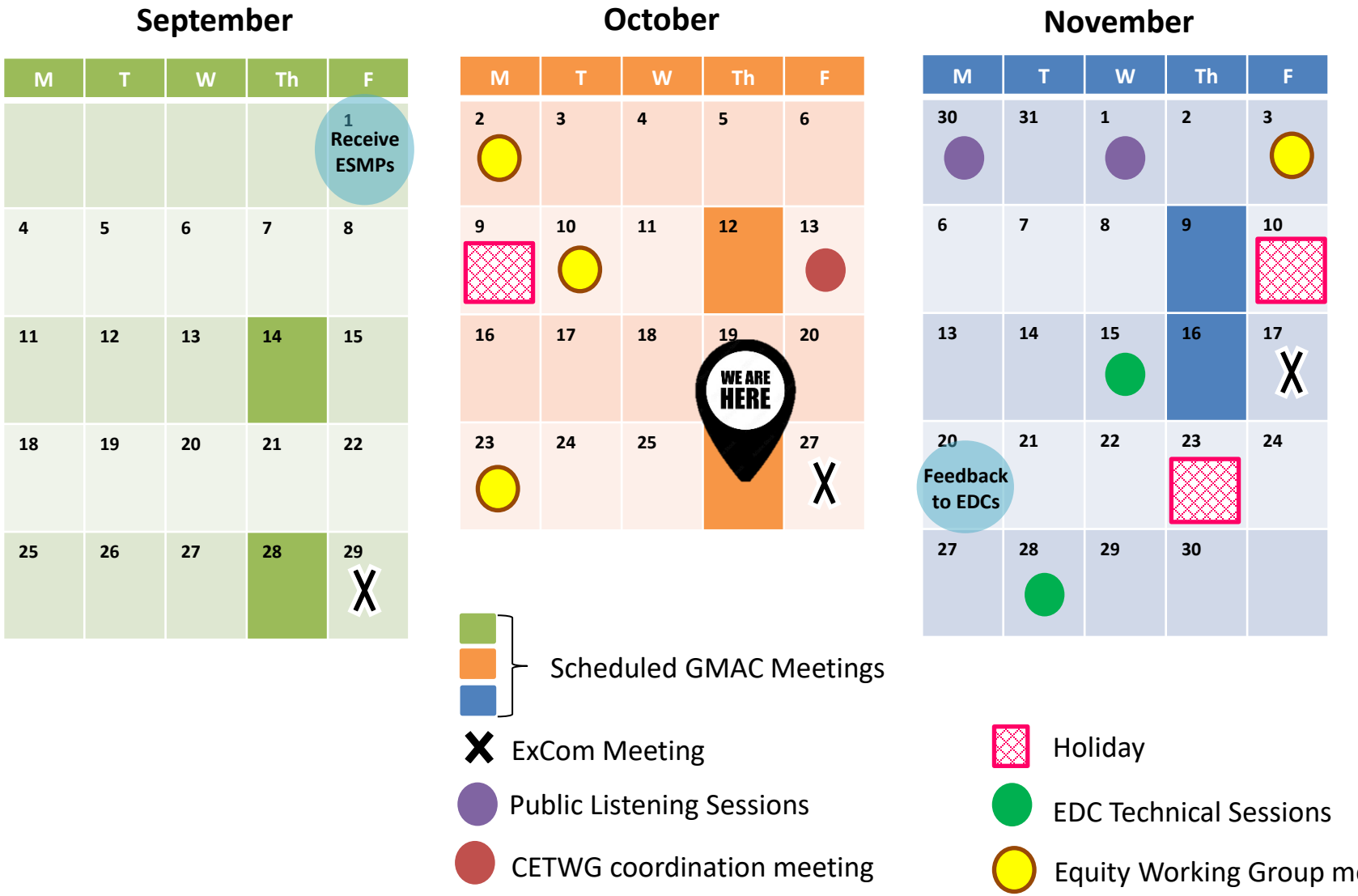
- Calling for vote to finalize:
  - October 12th GMAC minutes
  - October 13th Joint GMAC/CETWG minutes

- *Motion to approve the October 12th minutes [as distributed/as corrected]?*
- *Motion to approve the October 13th Joint GMAC/CETWG minutes [as distributed/as corrected]?*

ESMP Review Period Reminders

- **Listening Sessions**
  - Two sessions with language interpretation services available on an as-needed basis.
    - Monday 10/30 at 6:00 - 7:30 PM (66 registrants)
    - Wednesday 11/1 at 12:00 – 1:30 PM (65 registrants)
  - GMAC members have Zoom invitations for these sessions.
- **EDC Technical Sessions**
  - Wednesday 11/15 at 9:00 AM – 1:00 PM
  - Tuesday 11/28 at 1:00 PM – 5:00 PM
- **ESMP Recommendations Sheet:**
  - Due by Wednesday **11/1**: GMAC member review of compiled sheet for Sections 8, 9, 11
  - Due by Friday **11/3**: GMAC member recommendations sheets for Sections 1, 2, 7, 13. Members may add transmission-related recommendations to this sheet.

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

What to Expect in November

Process to Date

1. GMAC members submit recommendations by Section
2. GMAC members review aggregated section recommendations and indicate strong agreement and disagreement. EDCs provide responses to recommendations.
3. Full excel sheet posted online.

Any Comments or Questions?

Next Steps

- **Friday, 11/3:** Draft document of key findings and recommendations emailed/posted for GMAC member review and discussion in November. This includes:
  1. Word Document (see tentative outline to right)
  2. GMAC Recommendations
     - Merging similar recommendations from GMAC members
     - Highlighting areas of strong agreement
     - Keeping as much detail from member recommendations as possible
  3. Equity working group findings/recommendations included
- **Thursday, 11/9**: GMAC meeting to discuss draft findings/recommendations
- **Monday, 11/13**: GMAC members send track change requests to MA-GMAC by noon.
- **Thursday 11/16**: Final live edits and voting.

Document Outline

1. GMAC Process & Limitations
2. GMAC Findings
   a. Compliance with the Act
   b. Stakeholder engagement & equity goals
   c. Load forecasting (Short- and long-term)
   d. Solution sets (short- and long-term)
   e. Infrastructure/investment proposals (short- and long-term)
   f. Alignment with state policy goals, especially those in the CECPs
   g. Missing information
3. GMAC Recommendations.
   a. TBD in either word or excel format

ESMP Review Agendas

October 26th

1:00 – 1:15	Administrative Items
1:15 – 1:50	Discussion of DPU process Continued Day 3 Discussion
1:50 – 2:35	**Section 7:** 5-Year ESMP
2:35 – 2:45	**BREAK**
2:45 – 3:30	**Section 13:** Conclusion
3:30 – 3:57	Section 2: Compliance
3:57 – 4:00	Close

- Last set of chapters to review
- Continued Day 3 discussion to include check on findings and overall thoughts on ESMPs
- Metrics discussion (1st and 2nd set)

November 9th

1:00 – 2:20	Administrative Items • Equity Recommendations • Draft Findings Consultant Presentation & Discussion
2:20 – 2:30	**BREAK**
2:30 – 3:50	Draft Recommendations Discussion
3:50 – 4:00	Close

- Draft Recommendations Review
- Discussion of Equity Working Group recommendations

November 16th

1:00 – 1:20	Administrative Items Consultant Update
1:20 – 2:20	Final Recommendations Discussion and Voting
2:20 – 2:30	**BREAK**
2:30 – 3:50	Final Recommendations Discussion and Voting
3:50 – 4:00	Close

Final Recommendations Vote

Discussion of DPU Process

DPU Process: The Role of the GMAC

The EDCs shall submit their first plan for review, input, and recommendations to the GMAC

The EDCs shall submit their ESMPs to the DPU, together with a demonstration of the GMAC's review, input, and recommendations, including, but not limited to

- a list of each individual recommendation
- the status of each recommendation
- an explanation of whether and why each recommendation was adopted, adopted as modified or rejected
- a statement of any unresolved issues

Source: Section 92B(d)

DPU Process: Summary of Statutory Requirements

The DPU shall approve, approve with modifications, or reject the ESMPs, within 7 months of submittal.

In order to be approved, a plan shall provide net benefits to customers and meet these criteria:

- improve grid reliability, communications and resiliency;
- enable increased, timely adoption of renewable energy and distributed energy resources;
- promote energy storage and electrification technologies necessary to decarbonize the environment and economy;
- prepare for future climate-driven impacts on the transmission and distribution systems;
- accommodate increased transportation electrification, increased building electrification and other potential future demands on distribution and, where applicable, transmission systems; and
- minimize or mitigate impacts on the ratepayers of the commonwealth, thereby helping the commonwealth realize its statewide greenhouse gas emissions limits and sublimits under chapter 21N.

