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DER AND THE NON-WIRES SOLUTIONS OPPORTUNITY

The fifth in SEIA's *Improving Opportunities for Solar Through Grid Modernization* Whitepaper Series

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EXECUTIVE SUMMARY

Built during the last century, the United States electric grid was primarily designed to transport electricity from large central station power plants to end-use customers. But with rapid growth of distributed energy resources (DER) resulting from falling costs and technological advances, customers are increasingly taking charge of their own energy. These resources offer the promise of a more innovative, economic, and cleaner electric grid.[1]

DER, such as solar power, will play an important role providing power and grid services where they are needed most. To reach this goal, however, distribution grid planning must evolve to allow more transparency into system needs, enable more robust data exchange between utilities and DER providers, and include DER as a standard component of utility load forecasts.

This paper, the fifth in SEIA's series on grid modernization, focuses on the ways in which utilities are deferring traditional distribution grid investments with investments in DER. As with the rest of the papers in this series, the experiences of two leading states, California and New York, are examined in detail. In brief, the two leading states discussed have advanced Non-Wires Solutions (NWS) on a limited or test-bed basis and are now more widely deploying these measures. While their efforts are driving certain types of DER installations to constrained locations on the distribution grid, improvements to the solicitation process and the forecasting that drives the solicitation are needed. Furthermore, regulators will have to determine the best deployment mechanisms and methods for compensating DER to capture the opportunity presented by NWS.

ABOUT THIS WHITEPAPER SERIES

This series of SEIA policy briefs takes an in-depth look at state-level efforts to modernize the electric utility grid. Built during the last century, the United States electric grid was primarily designed to transport electricity from central station power plants to end-use customers. But with rapid growth of distributed energy resources such as solar, customers are increasingly taking charge of their own energy. Today's electric grid must allow distributed energy technologies to flourish and provide reliable, low-cost power for consumers. Distributed energy resources, like solar, can also provide power where it is needed most and help avoid investments that a utility would otherwise need to make.

This series explores the elements of electric grid modernization, compares the ways in which two leading states are tackling these issues, and discusses how these efforts are creating new opportunities for solar power. Grid modernization efforts in states present significant risks and opportunities for solar. These efforts will determine how much new solar and other distributed energy resources can interconnect to the grid, identify areas where solar can provide grid services in lieu of utility investments, and in some states, will shape the future of net energy metering.

[1] The term "grid" as used in this paper refers to the distribution grid. Non-wires solutions discussed herein are distributed resources that can be used to offset traditional distribution grid investments. However, there are also opportunities to replace traditional central station power plants and make transmission system investments more efficient with targeted applications of large-scale renewables, energy storage, and aggregated demand response.

DISCUSSION

Non-Wires Solutions Defined

Non-Wire Alternatives (NWA) or Non-Wire Solutions (NWS) allow utilities to defer or avoid conventional infrastructure investments by procuring distributed energy resources (DER) that are lower cost and have lower emissions while maintaining or improving system reliability and resilience.[2]

NWS are not entirely new. In fact, over 2 gigawatts (GW) of NWS have been proposed since 1991.[3] However, as the costs of distributed resources fall, technology enables customer adoption, and policymakers recognize the need for a more resilient, reliable, and cleaner grid, NWS have come to the fore as essential tools to be deployed by utilities to meet key policy objectives.

Two of the most notable NWS in the country are the Brooklyn/Queens Demand Management (BQDM) Project to displace a $1.2 billion substation upgrade and Southern California Edison's (SCE) Preferred Resources Pilot (PRP) seeking to demonstrate a diverse portfolio of locally-sited DER can meet incremental load growth reliably. In both cases, the utilities solicited DER to fill capacity needs and maintain or improve grid reliability through a portfolio of distributed energy resources, including solar, storage, and demand response.[4] Additionally, in the wake of natural disasters in Puerto Rico, Florida, and California, policymakers and system planners are looking to NWS as they consider designing a grid of the future that is resilient and can support critical infrastructure even under the most challenging conditions.[5]

Similar projects are springing up around the country, spurred on by regulators directing utilities to share more information regarding their distribution planning and forecasted system needs, and the establishment of solicitation processes and tariffs which enable DER providers to actively participate in serving grid needs.

