Technical Standards Review Group (TSRG) -

ESMP Technical Deep Dive Discussion

PRESENTATION NOTES AND Q&A MINUTES

Thursday, December 7, 2023, 1:00 – 4:00 p.m. EST

Virtual Meeting

Session Facilitator:	Sam Uyeno, West Monroe Partners
Utility Presenters:	Gerhard Walker (Eversource), Lavelle Freeman (Eversource), Sophia Zhang (Eversource), Jen Schilling (Eversource), Shira Horowitz (National Grid), Elton Prifti (National Grid), Emily Slack (National Grid), Samer Arafa (National Grid), Josh Tom (National Grid), Kevin Sprague (Unitil)

SESSION OBJECTIVES & INTRODUCTIONS (5 MIN)

Sam Uyeno, West Monroe Partners, Background Session & Objectives / Session Rules

- Described the purpose and background of this scheduled deep dive technical discussion requested by the Grid Modernization Advisory Committee (GMAC)
- Purpose: Discuss the current state of several DER interconnections, future electrification goals, and the infrastructure plans necessary to enable future load growth

ESMP OVERVIEW (30 MIN)

Elton Prifti, National Grid, Current State of Grid Infrastructure

- Substations are crucial in the electric power system, especially for converting clean energy sources like wind and solar power to deliver to customers.
- Expansion or construction of new substations is a high-cost, long-duration endeavor. Delay in building them could hinder electrification and other customer requests.
- The Electric Distribution Companies (EDCs) follow a consistent formal planning process, detailed as follows:
    1. Forecasting projected demand.
    2. Establishing planning criteria with thresholds for acceptable behavior, specific to

each EDC.
3. Developing recommendations to address performance concerns.

- The ESMP process for each EDC aligns with legislative goals and follows established planning processes.
- The outcomes of these processes are specific to each EDC, based on their system's unique characteristics.
- The planning process involves the flow of planning inputs into analysis, leading to the development of a plan and culminating in a recommended plan.

Kevin Sprague, Unitil, Clean Energy Targets & Objectives

- Today's electric system is not prepared for the level of electrification and interconnection of DERs identified in the Clean Energy Climate Plan (CECP).
- Goal of ESMPs is to support MA legislature clean energy goals and distribute benefits in an equitable manner, with attention to mitigate the impacts on historically disadvantaged communities to support a just transition.

Sophia Zhang, Eversource, Forecasting Methodology

- The primary objective is to anticipate future demand and service requirements, enabling utilities to plan orderly and economically. This includes expanding equipment and facilities at minimal reasonable costs.
- Forecasting Approach:
    - Utilizes existing data sources and the latest market outlook.
    - Near-term forecasts guide immediate capital infrastructure decisions.
    - Distributed Energy Resources (DER) forecasting aligns with state decarbonization goals, such as MA CECP 2050 and the Decarbonization Roadmap.
- Forecasting Sensitivities:
    - Forecasts consider various scenarios and inputs.
    - Five- and ten-year forecasts focus on a single scenario due to the need for immediate action by Electric Distribution Companies (EDCs).
    - The 2050 electric demand assessment will include sensitivities around different technologies and policies for the long term.
    - Long-term capacity forecasting needs to account for proposed infrastructure developments for EVs, heating electrification, battery storage, etc.
- EDCs employ common methods to analyze historical and current system peaks using SCADA readings.

Sophia Zhang, Eversource, EDC DG Forecast Assumptions (Eversource)

- State goals are to identify a path to decrease GHG emissions and reach net zero in the state. There are various pathways to accomplish this. For Eversource, they have selected the all-options pathway as the baseline.
    - This pathway includes 5.4 MW EVs, 2.8 MW Res. Air Heat Pumps, 23 GW Solar, and 3 GW Energy Storage as the Massachusetts 2050 decarbonization goals & objectives.
- Eversource incorporates energy efficiency and demand response into forecasts, DER forecasts (with existing and forecasted), and permanent load transfers.

Kevin Sprague, Unitil, EDC DG Forecast Assumptions (Unitil)

- Unitil forecast will be updated annually through 2050 to account for different adoption rates and technology changes that may affect the pace at which these technologies are adopted and also to address any changes between now and then regarding MA state goals.
- Unitil breaks forecast into load adders and load reducers.
    - Adders: large spot loads, EV, electrification.
    - Reducers: energy efficiency, DERs, volt var optimization.

