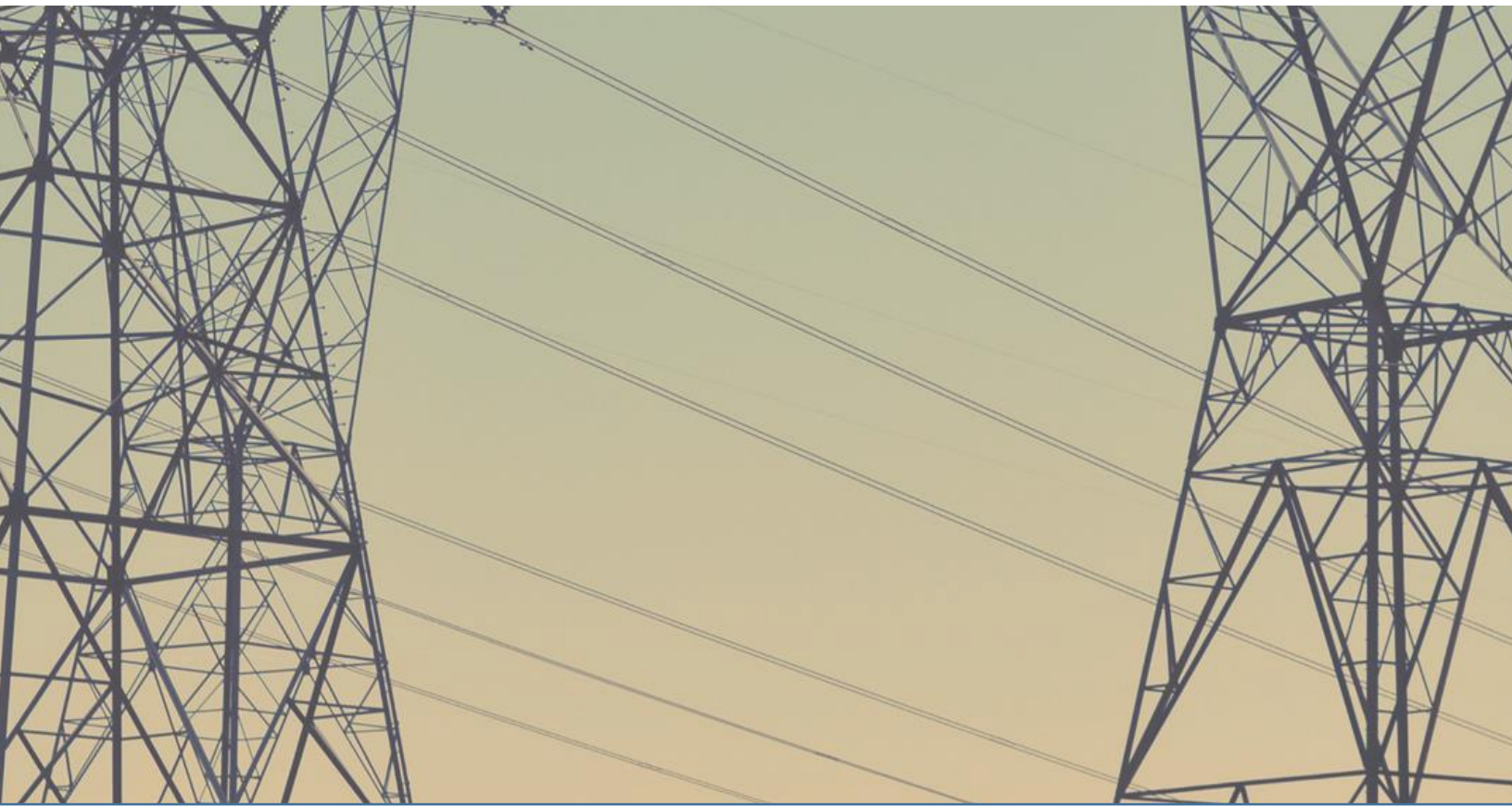
EM&V Forum and Policy Brief: State Leadership Driving Non-Wires Alternative Projects and Policies

January 2017



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About NEEP

NEEP was founded in 1996 as a non-profit whose mission is to serve the Northeast and Mid-Atlantic to accelerate energy efficiency as an essential part of demand-side solutions that enable a sustainable regional energy system. Our vision is that the region will fully embrace next generation energy efficiency as a core strategy to meet energy needs in a carbon-constrained world.

Disclaimer: NEEP verified the data used for this brief to the best of our ability. This paper reflects the opinion and judgments of the NEEP staff and does not necessarily reflect those of NEEP Board members, NEEP Sponsors, or project participants and funders.

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Introduction

As utility regulators contemplate major infrastructure investments to keep pace with pockets of growing peak demand throughout the region, less costly non-wires alternatives (NWAs) solutions — based on deployment of distributed energy resources — are becoming more common within transmission and distribution (T&D) system planning processes. The T&D system can experience peak demand at different times of the day, in different geographic locations, and during different seasons. Targeted deployment of distributed energy resources in areas where system peaks are approaching the system's nameplate capacity can, in many cases, provide an overall benefit to ratepayers by deferring or even alleviating the need for investing in costly T&D system assets. Moreover, this strategy can cost-effectively meet regional needs with greater benefits to ratepayers than traditional solution projects.

NEEP examined the role efficiency can play in deferring utility transmission and distribution system investments in the January 2015 Evaluation Measurement and Verification Forum (EM&V Forum) report, *Energy Efficiency as a Transmission and Distribution Resource: Lessons from Recent U.S. Efforts to Use Geographically Targeted Efficiency Programs to Defer T&D Investments*.[1] In particular, the report addressed the role that intentional targeting of efficiency programs toward constrained areas of the electric system – either alone or in concert with demand response, distributed generation and/or other strategies – can play in deferring T&D investments.[2]

The purpose of this brief is to provide an update on the projects captured in the January 2015 report, to highlight NWA project solicitations since the report, and to provide insight into the related policy proceedings in the NEEP region. Evaluating the current state of NWAs in the Northeast and Mid-Atlantic states will provide insight into the progress, opportunities and challenges shaping the future of NWA deployment in the NEEP region.