The EDCs shall be permitted to include in base electric distribution rates all prudently incurred plant additions that are used and useful

Source: Section 92B(d)

DPU Process: Summary of Hearing Officer Memo on ESMPs

The DPU has assigned separate dockets for reviewing the ESMPs of the three utilities

- DPU 24-10, 24-11, 24-12

The Department must prioritize safety, security, reliability of service, affordability, equity, and reductions in greenhouse gas emissions (G.L. c. 25, § 1A)

The DPU has established filing requirements for the ESMP dockets, including prefiled testimony that, among other things, include

- How the ESMP complies with each subsection of Section 92B
- How the distribution and transmission upgrades identified in the ESMP impact safety, security, reliability of service, affordability, equity, and reductions in greenhouse gas emissions
- How the net ESMP provides net benefits to customers. The net benefits analysis must identify the projected benefits and costs, explain the methodology used, identify all assumptions relied on in the analysis, and address whether, how, and why any factors were prioritized in the analysis
- Project bill impacts with one-year, three-year, and five-year outlooks

Source: Department of Public Utilities, Memorandum to Massachusetts EDCs, from Hearing Officers, re: Electric Sector Modernization Plans, August 7, 2023

Pre-Authorization of Investments: ESMPs

National Grid ESMP

- Very little mention of pre-authorization of proposed investments
- Some scattered discussion of investments already authorized by the DPU

Eversource ESMP

- No mention of pre-authorization of proposed investments
- No discussion of investments already authorized by the DPU

Unitil ESMP

- “This spending plan contemplates a pre-authorization by the Department similar to the approach taken in Grid Modernization”

Pre-Authorization of Investments: Consultant Reactions

The ESMPs should be clear on whether EDCs are planning to seek DPU authorization of any proposed investments in the ESMPs

- Unitil noted this point, but it should be articulated more clearly by all EDCs

The ESMPs should articulate whether pre-authorization will be requested in the forthcoming DPU dockets to review the ESMPs, or in separate rate cases

ESMPs should provide much more detail on pre-authorization, including

- Identification of investments that have already been authorized by the DPU
- Identification of proposed investments for which the EDCs will be seeking pre-authorization, either from (a) the DPU ESMP dockets or (b) rate cases
- Identification of proposed investments for which the EDCs will not be seeking pre-authorization, either from (a) the DPU ESMP dockets or (b) rate cases

This information is critical for the BCA and for the level of scrutiny warranted for investments

Informational: DPU Process: Pre-Authorization of Investments

DPU 12-76-B (generic docket)

- DPU required each company to file a grid modernization plan, including a five-year short-term investment plan.
- Investments included in the short-term investment plan would be eligible for preauthorization.
- Pre-authorization involves a review of the company's cost estimates for a project, such that the Department will not revisit in later filings whether the company should have proceeded with these investments.
    - The Department will, however, review the prudency of the company's implementation of these investments

DPU 15-120/121/122 (separate EDCs)

- DPU modified the grid mod plan terms from 5 years to 3 years, due to uncertainty and changes that can occur over longer time periods

DPU 21-80 A&B; 21-81 A&B; 21-82 A&B (separate EDCs)

- Approved $473 million for 2022-2025
- Approved $1.2 billion, $937 million for core AMI and $80 million for grid-facing grid mod
- Preliminary approval for $232 million of supporting AMI investments

DPU 22-22 (Eversource rate case, November 30, 2022)

- Grid mod investments were removed from rate base and not approved or pre-authorized in the order

Continued Day 3 Discussion

Recommendations Section 8: 2035–2050 Policy Drivers

Recommendation	Consultant	GMAC
The ESMPs should better integrate their 10-year and long-term forecasts.	√	
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.	√	
The EDCs should collaborate to achieve the Commonwealth's 2050 targets		√
The ESMPs should include information on winter peak load projections and how to consider them.		√
The ESMPs should include specific details on the assumptions made and strive to have consistent models and policy drivers across all of the EDCs.		√

Recommendations Section 9: 2035-2050 Solution Set

Recommendation	Consultant	GMAC
Include details of how the EDCs plan to communicate their offerings and how they will increase their transparency		√
Discuss rate reform and affordability to better understand bill impact on ratepayers and how to improve affordability in light of electrification		√
The ESMPs should explicitly state the detailed steps and timeline to developing demand management programs and how the EDCs will reduce peak load		

Recommendations Section 9: 2035-2050 Solution Set

Recommendation	Consultant	GMAC
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.	√	
Include details of how the EDCs plan to communicate their offerings and how they will increase their transparency		√

Recommendations Section 11: Gas-Electric Planning

Recommendation	Consultant	GMAC
The GMAC expressed that this section was challenging to review due to its brevity, and that more details were needed to offer more comment.	√	√
Generally, the ESMPs should detail how the transition from gas to electric will be coordinated, how and where the systems overlap, and in what order the transition should occur.		√
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.	√	√

ESMP Section #7

5-Year Electric Sector Modernization Plan

Outline of Section 7

7.0 5-year Electric Sector Modernization Plan

- 7.1 Investment Summary 5-year chart – Base reliability, existing programs (e.g., CIP, EV, EE, GridMod, AMI), and new proposals. Impact on GHG emission reductions
  - 7.1.1 Alternatives to proposed investments – Estimates of Impact of Investment Plan Alternatives
  - 7.1.2 Alternative approaches to financing
  - 7.1.3 Customer benefits
- 7.2 Investment Summary 10-year chart
- 7.3 Execution Risks – Siting, Permitting, Supply Chain and Workforce Challenges

Preview of Section 7 Discussion

- Summary of Section 7's (focus on capacity and reliability spending)
- Reactions
  - What it means to "optimize net benefits"
  - The benefits of ESMPs are essentially reductions in various risks
  - Costs of a grid prepared too far in advance can be high
- ESMP Recommendations
  - In cost-benefit analyses, place a dollar value on risk reductions (with example)
  - Use risk reduction value and cost to make difficult decisions under constraint

Summary of Section 7s

What Is in Section 7

- Five-year capital (and O&M) spending plans
- Ten-year capital spending plans

  (Reliability and Capacity Expansion)
- Descriptions of Plan Execution Risks

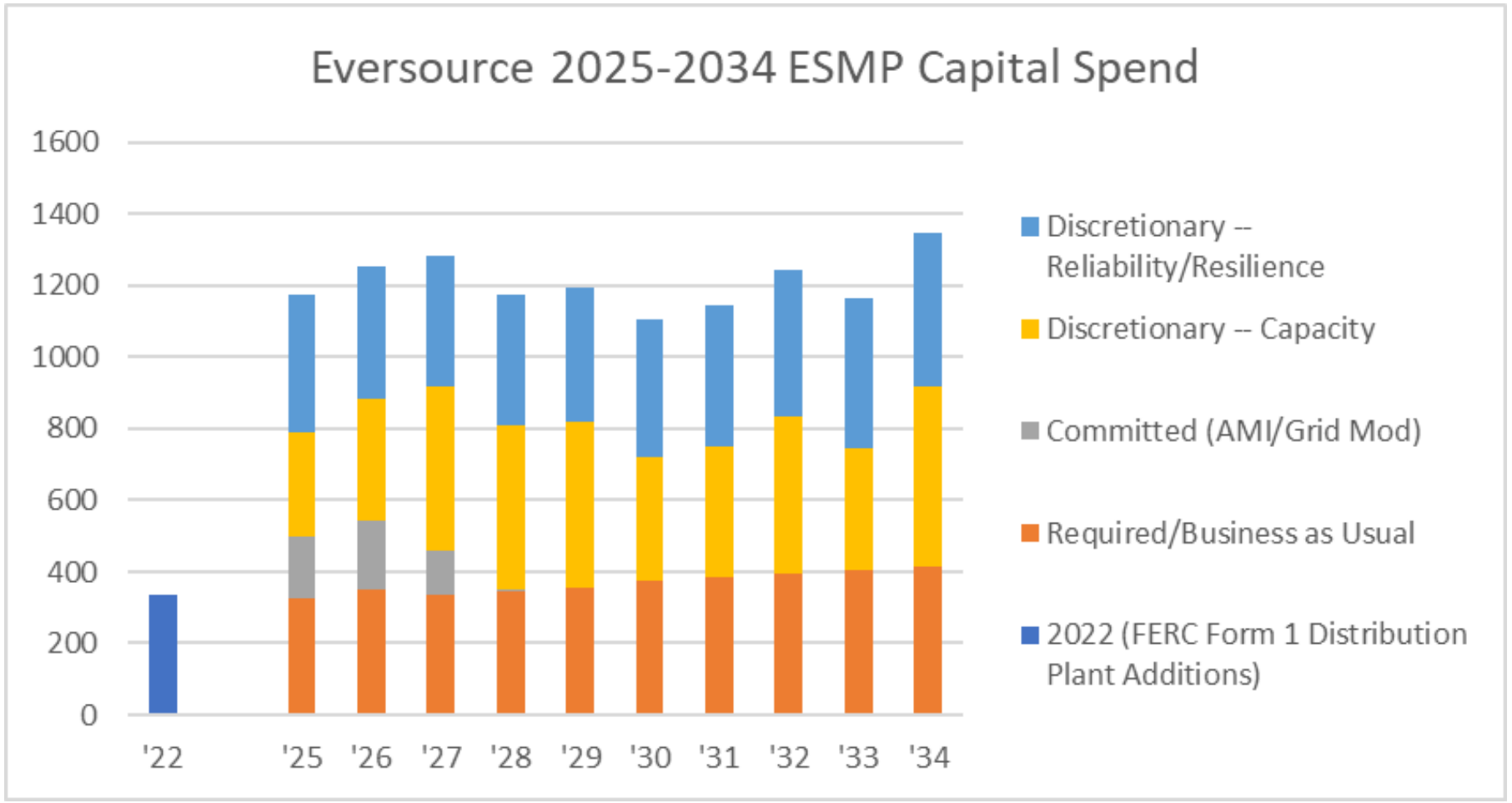
  (Siting/permitting; supply chain; resources/scheduling)
- Financing Options