Rain Xie, National Grid, EDC DG Forecast Assumptions (National Grid)

- Multiple state climate scenarios serve as the inputs to NG forecasts.
- For electric vehicles, base case is the California Clean Car and Clean truck rules, which has been adopted by the state. The forecast meets the state target to reach over 90% of light duty electrification penetration and about 40% of heavy-duty vehicle electrification by 2050.
- For heat pumps, we also meet the stage target reaching over 68% of residential heating electrification and around 68% of commercial heating.
- Projecting significant growth in rooftop solar, spreading across service territories.

Elton Prifti, National Grid, National Grid ESMP Summary

- Somewhere mid 2030s is when system shifts from summer to winter peaking, attributed to heating electrification anticipated.
- National Grid plans to build out network infrastructure significantly to support forecasted load growth:
    - In the next five years they plan to upgrade 13 existing substations and add 32 feeders.
    - From 2030-34, they plan to upgrade 17 substations, build 15 new substations, and add 105 feeders.
    - From 2035-2050, they plan to upgrade 44+ existing substations, build 26+ new substations, and complete 86 total projects.
- ESMP requires investment of 2.4B over the next five years. This enables 1 GW of beneficial electrification and DER hosting capacity, and lay bricks for another 3 GW by 2034.

Lavelle Freeman, Eversource, Eversource ESMP Summary

- Current state of Eversource's distribution system includes installed capacity of 7.9 GW across 4 planning regions.
- Eversource's ten-year capital plan includes upgrading 12 existing substations and building another 14 before 2035. Eversource plans on adding six more substations after 2035.
- With existing 10-Year Capital Plan and planned substation additions and upgrades beyond 2035, Eastern Massachusetts system peak capacity deficiency remains at 3.3 GW (1.7 GW in Metro West and 1.6 GW in Southeast). To close this gap with infrastructure, 11 additional new substations in the Metro West and 10-11 additional new substations in the Southeast regions would need to be constructed.
- Eversource's proposed ESMP investments over ten years:
    - ~11B planned distribution system investments in ESMP.

- 960M new capital expenses proposed in ESMP.
- 12.1B ESMP total cost over next decade.

Kevin Sprague, Unitil, ESMP Summary

- There are two types of proposed investments in Unitil's ESMP: customer-facing projects and grid-facing projects:
  - Customer facing projects include technologies that help support the adoption of DERs and customer access to third party service providers and markets.
  - Grid-facing projects are projects designed to increase capacity, improve efficiency, improve monitoring and control, increase DER hosting capacity, and improve the reliability and resiliency of the system.
- Existing and approved spending by 2030 $86M.
- Proposed spending by 2030 $46M.

OPEN Q&A (30 MIN)

QUESTION 1:

RUSS ANEY, PARALLEL PRODUCTS SOLAR ENERGY: "Can the utilities also address cost allocation? There was a notion that some of the cost allocation methods that were being highlighted would be taken up by the ESMPs. I have not seen much clarity regarding how ideas such as the beneficiary pays principle might be carried over from the CIPs that are group studies now, and similarly how a common system modification fee might be used for shared secondary service upgrades. My question stems from when 20-75 [1] effectively shut down due to the law that caused the creation of the Grid Mod Advisory Council. There was this notion that the some of the cost allocation methods that were being piloted or suggested in 20-75 would be taken up by the electric sector modernization plans. I have not seen much clarity regarding how ideas such as the beneficiary pays principle might be carried over from the capital improvement projects or CIP projects that are group studies now might be carried over for future group studies or system impact studies. And then similarly, how might a common system modification fee be used to pay for secondary network upgrades or secondary shared secondary service upgrades. If any of the utilities could address how cost allocation is going to be treated or how the success of 20-75 is going to be built upon for future impact studies and group studies, I'd be grateful."

JOHN BONANZOLI, UNITIL: "The EDC's forecast and plan systemwide which includes the substations. Separately from that, we forecast and plan the distribution system, which goes down to the customer. Distribution planning is not part of the scope of the ESMP, and for that reason, the proposed projects and costs that were listed do not include upgrades to the existing distribution circuits that that may be required. I want to make sure that especially the DER stakeholders don't expect that because we've done the system-wide planning on the ESMP that impact studies will now no longer be required. The ESMP is long-range planning down to the

[1] D.P.U. 20-75 is an Order in which the Massachusetts Department of Public Utilities' addresses the first phase of its investigation into improving distributed energy resource planning, furthering the Commonwealth's progress towards achieving net-zero greenhouse gas emissions consistent with the Massachusetts Climate Act and the Massachusetts 2050 Decarbonization Roadmap. Click here to read D.P.U. Order 20-75.

substation, it does not include distribution circuits. As far as cost allocation, the ESMP legislation really didn't speak to that."