The Importance and Potential of NWS

NWS are important because they enable desirable policy objectives and will help support and drive distributed energy markets.

Since 1991, over 130 NWS projects have been identified, planned, or implemented across several states surpassing 2 GW of total capacity. New York, California, and Oregon are leading states in this area.[6] Going forward, this trend is expected to grow, with states such as Illinois, Minnesota, and Massachusetts establishing processes for modernizing utility distribution planning and investment to include distributed resources.

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2 https://nyrevconnect.com/non-wires-alternatives/

3 https://www.greentechmedia.com/articles/read/gtm-research-non-wires-alternatives-market#gs.w=sEKj8

4 SCE Preferred Resources Pilot; ConEd BQDM Project, https://www.coned.com/en/business-partners/business-opportunities/brooklyn-queens-demand-management-demand-response-program

5 https://sepapower.org/puertorico/

6 https://www.greentechmedia.com/articles/read/gtm-research-non-wires-alternatives-market#gs.w=sEKj8

Additionally, key policy objectives can be achieved through NWS that benefit all ratepayers. These can include:

- **Ratepayer Savings** – NWS will be a key part of holding down utility system costs in the future, which will lead to significant ratepayer savings. As utilities are required to make public more of their system planning and expected investments, in many instances, DER providers will be able to offer solutions to meet utility needs that may otherwise be met through additional distribution grid infrastructure investments at a fraction of the cost. This will ultimately result in savings for ratepayers as utilities are able to contract with DER providers for more cost-effective solutions, and policymakers can develop tariffs that support DER to offset or relieve grid needs.
- **Resilience and Reliability** – As weather becomes more extreme, states move towards electrification, and society becomes more dependent on energy intensive technologies, grid reliability and resilience will be at a premium. Reliability refers to the ability of the electric grid to deliver power in the quality and quantity demanded by customers. Reliability can be measured by the number of outages and the quality of power on a specific segment of the distribution system.[7] On the other hand, resilience refers to the ability of the electric grid to reduce the impact of or recover from disruptive events. Resilience can be measured by the ability to keep running during a major event, or the time it takes to bring power back after it has been lost.[8] Enhanced distribution planning processes, and the availability of NWS as cost-effective alternatives to traditional investments, will enable utilities to better identify and address areas where reliability and resilience concerns arise.

  For example, enhanced grid planning and the availability of NWS will allow utilities to better forecast and cost-effectively prevent outages or power quality issues that may occur due to the overloading of a circuit from forecasted load growth. Similarly, utilities will have more tools to harden the grid in areas where old or highly centralized energy infrastructure may be vulnerable to extreme weather. DER deployed through targeted solicitations or tariffs can increase grid reliability and resilience by allowing utilities to invest in a bundle of DER technologies designed to meet specific needs and reduce identified risks. This will result in a more reliable grid in areas prone to outages or power quality issues, and a more resilient grid in the form of backup power for critical infrastructure such as hospitals, fire stations, and schools.
- **Customer Adoption** – One of the most exciting features of the clean energy revolution is the ability for customers to take control of their energy use. This leads to more customer awareness of energy production and use, which can lower energy bills and drive environmental and grid benefits for society. NWS are an important tool in moving to a more customer-centric electric system. In many instances, NWS will be met by deploying technology that allows customers to reduce and manage their energy usage. For example, to defer the need to upgrade an overloaded substation or feeder, utilities may develop tariffs that incentivize customers to reduce their energy use and shift load away from peak hours by using distributed resources such as smart home technology, distributed solar, or storage. This could enable the utility to avoid upgrading a substation, saving all customers money on their energy bills and protecting ratepayers from bearing the costs of expensive and avoidable distribution grid investments.[9]

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[7] https://ics-cert.us-cert.gov/sites/default/files/ICSJWG-Archive/QNL_MAR_16/reliability%20and%20resilience%20pdf.pdf; http://www.cpuc.ca.gov/General.aspx?id=4965