  (CIP; Federal Grants)

What Is Missing from Section 7

- Benefit Estimates (Value in $)
  - GHG Emission Reductions
    - Electric Vehicles
    - Electric Heat
    - Distributed Energy Resources
  - Reliability Improvements
- Costs to Customers (Revenue Requirement projections in $)
- Standardized definitions for spending types, categories, status

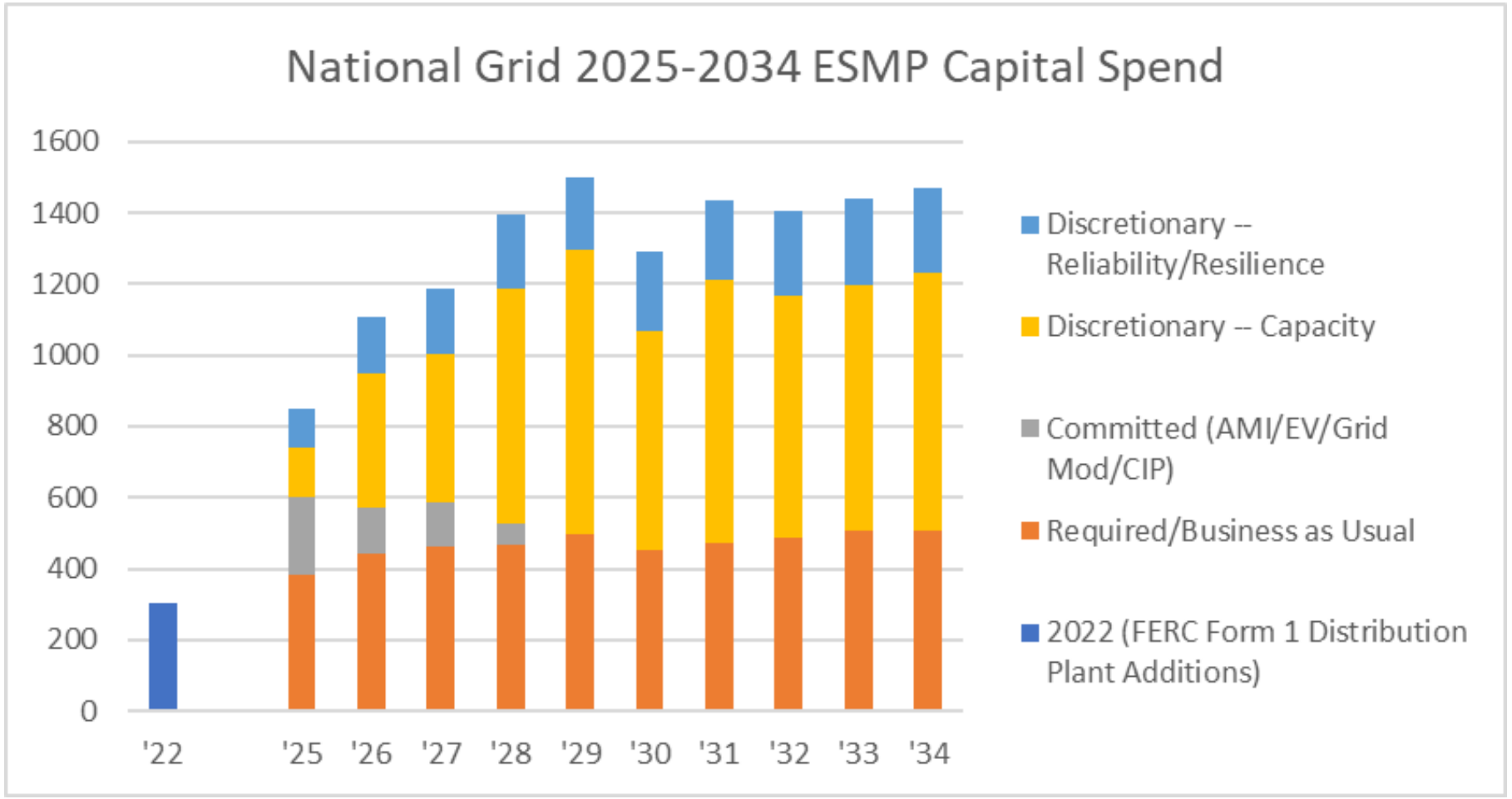
Eversource ESMP Capital Spending: Required vs. Discretionary



- Eversource annual capital spending almost quadruples
- Almost 100% of the growth is in Capacity and Reliability

Note: Expert interpretation of proposed 10-yr capital spend, ESMP p. 392.

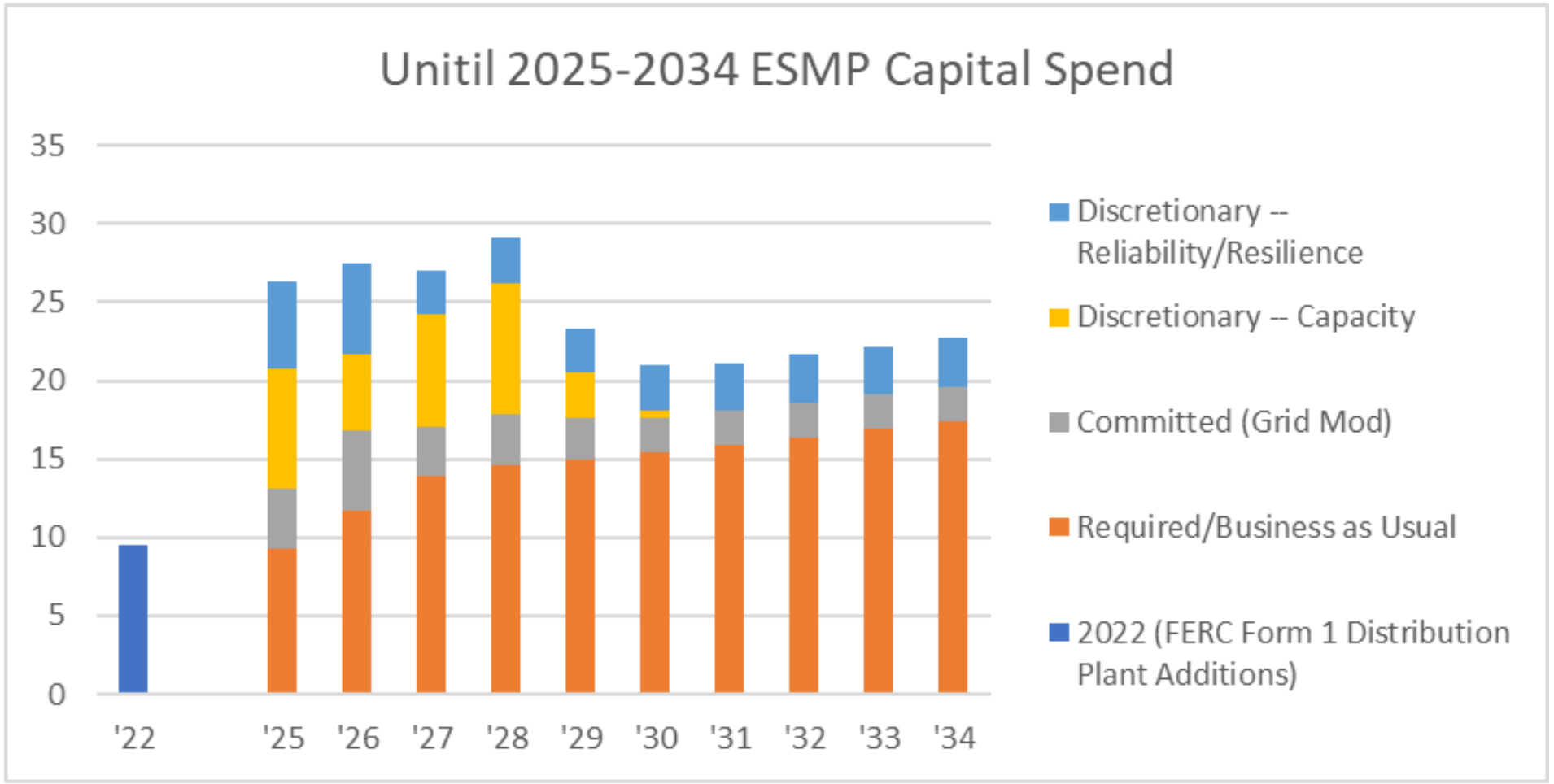
National Grid ESMP Capital Spending: Required vs. Discretionary



- National Grid annual capital spending quadruples
- Almost 100% of the growth is in Capacity and Reliability

Note: Expert interpretation of proposed 10-yr capital spend, ESMP p. 321.