ELTON PRIFTI, NATIONAL GRID: "It's a little bit different on the National Grid side, we are including some distribution line investments and scopes of work in our ESMP. But again, every application that comes in, whether it's load or DER, will have location specific scope of work associated with it to the point where we're still going to need those system impact studies to be performed to figure out what other implications they will have on our system. While we are including some scopes of work, it's not necessarily going to be site-specific. Therefore, there could be incremental scopes of work associated with any type of application, depending on their location. When it comes to the CIP cost allocation methodology, the proposal we have in the ESMP is that we continue with that type of cost allocation. While we're not proposing any CIPs in the ESMP from a National Grid perspective, we're looking for the DPU to be approving at least the methodology that we can use for any of the groups (currently ongoing or in the process of getting completed)."

LAVELLE FREEMAN, EVERSOURCE: "For Eversource, we have proposed 7 new CIPs in the ESMP. For the provisional program we are assuming that that will be approved going forward, and we also set up a construct in Chapter 9 of our ESMP about how we would approach closing that gap between where we are in terms of hosting capacity and where we need to be in 2050."

QUESTION 2:

RUSS ANEY, PARALLEL PRODUCTS SOLAR ENERGY: "So the input was 90/10 weather forecast, but was the additional bump-up required for extraordinary climate change effects?"

SOPHIA ZHANG, EVERSOURCE: "The normalized 90/10 weather forecast looks at 30 years of historical weather and that corrects for the historical weather conditions and extremes that we see year to year. The climate forecast looks at future weather patterns, especially extreme events. So like you said, we know that there are climate change impacts coming, but because there's different levels of GHG emissions based on the IPCC emission scenarios, we have those scenarios as additives to the forecast because there's not just one future-looking scenario versus there are 30 years of historical actual weather. The 90/10 forecast looked at probabilities and perhaps extremes on an average basis based on the data set of the last 30 years, and the climate forecast includes the growth in temperature or perhaps even extreme colds that we might expect to see over the next 40 years."

QUESTION 3:

CLAIRE CHANG, GREENFIELD SOLAR INSTALLER IN WESTERN MA: *"*National Grid stated that with the substation upgrades they expected to anticipate one GW of DER to be interconnected. Was that one GW a year or a decade or in what time frame?"

ELTON PRIFTI, NATIONAL GRID: "It's 1GW over the first five-year period that we are going to be enabling, that doesn't mean that that's what's going to be interconnected. So with the investments that we are proposing, that takes us out to 2029, we are enabling 1GW of load serving capability as well as DER interconnection capabilities. This is across the state because projects spread throughout the state."

CLAIRE CHANG, GREENFIELD SOLAR INSTALLER IN WESTERN MA: *"*That's not very much, how will MA meet its goals? How much DER can interconnect with each substation upgrade? Is it correct that substation upgrades are merely to meet anticipated electrical demand?"

ELTON PRIFTI, NATIONAL GRID: *"*Based on forecasting, electric demand surpasses DER interconnection. And then when it comes to how much each substation upgrade will enable from a DER interconnection capacity, it varies. It depends on what the substation currently serves from a load perspective and from a DER interconnection perspective. Then it also varies whether the DER is PV or solar or battery interconnection, standalone batteries more specifically."

CLAIRE CHANG, GREENFIELD SOLAR INSTALLER IN WESTERN MA: *"*So if the state has set goals for 2030 and we actually meet those goals in terms of either solar or storage production, then that forecasting may be erroneous. If we can have enough distributed generation, those substations sites may actually be suboptimal. I'm not clear as to how those substation sites are chosen. As a resident of Western Massachusetts, I see on the maps that basically nothing north of Springfield has planned."

ELTON PRIFTI, NATIONAL GRID: *"*The one thing that maybe I need to clarify is that the ESMP investments are on top of our normal investments that we're making, as well as some of the customer specific scopes of work that are being scoped out currently as we speak through the group studies for all the DER interconnection."