Showcased as a key component of the New York Reforming the Energy Vision (REV) proceeding,[3] The Brooklyn Queens Demand Side Management (BQDM) project catalyzed recent NWA conversation and interest the Northeast and Mid-Atlantic states, leading many other jurisdictions to examine their own NWA prospects. One encouraging trend to note is the increasing amount of transparency with utility investment decisions. For example, New York regulators have required utilities to develop a suitability criteria that will standardize the evaluation process for potential NWA opportunities. This allows utilities to focus on the objectives of NWAs, and explore eligible solutions. In Maine, the Public Utilities Commission suggested the NWA planning processes be managed by a neutral third party, rather than by the distribution utilities. Other states such as Connecticut, New Hampshire, New Jersey, and Rhode Island are also taking initiative in various ways regarding NWAs, as described in this brief.

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[1] *See Generally*, Grevatt, J., Neme, C. Energy Futures Group, on behalf of NEEP EM&V Forum. *Energy Efficiency as a T&D Resource: Lessons from Recent U.S. Efforts to Use Geographically Targeted Efficiency Programs to Defer T&D Investments.* (January 2015) Available at: http://www.neep.org/sites/default/files/products/EMV-Forum-Geo-Targeting_Final_2015-01-20.pdf

[2] Notable advantages of NWA projects over centralized T&D solutions include: ability to target high value areas, ability to avoid infrastructure siting concerns, the flexibility to be built incrementally and rapidly deployed using existing infrastructure, and the opportunity to provide enhanced reliability in diverse geographic locations. NWAs also provides a test bed for innovation; technologies and approaches piloted in NWA projects are later often adopted within statewide programs.

[3] New York State Department of Public Service. *Reforming the Energy Vision (REV) Proceeding- About the Initiative*. (2016) Available at: http://www3.dps.ny.gov/W/PSCWeb.nsf/All/CC4F2EFA3A23551585257DEA007DCFE2?OpenDocument

Non-Wires Alternative in Recent Policy Proceedings

States are taking a variety of approaches to NWA projects— including NWAs being employed as grid-side enhancement projects, NWAs managed by an independent entity, NWAs employed through integrated resource planning, and NWAs identified within the energy efficiency program planning process. The following section discusses recent policy proceedings that involve NWAs.

Connecticut

Connecticut is committed to filing NWA projects as part of its large facility demand response pilots in the 2017 update of its 2016-18 Conservation and Load Management Plan.[4] For these pilots, the utilities will consider geo-targeting areas across Connecticut that have been identified by ISO New England and other energy stakeholders as critical peak demand reduction areas.

Outside of the energy efficiency program planning process, Connecticut utilities are also considering NWA projects as part of their Grid Side Enhancement Demonstrations, which the major utilities in Connecticut were required to develop pursuant to Section 103 of the June 2016 state budget.[5]

For example, United Illuminating is exploring an automated Demand Response Management System application for a large facilities pilot at a distressed feeder at the Woodmont Substation in Milford, Conn.[6]. The pilot will look to enhance distribution grid reliability while addressing IT data security, a major customer acquisition barrier. The new system will also employ smart inverters and battery storage to buttress system reliability at photovoltaic penetration levels of more than ten percent. Participating customers will be offered a Demonstration Project DER Rate Rider (DPDRR) through which they earn $0.05/kWh of compensation during summer peak hours for any energy generated, in addition to any pre-existing net metering arrangement.

Eversource also responded to the Department of Energy and Environmental Protection's request for proposals with regard to demonstration projects for grid-side system enhancements to integrate distributed energy resources. The utility had been planning to use its Grid-Side Enhancement Demonstration to relieve a constrained substation in Uncasville, but chose a different project at the Blair substation after a large customer ceased operations and the value of distribution system deferral was significantly reduced.[7] The table below shows the matrix used to determine which project to choose. Eversource considered NWA as a factor in the location decision matrix. As shown in the table below in the "Avoid/Defer System Upgrades" column, NWA is factor assigned a weight of 20 percent.

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[4] 2017 Annual Update of the 2016-2018 Conservation & Load Management Plan. (October 2016) Page 55-59. Available at: http://www.energizect.com/sites/default/files/2017%20C%26LM%20Plan%20Update%20FINAL_10.31.16.pdf

[5] Conn. Public Act No. 15-5 § 103. Available at: https://www.cga.ct.gov/2015/ACT/pa/pdf/2015PA-00005-R00SB-01502SS1-PA.pdf

[6] Coretto, M. *UI Proposal for Distributed Energy Resources Integration Plan*. Uil Holdings Corporation. (November 2016) Page 10. Available at: http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/8525797c00471adb85258061005f1353/$FILE/2016-11-04%20UI%20DER%20Integration%20Plan%20-%20Localized%20Targeting%20of%20DERs%20-%20DEEP%20Grid-Side%20RFP%20PA%2015-5%20Sec.%20103.docx

[7] CL&P dba Eversource Energy, *CL&P dba Eversource Energy Proposal in Response to 8/12/16 Notice by DEEP.* (October 2016) Page 11. Available at: http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/8525797c00471adb8525805d0066c3c0?OpenDocument

DEEP Grid-Side Enhancements Energy Storage Demonstration System Location Decision Matrix[8]											
Substation	DER Penetration		Stackable Benefits		Avoid / Defer System Upgrades		Backup Capability		Land Available, Site Prep		Total
	SCORE	Weighting 30%	SCORE	Weighting 25%	SCORE	Weighting 20%	SCORE	Weighting 15%	SCORE	Weighting 10%	
Blair 15M	**5**	30	**4**	20	**1**	4	**2**	6	**4**	8	**68**
Scitico 27H	**3**	18	**3**	15	**4**	16	**2**	6	**3**	6	**61**
North Canaan 5L	**1**	6	**3**	15	**3**	12	**5**	15	**3**	6	**54**
Brooklyn 30Y	**2**	12	**3**	15	**1**	4	**4**	12	**5**	10	**53**
Uncasville 1Q	**2**	12	**3**	15	**1**	4	**2**	6	**4**	8	**45**
	1 = Low		**2 = Acceptable**		**3 = Average**		**4 = Promising**		**5 = Excellent**		