Unitil ESMP Capital Spending: Required vs. Discretionary



- Unitil annual capital spending more than doubles
- Almost 50% of the growth is in Capacity and Reliability

Note: Expert interpretation of proposed 10-yr capital spend, ESMP p. 115.

Reaction 1: An ESMP Will "Optimize Net Customer Benefits" If:

- Adequate capabilities and capacities are available/installed . . .
- In the right locations (to no greater geographic extent than necessary) . . .
- In advance of need (but not too far in advance of need) . . .
- For the lowest cost and execution risk.

As the GMAC has observed, ESMPs consist of 1) complex circuit-by-circuit and substation-by-substation decisions that 2) should be informed by electric demand forecasts based on multiple, widely-varying assumptions.

A GMAC with information, resource, and expertise asymmetry will find it extremely difficult to optimize complex, multi-billion-dollar ESMPs.

Reaction 2: The Benefits from ESMPs Are Risk Reductions

EDCs: "We need to spend _($)_ by _(year)_ to reduce the risk that _____."

- EV charging or electric heating installations will be delayed
- DER installations will be delayed
- Service reliability will be insufficient

How big is each risk, and what is the value of reducing it?

Until one assigns a value to risks, and to their reductions, it is impossible to know how much is appropriate to spend, or when, and in what priority.

Reaction 3: Costs of Being Prepared Too Far in Advance Can be High

- Rate increases are incurred earlier than necessary, or in wrong places.*
- There is a significant lag between the time when the EDCs prefer to make investments and the time when increased electric sales volume is available to pay for those investments.*
- Opportunities to take advantage of new, cheaper technologies will be missed.
- The technologies EDCs install can become obsolete before sufficient value has been delivered from them.

Customers bear 100% of these costs.

* *Distribution Grid Electrification Model*. Study and report by the Public Advocate's Office of the California Public Utilities Commission. August, 2023. Page ES-4

Critical Question for the GMAC

Q. Given the complexity of grid planning and investment, the complexity of demand forecasting, information/resource/expertise asymmetry, and the potentially high cost of preparing the grid too far in advance, how can the GMAC "optimize net benefits from ESMPs"?

A. **By defining planning process controls and ensuring they are applied throughout ESMP development.**

- Processes to develop demand forecasts
- Processes to develop Solution sets (ESMPs) to satisfy grid capacity & reliability needs

Process Control Example: Assign $ Values to Risk Reductions Available from Proposed Grid Investments

Risk Reduction value ($) = Reduction in adverse event likelihood (%) X Consequence of adverse event ($)*

A 25% Reduction in the Likelihood of an adverse event with a Consequence cost of $1 million is worth $250,000

1: Estimate reduction in adverse event likelihood

2: Estimate adverse event consequence in $

3: Calculate value of risk reduction over life of investment

4: Compare value of risk reduction to cost

Example risk to be Reduced (Benefit): Service interruption risk

Proposed Solution: Aging Infrastructure (Substation Equipment) Replacement

Description: Replace major substation equipment (power transformers, circuit breakers, switches, etc.) because they are "old" (i.e., fully depreciated at 50 years) and in "poor condition" (subjectively assessed).

Current Risk Mitigation: Periodic, objective diagnostic and functional testing

Question: How does the cost of the proposed solution compare to the value of the risk reduction?

*CPUC D.22-12-027 dated December 15, 2022 in R.20-07-013

Step 1: Estimate Reduction in Adverse Event Likelihood from Solution

Count of Substation Power Transformers over 50 years old: 100

Current rate of failure in service per year: 2

Rate of failure in service per year of new Power Transformer: 0 (simplified)

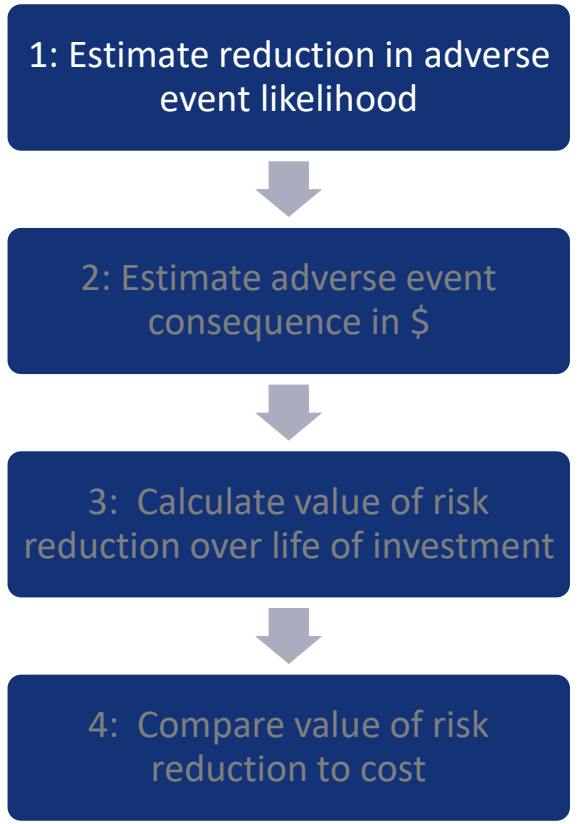
Reduction in adverse event likelihood: 2% per year.

Replacing 100 transformers will eliminate 2 failures per year (2%) for the next 50 years.

Context:

Cost to Replace a Substation Transformer: Typically $3-5 million, but as much as $10 million.

To replace 100 power transformers at $4 million each = $400 million.



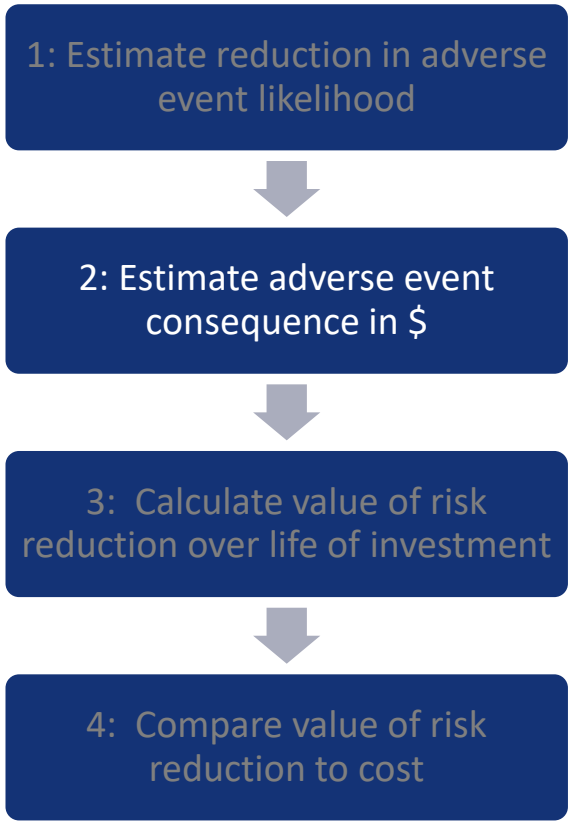
Step 2: Estimate Adverse Event Consequence in $

Count of customers impacted: 500 C&I customers and 5,000 residential customers

Estimated duration of a service interruption: 4 hours

Cost per customer of a 4-hour service interruption: $2,406 for C&I customers and $12.16 for residential customers.*

Consequence of a power transformer failure in service: $1,264,084



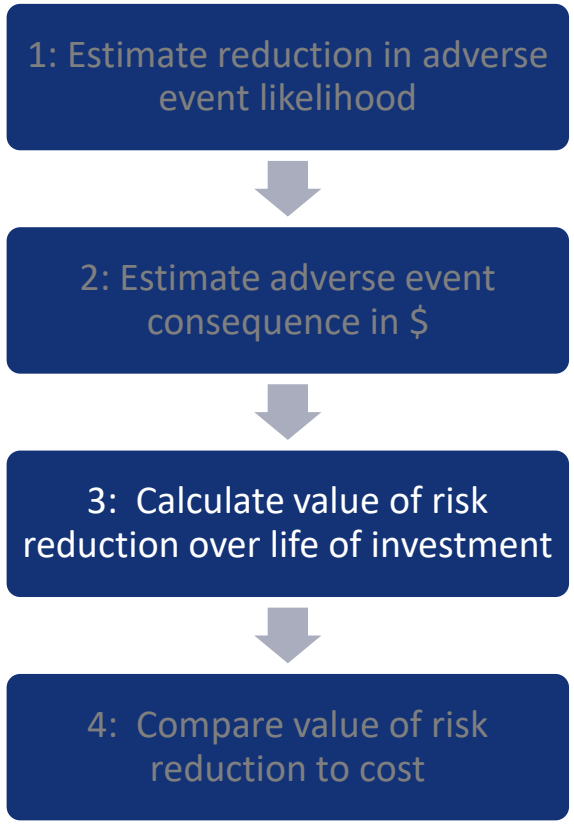
* Sullivan et al. *Updated Value of Service Reliability Estimates for Electric Utility Customers in the United States*. Report LBNL-6941E prepared by Lawrence Berkely National Laboratory and Nexant for the U.S. Department of Energy. January, 2015. Page xii. (Values increased 2.5% CAGR for inflation 2014-2023.)