LAVELLE FREEMAN, EVERSOURCE: "It would be great if we had a separate conversation dedicated to this. We look at load and DER equally as greatest drivers for building infrastructure and siting substations. It just so happens in the ESMP that twelve of our substations are driven by load, but we also are building 3 new subsections specifically for DER and those load substations do add a significant amount of hosting capacity for the DERs."

GERHARD WALKER, EVERSOURCE: *"*EDCs follow proposed state objectives in terms of DER objectives, so if the state hits its objectives, our forecasts are spot on. In terms of capacity buildout, a lot of buildout is clustered in urban areas due to load growth, and then there is CIP-specific build out in rural areas. All-in CIPs in front of DPU and ESMP CIPs, that's 2.5GW of hosting capacity added. Which, according to state projections, gets us well into 2045."

QUESTION 4:

RUSS ANEY, PARALLEL PRODUCTS SOLAR ENERGY: *"*Despite what Gerhard just said with state data driving DER growth, EDCs also looked at historical DER interconnection pace. I would note that in the last few years the pace of DER growth has been controlled completely by the interconnection process, not a desire by the industry to interconnect more systems, both storage and distributed generation. I think all the utilities have the largest interconnection queue backlogs that they have ever had at the moment and it's the slow pace of interconnection processing that is causing fewer projects to interconnect these days at almost a historically low rate. How much did this slow pace skew the perspective as to how many DER interconnections we'll see over next few years?"

GERHARD WALKER, EVERSOURCE: *"*The existing queue doesn't inform short term, the CIPs aren't formed on queue. Long term forecasts use annual buildout projection that is given by the state, we are using data based on hosting capacity at that point of the system at that point in time, and then we do an economic model of where the next solar development will go. If CIPs don't get approved, that's a big problem. So, we're building this based on the today's knowledge and mapping time that we know, assuming the steps are being approved, the forecast assumes they're approved."

RUSS ANEY, PARALLEL PRODUCTS SOLAR ENERGY: *"*Can you explain what investments Eversource is making to accelerate the study process for large DER projects? I would say that Eversource has extended the length of their studies more than anybody else by including dynamic studies and PSCAD modeling significantly extended the time it takes to complete studies. I'm wondering if you all are making investments to accelerate the pace through which you can complete these studies."

GERHARD WALKER, EVERSOURCE: *"*I don't want to shut this down, Russ, but now we're getting a bit off the ESMP. Right now we have that project on the interconnection automation going, which you're aware of. So that's the investment Eversource is doing. That's some $3 million granted by the Grid Mod Fund, and we're in the middle of that project and procurement of the solutions."

RUSS ANEY, PARALLEL PRODUCTS SOLAR ENERGY: *"*I'm very interested in any investments in modernization of your interconnection processing capabilities, which I think is a throttle or a critical constraint in your ability to achieve some of these goals."

ELTON PRIFTI, NATIONAL GRID: *"*We're going to touch on all of that on the next session, where we're going to talk about some of the technology enablement capabilities that we're looking into."

QUESTION 5:

Doug Pope, Pope Energy: "You referenced instructions by the state, are you using the 2050 decarbonization roadmap completed by EA that was completed December 2020, or are you using the roadmap legislation passed in 2021?"

SOPHIA ZHANG, EVERSOURCE: ***"***Original analysis. We looked at the all-options pathway in the 2021 study, and we have since compared those projects to the MASS CECP that was released.

They share a lot of the same base assumptions; we have done comparisons and added those sensitivities to the long-term analysis, and we correct as we go to see which one is reflecting the current trend."

Doug Pope, Pope Energy: *"*DOER, about a year ago, in referencing 2021 next gen roadmap legislation, stated that MA has to install between 27-31 GW solar by 2050. how are you going to respond to the Healey Administration's intent to revise the program to install 1.2 GW a year? Because it's happening in Grid Mod, you've got a Grid Mod proceeding that's happening right now and they're asking you for these answers in that Grid Mod proceeding."

GERHARD WALKER, EVERSOURCE: *"*1.2 is split across the state, going to have to ask NG as well. We can only build so fast as projects are approved. There is a limitation on what's possible."

Doug Pope, Pope Energy: *"*So if DPU gave instructions to accelerate growth, you'd be able to do that?"

LAVELLE FREEMAN, EVERSOURCE: "In our planning processes, there are drivers we respond to. Customer demand and policy directives are the big ones. We are looking at stimuli all across the system. If the legislators were to tell us to double capacity or rapidly increase, that would become a major driver, but it takes time to build capacity. If the state comes tomorrow and said more growth, I'm not promising you that something that we can do because as Sophia showed, it takes time to build capacity. But what it becomes is another driver for us to incorporate in our planning process and determine where and when and how we expand our system."

