GOVERNMENT OF THE DISTRICT OF COLUMBIA
OFFICE OF THE ATTORNEY GENERAL

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ATTORNEY GENERAL

Public Advocacy Division
Housing and Environmental Justice Section

ELECTRONIC FILING

June 14, 2024

Ms. Brinda Westbrook-Sedgwick
Public Service Commission
Of the District of Columbia Secretary
1325 G Street, N.W., Suite 800
Washington, DC 20005

Re: Formal Case No. 1130 – In the Matter of the Investigation into Modernizing the Energy Delivery System for Increased Sustainability

Dear Ms. Westbrook-Sedgwick:

On behalf of the Department of Energy and Environment (DOEE), please find its enclosed its Initial Comments on Synapse's VDER Study in the above-captioned proceeding. If you have any questions regarding this filing, please do not hesitate to contact the undersigned.

Respectfully submitted,

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Attorney General

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BEFORE THE PUBLIC SERVICE COMMISSION
OF THE DISTRICT OF COLUMBIA

IN THE MATTER OF:

Investigation Into Modernizing the	**)**	
Energy Delivery System for	**)**	**Formal Case No. 1130**
Increased Sustainability	**)**	

DEPARTMENT OF ENERGY AND ENVIRONMENT'S INITIAL COMMENTS ON A VALUE OF DISTRIBUTED ENERGY RESOURCES STUDY FOR THE DISTRICT OF COLUMIA

JUNE 14, 2024

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DEPARTMENT OF ENERGY AND ENVIRONMENT'S INITIAL COMMENTS ON A VALUE OF DISTRIBUTED ENERGY RESOURCES STUDY FOR THE DISTRICT OF COLUMBIA

The Department of Energy and Environment (DOEE) submits the following initial comments on Synapse Energy Economics' (Synapse) Study entitled *A Value of Distributed Energy Resources Study for the District of Columbia* (VDER Study).

I. Introduction

DOEE appreciates the opportunity to review and comment on Synapse's VDER Study. The VDER Study adds to a growing body of research showing that prompt action to accelerate the deployment of Distributed Energy Resources (DERs) in the District can provide significant cost savings to ratepayers while advancing the District Government's clean energy objectives.[1] The VDER Study adds new dimensions to this research by highlighting several specific drivers of electricity costs in the District and guiding the Public Service Commission of the District of Columbia (Commission) towards areas of priority action.

The VDER Study grew out of the Commission's Modernizing the Energy Delivery System for Increased Sustainability (MEDSIS) initiative.[2] The Commission launched the MEDSIS initiative in 2015 to address in a "global way the future outlook for energy growth in

[1] D.C. Department of Energy and Environment, The Strategic Electrification Roadmap for Buildings and Transportation in the District of Columbia (April 2023) (Strategic Electrification Roadmap), at 78-84 (finding that DER-based strategies can mitigate load issues on distribution feeders arising from electrification), *available at* https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/Strategic%20Electrification%20Roadmap-reducedsize.pdf.

[2] FC 1130, In the Matter of the Matter of Investigation into Modernizing the Energy Delivery System for Increased Sustainability, Smart Electric Power Alliance (SEPA), Final Report v.10 of the DCPSC MEDSIS Stakeholder Working Groups (May 31, 2019) (Final Report of the MEDSIS Stakeholder WG), at 124 (recommending the Commission obtain a value of DER study).

the District of Columbia, the feasibility of deploying more energy storage facilities and increased distributed generation, and the impact of these new technologies on Pepco's load forecasting and construction plans for the city."[3] In 2019, the Final Report of the MEDSIS Stakeholder Working Groups recommended the Commission obtain a value of DER study, noting how a robust understanding of the time and locational value of DERs could catalyze the cost-effective deployment of DERs.[4]

Synapse's VDER Study does indeed deepen our understanding of the times and places in which different forms of DERs can provide the most value. In these comments, DOEE focuses on several of the study's key findings and discusses next steps the Commission should take in light of the study's findings and recommendations. These comments are informed by technical assistance DOEE received from the National Renewable Energy Laboratory (NREL) through the U.S. Department of Energy's (DOE) National Community Solar Partnership. NREL provided a preliminary analysis of the study's methodology and findings, which is included as an attachment to these comments. However, DOEE notes that the specific policy recommendations included in these comments represent the views of DOEE and do not necessarily reflect the views of NREL, DOE, or their subject matter experts.

DOEE recommends the Commission take three concrete actions to build on the study's findings and recommendations:

1. The Commission should initiate a long-term distribution planning process to ensure that grid investments facilitate DER deployment, and to help

[3] FC 1130, Order No. 17912 (June 12, 2015) at 2.
[4] Final Report of the MEDSIS Stakeholder WG at 124.

proactively identify grid constraints that can be addressed with DER-based strategies.

2. The Commission should develop targets and specific compensation mechanisms to spur the deployment of energy storage in the District, in keeping with the national best practices for advancing energy storage.
3. The Commission should promote managed Electric Vehicle (EV) charging by expanding incentives for EV supply equipment and developing more ambitious rate offerings to incentivize off-peak charging.