[8] https://ics-cert.us-cert.gov/sites/default/files/ICSJWG-Archive/QNL_MAR_16/reliability%20and%20resilience%20pdf.pd;

[9] See O&R Monsey NWS, https://www.oru.com/-/media/files/oru/documents/business-partners/non-wires-alternatives/nwa-rfp-monsey-august-2017.pdf?la=en

- **Environmental/Environmental Justice Benefits** – Another important benefit of NWS is that they may lead to better environmental outcomes than business as usual. NWS will enable utilities to purchase less energy overall by driving more customer-sited clean energy resources such as solar and storage onto the system. And, because most utilities still procure significant amounts of fossil fuels to serve their customers, replacing this procurement with clean distributed resources through NWS will reduce environmentally harmful emissions in many instances. Further, localized pollutants such as particulates (NOx/SOx) can be avoided by cleaner locally-sited DER. This is especially true for disadvantaged communities. NWS enable the displacement of old polluting plants that are often located in disadvantaged communities that have historically borne the brunt of a fossil fuel-based energy system. Thus, NWS will play an important role in cleaning up our grid and helping drive the oldest, dirtiest, and often most expensive plants off the system.

NWS and The Utility System - Distribution Planning, Deployment Mechanisms, and Utility Compensation

NWS go hand-in-hand with utility planning. To enable DER providers to offer NWS to utilities, there must be visibility into the distribution planning process and clear deployment mechanisms so that NWS can be tailored to meet grid needs and DER providers can be fairly compensated for the benefits they deliver. In California, these are the Distribution Resource Planning (DRP) and Integrated Distributed Energy Resources (IDER) processes. In New York, these are the Distribution System Integration Plan (DSIP) process and Non-Wires Solutions processes.[10]

Enhanced distribution system planning should incorporate the following key features:

- DER growth scenarios to inform grid planners where organic DER growth can be expected, and where incremental DER deployment is needed;
- Hosting capacity analyses to determine DER hosting capacity limits on the distribution system to inform grid planners where additional investments may be needed to enable higher penetrations of DER;[11]
- A methodology for fully valuing distributed energy resources to ensure proper price signals;[12]
- A transparent evaluation process by which NWS can be measured against traditional utility investments to determine the best investment for ratepayers.[13]

It is also appropriate to consider utility investments required to enable higher penetration DER, but this should be done through a process that allows for robust stakeholder input. At the end of this process, the utilities should produce a grid needs assessment that identifies key information about their grid needs, and conventional utility proposals should be measured against candidate deferral projects to determine the best investment.

[10] For more discussion of distribution system planning, see Improving Distribution System Planning to Incorporate Distributed Energy Resources (SEIA July 2017)

[11] For more on hosting capacity, see Hosting Capacity: Using Increased Transparency of Grid Constraints to Accelerate Interconnection Processes (SEIA, September 2017)

[12] For more on valuing DER, see Getting More Granular: How the Value of Location and Time May Change Compensation for Distributed Energy Resources (SEIA, January 2018)

[13] See Decision on Track 3 Policy Issues, Sub-Track 1 (Growth Scenarios) and Sub-Track 3 (Distribution Investment and Deferral Process, February 8, 2018 (R. 14-08-013)

Further, procurement mechanisms can and should be developed to enable the deployment of NWS. SEIA supports the use of a portfolio of procurement mechanisms to capture the various ways in which DER can contribute to a modern grid. Below are a few examples:

Solicitation – Good for longer-term grid needs that can be addressed by more sophisticated market participants or that cannot otherwise be met through standard contracts, tariffs, or utility programs. For example, the BQDM project to defer the need for a $1.2 billion substation is being conducted through a solicitation for customer-sited resources in the Brooklyn-Queens region.

Standard Contract – For more expedited solicitations that are not done through tariffs, standard contracts allow NWS to be procured quickly and cost effectively. Standard contracts are being explored in California's IDER process.