BREAK (5 MIN)

TECHNICAL DISCUSSION (40 MIN)

Emily Slack, National Grid, Current State of Interconnection and Infrastructure Plans

- Over 2GW of DG interconnected to date.
- Over 2GW of DG currently in queue.
- Current interconnection policies and practices are limited by today's capabilities.
- ESMP network infrastructure investments enable 1 GW of capacity for beneficial electrification and DG interconnections by 2029, another 3 GW by 2034.
- Have signaled in ESMP that we intend to continue proposing the CIP cost allocation methodology for group studies that are finalized following DPU approval and extension of CIP methodology.

Samer Arafa, National Grid, Distributed Energy Resource Management System - DERMS

- Support flexible interconnections of DER
    - Flexible interconnections of DER reduce interconnection cost and time, allow the system to host more DER, help deliver commonwealth's clean energy goals.

    - DERMS investments needed- DER dispatch engine, grid edge control, short term forecasts, ADMS integration, hosting capacity maps, interconnection study enhancements.
    - Customers can select from several connection options for solar, energy storage, and EV.
- Customer grid services programs
    - Enhanced reliability, enhanced system resiliency, prioritize investments, DER services, earn income, participate in FERC 2222.
    - NG will prioritize delivery of bridge to wires solutions to help reduce likelihood and severity of expected overloads before needed network infrastructure projects can feasibly be constructed in areas.

Josh Tom, National Grid, Non-Wires Alternatives

- Bridge to Wires NWAs maintain reliability during gap period when overloads on the network may be expected during peak hours.
- Deferral NWAs defer the need for a planned wires investment until outside of the planning time horizon.

Lavelle Freeman, Eversource, Current State of Interconnection and Infrastructure Plans

- 1.8GW online, 1.4GW in queue
- Trend here is that the PV and PV + storage and standalone storage is a significant portion of the DER installed and the in queue.
- 2/3 of the installed DER is in southeast MA and west MA, and over 80% of the in-queue DER is in these two regions.
- Major CIPs in Ten-Year Plan
    - 17 new substations, 14 load 3 CIPs.
    - 26 substation upgrades, 12 load 14 CIPs.
- Five-Ten Year plan: DER Hosting capacity needs & solutions
    - Installed solar gen of 1.5GW.
    - Over next ten years, solar generation forecasted to increase to ~2.9GW.
    - In addition to ten-year capital plan solutions, CIP solutions add incremental ~3GW of hosting capacity.
    - Significant number of CIPs and smart solutions needed to meet 2050 goals.
    - With existing ten-year capital and CIP plans, solar hosting capacity (substation level) deficiency remains at ~2.4GW.

Jennifer Schilling, Eversource, Distributed Energy Resource Management System – DERMS

- DERMS process:
    1. Operators identify constraint in DMS load flow
    2. DERMS calculates a dispatch plan using available large-scale and BTM resources
    3. DERMS signals DMS (distribution management system) and aggregators to dispatch
    4. DER responds
    5. Grid field devices register changes to the grid and operators see impact in DMS load flow

- Eversource has to make DERMS investments to be able to have the capability to execute VPPs. The following 4 bullets are the process by which VPPs operate.
    1. Real time grid constraint – local load at risk due to overload, or over/under voltage or ISO requires local DER dispatch to address transmission constraints.
    2. Coordinated dispatch – Eversource dispatcher calls upon VPP in the affected local area.
    3. VPP responds – discharge battery, call demand response or reduce charging demand, change inverter settings to provide voltage, current or frequency support.
    4. Constraint alleviated – VPP action addresses issue.
- Grid Services Compensation Fund
    - Conducted by MA CEC to establish compensation levels and high-level implementation framework.
    - Expected program start in 2025, following study completion.
    - Compensation and dispatch frequency will vary based on local system need

Jennifer Schilling and Gerhard Walker, Eversource, Non-Wires Alternatives

- Current Process in System Planning:
    - Every project the company brings forward to get funding for must go under an NWA screening process. The process itself has a continuous feedback loop, continuously updating technology assumptions through stakeholder engagement.
- Existing Framework Design
    - Reliability model: How do we account for intermittent availability (e.g., response of DR programs)
    - Dispatch model: How do we model dispatch such as large battery assets on constraint systems
    - Cost model: How do we compare solution cost including standardized assumptions.
    - Revenue model: What type of revenue options do we account for, including ISO market participation.
    - Benefits model