In addition to the actions identified above, the initial VDER Study and future iterations will no doubt prove useful in guiding the development of policies and programs across a broad range of areas. DOEE looks forward to reviewing the comments of other parties in this proceeding, and to working with interested parties and the Commission on new initiatives to maximize the benefits of DERs in the District.

II. The VDER Study shows the importance of taking timely actions to accelerate the deployment of DERs in the District.

The VDER Study presents an array of important findings for the Commission and other parties to consider when evaluating grid investments and DER programs. To better understand the study's methodology and findings, DOEE requested technical assistance from NREL through DOE's National Community Solar Partnership.

With respect to the VDER Study's methodology and areas for future research, NREL's preliminary analysis concluded that the "report shows a generally comprehensive understanding

of modeling" the value of DERs and "provides significant insight into the value of DERs."[5] At the same time, NREL recommends the study team incorporate several improvements in future versions of the study, including (1) considering "interim time snapshots of 2030 and 2040 . . . instead of just 2045," (2) incorporating "additional feeders in the modeling to increase results granularity on feeder pressure," (3) refocusing the modeling to include "more commercial customers who make up a significant portion of load," and (4) providing additional analysis of "the impacts of heavier duty electric vehicle adoption," which can have significant impacts on both peak and annual loads.[6]

DOEE appreciates NREL's thoughtful assessment of the VDER Study's methodology and recommends the Commission incorporates these recommendations in future iterations of the VDER Study.

With respect to the VDER Study's key findings, NREL offers the following initial takeaways:

- **EV Charging Incentives**: To defer or avoid costly upgrades, the Commission could consider "the deployment of ratepayer funded incentives for electric vehicle supply equipment deployment that can deliver managed EV charging coupled with rate design that encourages off peak charging."[7]
- **Battery + Solar Incentives**: In the VDER Study's scenarios for increasing solar penetration, the "value of behind-the-meter (BTM) storage paired with rooftop PV

[5] Attachment: NREL, Review of the Public Service Commission of the District of Columbia's Value of Distributed Energy Resource Study, Version 1.0 (NREL Review) at 2,7 (June 2024). Note: The NREL Review contains a "DRAFT" watermark on each page. This is intentional because NREL has not officially published the NREL Review.
[6] NREL Review at 2, 7.
[7] NREL Review at 3.

. . . can be significant as this can help address the issue of matching local solar timing to help with summer and winter evening peaks."[8]

- **Non-Wires Alternatives (NWAs)**: The VDER Study's results present an opportunity for the Commission to "consider the value of implementing and incentivizing non-wires alternatives (NWA)," including enhanced demand response and customer-owned storage, which can "offer a cost-effective alternative to traditional substation upgrade[s] . . . for peak demand reduction."[9]

DOEE is grateful for NREL's assistance and concurs with the importance of those initial takeaways from the study. DOEE would also like to highlight several other key findings of note from the VDER Study.

First, the study finds that "needle" peaks on the distribution system, in which a feeder exceeds its normal rating for only a few hours a year, can trigger major system upgrades if left unaddressed.[10] These needle "peaks have the potential to drive hundreds of millions of dollars of capacity investment . . . when a few hours of relief could defer or avoid the upgrade."[11] The VDER Study goes on to conclude that many of these upgrades can be deferred or avoided entirely with the appropriate suite of DER-based strategies, potentially saving ratepayers hundreds of millions of dollars.[12]

Second, the VDER Study highlights the importance of prompt and timely action to accelerate the deployment of DERs. As the VDER Study notes, it takes time to implement DER-

[8] NREL Review at 3-4.
[9] NREL Review at 6.
[10] VDER Study at 8.
[11] *Id.*
[12] *Id.* ("In many instances, and in all modeled feeders, DER-based strategies have the potential to defer expensive system upgrades until 2045 or later, and potentially avoid these upgrades altogether.").

based strategies to address both distribution system constraints and financial risks associated with the wholesale power markets.[13] The VDER Study therefore repeatedly emphasizes the importance of early action to deploy DER-based strategies so that solutions are in place when they are needed.[14]

Indeed, District ratepayers are already facing the financial consequences of insufficient DER deployment and a lack of a robust toolkit to protect District ratepayers from wholesale power market price spikes. Between 2021 and 2022, real-time wholesale power prices in PJM increased by a staggering 101.4%, driven by gas and coal fuel supply shortages and generator outages during Winter Storm Elliott. [15] Structural problems with PJM's capacity market design and interconnection queue exacerbated the impacts of these events on electricity prices.[16] Greater deployment of local generation, energy efficiency, and load shaping and flexibility measures could have insulated the District from these price swings to a greater degree, thereby providing significant benefits to the District.