Source: Eversource: Grid Side Enhancement Proposal Response

Maine

Maine's NWA policies are derived from the Smart Grid Policy Act's directive to "improve the overall reliability and efficiency of the electric system, reduce ratepayers' costs in a way that improves the overall efficiency of electric energy resources, reduce and better manage energy consumption and reduce greenhouse gas emissions."[9] Pursuant to this directive, the act requires regulators, as a prerequisite to approving transmission projects, to consider whether NWAs can be deployed to resolve transmission system needs at a lower total cost giving preference to clean, low cost NWAs.[10]

After several years of NWA projects managed by a third-party developer known as Grid Solar, the Maine Public Utilities Commission recently opened an investigation into the Designation of a Non-Transmission Alternative (NTA) Coordinator.[11] The NTA Coordinator will work to identify projects that will more cost-effective by means of an NWA solution. A recent bench memo by the commission staff in the proceeding suggested that the NTA Coordinator should be an entity outside of the incumbent utility. This arrangement is unique because in most cases throughout the region, the distribution utilities are the entity that manages the NWA planning and procurement process. Yet, in this case, the Commission found that ratepayer interests would be best served by having an independent coordinator who worked in tandem with the distribution utilities. A related arrangement

[8]CL&P dba Eversource Energy. *DEEP Grid Side Enhancement Proposals – Response*. (October 2016) Page 13. Available at: http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/8525797c00471adb8525805d0066c3c0/$FILE/CL&PdbaEversource - DEEP Grid Side Enhancement Proposals - Response Oct31_2016.docx

[9] 35-A M.R.S. § 3143(3). Maine Legislature, Energy Planning; Construction; Purchases, Declaration of Policy on Smart Grid Infrastructure. (October 2016) Available at: http://www.mainelegislature.org/legis/statutes/35-a/title35-Asec3143.html

[10] 35-A M.R.S. § 3132, Maine Legislature, Energy Planning; Construction, Purchases, Construction of transmission lines prohibited without prior order of the commission, (October 2016), Available at: http://legislature.maine.gov/statutes/35-A/title35-Asec3132.html

[11] Maine Public Utilities Commission. Docket No. 2016-00049. Commission Initiated Investigation into the Designation of a Non-Transmission Alternative Coordinator. (March 2016) Available at: https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/CaseMaster.aspx?CaseNumber=2016-00049

exists in Vermont, where deferral projects are identified by the Vermont System Planning Committee (VSPC) and then coordinated by the statewide energy efficiency utility.[12] However, since the VSPC recently suggested that there are no viable geo-targeting opportunities in state, it receives minimal treatment in the body of this brief.[13]

New Hampshire

While there currently are not any NWA projects underway in New Hampshire, Liberty Utilities does describe a process it plans to implement in preparation for NWAs in its recent integrated resource plan.[14] NWAs are evaluated within a process designed by the cross-functional planning team established by Liberty Utilities. This process includes reviewing the demand forecast and T&D deficiencies, followed by screening projects. If a project passes the initial screening criteria and is determined to be feasible for an NWA solution, it then moves on to evaluating NWA solutions for technical feasibility, performing a cost-benefit analysis for the NWA solution, and then finalizing NWA program recommendations. This goal of the process is to ensure alternatives will successfully reduce, avoid, or defer a wires solution in the region.

Liberty's NWA Evaluation Process[15]	
Step	**Description**
Review Demand Forecast	Review demand forecasts prepared for each substation, sub-transmission line, and feeder under extreme weather scenarios to determine if capacity is adequate to meet demand under normal and contingency configurations
Review T&D Deficiencies	Develop a list of distribution deficiencies based on planning criteria.
Screen Projects based on Screening Criteria	• Distribution deficiency is not based on asset condition; • Distribution deficiency needs to be addressed in no less than two years, allowing for development of a NWA solution; • Wires solution, based on engineering judgement, will likely cost more than $0.5 million, providing sufficient cost savings to evaluate and implement a NWA solution; • Wires solution will likely start construction at least 24 months in the future, providing sufficient time to evaluate and implement a NWA solution; and • A NWA solution would be for less than 20 percent of the total load in the area of the distribution deficiency.
Evaluate NWA solutions for technical feasibility	Review potential NWA solutions for technical feasibility: alternatives that have successfully reduced, avoided or deferred a wires solution in the region

[12] *Supra*, at note 1. Page 54.
[13] Vermont System Planning Committee. Docket No. 7872. Memo to the Vermont Public Service Board (October 2016) Page 4. Available at: http://www.vermontspc.com/library/document/download/5544/VSPC_GTrecs_2017_toPSB_20161024.pdf
[14] Liberty Utilities, State of New Hampshire before the Public Utilities. Docket No. DE-16-097. Pg 39-40, 60-64, (January 2016) Available at: https://www.puc.nh.gov/Regulatory/Docketbk/2016/16-097/INITIAL%20FILING%20-%20PETITION/16-097_2016-01-15_GSEC_DBA_LIBERTY_LCIRP.PDF
[15] *Ibid*. Page 61.

Perform Cost-Benefit Analysis for NWA solutions	Evaluate cost effectiveness of NWA solutions according to Commission-approved TRC test.
Finalize NWA program recommendations	Finalize NWA recommendations and present for approval in capital and operating expenditures plans.