Kevin Sprague, Unitil, Current State of Interconnection

- Capacity Expansion
    - Projects identified to address capacity constraints (See ESMP Section 9).
    - Projects are based on most recent load forecast and demand assessment. These projects will be re-evaluated each year when the load forecast and demand assessment is updated with the most up to date load, DER, and NWA information.
- ADMS/DERMS
    - Goal to optimize the electric system.
- NWA Framework
    - DER or DG, energy storage or PV+storage, demand response, EE, managed charging, combined heat, and power, microgrid, future technologies.
    - Project is needed to address loading and/or voltage violations.
    - Traditional solution options greater than $500,000.
    - Required construction date is three to five years in future. At least three years to receive, evaluate, and implement NWA proposals.

    - Reliability, availability, and capacity characteristics included in the evaluation.
    - RFI and RFPs used to identify potential NWAs.
- Enable DER as a Grid Services
- FERC 2222 Implementation
    - Remove barriers for DERs to connect.
    - Allows DERs to participate in wholesale markets – same as large facilities.
    - Opens wholesale market to new source of energy.
    - Lowers wholesale price of electricity.

OPEN Q&A (40 MIN)

QUESTION 1:

MRINMAYEE KALE ("MK"), NEW LEAF ENERGY: "Do you separate the hosting capacity for DER export and load hosting?"

EMILY SLACK, NATIONAL GRID: "The capacity that we've stated is the increase in transformer rated capacity through each of the investments. So that capacity applies both to load and to hosting capacity, so it applies as an incremental ratings increase in both directions. And it's not something that we would allocate right to either load or DER if we had one MW of EV charging show up on that transformer, that doesn't take one MW away from a DG export customer. Although a battery that needed to charge from the system would need incremental charging capacity, so it depends on the type of DER. But for our plan, we did not allocate the incremental capacity to different use cases."

MK, NEW LEAF ENERGY: "I think it would be different based on where you are located geographically quite a bit. Some of the areas that are load-heavy and therefore they're not going to accommodate DER because the most popular DERs (like ground mount solar), there's no way you can put a ground mount solar in a very heavily loaded and city center."

EMILY SLACK, NATIONAL GRID: "So for the National Grid plan, our analysis showed that for the most part, our system is load serving constrained. So the greater constraint was accommodating beneficial electrification of the forecast rather than DER hosting capacity constraint. But the general theme for the ESMP investments is we're looking at the aggressive load growth to support beneficial electrification and also specifically focusing on the substation level not getting down to individual site-specific location for a specific DER or even load customer. All of the investments, the network investments that we are proposing in our ESMP are driven by the need to increase load serving capacity and hosting capacity as a secondary benefit."

MK, NEW LEAF ENERGY: "So in areas where there could be capacity increase, you wouldn't necessarily say that it is for accommodation in the ESMP."

GERHARD WALKER, EVERSOURCE: "A majority of the projects are load driven. And we have ~800 MW of step loads, those are just new buildings being put up in metro Boston area. ESMPs do include proposals for new substation capacity that is specifically targeted at DG interconnection. Substation in downtown Boston isn't going to enable hosting capacity. Nobody's deploying 200

MW worth of ground mounted solar in downtown Boston, so we're just geographically so far apart on that. But the ESMPs do include proposals for new substation capacity that is specifically targeted at DG Interconnection and I don't remember the National Grid numbers, Emily will have to speak to that."

MK, NEW LEAF ENERGY: *"*I have read through some of the upgrades that Eversource has proposed and understand the areas with National Grid door, and updates that I have reviewed. They seem like there's no distinction between load versus hosting capacity for DER. And that's I think from what Emily saying, capacity for DER wasn't a big factor in the ESMP not this round of the ESMPs, if I understand it right."

EMILY SLACK, NATIONAL GRID: "So because the load growth in our forecast far outpaces the DER growth, it's not that DER wasn't a big factor, it's that it wasn't the primary driver and that that is something that we're looking to articulate more clearly. As we're revising the plan before filing with the department, is the relationship between the enabled load serving capacity and hosting capacity in response to a lot of the great feedback we've gotten informs like these from the GMAC."

