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

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES

Grid Modernization Advisory Council

September 28, 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
Key Updates on ESMP Review Period	1:10 – 1:20
Continued Day 1 Discussion	1:20 – 1:45
Section 6: 5- and 10-Year Solutions	1:45 – 2:35
10-minute Break	*2:35 – 2:45*
Section 10: Reliable & Resilient Distribution System	2:45 – 3:35
Section 12: Workforce, Economic, & Health Benefits	3:35 – 3:57
Close	3:57 – 4:00

Meeting Minutes

- Calling for vote to finalize:
  - September 14th GMAC minutes

- *Motion to approve the September 14th minutes [as distributed/as corrected]?*

Key Updates on ESMP Review Period (1/6)

- **Coordination with CETWG – Joint GMAC/CETWG Meeting**
  - 10/13 CETWG meeting topic to focus on distribution system
  - GMAC members will receive a Zoom panelist invite for this meeting from the DPU on 10/10
    - A calendar hold was 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.
  - 70 registrants so far.

Reminder of ESMP Review Timeline (2/6)

September

M	T	W	Th	F
				1 Receive ESMPs
4	5	6	7	8
11	12	13	14	15
18	19	20	21 WE ARE HERE	22
25	26	27		29 X

October

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

November

M	T	W	Th	F
30	31	1	2	3
6	7	8	9	10
13	14	15	16	17 X
20 Feedback to EDCs	21	22	23	24

Review Final Document

Finalize Comments

Scheduled GMAC Meetings

X ExCom Meeting

Oct. 30 & Nov. 1st Listening Sessions

CETWG coordination meeting

Equity Working Group meetings

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 Recommendations Sheet (3/6)

- **New** drop-down options added to Columns A and F.
- We are planning to add an additional column to the aggregated feedback sheet that allows GMAC members to add their support or disagreement to submitted feedback.
- Do GMAC members have feedback on the spreadsheet?

Use this spreadsheet to submit your broader recommendations on the ESMPs.

See next slide for when GMAC members should submit their recommendations.

	A	B	C	D	E	F	G	H	I	J	K
1	**Grid Modernization Advisory Council ESMP Review**										
2	***Instructions:***	Review Meeting #2: September 28, 2023 (Sections 6, 10, and 12) Excel Sheet Due: October 6, 2023									
3	**Please add feedback and/or recommendations pertaining to individual sections in each row. Use the dropdown arrows within the column to select specific EDCs, sections, subsections, etc. Dropdown selections can be made in Columns A, B, C, F, G, I, and K. Row 7 serves as an example entry. Optionally, if there are additional written comments, feedback, or documents that supplement a row entry, please indicate in Column K that additional document(s) will be emailed to MA-GMAC@mass.gov along with your completed Excel sheet. Please send completed Excel sheets with recommendations on the sections corresponding to the GMAC ESMP review schedule. See the "Schedule" sheet for more information on feedback deadlines.**										
4											
5											
6	**EDC ESMP**	**Section**	**Subsection**	**Page Number**	**Area of Concern**	**Guiding Question**	**Recommendation or Question**	**Additional Comment**	**GMAC Member**	**Date Added**	**Additional Information Attachments**
7	*National Grid*	*3 - Stakeholder Engagement*	*3.3*	*25*	*EJ Population Engagement*	*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 EJ population engagement is meaningful, Ngrid should provide education opportunities on electric grid planning in advance of the stakeholder session .*	*EEA's EJ Policy defines meaningful involvement as "all neighborhoods have the right and opportunity to participate in energy, climate change, and environmental decision-making including needs assessment, planning, implementation, compliance and enforcement, and evaluation, and neighborhoods are enabled and administratively assisted to participate fully through education and training, and are given transparency/ accountability by government with regard to community input, and encouraged to develop environmental, energy, and climate change stewardship."*	*Elizabeth Mahony*	*8/18/2023*	*Yes, attachment(s) emailed with Excel sheet.*
8											
9											

Process for Review – September 28th Meeting (4/6)

Meeting today to discuss Chapters 6, 10, and 12

A. **Tuesday before GMAC meeting, 9/26**: **Consultant team** provides summary slides of selected chapters (posted on GMAC website)

B. **GMAC meeting, 9/28**: **Consultant presentation** to summarize Chapters and GMAC discussion

C. **Tuesday after GMAC meeting, 10/03: 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, 10/06:** GMAC members submit their Recommendations sheet for Chapters discussed at 9/14 meeting.

E. **Tuesday before next GMAC meeting, 10/10**: **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 1 ESMP Review occurred on 9/26)

F. **Next GMAC meeting, 10/12:** GMAC discusses updated chapter take-aways and grouped recommendations from last meeting Chapters (F from Day 1 ESMP Review occurs on 9/28)

September

M	T	W	Th	F
25	26 E/A	27	28 F/B	29

October

2	3 C	4	5	6 D
9	10 E	11	12 F	13

Agendas for ESMP Review (5/6)

For the September 28th meeting, discussion times for Sections 6 and 10 were increased and discussion time for Section 12 was decreased based on consultant feedback.

September 28th

1:00 – 1:20	Administrative Items
1:20 – 1:45	Continued Day 1 Discussion
1:45 – 2:35	**Section 6:** 5- and 10-Year Solutions
2:35 – 2:45	**BREAK**
2:45 – 3:35	**Section 10:** Reliable & Resilient DS
3:35 – 3:57	**Section 12:** Workforce, Economic, & Health Benefits
3:57 – 4:00	Close

For each Section:
- ~7-10 mins consultant
- ~15-40 mins discussion
- Continued Day 1 discussion to include check on findings

October 12th

1:00 – 1:15	Administrative Items
1:15 – 1:55	Continued Day 2 Discussion
1:55 – 2:30	**Section 8:** 2035 - 2050 Policy Drivers
2:30 – 2:40	**BREAK**
2:40 – 3:20	**Section 9:** 2035 - 2050 Solution Set
3:20 – 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

Updated Agendas for ESMP Review (6/6)

October 26th

1:00 – 1:15	Administrative Items
1:15 – 1:55	Continued Day 3 Discussion & Overall Thoughts
1:55 – 2:30	**Section 7:** 5-Year ESMP
2:30 – 2:40	**BREAK**
2:40 – 3:20	**Section 13:** Conclusion
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 of ESMPs

November 9th

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

Wired Group

GREENER U

Synapse
Energy Economics, Inc.

Massachusetts Electric Sector Modernization Plans

Consultant Presentation to
the Massachusetts Grid Mod Advisory Group
ESMP Review Meeting #8

Synapse Energy Economics
Wired Group
GreenerU

September 28, 2023

Update on GMAC Process for Reviewing ESMPs

Update: Plan for Drafting Recommendations

At each GMAC meeting the Consulting Team plans to propose recommendations for GMAC discussion for each section of the ESMPs.

Based on the GMAC discussions in the first four meetings, and the submitted recommendations in the excel sheets, both GMAC and consultant recommendations will be rolled up into a single set that will be discussed and finalized in the last two GMAC meetings.

Guiding Questions for GMAC Review of ESMPs

Going forward, the Consultant Team will use these questions to guide our reactions and recommendations.

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?
2. Does the ESMP section encourage **least-cost investments** in the electric distribution systems or alternative investments, such as virtual power plants (VPP) and non-wire alternatives (NWA)?
3. Does the ESMP section facilitate the achievement of the **statewide greenhouse gas emission limits and sublimits** under chapter 21N?
4. Does the ESMP section effectively **optimize net customer benefits and cost-effective investments** in the distribution grid? This includes investments to enable the interconnection of and communication with distributed energy resources and transmission-scale renewable energy resources, facilitation of electrification of buildings and transportation, and increased reliability and resiliency.
5. Does the ESMP section **minimize or mitigate impacts on ratepayers** and reduce impacts on and provide benefits to low-income ratepayers?

DPU ESMP Filing Requirements (1)

Going forward, the consultant team will use these filing requirements to guide our reactions and recommendations.