Finally, the VDER Study concludes that a variety of changes to distribution system planning are needed to realize the benefits and cost savings of DER-based strategies. These

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[13] In these comments, DOEE uses the term DER-based strategies to refer to the suite of tools to manage both local supply of and demand for electricity, including energy efficiency improvements, generation from solar and storage, and load-shifting measures such as rate designs that reward customers for reducing load during periods of peak demand.

[14] *See, e.g.*, VDER Study at 8 ("Therefore, the potential avoided costs suggest a high value for early action."); *id*. at 10 (noting the importance of "continuously monitor[ing] feeder-level loads against normal ratings to allow sufficient time to deploy solutions."); *id.* at 80 ("Targeted DER initiatives to address [alternatives to long-range construction projects] require time to develop and implement.").

[15] Monitoring Analytics, LCC, Independent Market Monitor for PJM, 2022 State of the Market Report for PJM (March 9, 2023), at 2-3, https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2022/2022-som-pjm-vol1.pdf.

[16] *Id*. at 2, 78-79, 82.

changes include utilizing longer planning horizons, establishing baselines for feeder-level loads and continuously monitoring changes to those baselines relative to feeder ratings, undertaking more granular forecasting of hourly demand and projected grid pressures, and developing estimates of long-term distribution system upgrade needs and costs to evaluate the cost efficacy of various distribution system solutions, including DER-based strategies.[17] As discussed below, these findings add to a chorus of recommendations from national experts and local D.C. parties regarding the need for an integrated distribution planning process in the District.

III. The Commission should take three concrete actions to implement the recommendations in the VDER Study.

The VDER Study underscores the importance of the Commission taking immediate action to develop programs, policies, and tariffs that will support the next generation of DER-based strategies in the District. These comments highlight three priority actions the Commission should pursue in the coming months.

A. The Commission should initiate an integrated distribution system planning process.

The VDER Study and comments from other parties drive home the need for an Integrated Distribution system Planning (IDP) process in the District. The DOE considers integrated distribution system planning to be a national best practice for reasons the VDER Study reinforces.[18] And many interested stakeholders and policy makers in the District, including DOEE, have highlighted the importance of an IDP process for achieving the District Government's clean energy goals.[19]

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[17] VDER Study at 79-83.
[18] *See generally* U.S. DOE, Office of Electricity, *Integrated Distribution System Planning*, https://www.energy.gov/oe/integrated-distribution-system-planning (accessed June 11, 2024).
[19] *See, e.g.*, FC 1130, Department of Energy and Environment's Initial Comments on Staff Proposed Order in Response to Order No. 19984 (Sept. 16, 2019), at 2-3 ("Integrated distribution

Incorporating increasing levels of DERs and realizing the greatest benefits from those investments requires a granular understanding of the current and forecasted capabilities of the distribution system. This system needs assessments should be developed through an IDP process that includes, among other elements, granular scenario-based forecasting of load and DER growth, assessment of short- and long-term system needs to accommodate load changes and anticipated DER growth, and identification of a range of possible solutions to address grid needs across different timeframes.[20]

Critically, utilities must create IDPs in collaboration with policy makers, DER developers, and other interested stakeholders, and an IDP must be subject to Commission review and approval. This collaborative planning process ensures the IDP includes accurate and useful information, promotes information sharing across the utility and other parties that will utilize the IDP to develop and deploy DERs, and facilitates identification of the full range of potential grid investments and DER-based solutions that may be needed to accelerate the deployment of DERs and alleviate pressures on the grid.[21] The VDER Study provides support for an IDP process in the District, outlining a variety of distribution planning improvements the Potomac Electric Power Company (Pepco) should undertake to unlock the full value of DERs in the District.

Comments already filed in this proceeding echo the importance of an IDP process. In its initial comments on the VDER Study, the DC Sustainable Energy Utility (DCSEU) Advisory

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resource planning will allow for additional transparency in utility planning process while enabling the most efficient deployment of DER.").

[20] *See* Smart Electric Power Alliance, *Integrated Distribution Planning: A Framework for the Future* (Sept. 2020), at 6, *available at* https://sepapower.org/knowledge/integrated-distribution-planning-idp-what-is-it-and-how-do-we-achieve-it/ (accessed June 11, 2024).

[21] U.S. DOE, Office of Electricity, Integrated Distribution System Planning: Principles and Approaches (Nov. 4, 2023), at 7 (noting that IDPs should be created with stakeholder input and be subject to regulator approval), https://www.energy.gov/sites/default/files/2023-11/IDSP%20Principles%2011%2004%20_optimized.pdf.

Board emphasizes the importance of information sharing around distribution system plans. As the DCSEU Advisory Board aptly notes, under the status quo, the DCSEU is "not able to prioritize placement of DER optimally, or to otherwise contribute to shifting or reducing peak load . . . [i]n the absence of an integrated resource plan that makes feeder improvements transparent."[22] Similar information gaps affect DOEE as the agency works to design and implement clean energy programs.

A well-designed IDP process would serve an array of important goals, including addressing information gaps regarding the capabilities and needs of the distribution system, ensuring Pepco's planning horizons and forecasting utilize appropriate assumptions, facilitating identification of additional grid investments that are needed to enable the cost-effective interconnection of DERs, and evaluating DER-based strategies that could result in significant cost savings to the District.