Source: Liberty Utilities 2016 Integrated Resource Plan

In addition to the evaluation process, Liberty Utilities also compares a solution's risk profile for both wires and non-wires solutions based on a number of risk factors including project size, number of lead elements, project complexity, project completion time, success risk factor, level of customer involvement, and complexity of regulatory approvals. The risk factor is rated on a scale of one to 10, then summed to calculate a total project risk score. The risk factor is considered along with the evaluation process ensure the optimal solution is solicited.

While Liberty Utilities outlines a process for considering NWAs in its IRP, the utility also identifies two major impediments that discourage the undertaking such projects: (1) there is no established mechanism in New Hampshire for recovering costs to retain an outside consultant for project analysis; and (2) there is no established mechanism in New Hampshire for recovering lost revenues and return that the utility would have gained through investment in the wires solution.[16]

New Jersey

The New Jersey Clean Energy Program (NJCEP) recently awarded a new contract to Applied Energy Group (AEG) for administration of its energy efficiency programs. In AEG's proposal to administer the programs, it provides a strategic plan that mentions T&D deferrals as a potential source of supplemental funding for energy efficiency programs.[17] This assertion assumes that savings derived from deferring the traditional wires solution could provide a revenue stream for funding cost-effective investments in distributed energy resources. According to AEG, capitalizing on this opportunity will require minor policy and program changes, such as localizing the programs to constrained areas.

New York

The trend toward requiring NWAs as a core component of system planning process is particularly pronounced in New York, where in early 2016 the New York Public Service Commission issued formalized guidance to utilities requiring that they file NWA candidate opportunities in their Distributed System Implementation Plans (DSIPs):

> "[T]he plans should identify specific areas in the utility footprint where DERs would provide benefits to the distribution system. These include areas where there is an impending or foreseeable delivery infrastructure upgrade need where DERs would have a delivery infrastructure avoidance value; where DER may provide reliability or operational benefits; or, where there is no forecast delivery infrastructure need for years to come and hence the infrastructure avoidance value of DERs is likely to be lower or insignificant in the short-term. It should also include a list of specific infrastructure projects by location, and description of the process used to identify the projects where DER solutions should be compared as potential

[16] *Ibid*. Page 64.

[17] Applied Energy Group. *AEG Proposal to Provide NJCEP Program Administration and Management Services- Section 5.* Page 51, (2015), Available at: http://www.njcleanenergy.com/files/file/Section%205%20FINAL.pdf.

alternatives to traditional grid infrastructure under varying scenarios of DER integration, and describe how the utility will use the BCA Handbook for performing the comparative analysis of substituting DERs to defer infrastructure investments. Further, the filing should describe a proposed process for collaborating with stakeholders to develop and implement ways for various DERs to be substituted for traditional grid-based solutions in order to avoid or reduce utility capital or operating costs."[18]

This guidance represents a significant shift toward incorporation of the impact of distributed energy resources into system planning processes. It requires the utilities to provide a greater degree of transparency in their planning processes, as well as a greater visibility into the location-specific value of distributed energy resources on the distribution grid.

The Commission also directed each utility to file, along with their DSIPs, a Benefit-Cost Analysis Handbook (BCA Handbook). The BCA Handbooks contain methodologies and equations for calculating utility-specific DER value and avoided costs, including within in the context of an NWA project.[19] The handbooks suggest that "project and location specific avoided distribution costs and deferral values should be used when and wherever possible."[20]

After initially identifying NWA candidate projects in their individual DSIPs, the joint utilities proposed a NWA suitability criteria framework in their Supplemental Distributed System Implementation (SDSIP) Plan.[21] This model will create a common evaluation framework between utilities for determining whether a project is suitable for an NWA solution. The Joint Utilities will also publish utility-specific suitability criteria to provide more transparency regarding how each utility will define and adopt the framework. The NWA suitability criteria will capture the various dimensions of project characteristics that influence the ability of the project to defer or avoid traditional utility infrastructure.

The elements of the suitability criteria framework include the project type, timeline, and cost. Proposed projects are classified into broad categories of utility projects to determine overall sense of applicability. These categories are based on the type of work needed, such as new business, system expansion, risk reduction, and asset replacement. From a timing perspective, the utility must indicate it can procure the NWA and implement it prior to when a solution is needed on the T&D system. The cost suitability criteria of the utility project is used to determine if an NWA solution is cost-competitive.

According to this framework, load relief and reliability are the project categories most applicable for NWA. Other types of projects include: power quality, conservation voltage reduction (CVR), resiliency, damage failure (not always conducive to NWA due to the limited time for planning), asset condition, new business, and service upgrade. Projects that are *not* suitable for NWAs under to this proposed criteria include those that require

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[18] New York State Public Service Commission. Case No. 14-M-0101. *Order Adopting Distributed System Implementation Plan Guidance*. (April 2016) Page 35. Available at: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BB1C7035C-B447-459A-8957-20BF3BDB6D0F%7D

[19] Con Edison. Benefit Cost Analysis Handbook. Page 39. (August 2016) Available at: https://www.coned.com/-/media/files/coned/documents/dg/dsp/pdf/coned-bcah.pdf?la=en

[20] *id*.

[21] Joint Utilities, *Supplemental Distributed System Implementation Plan*. New York Public Service Commission Case 16-M-0411. (November 2016) Page 51-57. Available at: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7b3A80BFC9-CBD4-4DFD-AE62-831271013816%7d

complete relocation of an existing facility due to the terms of a right-of-way/permit/license, and those that contemplate investment in intangible assets such as software and telecommunication capabilities.

The specific design and implementation of the criteria will continue to evolve as greater experience is gained. Input provided by different stakeholders will also help to inform the Joint Utilities' further development of the concepts included in the criteria.

Rhode Island

Under Rhode Island's System Reliability Procurement (SRP) law,[22] utilities are required to consider diverse energy resources and strategies to maximize the benefit to the state's energy system through NWA solutions. National Grid, the state's major distribution utility, can recover the costs of investment in system reliability procurement.