QUESTION 2:

RUSS ANEY, PARALLEL PRODUCTS SOLAR ENERGY: *"*How you value DER that's providing grid services. A lot of times DER is considered as deferral solution that gets awarded a value equal to the cost of funds of a capital improvement deferral rather than actually a substitute for the capacity that it might actually be providing and not just for a short period of time, but for a long period of time. How do we engage with NG and other utilities to the degree that they're discussing a grid services framework or platform to discuss how to value DER assets? How would you evaluate front of the meter batteries that can perform that same service during those same hours. How would you suggest compensating those front of the meter batteries for that grid service?"

JOSH TOM, NATIONAL GRID: *"*I think the question about front of the meter battery value, the short answer is yes, because I saw your question of can they provide those services in the same way that behind the meter batteries are compensated through connected solutions, is there value there. So, I think what we really want to make sure that we're doing is we're engaging with stakeholders. We're working across the other utilities. We're working with Mass CEC so that we have a common framework of how do these different assets provide value to the distribution grid. And then we can use that to figure out how to actually go forward with the grid services compensation fund and find actual opportunities for non-wires alternatives."

RUSS ANEY, PARALLEL PRODUCTS SOLAR ENERGY: *"*I would be happy to engage in these discussions, please send me the invite. Front of the meter batteries do provide value when they discharge during peak periods and that value should be compensated in some form or another potentially included in the wholesale distribution tariff if not through some other mechanism. Given that, I think we all agree there is significant value that they're providing during those hours, which is not for the distribution grid and is currently going uncompensated."

QUESTION 3:

CLAIRE CHANG, GREENFIELD SOLAR INSTALLER IN WESTERN MA: *"*The expectation by the utilities is that all the projects in the CIP queues are going to build, which is highly optimistic, and what happens if 20% of them don't? If you're betting on that, that limits your opportunities for building out anywhere else. Because of the climate in MA, a lot of the big developers are not pursuing big projects, I think it's going to be more and more difficult, especially with high capital costs, who knows what's going to happen with the smart incentives and who is actually eligible for them. There are a number of complications in this forecasting, and I think that there are the net metering issues that get added in, so it's not as simplistic as saying that the CIPs projects are all going to get counted. EDCs need to take into account that there is going to be some other mechanisms for encouraging PV development. Western MA is getting a lot of pushback for cutting down trees, and that is going to be a big problem if you want to put big projects in wooded areas. Western MA is not as favorable to those projects as it has been in the past. Also regarding grid services that's very interesting because grid services and behind the meter solar is not compensated nearly as much as it should be as a capacity building endeavor at the distribution level."

RAIN XIE, NATIONAL GRID: *"*I want to comment about the 10 GW by 2030 a little bit because we look at the all options scenario in the state 2050 road map as well as the newly released CECP. All the scenarios seem to be proposed something between 5 to 8 GW range statewide. So I'm not quite sure about the 10 GW or 20 GW of by 2030."

GERHARD WALKER, EVERSOURCE: "If we would get some clarification on those numbers would be great."

CLAIRE CHANG, GREENFIELD SOLAR INSTALLER IN WESTERN MA: *"*I think that the 20 gigawatts is total. So if we're at 3 1/2 four right now approximately, then that's adding six. It's 6 1/2. So that may be where the discrepancy lies."

GERHARD WALKER, EVERSOURCE: "So if the number is 10 gigawatts by 2030 that was mentioned right. And from our perspective, the known plans by the state don't come nearly close to that number. So where is the 10 gigawatts coming from?"

CLAIRE CHANG, GREENFIELD SOLAR INSTALLER IN WESTERN MA: *"*This has been in discussions with other groups about what the 2030 climate plan passed in March of 22 I think encompassed. So if I'm wrong, please excuse me, but there's still a gap between what the 2030 plan"

GERHARD WALKER, EVERSOURCE: *"*This could be something we can take offline, but we're going off the last published plans, not ongoing discussions and if there are such ongoing discussions that would ramp up the projected solar significantly at least I know my forecasting group is not involved in it and given by rains question, I'm gathering national groups not involved either. So I would highly recommend to involve the EDC's in those discussions to make sure that we can

capture that information and can adequately plan for it, because if we're hearing it here for the first time, that means we're not in those discussions."

QUESTION 4:

DOUG POPE, POPE ENERGY: "Do your planning models use the data that you already have in place. Will you be moving toward modeling using AI to expedite your forecasting process? Are you able to aggregate all this data into a predictive planning model that is using a historical base and AI?"