1. A summary of all proposed and related investments, alternatives to these investments and alternative approaches to financing these investments that have been reviewed, are under consideration or have been approved by the Department previously;
2. Identification of customer benefits for all proposed investments and alternative approaches to financing those investments;
3. Three planning horizons for electric demand, including a five-year and ten-year forecast and a demand assessment through 2050; and
4. A list of each GMAC recommendation, including an explanation of whether and why each recommendation was adopted, adopted as modified, or rejected.

From: Massachusetts Department of Public Utilities, Memorandum, RE: Electric Sector Modernization Plans, August 7, 2023.

DPU ESMP Filing Requirements (2)

More detailed filing requirements.

1. Supporting documentation that addresses how the ESMP complies with each subsection of G.L. c. 164, § 92B.
2. Supporting documentation that addresses how the distribution and transmission upgrades identified in the ESMP impact safety, security, reliability of service, affordability, equity, and reductions in greenhouse gas emissions.
3. Supporting documentation that addresses how the ESMP provides net benefits to customers.
    - The EDCs should apply a consistent framework and method to assess and analyze the net benefits of their respective ESMP and, where applicable, explain any proposed differences in approach
4. Supporting documentation on the forecast projection and demand assessment methods that addresses how the methods (a) are reasonable, reviewable, and reliable; and (b) inform planned and proposed investments.
5. Supporting documentation on projected bill impacts with one-year, three-year, and five-year outlooks.

From: Massachusetts Department of Public Utilities, Memorandum, RE: Electric Sector Modernization Plans, August 7, 2023.

Continued Discussion of Day 1

Section 3: Stakeholder Engagement

Section 4: Current State of the Distribution System

Section 5: Five- and Ten-Year Demand Forecasts

Draft Recommendations Section 3: Stakeholder Engagement

CONSULTANT RECOMMENDATIONS

Develop goals and clear metrics of success by which to measure the efficacy of proposed stakeholder engagement, including:

- Clearly defined identification of stakeholder groups, historical concerns, and potential conflicts with other stakeholder groups' interests
- ESMP goals and outcomes for each stakeholder group
- Information stakeholders need to be well informed
- Information utility companies need to understand stakeholders' concerns
- Appropriate and diverse vehicles for meaningful dialogue
- Methods for tracking, organizing, analyzing, and responding to stakeholder feedback

GMAC RECOMMENDATIONS

- Include more specific definitions of equity, as well as quantifiable metrics and a detailed explanation of the stakeholder engagement process (timeline, stakeholder groups, potential trainings, desired outcomes)
- Develop consistent definitions of equity, inequity, and discrimination

Draft Recommendations Section 4: Current State of Distribution System

CONSULTANT RECOMMENDATIONS

The ESMPs should use consistent methods for presenting the following information:

1. Aging infrastructure for substations, transformers, feeders, breakers, reclosers, and poles, including descriptions of the rationale that is used for determining when to replace it

2. Capacity deficiency for substations, transformers, feeders, breakers, reclosers, and poles, including estimates of headroom forecasted out for 10 years in the absence of new grid mod investments

3. Existing DER capacity, including DERs on-line, in the queue, and current time to get through the queue, and broken out by type of DER: energy efficiency, demand response, heat pumps, distributed PV, electric vehicles, storage, etc.

4. DER hosting capacity, including estimates of headroom forecasted out for 10 years in the absence of new grid mod investments

5. Reliability, including most relevant reliability metrics and summary of outages causes on blue-sky days

6. Resilience, including all relevant “all-in” performance metrics and summary of outages causes on black-sky days

GMAC RECOMMENDATIONS

- Depict information data tables and graphics in a couple places (and source data)

- Include data and metrics on power quality, new metrics for environmental justice communities and for electrification growth reporting, benefits of smart inverter controls, and estimates for peak demand reduction

- Explicitly connect content to the Commonwealth’s goals and suggest more technical and policy solutions

Draft Recommendations Section 5: Forecasting

CONSULTANT RECOMMENDATIONS

- Provide more details substantiating assumptions
- Include in load forecasts tables for each year for the next ten years, for the entire system, separately the expected impacts of new customers, demand response, energy efficiency, distributed PV, EVs, heating electrification, and distributed storage
- Describe how the forecasts of new DERs are derived, including (a) whether they are consistent with Massachusetts GHG and other policy goals and (b) a forecast of DER development without proposed grid mod investments and a forecast of DER development with proposed grid mod investments
- Include two sensitivities (low and high) in load forecasts to reflect uncertainty
- Include a forecast of the GHG emissions expected from each EDC, including (a) a forecast of GHG emissions without proposed grid mod investments and a forecast of GHG emissions with proposed grid mod investments and (b) a comparison of how those two forecasts compare with the requirements of the Climate Act

GMAC RECOMMENDATIONS

- Be more transparent in how different factors (such as policies, mass transit, climate change impacts, EV charging infrastructure, etc.) were factored into the demand forecasts
- Provide documentation of the assumptions made in the models and their uncertainties and provide this information in detail from all companies (preferably with a copy of the model itself)
- Use citations to indicate methodology/content and create consistent formatting
- Provide more detail for battery electric storage growth and sensitivity analysis
- Use sensitivity analyses to accommodate varying demand estimates for heat pumps

Section 6: 5- and 10-Year Solutions

- Consultant reactions and recommendations (10 minutes)

- Discussion (40 minutes)

Section 6

Five- and Ten-year Solutions

Outline of Section 6 Discussion

- Summary of ESMP Solution Sections
- Top observations, reactions, and concerns
- Balancing EDC incentives and grid “readiness” (for EV, HP, DER)
- What constitutes a capacity planning violation?
- To what degree can demand be managed through customer programs?
- To what degree do ESMPs consider alternatives to EDC capital spending?
- Joint EDC Proposal for Grid Services Compensation Fund
- Recommendations for the GMAC

EDC ESMP outline for 6

6.0 5- and 10-Year Planning Solutions: Building for the Future

- 6.1 Summary of existing investment areas and implementation plans (existing asset management and core investments, including Rate Case, Grid Modernization, Approved CIP Programs, Decarbonization, Heating, Electric Vehicle and Energy Efficiency Programs)
- 6.2 Design criteria changes (if applicable)
- 6.3 Technology platforms we are implementing (including AMI with data access, VVO, FLISR, ADMS, DERMs (to optimize 20-year solution set), Automated interconnection tools, etc.
  - 6.3.1 Description of implementation justification and expected benefits
- 6.4 Planning sub-regions
- 6.5 Sub-region 1
  - 6.5.1 Major substation projects
  - 6.5.2 Non-Wire Alternatives
  - 6.5.3 Alternative cost allocation approaches to interconnect solar projects – exploration of different approaches – pros and cons
  - 6.5.4 Alternative cost allocation approaches to interconnect battery storage projects – exploration of different approaches – pros and cons
  - 6.5.5 Equity and EJ outreach
- 6.6 Sub-region N
  - 6.6.1 Major substation projects
  - 6.6.2 Non-Wire Alternatives
  - 6.6.3 Alternative cost allocation approaches to interconnect solar projects – exploration of different approaches – pros and cons
  - 6.6.4 Alternative cost allocation approaches to interconnect battery storage projects – exploration of different approaches – pros and cons
  - 6.6.5 Equity and EJ outreach
- 6.7 Sub-region N (as above)
- 6.8 New Clean Energy Customer Solutions

Summary of Solutions Sections

Existing and Future Solutions

- Physical Grid Infrastructure* (for EV & HP load growth; DER/CIP; reliability/resilience?)
- Customer Programs (EV, HP, EE, DR, Solar, Rate designs, etc.)
- Technologies (ADMS, DERMS, CVR/VVO, FLISR, Load flow modeling, Communications Networks, AMI/related)