Step 3: Calculate Value of Risk Reduction Over Investment's Lifetime

Risk Reduction value ($) = Reduction in adverse event likelihood (%) X Consequence of adverse event ($)

Risk Reduction value ($) = 2% x $1,264,084 = $25,282 (for one year)

Present value of $25,282 over 50 years*: $458,902 (using 2.5% benefit inflation rate & 7.5% discount rate for transforming a stream of future years' risk reductions into present value)



* Depreciation period for the new transformer, based on the new transformer's expected useful life.

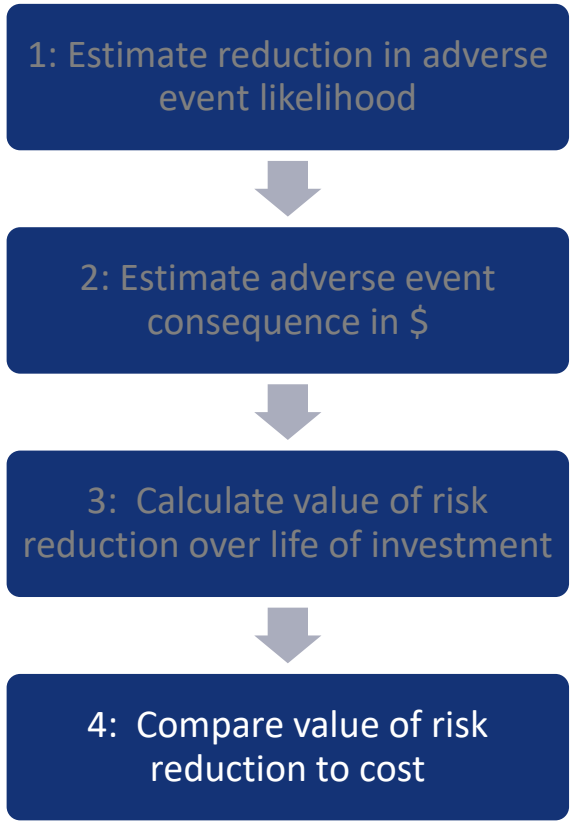
Step 4: Compare Value of the Risk Reduction to the Cost to Deliver It

Benefit of Service Interruption Risk Reduction: $458,902.

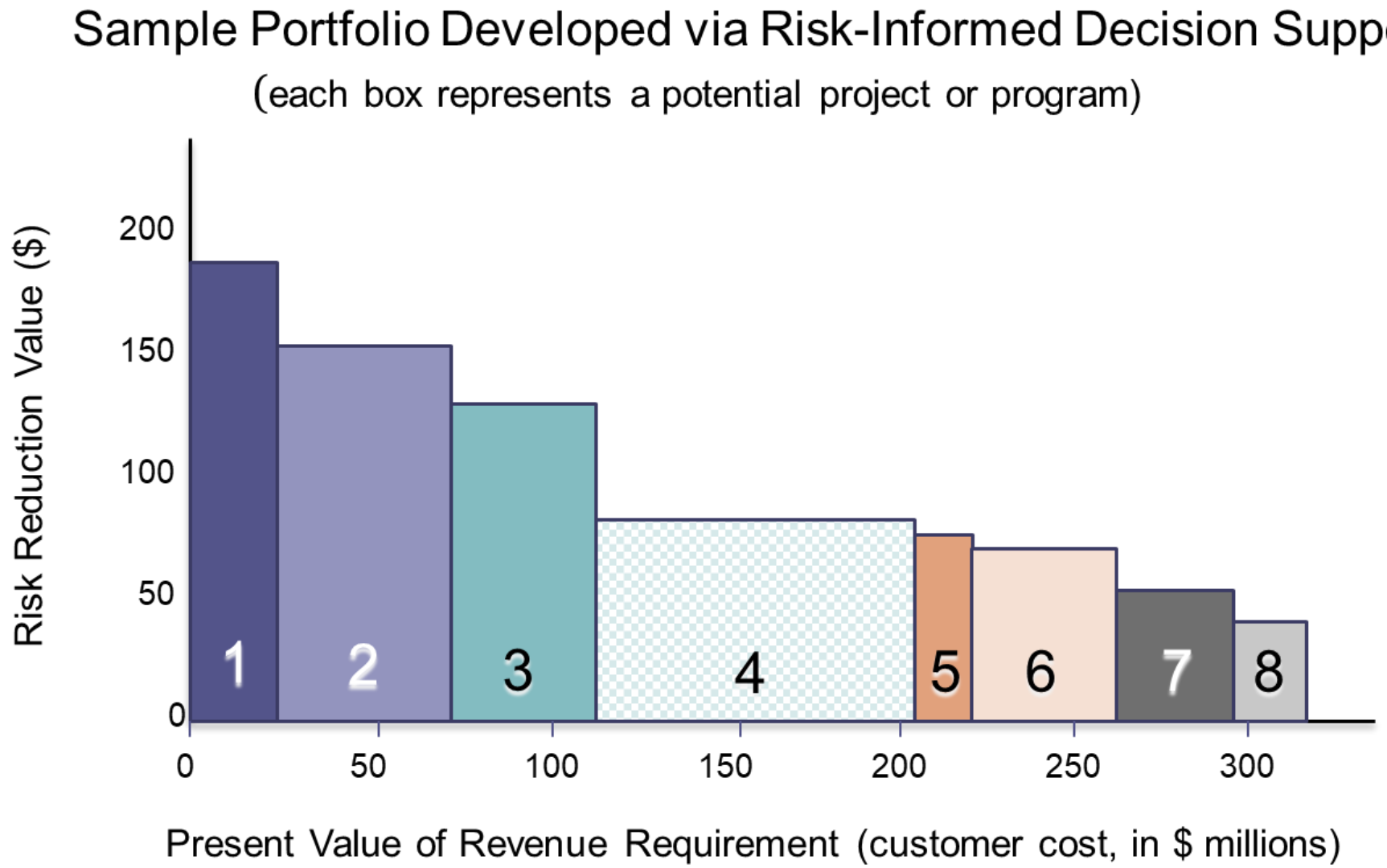
Cost to Replace a Substation Power Transformer: Typically, $3-5 million; but can be as high as $10 million.

To be cost-effective, transformer replacement would need to cost less than $458,902.

In this example, the replacement of Power Transformers that are fully depreciated and have passed objective tests is not a cost-effective way to reduce Service Interruption Risk.



Section 7 Recommendation #1: Calculate the Value of Risk Reductions from Proposed Investments in $, and Use to Make Spending Decisions



Section 7 Recommendation #2: Standardize Types, Categories, and Status of Historical and Proposed Capital Spending

REQUIRED: Solution is needed for safe and reliable service within the planning period

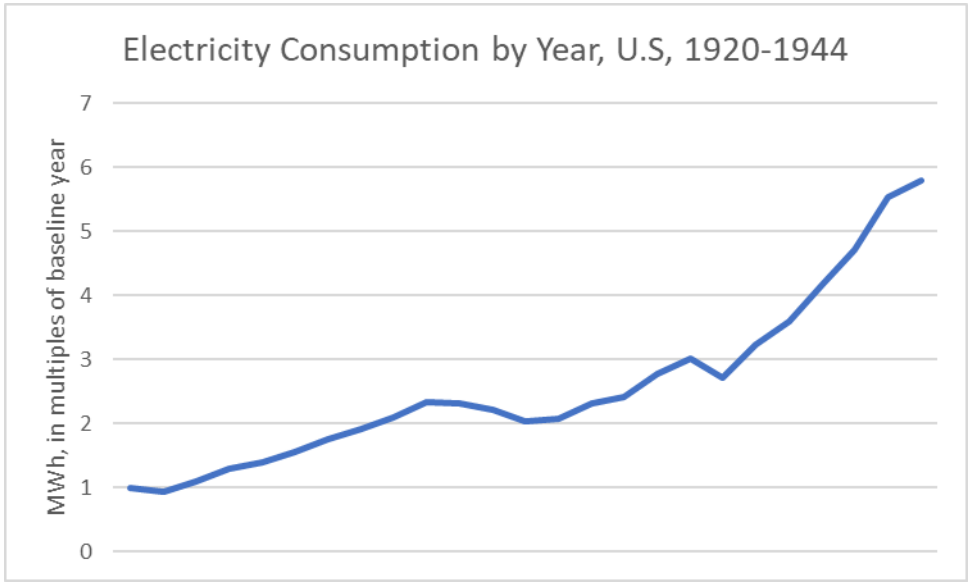
- Facility Relocations
- New Business Connections
- Capacity Expansion (backed by circuit- or substation-specific load forecasts indicating near-term equipment rating exceedances)
- Repair or Replace Equipment that has failed or been damaged
- Some types of software (admin, operations)
- Some types of standard compliance (strictly interpreted)
- Real Estate, Fleet, Tools