Tariff – Tariffs can be used to procure grid services to address near term grid needs and for leveraging customer-sited DER such as demand response, solar, storage, smart inverters, etc. For example, tariffs are an effective tool for incentivizing customers to activate advanced smart inverter functionality to help manage power quality

Finally, regulators should also ensure that a utility earnings mechanism exists to remove utility bias against NWS efforts. In our two leading states, distribution utilities make money on the construction of substations and other major capital projects. By avoiding these capital expenditures with solar or other DER, utilities would lose revenue opportunities and may be disinclined to provide information about systems operations that would enable NWS. Therefore, in these jurisdictions, regulators have created compensation mechanisms that allow utilities to collect revenue related to NWS projects. Mechanisms removing utility bias and making utilities indifferent to DER offsetting capital projects are critical to the success of NWS.

CASE STUDIES

California

In late 2013, Southern California Edison announced its preferred resources pilot (PRP), originally planned to meet 300 MW of customer demand to address load growth and the retirement of the San Onofre Nuclear Generating Station in Southern California and the impending retirement of ocean-cooled power plants. While the load forecast has fluctuated over the years, local load growth remains in the forecast and is now expected at 238 MW. The project spans 13 cities in Southern California and 250,000 residential and commercial customers. SCE intends to use the PRP to gain experience integrating a diverse suite of DER at scale to meet grid needs and to better understand the performance of these resources. The PRP relies on existing utility programs, tariffs, and solicitations to procure distributed solar, demand response, storage, and energy efficiency. To date, SCE has acquired approximately 260 MW of location-specific DER through its procurement and customer programs, roughly 50 MW of which is distributed solar.

Similarly, in 2015 a natural gas storage field in Southern California experienced a catastrophic natural gas leak, creating an environmental emergency from methane emissions and the risk of energy shortages in the region. In response, the CPUC approved 100 MW of energy storage in San Diego Gas and Electric and Southern California Edison service territories. The storage was brought online in a matter of months. Although an unfortunate incident, the gas leak showed the ability of distributed resources to respond quickly and flexibly to an urgent grid need.

New York

The most discussed NWS project in New York State, possibly in the nation, is the Brooklyn Queens Demand Management Program. Emerging from the Consolidated Edison (Con Ed) rate case settlement in 2013, the New York State Public Service Commission (PSC) agreed to defer the construction of a proposed $1.2 billion substation in the Ridgewood, Crown Heights, Richmond Hill neighborhoods of Brooklyn and Queens in New York City in December 2014. Instead, the PSC authorized Con Ed to meet the forecasted load with 17 MW of customer-sided solutions and 52 MW from non-traditional utility-sided solutions by mid-2018.[14]

By summer of 2018, Con Edison expects to have contracted for the 52 MW of non-traditional utility-sided projects with funds to spare. The overall BQDM operating budget was $200 million, of which approximately $69 million has been spent.[15] In 2018 the PSC extended the BQDM project to allow spending of any remaining budgeted funds and to defer a potential new investment in the area.[16]