Detailed load forecasts and capacity upgrade needs by subregion/substation

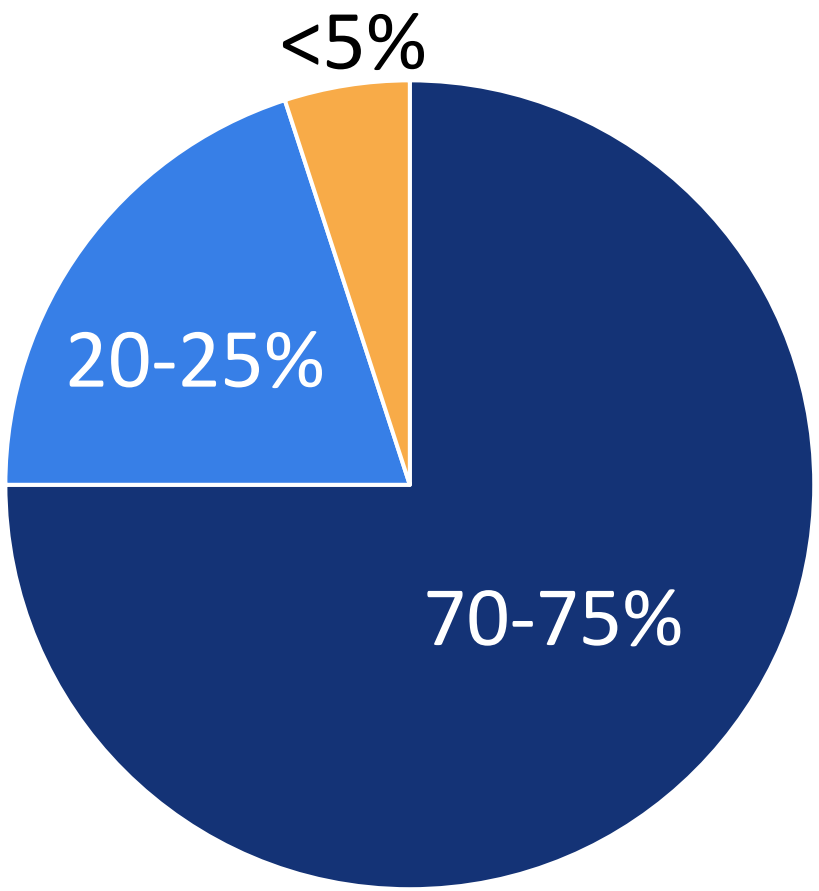
Non-wire alternatives (generally as a temporary solution, generally EDC-owned)

Joint EDC Proposal for Grid Services Compensation Fund

* Substations, Transformers, Circuit Breakers, Switches, Poles, Wires

Relative Size of Incremental ESMP Spending by Solution

When considering cost-effectiveness, focus on where the most dollars are:



- Physical Infrastructure
- Customer Programs
- Technology

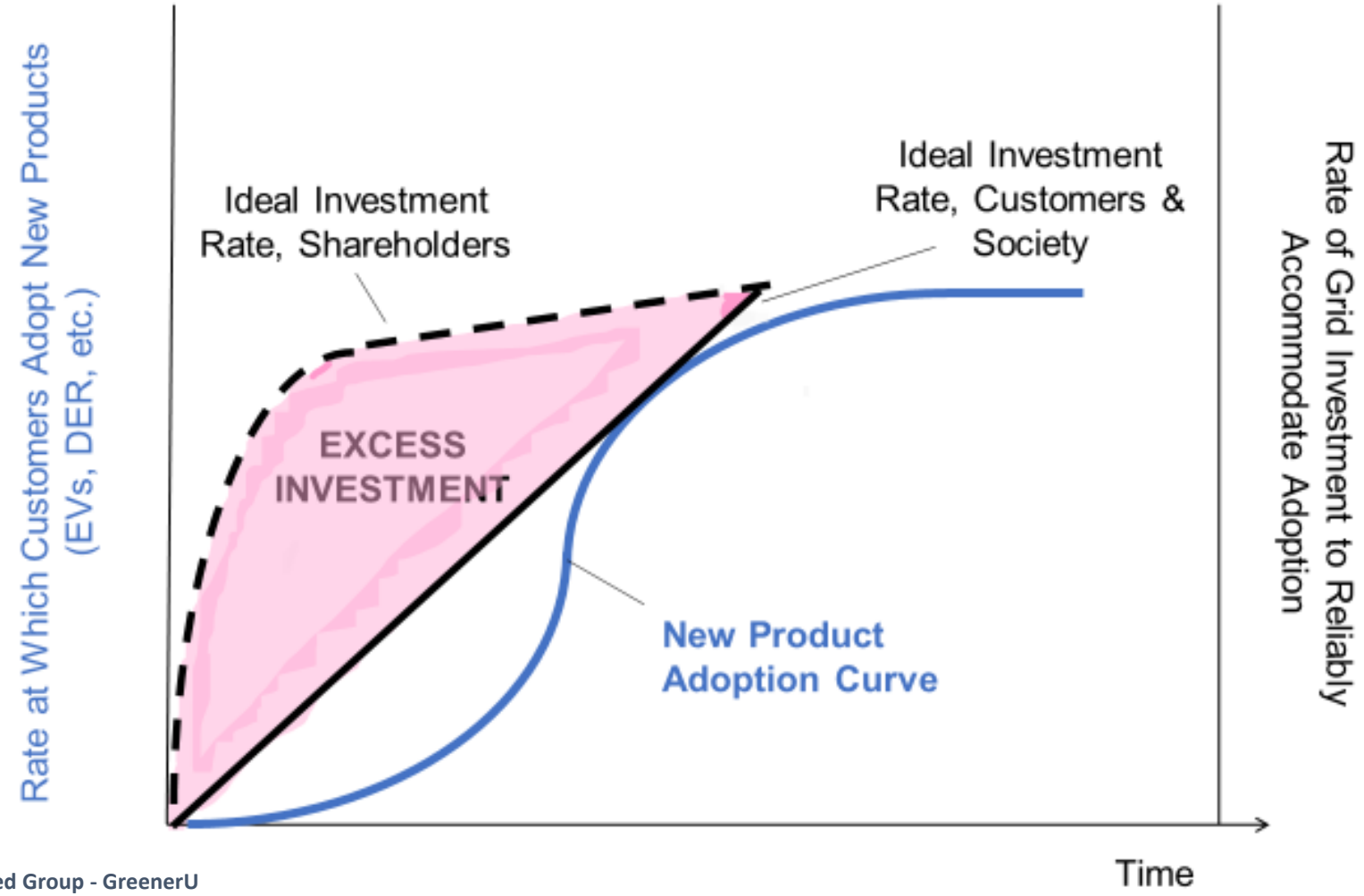
(Rough ranges, from Section 7 ESMPs)

Observations, Reactions, and Concerns

- Load growth solutions are based on forecasts that assume best case HP, EV and DER adoption assumptions (and then some, described as “head room”).
- EDCs appear to treat the translation of load forecasts into the need for capacity upgrades as a given. In reality, some amount of “overloading” discretion is available.
- The degree to which customer program potential to reduce peak loads has been incorporated into load forecasts is unclear (and possibly unsatisfactory).
- The degree to which alternatives to utility capital spending have been considered is unclear (and likely unsatisfactory).
- A Joint EDC proposed “Grid Services” tariff introduces competitive market concerns.