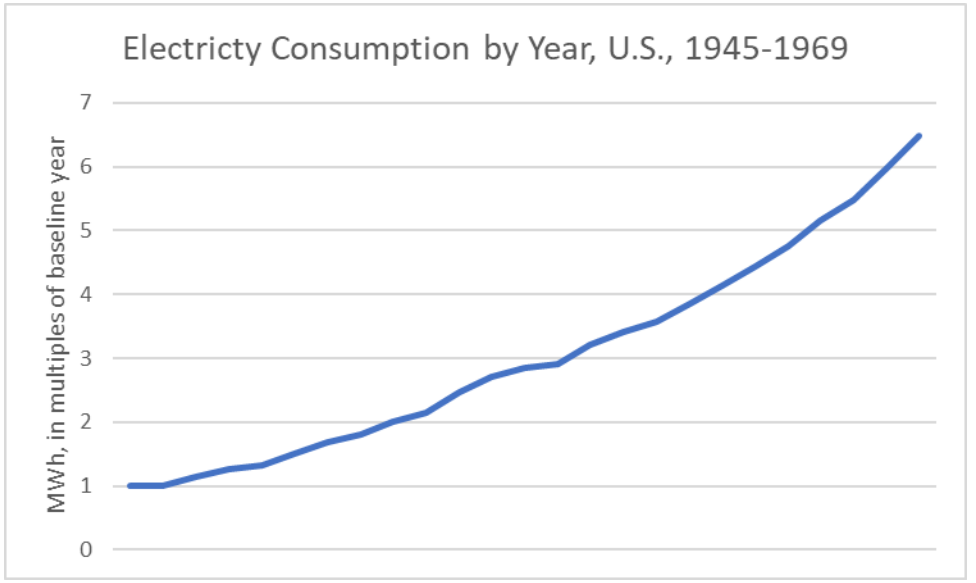
DISCRETIONARY: Variation is available as to solutions, timing, and geographic extent

- Advance Capacity Expansion (in anticipation of future load growth)
- System Performance (extraordinary efforts to improve reliability beyond current levels)
- Specialty software
- Discretionary options for standard compliance (loosely interpreted)
- Customer programs

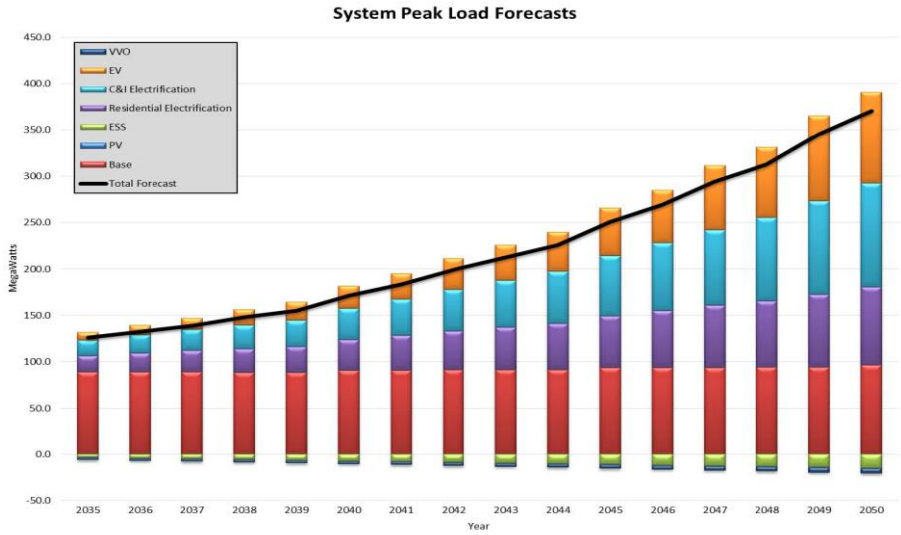
STATUS: 1) Awaiting DPU prudence review; 2) previously approved by DPU; or 3) Proposed new

A Note of Encouragement . . .





Cleveland CJ et al. *United States Electric History in Four Charts*. Institute for Global Sustainability, Boston University. Available at http://visualizingenergy.org



Unitil ESMP, page 119 (3-fold increase in 15 years)

Break

Please be ready to start again in ~10 minutes

After the break…

- *Section 13: Conclusion*
- *Section 2: Climate Act Compliance*
- *Close and Next Steps*

ESMP Section #13

Conclusion

Outline of Section 13

13.0 Conclusion

- 13.1 Next steps
- 13.2 Process to support updates to ESMP throughout the 5-year cycle
- 13.3 Reporting and Metrics Requirements with common EDC table
- 13.4 Process to report to DPU and Joint Committee on Telecom, Utilities and Energy

Summary of Section 13

Analysis of customer net benefits

- The EDCs are currently preparing these analyses
- They will include a quantitative and qualitative net benefits assessment
- They will include a quantification of GHG emission reductions
- The analyses will be included in the ESMPs filed with the DPU in January
- The EDCs will provide more information on their method on or around November 9

Process for ESMP Updates Throughout Five-Year Cycle

- EDCs will use a common reporting template
- EDCs will provide bi-annual reports
    - April 1: Comprehensive report on ESMP progress through prior year
        - Replacing the current Grid Modernization Annual Report
    - October 1: Interim review of year-to-date (Jan – Jun) progress

Summary of Section 13 - Continued

ESMP Metrics

- The ESMPS filed with the GMAC did not include metrics
- Instead, all three EDCS proposed ESMP metric Categories (see table)
- The EDCs filed equity metrics with the Equity Work Group
    - These metrics will be addressed separately, by the EWG
- The EDCs filed remaining metrics on October 19

Category	Description
Implementation	Delivery of ESMP investments relative to established milestones
Resiliency	Customers benefitting from resiliency investment and improvements in relevant outage statistics
Electrification and DER Hosting Capacity	Amount of Electrification and DER capacity enabled on the distribution system
Use of DER as a Grid Asset	Amount of capacity enabling Grid Services and Flexible Load
Stakeholder Outreach	Specific engagements with stakeholders including those in EJ, disadvantaged or underserved communities

Source: All three EDCs presented the table above.
Eversource, page 542; National Grid, page 403; and Unitil, page 190.

Proposed Metrics - Equity

- The number of outreach and involvement meetings about the ESMP filing with stakeholders, including EJCs, municipal leaders, community-based organizations and customers
- The number of outreach and involvement meetings about specific ESMP infrastructure projects with stakeholders, including EJCs, municipal leaders, community-based organizations, and 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
  - the EDCs' response to these requests classified as under consideration, implemented, not accepted with reason, and other.

Proposed Metrics – Other (1)

1. **The achievement dates of ready for load ("RFL") for major ESMP infrastructure projects**
   - Measured from the time the EDC receives: (1) a final, non-appealable order from the Department of Public Utilities ("Department") approving a cost recovery mechanism applicable to the project; and (2) all required permits and approvals for such projects through final, non-appealable state or federal orders and local permitting processes.
2. **The percentage of customers covered by/benefiting from incremental resiliency investments outlined in the EDC's ESMPs**
3. **The increase in: (a) DER hosting capacity, and (b) load serving capacity by substation demonstrated by transformer rating**
   - Will include reporting information specific to environmental justice communities ("EJCs"), stating what percentage of benefits is located in an EJC.
   - This metric will be measured from the time the EDC receives: (1) a final non-appealable order from the Department approving a cost recovery mechanism applicable to the substation project, and (2) for specific projects at the time when all required permits and approvals for such projects are received, including through final, non-appealable state or federal orders and local permitting processes.

Proposed Metrics – Other (2)

4. **A measure of the greenhouse gas reduction impact of investments enabled**
   - This metric will be measured from the time the EDC receives (1) a final non-appealable order from the Department approving a cost recovery mechanism applicable to the investment, and (2) for specific projects at the time when all required permits and approvals for such investments are received, including through final, non-appealable state or federal orders and local permitting processes.
   - The EDCs have contracted with an expert consultant to analyze the net benefits of each EDC's incremental investments, which will include greenhouse gas reduction analyses. The EDCs welcome input from the GMAC regarding recommended approaches to analyzing and measuring greenhouse gas reduction benefits.
5. **For the EDC's distributed energy resources management system ("DERMS"),** (a) the number of participating sites, (b) the amount (kW) of non-company owned dispatchable assets that the utility can control, and (c) number of instances sites are dispatched.
   - The EDCs note that this metric is already under consideration by the Department as a proposal through 2025 in D.P.U. 21-80, D.P.U. 21-81, and D.P.U. 21-82. The EDCs propose that the metric would continue for incremental DERMS investments in 2026 and beyond.