To determine if an NWA is feasible, National Grid first screens transmission and distribution projects against the following suitability criteria:

NWA Suitability Criteria in Rhode Island	
1.	The need is not based on asset conditions
2.	The wires solution will cost more than $1 million
3.	If load reduction if necessary, it is expected to be less than 20 percent of the relevant peak load in the area of defined need
4.	Start of wires alternative construction is at least 36 months in the future
The utility may propose a project that fails to meet one or more of the above criteria if it has reason to believe that a viable NWA solution exists, assuming the benefits justify the costs	

Source: Rhode Island System Reliability Procurement Law

Since implementation of the criteria, there have been 19 distribution projects screened for NWA feasibility between March 1, 2015 and March 31, 2016. In 2016, only one new project passed the initial screening.[23] The project that was considered for NWA opportunities was part of the East Bay Area study. This project consists of contingency-related work, not suitable for NWA, and load growth at the Bristol and Warren substations-appropriate for NWA. Further analysis determined that the traditional wires solution would cost less than the necessary load reduction of 11MW, and the NWA project was not embraced.

In reaction to this, a methodology for partial NWA solutions was examined during 2016, and National Grid is working to fully consider partial NWA solutions where applicable. A partial solutions process has been incorporated into the SRP Standards revisions to be proposed by National Grid. Rhode Island is also currently considering relaxing the criteria as the load growth rate decreased significantly over the last year. Peak load growth rate is currently one percent or less in Rhode Island, providing longer time horizons for planning and implementing NWAs compared to the current thirty-six month timeframe.

[22] Rhode Island Office of Energy Resources. System Reliability Program. (2016) Available at: http://www.energy.ri.gov/reliability/
[23] National Grid. *2017 System Reliability Procurement Report Docket No. 4655*. Submitted to Rhode Island Public Utilities Commission, pgs. 3-4 (October 2016). Available at http://www.ripuc.org/eventsactions/docket/4655-NGrid-SRP2017(10-17-16).pdf

The state recently convened a working group—known as Systems Integration Rhode Island (SIRI)—to identify significant issues with respect to the future of Rhode Island's electric grid and develop recommendations, which are presented in a vision document.[24] Among other things, the 2016 vision document identifies gaps to NWA procurement through SRP. For instance, renewable energy and other NWA technologies with distribution benefits, such as conservation voltage reduction and volt/VAR optimization, are deployed through processes that are not clearly linked to SRP. There are also technologies such as EVs, storage, and time-varying rates, that might contribute to SRP planning, but do not have existing utility or state processes. The vision document also notes that while National Grid can recover cost of NWA projects, they are not incentivized to do so on an equal footing with traditional capital investments.

Building on the work of the SIRI Vision Document, the Rhode Island Public Utility Commission opened an Investigation into the changing distribution system meant to develop a single set of metrics for costs and benefits across all distribution system investments.[25] The PUC has embraced a broad stakeholder engagement strategy within the investigation, with a professional facilitator and subject matter experts.

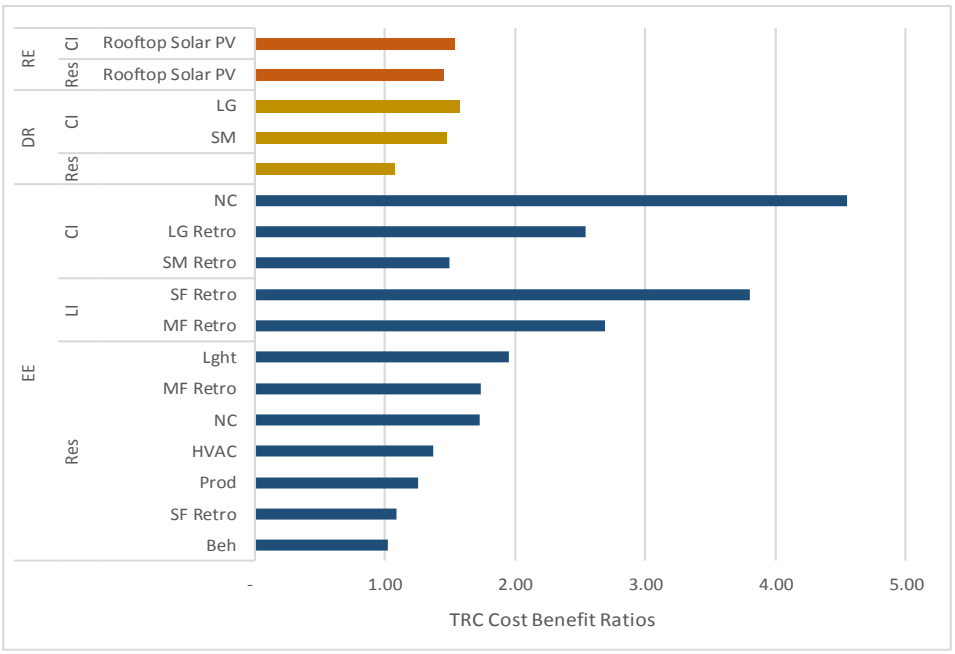
Early insights from the stakeholder-driven process indicate a move from legacy cost-effectiveness testing for energy efficiency toward an all-encompassing process known as dynamic portfolio optimization, where distribution system investments are optimized across all possible DERs and policy resources as a core component of system planning. The charts below, excerpted from a memorandum published during the stakeholder process, may provide further insights into what the preliminary dynamic portfolio optimization process may encompass.[26]

[24]Sedano, R., Musher, D., Systems Integration Rhode Island Vision Document Developed under the Coordination of the Rhode Island Office of Energy Resources, Regulatory Assistance Projects, pgs. 15-16, (January 2016), Available at: http://www.energy.ri.gov/documents/siri/Systems%20Integration%20Rhode%20Island%20Vision%20Document%20January%202016%20FINAL.pdf

[25] *See Generally*, Rhode Island Public Utility Commission. Docket No. 4600. Recommendations for a Docket to Investigate the Changing Distribution System (March 2016) Available at: http://www.ripuc.org/eventsactions/docket/4600-PUC-Recommendation_3-1-16.pdf