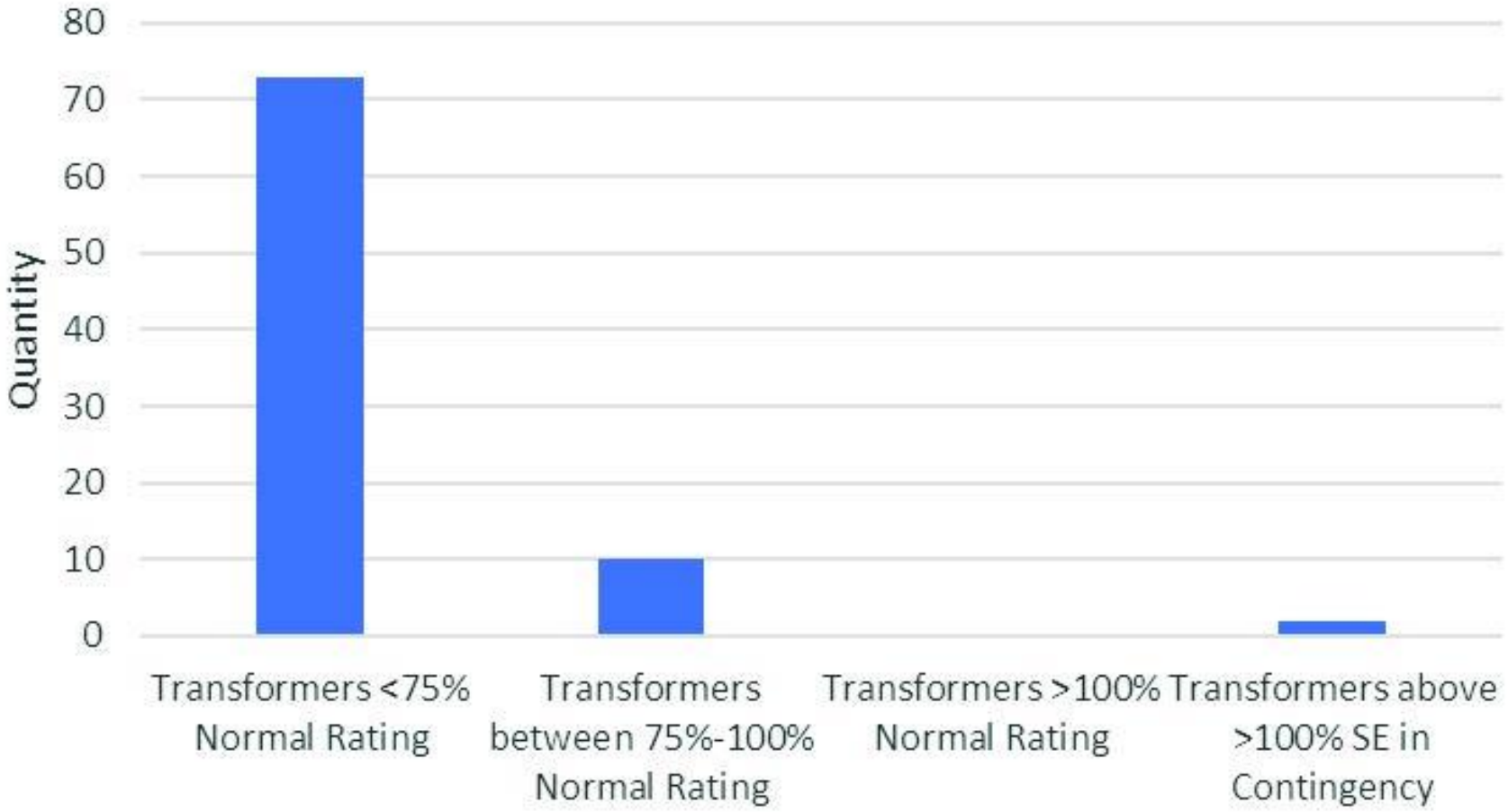
Balancing Utility Incentives and Grid "Readiness"

It is possible to invest too much, or too early, in grid readiness (for EV, HP, DER, etc.)
How can we know if we're closer to the dotted line or the solid line?



What Constitutes A Capacity Planning Violation? (Overloading)

(National Grid, Central Subregion, Section 4)

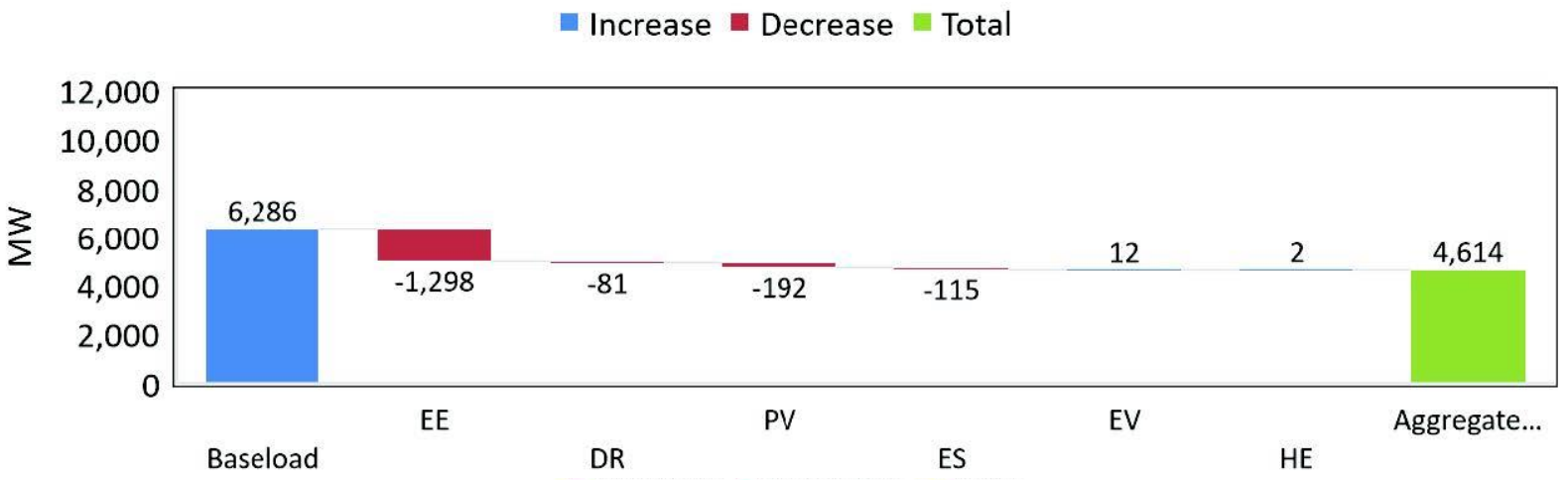


Overloading in contingency situations (abnormal, temporary grid configuration) is characterized by a range of risk based on the ratio of the hours of a year in which the overloading would occur if reconfigured.

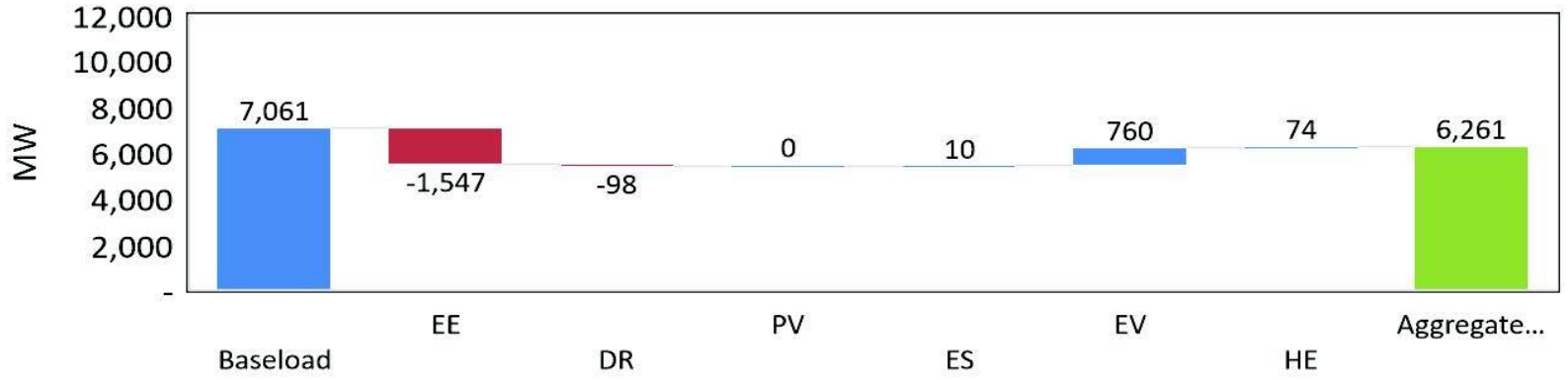
To What Degree Can Customer Programs* Reduce Peak Loads?

* Rate designs, demand response, customer-owned storage, vehicle-to-grid, etc.

System Peak 2024



System Peak 2034



- System Peak increases 1,647 MW
- Demand Response increases 17 MW

(National Grid, Section 5)

To What Degree do ESMPs Consider Alternatives to EDC Capital?

Example 1: BESS to improve power quality, New Bedford industrial park (Eversource)

- Is New Bedford PQ worse than system averages? What are the causes? What is the rationale for socializing these costs to all customers?
- What are the pros and cons of available alternatives to improving PQ at this location?