GERHARD WALKER, EVERSOURCE: "We are working on doing some interconnection automation that would automate good portions of these processes. Are we going to replace system planning process with AI? Not now, it is not reliable enough and we still need human judgement. There is a project on our end that is looking to automate some steps on the interconnection time side of this."

QUESTION 5:

BRIAN LYDIC, ***INTERSTATE RENEWABLE ENERGY COUNCIL***: "AMI and DERMS platforms, what synergies can they share to avoid duplication? Want to make sure we're not missing out on an opportunity to leverage technology."

SAMER ARAFA, NATIONAL GRID: "Yes, short version is that we believe we will have this data sharing platform and AMI will work through that platform. Master control comes from ADMS, but there is this data group where information gets passed though ADMS, DERMS. And so we do utilize some of the kind of the mesh that's going to happen from the data transferred through AMI. But at the end of the day, if you read our grid mod plan, we actually develop the more kind of strategic plan because it's not just terms it's also the capacitors, the reclosers, the FLISR, the VVO, all of that communication. So we put out our entire plan for communications. You'll find it in our grid mod filing, but you can't really utilize the entirety of the data communications platform in AMI you need. There's just more need than you have capacity, but we did present that our case for to do with our data."

QUESTION 6:

MK, NEW LEAF ENERGY: "Is this market platform envisioned to provide services to distribution or for DG to participate in transmission markets?"

SAMER ARAFA, NATIONAL GRID: "There is the distribution system grid services and that's our market platform and then there is some of the transmission system needs and that's from work to try once we're going to have to communicate with ISO. Short version is that we have a market platform in grid services and so does the ISO."

QUESTION 7:

RUSS ANEY, PARALLEL PRODUCTS SOLAR ENERGY: *"*Lavelle, without the Interconnection Process constraint, MA (and the world) has always met its solar targets well ahead of schedule. Solar and storage costs continue to decrease. Referencing back to Doug's question: what happens if we hit our 2030 targets sooner? My concern is that solar has consistently overachieved in terms of it deployment. Its only critical constraint has been the interconnection process. I hope the notion here is that here in MA if not nationally, we have reached those goals early, if allowed to proceed at the pace that we desire. What are the backup plans or contingency plans for DER that continue to outpace the capacity that's being developed as other part of this plan or through CIP upgrades."

LAVELLE FREEMAN, EVERSOURCE: "We are definitely never holding back solar. We take obligation to interconnect customers seriously. The way to overcome the slowdown of queue is the CIPs. We have been successful in getting one approved, we have 5 pending we are hoping get approved. That puts us at another GW of hosting capacity. We have said in this session we have proposed another 7 CIPs, this will provide another 500 MW of hosting capacity. Going forward, the way to do this is more CIPs, we understand we need to improve on our planning process. Switching from a paradigm of 'we are seeing constraints let's build a substation', now the paradigm is 'we project that in order to meet the states goals we need to enable solar and build the infrastructure and relieve the bottleneck'. Doing CIPs and group studies will help relieve that constraint."

RUSS ANEY, PARALLEL PRODUCTS SOLAR ENERGY: *"*We have had a project in the CIP group studies for over five years. That is very slow. I hope you request more CIP requests and group studies in your ESMP so we can accelerate this process. The beneficiary pays principle is integral to what we call the CIP process, and timeliness is really critical here. We are never going to see these projects resolved, we need to see a lot of investments towards making that process faster and reaching key decision points more quickly so that we can actually get things built and the EDCs hold the key to that."

LAVELLE FREEMAN, EVERSOURCE: "We will put proposals before the DPU in the interim for the next ESMP. We will have an improved cost allocation methodology that we are proposing, but one of the things that we do recognize is that it's not all technical. There are a lot of procedural related issues. There has not been a decision given yet as to why it's happening, but we are working on it."

JOHN BONANZOLI, UNITIL: "The ESMP is very dynamic. We are continuing to update our planning process and well as forecasts every year. This is not a one-time plan and then we don't do anything with it for five years. We are going to continue updating our planning and forecast based on the load and the DER that we see. This is not just a onetime thing."

GERHARD WALKER, EVERSOURCE: "In addition to capacity buildout, we do not hold all the keys. There are other tools too, flexible interconnection, we just filed the operational tariff that would

allow these sites to interconnecting constrained systems. In a lot of other things, we try to stretch the existing hosting capacity further."

END OF MEETING