The Commission should initiate an IDP process and establish expectations for the contents of the plan as well as Pepco's level of engagement with interested stakeholders in its creation. The IDP proceeding would also provide an opportunity to review and enhance Pepco's NWA process as one component of an IDP.

When the Commission first approved Pepco's DSP/NWA Process in 2020, it "agree[d] with DOEE and other stakeholders that the DSP/NWA process must be an iterative one," and cited comments from DOEE and DC Solar United Neighborhood noting that the NWA process "could iteratively be transformed into a full-fledged [integrated distribution resource planning] process."[23]

[22] Initial Comments of the DCSEU Advisory Board at 3-4.
[23] FC 1130, Order No. 20286 (Jan. 24, 2020) at 14.

Since initiating its NWA process in 2020, Pepco has not approved a single NWA solution.[24] Nor is Pepco forecasting a need for a NWA in the near term, even as the Company continues to propose major traditional capital investments in rate cases.[25] As the Commission correctly concluded in 2020, the NWA process must be an iterative one. The Commission should lead the development of the next iteration of the NWA process as part of an IDP process.

B. The Commission should develop targets and new compensation mechanisms to incentivize the deployment of energy storage.

Several of the VDER Study's findings highlight the importance of energy storage in the District. Energy storage, along with measures to expand energy efficiency and demand response, can address the "needle" peaks that trigger costly distribution system upgrades. Energy storage can also provide a suite of other benefits to the District, including reduction in transmission congestion and locational marginal prices associated with purchasing energy on the wholesale market during periods of peak demand.[26] NREL's review of the VDER Study notes that the value of behind the meter storage in particular can be significant in high solar penetration scenarios as "this can help address the issue of matching local solar timing . . . with summer and winter evening peaks."[27]

The District has fallen far behind other jurisdictions when it comes to energy storage. In the Mid-Atlantic and Northeast alone, Maryland, Virginia, New Jersey, New York,

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[24] FC 1130, Pepco Letter to the PSC re 2nd DSP/NWA Process Results (Apr. 17, 2024).
[25] *Id*. at 2 ("Pepco is currently not forecasting a constraint over the next 3 years that meets the criteria to be included in the DSP/NWA Process.").
[26] Strategic Electrification Roadmap at 72-74 (reviewing the different value streams that energy storage can capture).
[27] NREL Review at 3-4.

Massachusetts, Connecticut, and Maine have all adopted targets for procuring energy storage.[28] These and other states have also developed financial incentives to promote either front of the meter storage, behind the meter storage, or both.[29] These compensation mechanisms can be vital for jumpstarting local energy storage markets.

Unlike the vast majority of other jurisdictions in the region, the District of Columbia does not have energy storage targets nor has it developed compensation mechanisms to procure or incentivize the deployment of storage. Over the past decade, the Commission has undertaken preliminary investigations related to energy storage, but has not pursued the proactive regulatory initiatives needed to support energy storage deployment in the District.[30]

The District is an outlier in this regard; almost all other states in the Northeast and Mid-Atlantic have made substantially more progress on energy storage, and states outside of the region such as California and Texas have made even more progress.[31]

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[28] Morgan Lewis, State by State: A Roadmap Through the Current US Energy Storage Policy Landscape (Mar. 4, 2024), https://www.morganlewis.com/pubs/2024/03/state-by-state-a-roadmap-through-the-current-us-energy-storage-policy-landscape (accessed June 12, 2024).

[29] *Id*. The Maryland PSC has an open active process to develop these compensation mechanisms. *See* Public Service Commission of Maryland, Maryland Energy Storage Program (MESP) 2023 Status Report (Dec. 27, 2023) (reviewing progress the MD PSC has made to develop procurement mechanisms, grid services programs, and deployment incentives for energy storage), https://www.psc.state.md.us/wp-content/uploads/Maryland-Energy-Storage-Program-MESP-MGA-Status-Report-2023.pdf.

[30] *See, e.g.*, FC 1166, In the Matter of the Investigation into Energy Storage and Distributed Energy Resources in the District of Columbia, Notice of Inquiry (Sept. 30, 2020), at 3 (inviting comments on questions related to energy storage classification and ownership).

[31] *See, e.g.*, Office of the California Governor, *California Achieves Major Clean Energy Victory: 10,000 Megawatts of Battery Storage* (noting that the state has increased its battery capacity by 1,250% since 2019), https://www.gov.ca.gov/2024/04/25/california-achieves-major-clean-energy-victory-10000-megawatts-of-battery-storage/#:~:text=At%2010%2C379%20MW%2C%20the%20state,100%25%20clean%20electricity%20by%202045 (accessed June 14, 2024).