General Reactions to Proposed Metrics - Equity

The Equity Working Group has proposed a much more comprehensive set of equity metrics:

- Categories of metrics
- Problem statement
- How ESMPs propose to address problems
- EWG desired outcomes from ESMPs
- Metrics of success

Categories of metrics include:

- Accessibility and community engagement
- Workforce and economic benefits
- Health benefits
- Financial benefits and incentives
- Affordability
- Reliability and resilience

General Reactions to Proposed Metrics - Other

It is not clear why some metrics are contingent upon DPU approval of cost recovery

The metrics are not tied to the proposals in the ESMP

- Achievement dates, customers experiencing resilience benefits, increase in DER hosting capacity, GHG emissions reductions, use of DERMS
- The data for all of these should be presented in the ESMP – to provide benchmarks for comparing to metrics

For some metrics there is no description of how they will be measured

- Customers benefitting from resilience investments
  - How is resilience measured?
  - How will EDCs know which customers benefit?

For some metrics there is no description of how EDCs will determine incremental impacts

- Resilience benefits
- GHG emission reductions

For some metrics additional detail is required

- How are major ESMP infrastructure projects defined?
  - Does this include investments in the categories of basic business, new customers, reliability, etc.?

Section #13

Net Benefits Analysis & Demonstration of Rate Impacts

Recommendations

BCA: Summary of BCA Requirements of the Climate Act

The Climate Act requires that ESMPs include net benefit information; it also calls for ratepayer impacts and equity impacts to be addressed in plans and factored into the evaluation of proposals

Section 92(C)(b): ESMPs should

- Maximize net customer benefits and demonstrate cost-effective investments
  - This requires a rigorous benefit-cost analysis (BCA)
- Minimize or mitigate impacts on ratepayers
  - This requires a rigorous rate impact analysis
- Reduce impacts on and provide benefits to low-income ratepayers
  - This requires information on how the benefits are distributed across customers (EJC, residential, C&I)

In general, the Department must prioritize safety, security, reliability of service, affordability, equity, and reductions in greenhouse gas emissions (G.L. c. 25, § 1A)

BCA: Which Costs and Benefits to Include?

The costs and benefits included in the BCA (the BCA “test”) should be articulated up front

The MA energy efficiency programs BCA test is a logical starting point for grid mod investments

- A modified Total Resource Cost Test is used. This includes utility system impacts; host customer impacts; other fuel (non-electric) impacts; low-income impacts; greenhouse gas emissions

Since the DPU must prioritize safety, security, reliability of service, affordability, equity, and reductions in greenhouse gas emissions, these benefits should be accounted for in the BCA test as well

- Even if only in qualitative or quantitative terms

BCA should identify up front the discount rate to use for calculating present value dollars

- The MA energy efficiency programs use a low-risk discount rate of roughly 0.2% (in real terms)
- This discount rate should be used for the ESMPs as well

BCA: Methods

All benefits and costs should be compared with a Reference Case

- The Reference Case should be based on forecasts of all non-discretionary investments
- Non-discretionary investments should be clearly justified
- This justification should include least-cost, best-fit analysis (see below), as well as qualitative justification

Alternative cases should be designed to evaluated the net benefits of incremental grid mod projects, relative to the Reference Case

Each incremental project should ideally be evaluated and justified on its own merits

In justifying each incremental project, multiple alternative projects should be evaluated

- For example, conventional distribution options should be compared against DERs and NWAs

If it is not practical to evaluate each incremental project, then some projects should be bundled into logical groupings of interrelated projects.

BCA: Uncertainty and Risk

Uncertainty

Many of the inputs to a BCA are uncertain

- Load growth, customer adoption of DERs, costs of emerging technologies, etc.

Uncertainty can be addressed in BCA by applying sensitivities to those assumptions that are most uncertain and affect the results the most.

Risk

Many grid mod investments, especially the discretionary ones, are designed to reduce risk

- Reliability risks, resilience risks, risks associated with meeting MA climate goals

Risk should be addressed in BCA using risk-informed decision-making practices

- See the discussion above on Section 7 for more detail.

BCA and Least-Cost/Best-Fit Analysis

Least-Cost/Best-Fit (LCBF)

- For investments where the "need" has been established
  - Ex: A new distribution line is needed to provide service to a new residential development.
- Different options might be considered for how to meet the need
  - Ex. Different paths, different combinations of transformers, substations, etc.
- Used to determine the option that meets the need at the lowest cost
- Does not require quantifying or monetizing the benefits, thus cannot assess net benefits

Benefit-Cost Analysis

- For determining whether to make an investment
- BCA used to determine whether the investment will result in net benefits
- Requires monetizing, or somehow accounting for, all costs and benefits

BCA Versus Least-Cost/Best-Fit

BCA is a superior technique for economic assessment of utility investments

- BCA does not require a determination of need
- BCA explicitly accounts for benefits, which allows for assessment of net benefits
- BCA is useful even when the need for grid mod investment or project seems clear
- BCA is more transparent
- BCA can more flexibly address uncertainty
- BCA can more easily address risks

If an ESMP uses LCBF, it should fully justify why it is used instead of BCA

- Is the investment or project truly needed?
- Are there alternative investments or options that should be considered?
- Can the benefits of the investment or project be determined?
- Are there any compelling reasons why a BA cannot or should not be conducted?

BCA: Accounting for Non-Monetary Impacts

Costs and benefits can be presented in three forms: qualitative, quantitative, and monetary

- Costs are typically easy to monetize
- Some benefits are hard to monetize

Good practices for accounting for these different forms of costs and benefits

- Put as many impacts as possible in monetary terms
  - With sufficient time and stakeholder input, almost all impacts can be monetized
- For the remaining impacts, put as many as possible in quantitative terms
  - For example, reliability impacts should be presented in terms of reliability metrics (if not monetized)
- For the remaining impacts, provide as much qualitative information as possible
  - The qualitative impacts should be a consideration in making decisions
  - This requires putting less weight on the monetary impacts
- If the non-monetary impacts are significant, apply transparent scoring and weighting practices, with stakeholder input

BCA: Accounting for Rate Impacts

In order to demonstrate that the ESMPs will minimize or mitigate rate impacts, it is necessary to conduct a rate impact analysis

- Accounting for increased costs from infrastructure investments
- Accounting for reduced sales from some DERs (energy efficiency, distributed generation)
- Accounting for increased sales from some DERs (electric vehicles, space heating)

The rate impact analysis should follow the same structure as the BCA

- Same definition of the reference case
- Same identification of non-discretionary versus discretionary investments
- Same identification of which investments to compare with the reference case

The rate impact analysis should be used to inform the *optimization* of investments

- As opposed to an after-the-fact check
- Decisions on which investments to make should be informed by the rate impact analysis

BCA: Accounting for Equity

Benefit-cost analyses and rate impact analyses do not provide information on the distribution of costs or benefits (e.g., between EJC and other customers).

- The distribution of costs is an issue for the DPU and not within the scope of the GMAC review
- But the distribution of benefits is very much within the scope of the GMAC review

Some benefits are valued differently by different customers.

- What value do EJC customers place on improved reliability?
- What value do EJC customers place on improved resilience?
- Will EJC customers be able to install DERs as much as other customers?

The ESMPs include a lot of discretionary spending.

- How much will this discretionary spending benefit EJC customers?

Most of the infrastructure investments are to reduce risk.

- How much should EJC communities be required to pay to reduce risk?

At a minimum, ESMPs should articulate how benefits will be experienced by EJC customers relative to other customers.

- This will allow for a more informed discussion and decision-making regarding equity

ESMP Section #2

Compliance With the 2022 Climate Act

Outline of Section 2

2.0 Compliance with the EDC Requirements Outlined in the 2022 Climate Act

- 2.1 Purpose
- 2.2 Information Considered
- 2.3 Planned Investments

Summary of Section 2

The EDCs have provided relatively standardized and high-level documentation of the compliance of ESMPs with the Climate Act.

The ESMPs in Section 2 do not address compliance with Section 92C(b), which details the GMAC's responsibilities and indicates additional informational requirements.

Key Components of Climate Act Compliance

The Climate Act requires each ESMP to:

1. Propose investments to meet specific statutory goals
2. Describe alternatives to proposed investments and alternative financing and identify the benefits of each
3. Consider specific grid technologies
4. Provide specific load forecast information
5. Meet GMAC informational requirements so that the GMAC may fulfill its duties
    - Net benefits, rate impacts, and low-income customer impacts

The EDCs must solicit input GMAC, respond to information and document requests from the GMAC 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

Required Information: (1) Propose Investments to Meet Statutory Goals

The EDCs, "[s]hall propose discrete, specific, enumerated investments…[and alternatives], that facilitate:

- grid modernization
- greater reliability
- communications and resiliency
- increased enablement of distributed energy resources
- increased transportation electrification
- increased building electrification
- and the minimization or mitigation of ratepayer impacts

…to meet the statewide greenhouse gas emissions limits and sublimits under chapter 21N."