Example 2: Electrifying Boston district steam network boilers (Eversource)

- Available alternative A: Direct electrification (Air source heat pumps: more efficient?)
- Available alternative B: District ground source heat pump: even more efficient/cost-effective?

Example 3: Grid communications network services (Eversource, National Grid)

Example 4: Retain fossil-fueled heating for extreme cold events?

Joint EDC Proposal for Grid Services Compensation Fund and Studies

WHAT: EDC pays customers to use the energy in customers' batteries/EVs

WHY: To address local (temporary?) capacity needs/defer capacity upgrades

Concern 1: How does the cost of the payments compare to the cost of the upgrades? Are the upgrades being avoided, or merely deferred? How do the payments compare to payments available from demand response?

Concern 2: If the EDC controls the battery/EV, can EDCs use it for economic dispatch? Is this fair to demand response aggregators competing in ISONE?

Recommendations Regarding Sec. 6: Solutions

- **Solutions should be accompanied by metrics, with baselines and targets.**
  - 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)
- **Mandate consideration of alternative solutions to EDC capital spending.**
- **Mandate stakeholder participation in investment plan development.** Too late for this round of planning, but an idea of value for future ESMPs. Note that participating in plan development is dramatically different than evaluating the ESMPs the EDCs develop.
- **Standardize approaches to developing ESMP components among utilities.*** Opportunities to standardize the approaches utilities use include 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.
- **Coordinate electric grid planning with gas grid planning (Section 11).** What is the best way to use gas distribution assets in the future? How will this use impact electric distribution load forecasts and the need for capacity upgrades?

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

Break

Please be ready to start again in ~10 minutes

After the break…

- *Section 10: Reliable and Resilient Distribution System*
- *Section 12: Workforce, Economic, & Health Benefits*
- *Close and Next Steps*

Section 10: Reliable and Resilient Distribution System

- Consultant reactions and recommendations (10 minutes)

- Discussion (40 minutes)

Section 10

Reliable & Resilient Distribution System

EDC ESMP Outline for Section 10

10.0 Reliable and Resilient Distribution System

10.1 Review of the Commonwealth's Climate Assessment and Hazard Mitigation and Climate Adaptation Plans

10.2 Distribution reliability programs

10.3 Distribution resiliency hardening programs

10.4 Asset Climate Vulnerability Assessment (such as Flood Impacts, Wind Speeds, High Heat Impacts, Ice Accretion, Wildfire and Drought)

10.5 Framework to address Climate Vulnerability risks through Resilience Plans

Outline of Section 10 Discussion

- Summary of ESMP Reliability/Resilience Sections
- Perspectives on grid reliability/resilience, spending, and performance.
- Data-driven decision-making for spending intended to improve reliability and resilience: service interruption *likelihood* and *consequence*.
- Affordability concerns may require difficult solution prioritization and selection decisions.

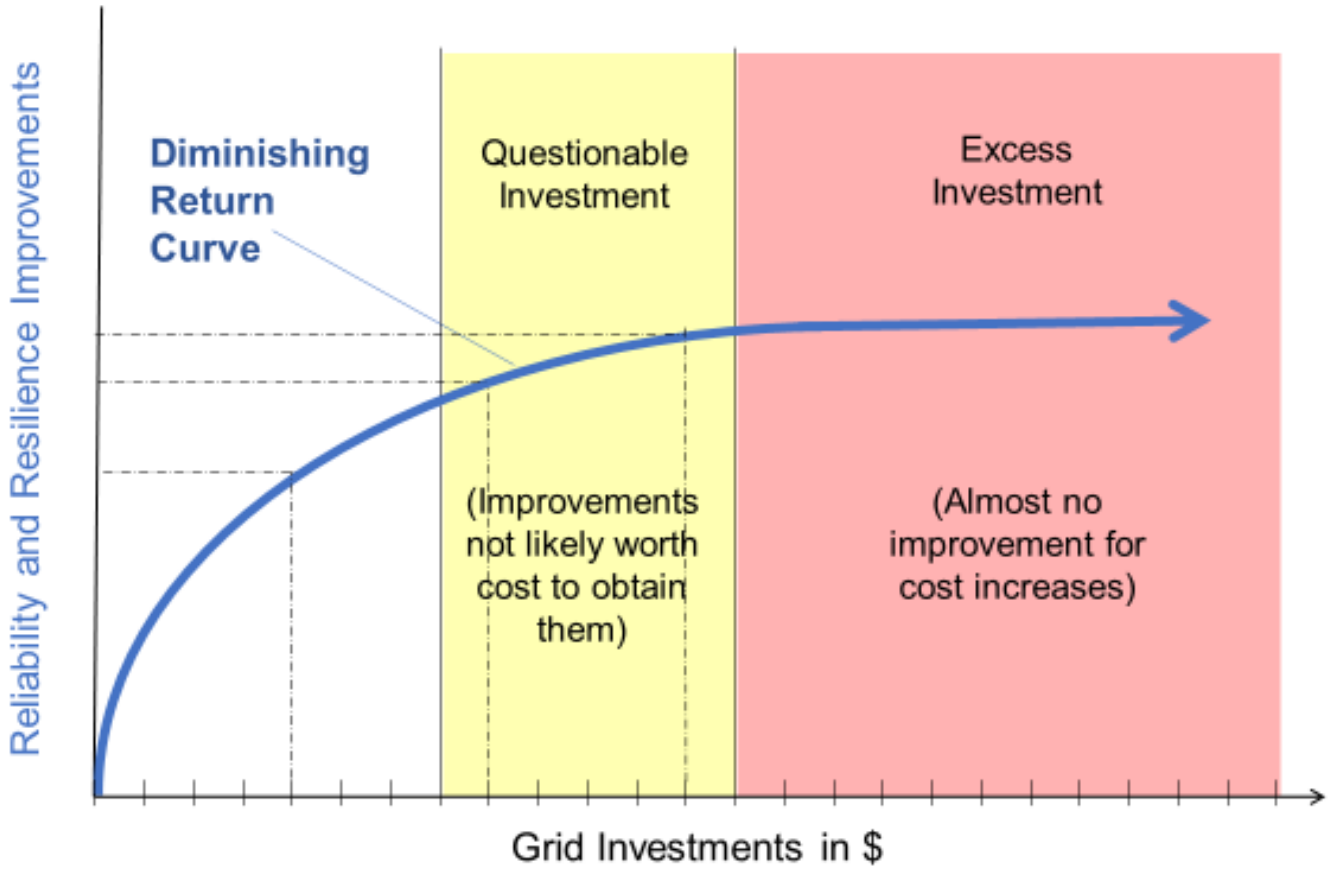
Summary of Reliability/Resilience Sections

- All EDCs cite increasing weather volatility as a rationale for increased spending
- All EDCs describe the same types of risk reduction efforts*
  - Emergency response programs/planning
  - Vegetation management
  - Distribution automation
  - Line “hardening” (covered conductor for vegetation contact and spacer cable for strength)
  - Prospective equipment replacement (substation equipment and poles)
  - Underground cable replacement programs (optimum replacement rate difficult to determine)
  - Undergrounding over overhead lines (extremely expensive on a per-customer basis)
- Eversource: 4kV circuit conversions to 13.8kV; worst-performing circuit program
- National Grid: Recent changes to construction standards