Well-designed energy storage programs can provide significant benefits to the District in ways the VDER Study highlights, including by addressing needle peaks on overloaded systems during critical hours each year. As NREL also notes in its preliminary review, depending on cost and program design, the "deployment of solar PV and storage to minimize these [distribution feeder] peaks could form the basis of additional ratepayer supported rebates and incentives."[32]

In keeping with regional best practices for incentivizing storage, the Commission should initiate a proceeding to establish both appropriate energy storage procurement targets and supporting compensation mechanisms to facilitate the development of a robust energy storage ecosystem in the District.

C. The Commission should expand incentives for EV supply equipment that incorporates managed charging, and develop more ambitious rate offerings to shift EV charging load to off-peak hours.

Many of the VDER Study's core recommendations require undertaking ambitious efforts to reduce electricity consumption during periods of peak demand. The VDER Study delves into the importance of both load shaping measures (such as building efficiency, EV charging patterns, and solar generation) and load flexibility (such as demand response and battery dispatch). These initiatives require supportive programs and rate designs that provide price signals and financial incentives for energy users to shift their consumption during periods of peak demand. The Commission should act on these results to advance energy efficiency and load shaping measures across a range of load types, including electricity consumption from buildings.

DOEE would like to highlight one area in particular for the Commission's attention. Noting the impacts of EV charging load, NREL explains that the Commission could consider "ratepayer funded incentives for electric vehicle supply equipment deployment that can deliver

[32] NREL Review at 5.

managed EV charging coupled with rate design that encourages discounted off peak charging . . . to minimize the impact of peaks and defer or avoid costly" upgrades.[33]

DOEE agrees. The VDER Study supports the potential of advancing managed EV charging through ratepayer funded programs and supportive rate design, as do other technical analyses performed by DOEE.[34]

Therefore, the Commission should take two next steps to advance managed EV charging in the District. First, the Commission should expand ratepayer-funded programs for EV supply equipment that incorporates managed charging. Second, the Commission should develop more ambitious rate designs to promote beneficial load shifting, and track the success of these rates over time.

In its pending rate case, Pepco has proposed new time-of-use rates for both residential customers and commercial EV charging.[35] DOEE is encouraged by Pepco's proactive efforts to develop new rate designs to assist with beneficial load shifting. At the same time, these proposals do not include several features that will likely be necessary to realize the full load shifting and load flexibility measures identified in the VDER Study, including critical peak pricing or real-time dynamic signals. Therefore, DOEE recommends that the Commission task the Transportation Electrification Working Group with creating an annual work plan to develop, evaluate, and propose regular improvements to Pepco's time-of-use and dynamic real-time price offerings to shift EV charging load to off-peak periods.

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[33] NREL Review at 3.

[34] *See, e.g.*, Strategic Electrification Roadmap at 3 ("For the future EV fleet, carbon emissions reductions of 3-12% can be expected on an annual basis through smart- charging with an emissions-optimal control scheme.").

[35] FC 1176, Application of PEPCO for Authority to Implement a Multiyear Rate Plan for Electric Distribution Service (Apr. 13, 2023), Direct Testimony of M.J. Bonikowski at 42-55 (describing proposed rate offerings).

IV. Conclusion

The VDER Study is an important call to action for the Commission to take immediate and ambitious next steps to facilitate the next generation of DER deployment in the District. The VDER Study highlights the ways in which DER deployment could benefit the District and its ratepayers. But these benefits will not be realized without timely action to develop the programs, policies, and planning processes needed to realize the full benefits of DERs in the District.

Therefore, DOEE recommends the Commission (1) initiate an IDP planning process, (2) adopt energy storage procurement targets and create supportive compensation mechanisms, as the vast majority of states in the region have done, (3) build upon recent successes with the District's transportation electrification programs by expanding the scope of those programs, and tasking the Transportation Electrification Working Group with evaluating and designing the next generation of supportive rate designs to promote managed EV charging.

ATTACHMENT

Review of the Public Service Commission of the District of Columbia's Value of Distributed Energy Resource Study

National Community Solar Partnership Technical Assistance

The District of Columbia Department of Energy and Environment

June 2024

Version 1.0

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NREL is a national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy
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Overview

The District of Columbia's Department of Energy and Environment (DOEE) requested technical assistance (TA) through the US Department of Energy's (DOE) National Community Solar Partnership (NCSP) related to a proceeding by the Public Service Commission of the District of Columbia (PSCDC) on the Value of Distributed Energy Resource. NREL provides technical support to NCSP and is supporting NCSP on DOEE's request. DOEE's TA request was submitted in response to Formal Case 1130, "Investigation Into Modernizing the Energy Delivery System for Increased Sustainability". DOEE requested assistance on two topics from the case. The first phase is to review and provide input to DOEE on the Synapse Value of Distributed Energy Resources (VDER) Study (the Synapse Study) developed at the behest of PSCDC. The second phase will be to assess the potential impact of compensation mechanism scenarios in the Synapse Study on DOEE's solar incentives.