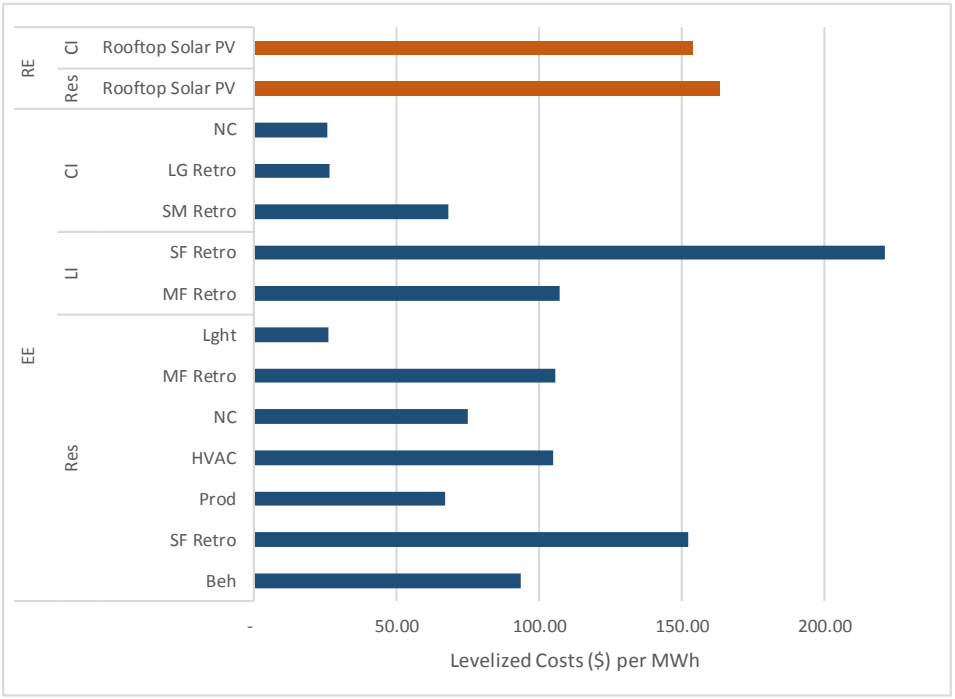
[26] Wolf, T and Kallay, J, Synapse Energy Economics. Docket 4600. Cost-Effectiveness Roadmap Draft- For Discussion Purposes. Page 3-6. (November 2016) Available at: http://www.raabassociates.org/Articles/Synapse-Memo-RI-CE-Roadmap-11-17.docx

Cost-Effectiveness of Multiple Resources: Benefit-Cost Ratios



Source: Synapse Memo to Docket 4600 Stakeholders

Cost-Effectiveness of Multiple Resources: Costs per MWh



Source: Synapse Memo to Docket 4600 Stakeholders

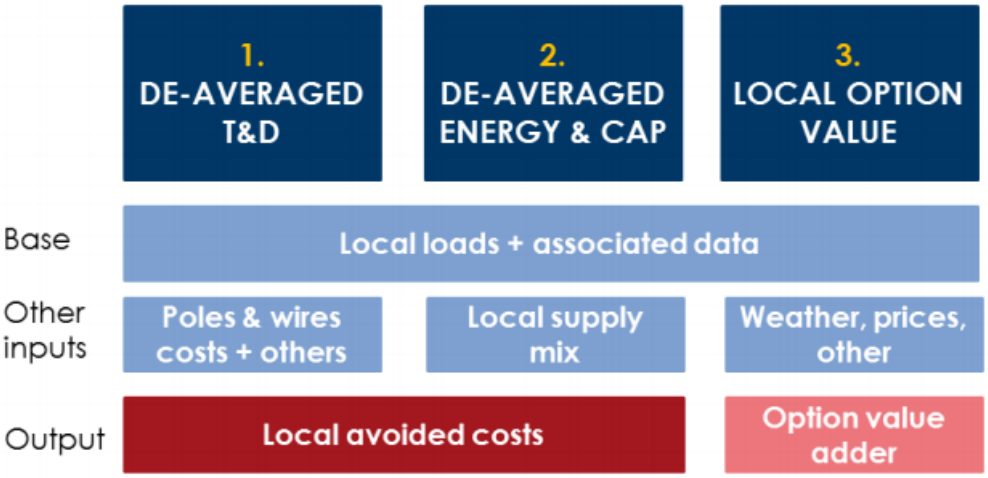
Update on Recent and Ongoing Projects

A growing number of jurisdictions have begun to use NWA solutions to cost-effectively defer new investments in transmission and distribution system infrastructure. More than two dozen NWA projects are in some stage of planning or procurement in the NEEP region. Provided below is an update on five significant projects within the Northeast and Mid-Atlantic states.

Massachusetts Nantucket Project

In Massachusetts, National Grid had proposed an NWA project for the Nantucket Island in early 2016 that was meant to defer laying a third cable to the island for purposes of reliability during extreme events and summer peak load.[27] The goals of the NWA project were: (1) to create economic, comfort-related and environmental benefits for customers through enhanced installation of energy efficiency, new technology adoption; (2) to minimize use of diesel generation as contingency support should one of the undersea cables fail; and (3) to defer the construction of a third undersea cable. In order to achieve these goals, The Dunksy Energy Consulting Group suggested the use of a localized option value and de-averaged T&D avoided costs methodology in place of the uniform, system-wide cost-effectiveness methodology traditionally used by National Grid.[28] The Dunsky method captures the local benefits of the capital investment deferral or delay of NWA by accounting for the localized load growth and investment schedule in a constrained area. The figure below is excerpted from Dunksy's proposal, and provides an overview of the proposed cost-effectiveness elements.[29]

Dunksy's Cost-Effectiveness Methodology, Proposed on behalf of National Grid



Source: Dunksy Energy Consulting's Cost-Effectiveness Methodology on a Local Scale

[27] Liazos, M. *D.P.U. 16-06 – Petition of Massachusetts Electric Company and Nantucket Electric Company d/b/a National Grid for Approval of Non-Wires Alternative Pilot, and of Non-Wires Alternative Provision*. National Grid. Pg. 4. (January 2016), Available at: http://www.ackenergy.org/uploads/3/4/9/7/3497858/16-06_nwa_pilot_filing__1-11-16_.pdf

[28] Boulanger, F. *Geo-Targeted DSM- Cost Effectiveness Methodology on a Local Scale, Redacted Version*. Dunksky Energy Consulting. Pgs.17-19. (September 2015) Available at: http://www.dunsky.com/wp-content/uploads/2016/09/NGrid-Geo-Targeted-DSM-Final-Redacted.pdf

[29] *id*. at page 16.