* Listed in rough order of cost-effectiveness

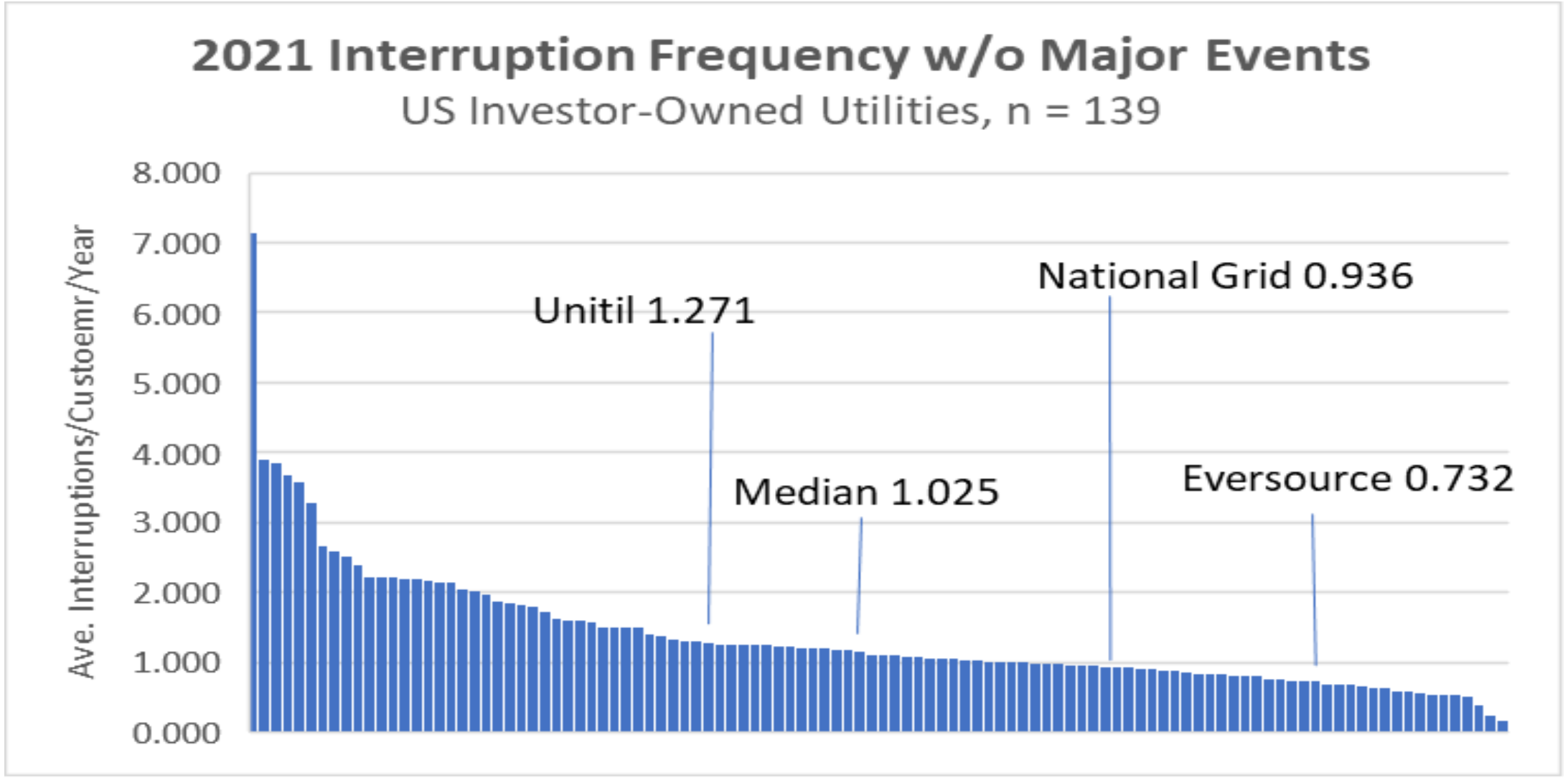
Perspectives on Reliability/Resilience – Law of Diminishing Returns

Every incremental dollar spent delivers less improvement than the last dollar spent.

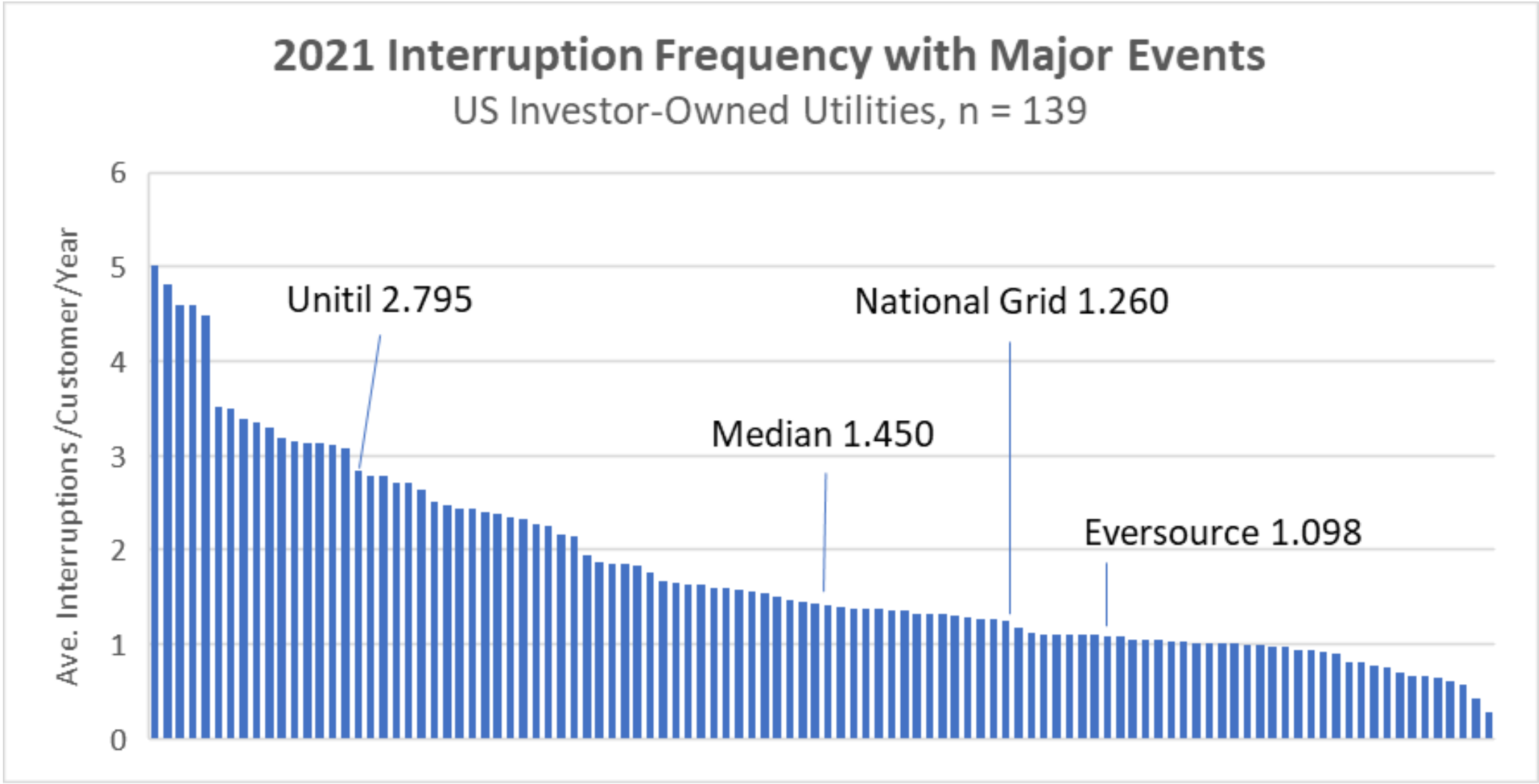


Eversource acknowledges diminishing returns to their resilience work.

Perspectives on Reliability – EDC Performance



Perspectives on Resilience – EDC Performance



Likelihood of Service Interruptions Varies Widely by Location

- Coast and Cape at higher risk from hurricane/nor'easter than inland.
- Heavily treed areas at higher risk from ice and wind.
- Customers further from substation at higher risk than those closer to substation.
- Urban customers have fewer interruptions than rural customers (due to the greater availability of grid reconfiguration options).
- Customers served by overhead lines are at higher risk than those served by underground cable.