This report addresses the review and input requested above. The analysis and report is being completed and presented to DOEE in phases to align the performance with the PSCDC formal case timeline. The two phases outlined above will be provided in version 1 and version 2 of this report. Version 1 of this report will address the phase 1 preliminary review and set of inputs based on the DOEE request. Version 2 of this report will dive deeper into phase 1 considerations and add phase 2; a more in-depth analysis and inputs for DOEE to consider with an additional focus on the DER compensation mechanisms request made.

Review and Input on Synapse VDER Study

NREL has reviewed and summarized the Synapse Study and presented conclusions that compare and contrast methods, data sources, and findings between the Synapse Study report and other studies, consistent with the DOEE and PSCDC's requested areas of interest. As part of this review, NREL has leveraged other related value of DER work it has undertaken as well as similar utility-specific and National Lab studies. Further, NREL has not made recommendations, but has focused on assessing ways in which the Synapse Study reflects best/commonly accepted practices and whether Synapse has employed a reasonable methodology.

NREL has categorized its conclusions consistent with the following PSCDC requested areas of input and Key Findings in Table ES-1 of the Synapse Study. The PSCDC asked for 4 types of input on the VDER study in Formal Case 1300:

a. *Upon review of the Study's recommendations and proposed additional research, what are your comments, and are there any additional recommendations and/or additional research you would propose?*
b. *How can the Study, or successor studies, if any, contribute to the District's climate goals (specifically in the area of avoided greenhouse gas costs)?*
c. *How can the Study support the expansion of solar resources in the District?*

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d. What other recommendations, if any, do you have on the uses and applications of the VDER Study?

This report will provide input on 3 of the 4 questions, excluding request "b" on the topic of climate goals.

PSCDC's first request asked for input from stakeholders on what comments and additional recommendations or research were identified in relation to the VDER report. An initial review of the report shows a generally comprehensive understanding of modeling VDERs. Preliminary takeaways and recommendations are as follow:

- The study team could also consider interim time snapshots of 2030 and 2040 as well instead of just 2045 to see in more detail the grid pressure and relief from different measures on the modeled feeders.
- The study team incorporated representative feeders for modeling avoided distribution costs to inform district specific findings and recommendations. Within the "Distribution Grid Feeder Selection" section of the report, it was mentioned that of the nearly 800 distribution system feeders in DC, Pepco provided data for 32 feeders and out of these the study team identified 27 feeders for further analysis considering availability of data. From these 27 feeders, the team then selected 4 feeders based on categorization by level of pressure at peak demand, the seasonality of the peak, and the shape and duration of peak demand. Although the 3 criterions summarized below are broad but the 4 feeders that eventually got selected don't capture the various heterogeneity among the various combinations within the 3 categories. The 4 selected/modeled feeders out of the 800 feeders represent 0.5% of the all the available actual feeders in DC. Selecting more feeders for this modeling analysis would have been helpful to capture the breadth of various potential benefits that vary by feeder.
    - Level of peak pressure (very high, high, medium, and low)
    - Peak seasonality summer-peaking, winter-peaking, and all-season)
    - Shape of pressure (needle peaks, following load, graded pressure, minimal)
- As mentioned within section 5.1, approximately 75 percent of the total energy is represented by commercial customers, close to 27,000 commercial customers. Although commercial customers represent 75 percent of the total energy consumption as compared to residential customers, the study seems to be heavily skewed towards residential customers and residential loads within both modeled grid pressure and grid relief modeling assumptions.
- Electrification of Medium- and heavy-duty vehicles (MHDVs) should also be considered specifically as their impact can be significant in driving peak loads as well as annual loads.

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Key finding 2 (Table ES-1) from the Synapse Study focuses on the impacts of vehicle and building electrification on the District's peak grid periods[1].

> *New loads from 100 percent electrification of vehicles will be greater in volume, but new loads from both vehicles and buildings have a high potential to exacerbate current peak times if electrification is not well planned and/or inadequate relief measures are provisioned. Electrification of heating loads on some feeders may also create new peaks on winter mornings and evenings in addition to the summer afternoon and evening peaks that are currently typical.*

Initial takeaways are that the deployment of ratepayer funded incentives for electric vehicle supply equipment deployment that can deliver managed EV charging coupled with rate design that encourages discounted off peak charging for residential and fleet electric vehicle charging can be considered to minimize the impact of peaks and defer or avoid costly substation and or feeder upgrades due to electrification.

Key finding 5 (Table ES-1) from the Synapse Study focuses on the potential benefits of DERs to relieve grid pressures[2].