Source: Section 92B(a) and Section 92B(b)

Required Information: (2) Describe Alternatives and their Benefits

Alternatives to proposed investments:

- Rate design
- Load management
- Other methods for reducing demand, enabling flexible demand, and supporting dispatchable DR

Alternative financing:

- Cost allocation between developers and ratepayers
- Equitable allocation/sharing of costs with other states and populations and interests within other states

Each ESMP must both “consider” and “include a summary” of these alternatives.

Source: Section 92B(b)viii, Section 92B(b)ix, and Section 92B(c)ii

Required Information: (2) Describe Alternatives and their Benefits

"For all proposed investments and alternative approaches…identify customer benefits, including, but not limited to:

- safety
- grid reliability and resiliency***
- facilitation of the electrification of buildings and transportation***
- integration of distributed energy resources***
- avoided renewable energy curtailment
- reduced greenhouse gas emissions*** and air pollutants
- avoided land use impacts and
- minimization or mitigation of impacts on the ratepayers of the commonwealth."***

****Required from proposed investments*

Source: Section 92B(b)ix

Required Information: (3) Consider Specific Technologies

ESMPs must consider specific technologies:

- Smart inverters
- Advanced metering and telemetry
- Energy storage technology
  - For meeting forecast reliability and resiliency needs
  - To improve renewable energy utilization and avoid curtailment

Source: Section 92B(b)ii and Section 92B(b)vii

Required Information: (4) Provide Required Load Forecast Information

ESMPs must prepare and use 3 planning horizons for electric demand:

- a 5-year forecast
- a 10-year forecast
- a demand assessment through 2050 to account for future trends in renewables, DERs, energy storage, and electrification technologies

Source: Section 92B(c)i

Required Information: (5) Information for the GMAC

ESMPs must provide the information required to enable the GMAC to:

- "Encourage ***least-cost investments*** in the electric distribution system"
- "Provide recommendations on electric-sector modernization plans…that maximize ***net customer benefits*** and demonstrate cost-effective investments in the distribution grid."
- "Provide recommendations on electric-sector modernization plans…[that] minimize or mitigate impacts on ratepayers throughout the commonwealth and ***reduce impacts on and provide benefits to low-income ratepayers*** through the commonwealth."

Source: Section 92C(b)

Summary of Missing Information

The following omissions in the ESMPs make it difficult to assess compliance with the Climate Act:

- Lack of detail on costs and benefits
- Lack of analysis of cost effectiveness
- Lack of analysis of ratepayer impacts
- Lack of analysis of low-income customer impacts
- Lack of detailed assessment of alternatives, including assessment of both alternative investments and alternatives to investment.
- Lack of detailed consideration of alternative financing

Summary of Compliance with ESMP Requirements - Section 92B

	Reference	Eversource	National Grid	Unitil
1. Propose investments to meet statutory goals	Section 92B(a) and Section 92B(b)	Yes, except for ratepayer impacts per 92B(a)vi	Yes, except for ratepayer impacts per 92B(a)vi	Yes, except for ratepayer impacts per 92B(a)vi
2. Describe alternatives to proposed investments and alternative financing and identify the benefits of each	Section 92B(b)viii and Section 92B(b)ix	No / Partial	No / Partial	No / Partial
3. Consider specific technologies	Section 92B(b)ii and Section 92B(b)vii	Partial	Partial	Partial
4. Provide required load forecast information	Section 92B(c)i	Partial	Partial	Partial

Summary of Compliance with GMAC Informational Requirements - Section 92C(b)

Information necessary for the Council to determine whether the ESMPs:	Eversource	National Grid	Unitil
[propose] least- cost investments in the electric distribution systems, alternatives to the investments, or alternative approaches to financing investments…	No / Partial	No / Partial	No / Partial
maximize net customer benefits…	No	No	No
minimize or mitigate impacts on ratepayers throughout the commonwealth….	No	No	No
reduce impacts on and provide benefits to low-income ratepayers throughout the commonwealth.	No	No	No

Recommendations: Section 2

1. The consultant and GMAC recommendations regarding the other sections of the ESMPs should be adopted to help improve the ESMPs and make them more in compliance with the Climate Act
2. Section 2 should be expanded to provide more detail about how the ESMPs comply with the Climate Act
    - Instead of a simple reference to another section or subsection of the ESMP, Section 2 should include text explaining how the section or subsection demonstrates compliance
    - Section 2 should include a chart or table summarizing and mapping the requirements of the Climate Act with the location in the ESMP that demonstrates compliance with those requirements

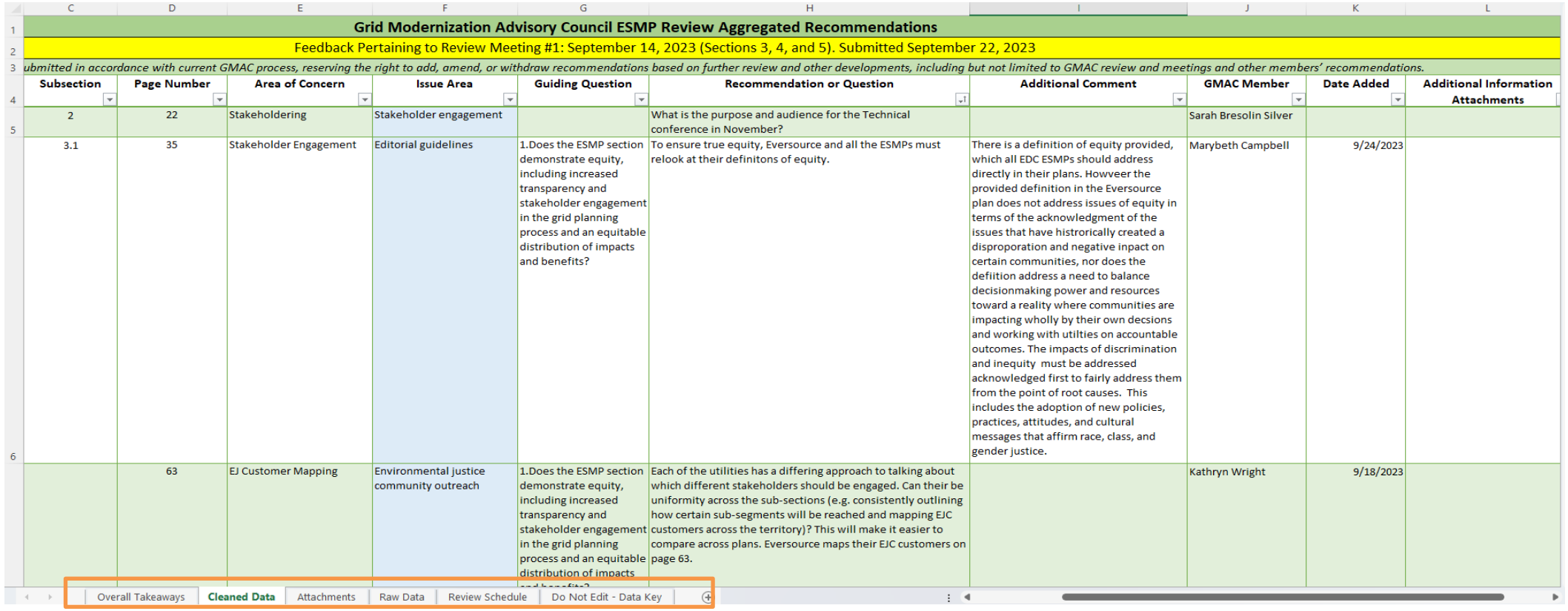
Close and Next Steps

- Executive Committee Meeting: tomorrow from 2-3:30 PM
- Listening Sessions:
  - Monday 10/30 at 6:00 - 7:30 PM
  - Wednesday 11/1 at 12:00 – 1:30 PM
- GMAC Equity Working Group Meeting: November 3, 2023, from 12-1 PM
- Next Full GMAC Meeting: November 9, 2023, from 1-4 PM

- **Due Next Week: ESMP Recommendations Sheets**
  - Due by Wednesday 11/1: GMAC member review of compiled sheet for Sections 8, 9, 11
  - Due by Friday 11/3: GMAC member recommendations sheets for Sections 1, 2, 7, 13. Members may add transmission-related recommendations to this sheet.

Appendix: ESMP Recommendations Sheet

- **New:** Based on GMAC member feedback, members can add transmission system recommendations. This is a follow-up from the CETWG coordination meeting on October 13th .
- 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 historically 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

Appendix: Upcoming Recommendations Sheet Deadlines

Chapters 3, 4, 5 - *COMPLETED*

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

Chapters 6, 10, 12 - *COMPLETED*

- ✓ 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 for these chapters.

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	