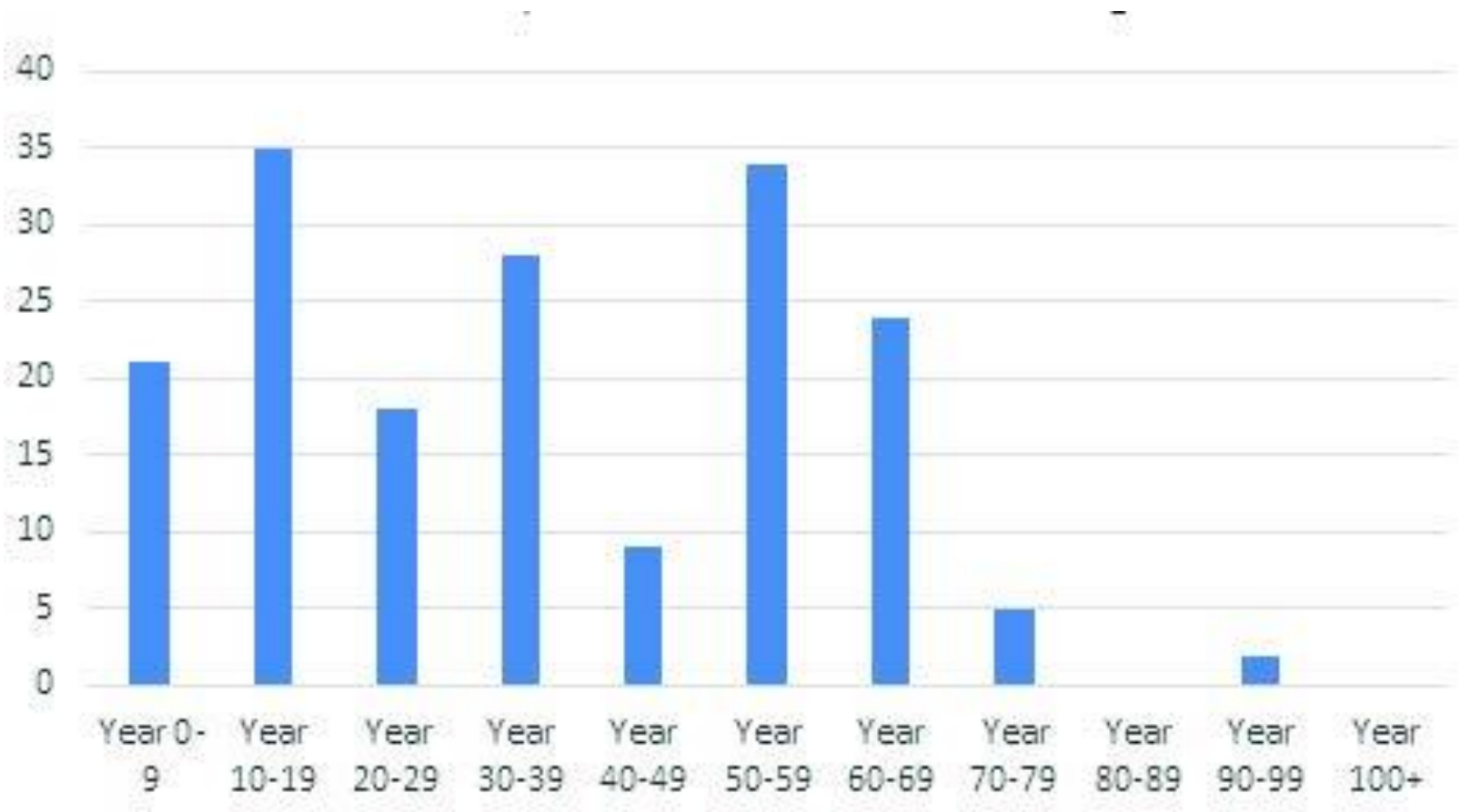
Consequence of Interruption Varies by Location and Customer

- Customer Density (urban consequences higher than rural)
- Facility Type (hospital, wastewater treatment, police/fire departments, etc.)
- Customer with full electric heat (higher consequences)
- Customer or community with DER and energy storage (lower consequences)

Variation in service interruption likelihood, consequence, and solution cost make data-driven decision-making imperative for investments proposed to improve reliability/resilience.

Data-Based Decision Making: Prospective Equip. Replacement Example

(National Grid, Merrimack Valley Subregion, Substation Transformer Age, Section 4)



- Substation equipment is tested routinely.
- Equipment that passes objective tests should remain in service.
- Replacing equipment that passes tests because of age or subjective assessments of condition is not cost-effective.
- Equipment replaced due to age/subjective assessments may need to be replaced again in a few years for load growth.

Affordability Concerns and Solution Prioritization/Selection

If necessary, how should Massachusetts evaluate the trade-offs associated with solution prioritization/selection/deferral?

- Capacity expansion for EV and HP
- Reliability and resilience improvements
- Renewable generation and energy storage capital expenditures
- New transmission capital expenditures
- DER accommodation capital expenditures
- Paying down the gas infrastructure

Recommendations Regarding Sec. 10: Reliability/Resilience

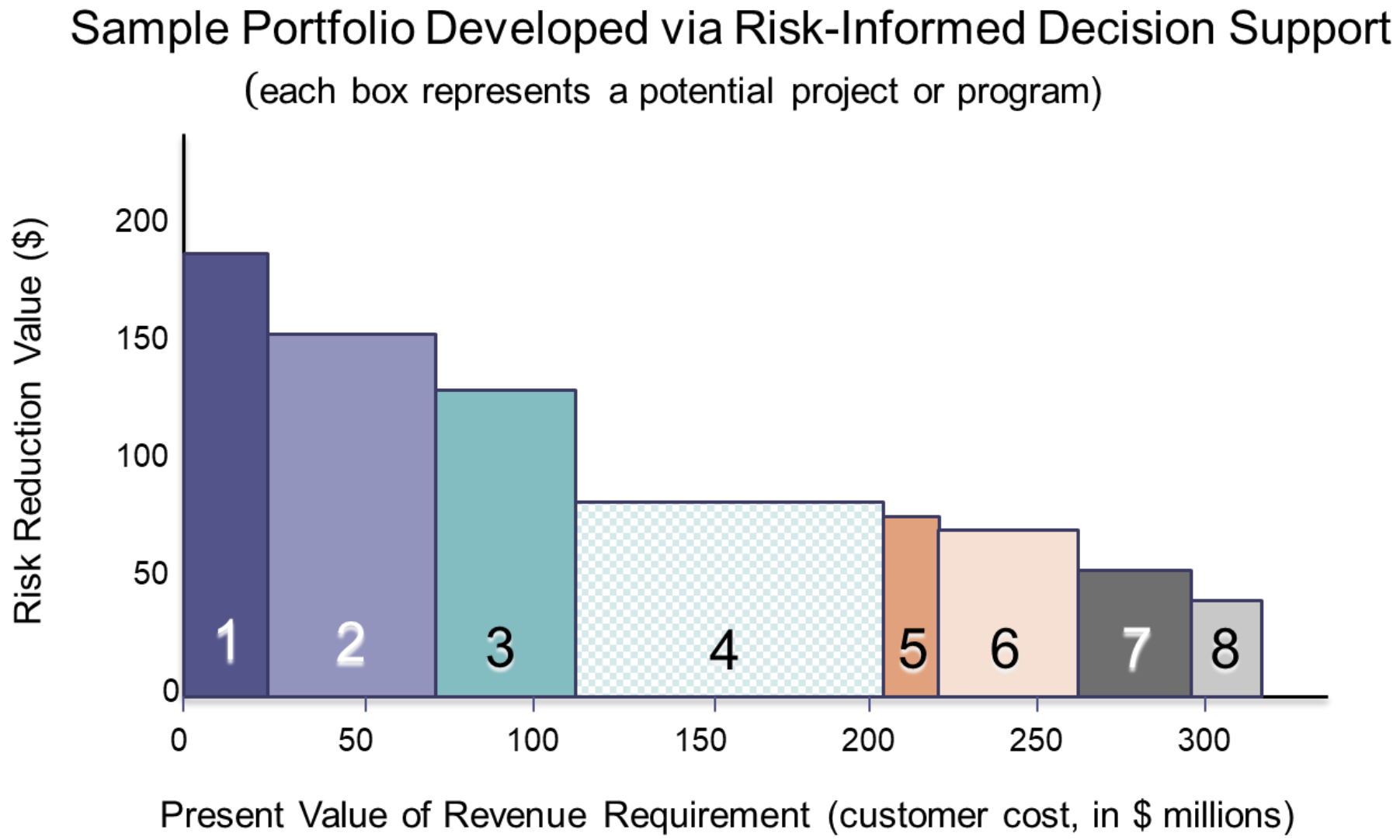
- **Mandate that EDCs estimate the (reliability) risk reduction value of Solutions in dollars, enabling comparisons to costs (and to other competing Solutions)**
  - California PUC recently mandated for all reliability/resilience and safety spending.*
  - Can be applied to other types of risk (DER interconnection delay, EV charger delay, heat pump delay, etc.)