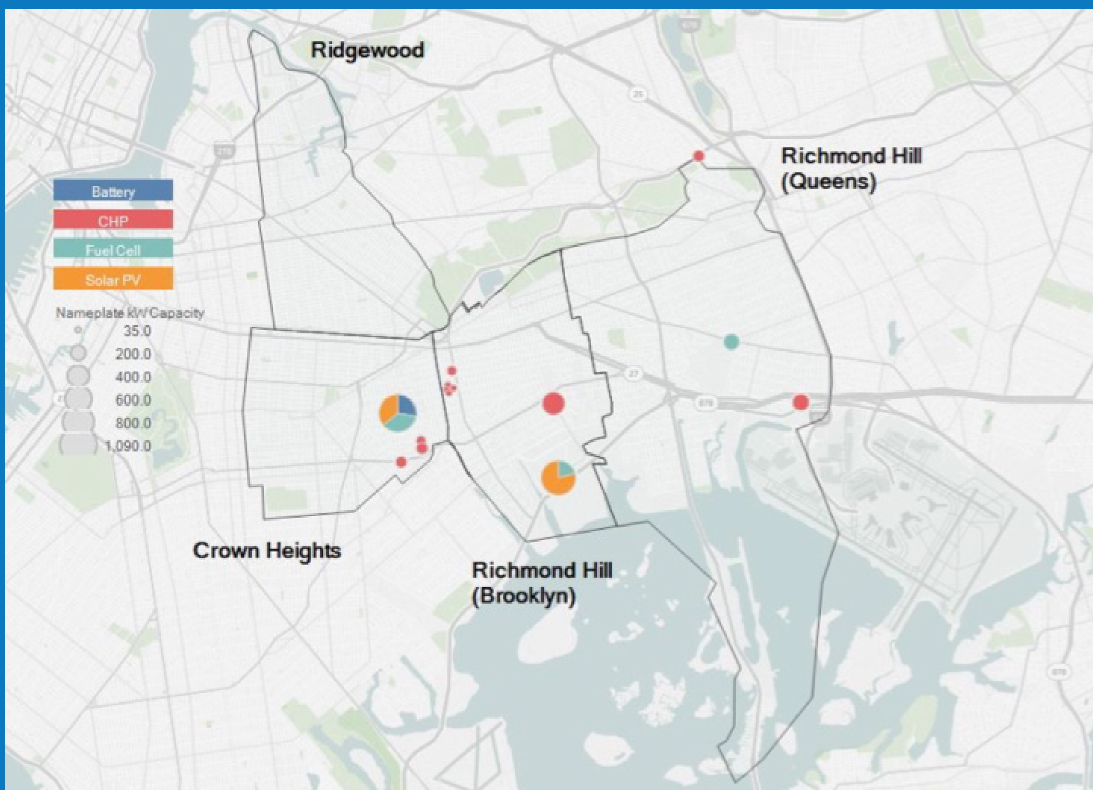

Figure 1: BQDM Quarterly Expenditures & Program Report Q4 2017, Figure 9

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14 "BQDM Quarterly Expenditures & Program Report" Consolidated Edison, Quarter 4, 2017. Available at: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={3807C1C8-369F-42D1-BDDE-B5ED2D00E6EE}

15 Ibid.

16 "Order Granting Modification and Clarification" New York State Public Service Commission, January 18, 2018. Available at: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={2DDC30CF-4215-45DA-8592-5106D967D5EF}

While BQDM enabled two commercial solar projects in the Crown Heights and Richmond Hill neighborhoods by offsetting interconnection costs, this NWS has not resulted in a number of solar projects coming online. Furthermore, although the BQDM initial program plan included a component to consider and solicit proposals to generate 1 MW of additional capacity through the installation of solar, the program was put on hold after bids were received.[17]

In part, the lack of solar deployment may be the result of a utility solicitation schedule that did not provide enough lead time to secure solid bids from larger solar projects. Often, even a 12-month solicitation schedule fails to take into account the time it takes to develop projects on the ground. For large projects, development cycles can last 24 months or longer. Combined with permitting challenges, lack of suitable roof space, and other economic challenges faced by all construction projects in New York City, these factors made this solicitation an unattractive option for many solar projects.

CONCLUSION

In brief, the two leading states discussed have advanced NWS on a limited or test-bed basis and are now more widely deploying these measures. Regulators and the industry will gain more insight into NWS outcomes as they proliferate.

While NWS are increasingly being looked to as a driver for DER installations, they must be well designed. A NWS is best suited to deferring a long-term distribution system need. To allow for fair competition among all DER market participants, NWS solicitations should build in ample lead time for market participants to design projects. Furthermore, the combination of solar with energy storage, or projects that pair various DER together to meet distribution needs are more feasible with a longer lead times.

Understanding the nature of the system need at least two years in advance may help solar projects more effectively bid into any solicitation. Increased transparency into utility planning, load forecasting, and longer-term system constraints should contribute to the success of a NWS as a driver of solar. For shorter-term needs, regulators should also look to specific tariffs with enhanced values for deploying resources in certain locations, or standard contracts to encourage DER development on the system. All of these tools should be on the table when planning out the modern grid.

[17] "BQDM Quarterly Expenditures & Program Report" Consolidated Edison, Quarter 4, 2017. Available at: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={3807C1C8-369F-42D1-BDDE-B5ED2D00E6EE}

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