While the methods proposed by the Dunsky report may identify greater benefits than those associated with traditional screening processes, National Grid didn't entirely incorporate them into their proposal. Additionally, the utility filed a motion to withdraw petition in August 2016 and the project was cancelled when an error in the discount rate of the undersea cable investment rendered the NWA project no longer cost-effective.[30]

Maine Boothbay Project

The Boothbay Pilot was successful in overcoming barriers to the broad adoption of non-transmission alternatives (NTA) technologies and equipment. A critical challenge to least-cost system planning in Boothbay was the seasonality of many regional businesses. This project included energy efficient commercial lighting, energy storage, and rooftop solar PV systems, which helped to mitigate the impacts of seasonal businesses. Through testing and monitoring the performance of these technologies, the project is demonstrating the ability of the technologies to provide reliability benefits. The project also addresses interconnection barriers of distributed generation resources to the grid. This is because certain NTA resources, such as battery storage systems, are dispatched during maximum load conditions on the circuit, which enables the circuit to handle a higher generation output without creating a reverse power-flow.

An interim report on the project was released in January 2016,[31] with the final report due in early 2017. As for the result of the project, 1.8 kW of non-transmission alternatives (NTAs) were deployed between late 2013 and early 2015. This included the first large-scale, 500 kW, battery storage unit in Maine, a 500 kW diesel fueled back-up generator, 243 kW of efficient lighting and air conditioning, 308 kW of solar PV, 224 kW of peak load shifting, and 29 kW of demand response units.

GridSolar, the manager of the Booth Bay project, has a total NTA resource portfolio of 1,804.68 kW of nameplate capacity with an effective capacity rating of 1,676.84 kW. The pilot was initially approved as a three-year demonstration project, with an option to extent to 10 years. In the interim report, GridSolar recommended the Commission extend the pilot to 10 years. The Boothbay Pilot Extension was approved for a one year extension during summer 2016.

Rhode Island's Tiverton/Little Compton Pilot

DemandLink, the system reliability procurement pilot, in Tiverton and Little Compton was designed by National Grid to test whether geographically-targeted energy efficiency and demand response could defer the need for a new substation feeder to serve 5200 customers (80 percent residential, the remainder small businesses) in the two municipalities. The pilot began in 2012 with the objective of deferring a $2.9 million feeder project for at least four years (i.e. from an initial estimated need date of 2014 until at least 2018).The pilot's focus in 2016 has been on varying the marketing tactics from those used in the past in order to refresh the message and engage new participants.

National Grid recently released its 2017 System Reliability Procurement Report,[32] which discusses the project to date and future expectations. Since 2017 is the final year of the pilot's planned lifecycle, the utility has

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[30] Crowe, P. *Motion to Withdraw Petition*. National Grid. (August 2016), Available at: http://web1.env.state.ma.us/DPU/FileRoomAPI/api/Attachments/Get/?path=16-06%2fMotion_Withdraw_Petition_81816.pdf

[31] GridSolar, *Final Report- Boothbay Sub-Region Smart Grid Reliability Pilot* Project, Docket No. 2011-138, pgs. 5-7, 44-45 (January 2016), Available at: http://www.neep.org/sites/default/files/resources/FINAL_Boothbay%20Pilot%20Report_20160119.pdf

[32] National Grid. *2017 System Reliability Procurement Report.* Docket No. 4655. Page 17-20. (October 2016) Available at http://www.ripuc.org/eventsactions/docket/4655-NGrid-SRP2017(10-17-16).pdf

determined that approximately 330kW are needed to reach the goal of one MW by the end of 2017. To reach this goal, incentives for Wi-Fi thermostats, heat pump water heaters, window AC purchases, and recycling will continue. In addition, there will be marketing to encourage customers to complete an EnergyWise or Small Business Direct Install (SBDI) energy assessment.

A major change for 2017 is the implementation of automatic meter reading (AMR),[33] coupled with time-of-use rates. Customers will still be billed on the basic service rate, but will receive a shadow bill as an informational tool to show customers the cost of energy at varying times of use and to encourage them to shift their usage to off-peak. A second major change for 2017 is the plan to release a Request for Proposals (RFP) to identify cost-effective market-based solutions to help reach the 330 kW target. This represents a shift in the approach taken by National Grid, which now more closely resembles the RFP-based approached that has become popular in the region.

Appendix 3 of the report presents the table below of the 2017 SRP Benefit Cost Analysis.[34] National Grid modeled the Tiverton/Little Compton pilot using the standard total resource cost test with the exception of the distribution benefit. With that benefit, they excluded the value used from the regional avoided cost study and replaced it with the annualized benefit of pushing the feeder investment out for each of four years.