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

- **Consider developing processes to help make difficult Solution prioritization, selection, and deferral decisions.** (Risk Informed Decision Support is one option for making choices within constraints.)

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

Appendix: Risk-Informed Decision Support Example



Section 12: Workforce, Economic, & Health Benefits

- Consultant reactions and recommendations (<10 minutes)

- Discussion (10-15 minutes)

Section 12

Workforce, Economic, & Health Benefits

EDC ESMP outline for Section 12

12.0 Workforce, Economic, and Health Benefits

- 12.1 Overview of key impact areas
- 12.2 Jobs training and impacts to disadvantaged communities
- 12.3 Workforce training (with action plans) – barriers for building the workforce needed to build and operating the grid of the future
- 12.4 Location economic development impacts
- 12.5 Health Benefits

Overall Reactions: Scope and Priorities

Terminology:

- Workforce impacts refers to the creation of new jobs in the clean energy industry
- Economic impacts refers to job gains/losses and other effects on the economy in general
- Health impacts refers to public health impacts of electricity generation, transmission, and distribution

Requirements of Sections 92b and 92c of the Climate Act (pertaining to Grid Mod):

- Workforce impacts are not mentioned (except in the subtitle) but are mentioned elsewhere in Climate Act. This implies they are a relatively low priority.
- Economic impacts are not mentioned. This implies they are a relatively low priority.
- Health impacts are not mentioned. This implies they are a relatively low priority.
- GHG impacts are explicitly mentioned. This implies they are a relatively high priority.

Much of the information in Section 12 focuses on the low priority impacts, while there is very little information on the high priority impacts (GHG emissions)

Overall Reactions

Chapter 12 is highly standardized across the ESMPs

- Qualitative discussion of workforce benefits
- Quantitative presentation of economic benefits (estimated with the RIMS II model)
- Qualitative discussion of health benefits

Given the EDC's approach to Chapter 12, results will be generally positive by design

- Renewable generation and electrifying end-uses will reduce emissions and adverse health impacts.
- Spending money to support DERs will stimulate economic activity and workforce development.

But these positive results do not demonstrate that the EDC's grid mod proposals are the best way to achieve these outcomes

Further, the methods used do not help justify the grid mod investments

- The methods are not sufficiently quantitative or robust
- The incremental impacts of the investments are not clarified

Reactions: Workforce Benefits

To assess workforce development benefits, the EDCs should quantify anticipated job creation and provide details about these jobs including:

- The types of jobs that will be created because of the proposed investments
- Where the created jobs will be located
- Who will fill these jobs – specifying EJ/equity implications

Workforce impacts could be better integrated with the quantitative analysis of economic impacts:

- Economic impacts analysis could provide detail at the sectoral and/or community resolution
- Economic impacts for given investments and alternatives could be scored based upon their relative workforce development benefits
- Deployment plans could be calibrated to maximize workforce development benefits

Workforce development efforts could be better integrated with stakeholder outreach to ensure that the EDCs plans are viable and best address workforce needs.

Reactions: Economic Benefits – EDCs' Approach with RIMS II

The EDCs used the Regional Input-Output Modeling System (RIMS II) tool to estimate the "economic impact" and "employment impact" of proposed plan spending

RIMS II is an input-output (I-O) model similar to IMPLAN that relies on Bureau of Economic Analysis data

RIMS is a reasonable option for this purpose, given that economic impacts appears to be a low priority, but it has drawbacks (e.g., high degree of sectoral aggregation, static economy model)

The EDCs do not provide sufficient detail about their modeling methods and results, and the benefits that are reported do not facilitate evaluation of investment proposals and alternatives

Reactions: Economic Benefits – National Grid Results

Table 82: Economic and Employment Impacts of ESMP Investments based on RIMS II Methodology

Summary	
Economic Impact of Final Demand	**$M**
Incremental Benefit (2025-2030)	$1,483
Incremental Benefit (2030-2035)	$1,464
Incremental Benefit (2025-2035)	**$2,948**
Employment Impact of Final Demand	**# Jobs**
Incremental Jobs Impact (2025-2030)	11,162
Incremental Jobs Impact (2030-2035)	11,514
Total Incremental Jobs Impact (2025-2035)	**23,176**

The presentation of economic benefits lacks key detail: the EDCs should include more information about inputs/assumptions and results should be disaggregated for both the "with grid mod" and "without" scenarios.

Source: National Grid ESMP, Section 12.4, page 534

Reactions: Economic Benefits – Need for a Net Analysis

Three key contributors to the net macroeconomic impact:

- Investment in a technology (e.g., grid mod, DERs) will naturally increase jobs and economic activity
- Investments in these technologies can reduce jobs and economic activity by eliminating the need for other investments (e.g., traditional distribution, transmission, and generation)
- Utility bill impacts
  - Increased bills will reduce customer spending and reduce economic development
  - Reduced bills will free up customer spending and increase economic development

A complete, net economic analysis should account for all three drivers. However:

- The ESMPs apparently do not account for reduced jobs from shifting investments away from traditional infrastructure or reduced jobs from bill increases from grid mod spending.
- Consequently, the economic impacts are likely to be significantly overstated.
- To address these issues, the EDCs should have evaluated two scenarios – one with grid mod, and one without.

Reactions: Health Benefits

While Sections 92B and 92C do not require analysis of health impacts with the ESMPs, the EDCs are tasked with identifying "customer benefits" associated with "all proposed investments and alternative approaches," including "reduced greenhouse gas emissions and air pollutants" (Section 92B(b)ix).

The ESMPs do not indicate the extent to which health impacts are due to reductions in GHG, reductions in other emissions, or something else.

The ESMPs do not present the health impacts quantitatively or provide health information in a manner to support comparison across alternatives.

The ESMPs do not clarify whether health impacts will be incremental with proposed grid mod investments.

Reactions: Climate Benefits

The Climate Act, the DPU filing requirements, and the GMAC guiding questions all very clearly state that the ESMPs should "facilitate the achievement of the statewide greenhouse gas emission limits."

The ESMPs *qualitatively* discuss the potential for grid mod investments to reduce GHG emissions but provide no *quantitative* evidence of how they will do this.

Quantitative evidence should include:

- Forecasts of GHG emissions assuming the proposed gird mod investments are not implemented.
- Forecasts of GHG emissions assuming the proposed grid mod investments are implemented.
- A comparison of those forecasts with each EDC's statewide GHG emission limits.

Draft Consultant Team Recommendations

General

- 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.

Economic Benefits

- This should be a net analysis that accounts for rate impacts and job losses.

GHG Benefits

- Much more detail and rigor are needed.
- Results should show incremental impacts of grid mod.
- Results should show quantitatively how the grid mod investments help EDCs meet GHG targets.

Close and Next Steps

- Next GMAC Meeting: October 12th, 2023, from 1-4 PM.
- Topics for next meeting
  - Continued September 28th Discussion and Review of Key Chapter Findings
  - Section 8: 2035-2050 Drivers
  - Section 9: 2035-2050 Solutions
  - Section 11: Integrated Gas-Electric Planning

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Appendix: Process for Questions and Information Requests

- The GMAC is under significant time constraints to discuss the ESMPs.
- We expect the GMAC to have many questions about the provided ESMPs.
- We request the EDCs to prioritize GMAC discussion over immediately answering questions during meetings.
- The meeting minutes taker will keep a list of questions raised by GMAC members during meetings and compile into a list for review by the Chair.
- The Chair will review and send appropriate questions to the EDCs for their response.
- EDCs' responses will be posted on the GMAC website.