> *The technical potential for relief of pressure via DERs is significant, and in most of the cases studied even exceeds the potential pressure itself. The relief measures modeled are layered and include load-shaping measures from building efficiency, EV charge timing, photovoltaics, and load flexibility measures such as demand response and battery dispatch. Within these measures, load-shaping is expected to deliver the greatest load reductions, and combinations of measures are required to address the range of pressure scenarios observed. Notably, local solar delivery timing is not especially well matched to modeled summer and winter peaks because the pressure is most intense after 6 pm. Potential modifications of solar programs to favor western-facing arrays may be beneficial.*

Initial takeaways show that although the study found that the technical potential for relief of pressure via DERs is significant, within the load-shaping measures the building retrofits seem to provide the greatest load reductions both in terms of annual energy and peak demand reduction. The Main Relief scenario considers a modest amount of PV adoption using the Modest PV adoption Curve (shown in figure below) which assumed PV adoption at approximately 11 percent by 2045. The value of behind-the-meter (BTM) storage paired with rooftop PV in this case can be significant as this can

[1] Kallay, Jennifer, et. al., *A Value of Distributed Energy Resources Study for the District of Columbia.* 2024, Synapse Energy Economics, Inc.

[2] IBID

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help address the issue of matching local solar timing to help with summer and winter evening peaks with BTM storage.

As one of the recommendations, additional research should be performed to include BTM storage paired to rooftop solar exogenously by not only considering the modest level of PV adoption but variations of PV and BTM storage adoptions as well.

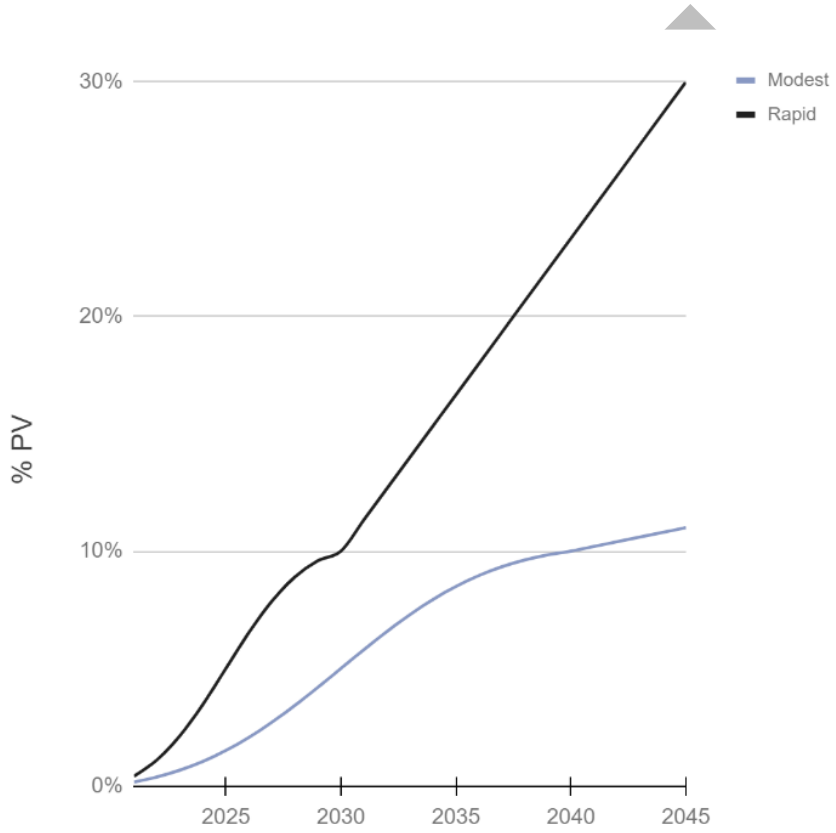

Figure 1 - PV adoption curves for scenarios modeled in the Synapse Study[3]

PSCDC's third request asked for input on how the study can be utilized to support the expansion of solar in the District of Columbia? Key finding 1 (Table ES-1) from the Synapse Study focus on how DER policies can be used to ameliorate impacts and costs of grid upgrades caused by electrification[4].

> *Aggressive electrification of buildings and transportation could increase summer demand peaks and the risk of costly distribution system upgrades to*

[3] Kallay, Jennifer, et. al., *A Value of Distributed Energy Resources Study for the District of Columbia.* 2024, Synapse Energy Economics, Inc.

[4] IBID

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meet the increased demand. Smart DER policies can provide a means to manage this risk proactively and benefit ratepayers, so long as solutions materialize in a timely manner. When the need for large investments can be deferred or avoided, the ratepayer benefits can be substantial.

Preliminary findings show that the increase in summer demand peaks due to electrification of buildings and transportation presents an opportunity for the PSCDC to consider the impact that customer-owned, but distribution utility-controlled solar PV and storage that can be deployed to limit the impact of these peaks and defer or avoid costly substation and or feeder upgrades. Depending on the outcomes of the ratepayer costs associated with these peaks, the deployment of solar PV and storage to minimize these peaks could form the basis of additional ratepayer supported rebates and incentives. Incorporation of time and locational varying rates to better cater towards solar, batteries and EV should be helpful to better align grid needs with resources.

Key finding 3 and 4 (Table ES-1) from the Synapse Study focuses on the potential for DERs to defer costly upgrades on feeders in multiple scenarios modeled while noting some upgrades may be worthwhile under certain scenarios[5].

As electrification pressure builds, many feeders may exceed their normal rating for only a few hours per year at first. As a result, initially only a few hours have the potential to cause high costs from distribution system upgrades. Therefore, the potential avoided costs suggest a high value for early action. In many instances, and in all modeled feeders, DER-based strategies have the potential to defer expensive system upgrades until 2045 or later, and potentially avoid these upgrades altogether. (Pepco's distribution system baseline stayed within or almost within the bounds of the normal rating of the feeders over the study period.)

Because large distribution capacity projects are relatively expensive, and because they are driven by the peak hour of load, "needle" peaks that cause the feeder to exceed its normal rating during only a few overloaded hours are among the most expensive events in terms of $/MWh. These peaks have the potential to drive hundreds of millions of dollars of capacity investment across the District when a few hours of relief could defer or avoid the upgrade. Because the large cost of a distribution system upgrade is spread across more hours of pressure in our "Maximum Pressure" scenario, it may make more sense to invest in upgrades to the system. However, when the pressure is partially reduced, such that only a few remaining hours are creating pressure, the same logic applies: the hourly value of responsive load curtailment is much greater.

[5] Kallay, Jennifer, et. al., *A Value of Distributed Energy Resources Study for the District of Columbia.* 2024, Synapse Energy Economics, Inc.

These results imply that the increase in pressure on feeders for short periods of time presents the opportunity for the PSCDC to consider the value of implementing and incentivizing non-wires alternatives (NWA), including enhanced demand response (DR) programs and customer-owned, but distribution utility-controlled solar PV and storage programs to reduce short duration peaks in a timely manner. These NWAs can offer a cost-effective alternative to traditional substation upgrade analyses for peak demand reduction.

Key finding 5 and 6 (Table ES-1) from the Synapse Study focuses on the types and beneficial impacts that DER deployment has in meeting or exceeding grid pressure while noting there are potential limitations due to shifts in peak grid hours seasonally[6].

> *The technical potential for relief of pressure via DERs is significant, and in most of the cases studied even exceeds the potential pressure itself. The relief measures modeled are layered and include load-shaping measures from building efficiency, EV charge timing, photovoltaics, and load flexibility measures such as demand response and battery dispatch. Within these measures, load-shaping is expected to deliver the greatest load reductions, and combinations of measures are required to address the range of pressure scenarios observed. Notably, local solar delivery timing is not especially well matched to modeled summer and winter peaks because the pressure is most intense after 6 pm. Potential modifications of solar programs to favor western-facing arrays may be beneficial.*
>
> *It will likely be important for the District to put careful thought into relief measures for winter-peaking feeders because more feeders may become winter-peaking over time with increased electrification. The modeled relief in this study (building retrofits, EVs, and solar generation) was more adept at addressing potential pressures on summer-peaking feeders than on winter-peaking feeders.*

From these findings the value of implementing and incentivizing non-wires alternatives (NWA) is clear, including enhanced demand response (DR) programs and customer-owned, but distribution utility-controlled solar PV and storage programs to reduce short duration peaks in a timely manner can vary between summer and winter load peaks. These seasonal factors should be closely considered to avoid unintended consequences from program design and implementation. It may be necessary to deploy different approaches in different seasons, provide varying incentives for DERs to meet the seasonal needs, and implementing a single approach uniformly across the year may not alleviate grid pressure.

[6] Kallay, Jennifer, et. al., *A Value of Distributed Energy Resources Study for the District of Columbia.* 2024, Synapse Energy Economics, Inc.

PSCDC's final request asked for input from stakeholders on how else the VDER study could be used. For this version of the report conclusions on this section have not been compiled and will be shared in version 2 which will contain phase 2 insights.

Conclusion

Version 1 of this report provides preliminary insights into the Synapse Study of VDERs. The insights are based on a review of the study and subject matter experts input based on review of other industry and national laboratory studies. Preliminary conclusions find that study provides significant insight into the value of VDERs but could include more data for interim years in grid scenarios modeled, include additional feeders in the modeling to increase results granularity on feeder pressure, seasonal variations, and the shape of the peak pressure, include more commercial customers who make up a significant portion of the load, and address the impacts of heavier duty electric vehicle adoption.

Preliminary synthesis of the Synapse Study findings show that there is significant potential of DERs to address future grid pressure implying their value to the grid and avoiding costly upgrades. A suite of DER options to address the changing load profile and grid pressure is essential. The value of each DER is specific to how they were modeled, but PV alone may not meet the shifting grid peak periods unless paired with storage to shift generation times. DER incentive values can be structured to drive markets and adopters to supply the necessary grid pressure alleviation to meet most grid upgrades that would be required in the absence of action to shape load or generation profiles.

The findings herein are preliminary and will be expounded upon in version 2 including comparison with other studies to offer insight into the findings and recommendations of this report. Further, a narrative, pulling from other industry and national laboratory studies, will address how this study could be used to inform compensation mechanisms for solar incentives in the District.

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CERTIFICATE OF SERVICE

I hereby certify that on this 14th day of June, 2024, I caused true and correct copies of DOEE's Initial Comments on Synapse's VDER Study to be emailed to the following:

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