Appendix 3 – 2017 SRP Benefit Cost Analysis Tables

Table S-2
System Reliability Procurement - Tiverton/Little Compton
Summary of Cost Effectiveness ($000)

	2012	2013	2014	2015	2016	2017	Overall
Benefits	**$358.0**	**$1,325.4**	**$1,033.3**	**$1,281.1**	**$831.2**	**$1,412.4**	**$6,241.4**
Focused Energy Efficiency Benefits[1]	$248.0	$1,015.1	$716.7	$1,024.8	$591.0	$595.9	$4,191.4
SRP Energy Efficiency Benefits[2]	$110.1	$310.4	$136.8	$78.0	$75.6	$656.0	$1,366.7
Demand Reduction Benefits[3]	$0.0	$0.0	$5.6	$6.8	$5.3	$12.3	$30.0
Deferral Benefits[4]	$0.0	$0.0	$174.2	$171.5	$159.4	$148.2	$653.3
Costs	**$133.4**	**$672.4**	**$569.3**	**$1,029.4**	**$989.7**	**$1,349.4**	**$4,743.8**
Focused Energy Efficiency Costs[5]	$46.6	$331.1	$195.8	$529.3	$579.1	$949.1	$2,631.0
System Reliability Procurement Costs[6,7]	$86.8	$341.3	$373.5	$500.2	$410.7	$400.3	$2,112.8
Benefit/Cost Ratio	**2.68**	**1.97**	**1.81**	**1.24**	**0.84**	**1.05**	**1.32**

Source: National Grid 2017 System Reliability Procurement Plan

New York PSEG Long Island Utility 2.0 Projects

PSEG Long Island has planned several 'Utility 2.0' projects on Long Island that propose NWAs using energy efficiency, customer management of electricity use, and peak load reduction.[35] PSEG Long Island plans to issue

[33] New York City Environmental Protection. *About Automated Meter Reading (AMR).* (2016) Available at: http://www.nyc.gov/html/dep/html/customer_services/amr_about.shtml

[34] National Grid. *2017 System Reliability Procurement Report.* Docket No. 4655. Appendix 3. Page 46. (October 2016) Available at http://www.ripuc.org/eventsactions/docket/4655-NGrid-SRP2017(10-17-16).pdf

[35] PSEG Long Island. *Utility 2.0 Long Range Plan 2015 Annual Update*. Page. 6-8. (December 2015), Available at: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKEwikjsrhr_bQAhWMIsAKHSACBxgQFggjMAE&url=http%3A%2F%2Fdocuments.dps.ny.gov%2Fpublic%2FCommon%2FViewDoc.aspx%3FDocRefId%3D%257B49565FC8-538A-43F5-B854-D6C442FF9223%257D&usg=AFQjCNGh7I640YGz1-4J3wS29O8ttgd5KQ&sig2=cKSmhBik7Y0zuZf3kntWew

several RFPs from competitive companies in order to reduce stress on systems in South Fork, Far Rockaway, Glenwood and other areas.

The South Fork Supply and Load Relief project is intended to defer new transmission needed on the South Fork until the year 2022 and to defer transmission needed east of the Buell substation until 2030. To achieve the planned deferral of transmission lines, PSEG Long Island has forecasted that 63 MWs of peak load capacity resources are required to be installed between 2017 and 2019. PSEG Long Island will begin issuance of contracts between quarter four of 2016 and quarter three of 2017.

PSEG Long Island will develop, own, and operate a five MW/25 MWh battery storage system to facilitate significant additions of renewables and to enhance power quality, grid reliability, and resilience across the vulnerable grid area in the East End of the South Fork.

In 2015 PSEG Long Island determined that between 300 and 400 MWs of resources are needed in total for Glenwood and Far Rockaway load pockets in order to defer additional transmission infrastructure by December 2020.[36] A Western Nassau RFP was released in January 2016.[37] The eligible resources for RFP bids include: demand reduction, energy efficiency, battery storage, CHP, fuel cells, renewable generation, peaking generation, cycling generation, and base load generation.

New York's Brooklyn Queens Demand Management Project (BQDM)

Con Edison has one of the most highly-publicized NWA projects. In 2013, Brooklyn and Queens began to experience increased customer electric demand, which began to overload the capabilities of the sub-transmission feeders that serve the Brownsville No. 1 and 2 substations. The BQDM program is designed to address the overload by reducing load 69 MW by summer 2018. To achieve this goal, 52 MW of the reduction will be attained through a combination of nontraditional utility-side and customer-side solutions and 17 MW by using traditional utility infrastructure investment.

Con Edison has created an implementation plan that serves as an annual update on the BQDM program[38]. This plan functions as a "living" document and is updated to provide information on working components and timing of the program. In addition, Con Edison files quarterly reports with the Commission on program activities and expenditures.[39]

Con Edison maintains an open Request for Information (RFI) seeking information and proposals for customer-side and utility-side non-traditional solutions for the BQDM program. By keeping the RFI open, the opportunity to receive potential solutions is on-going and Con Edison can adjust according to new technologies and market participants throughout the lifetime of the program.

Con Edison has embraced two adder-based initiatives that provide extra incentives for already successful programs. The Small Business Direct Install Adder initiative is expected to result in an additional BQDM peak

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[36] *id*. at page 8.
[37] PSEG Long Island. Request for Proposals for Western Nassau Resources. (January 2016) Available at: http://www.psegliwnrfp.com/Western_Nassau_RFP_05_05_16_Addendum_4_Clean.pdf
[38] Elcock, G., *Brooklyn Queens Demand Management Program Implementation and Outreach Plan,* Consolidated Edison Company of New York, Inc, Pgs. 3-4,6,14-16,19-23, (January 2-16), Available at: https://assets.documentcloud.org/documents/2782996/BQDM-Update-1-2016.pdf
[39] ConEd, BQDM Quarterly Expenditures and Program Report, Q-3 2016, Consolidated Edison Company of New York, Inc., (2016), Available at: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={0FF4D5C0-E411-462A-8901-92BE2279F9D4}

hour load relief of approximately 2.2 MW, for a total of eight MW, installed by December 2016. The Multifamily Energy Efficiency Program Adder initiative is expected to result in a total peak hour load relief of 5.4 MW by December 2016.

Con Edison also expects to increase adoption of modular, off-the-shelf combined heat and power (CHP) systems that reduce baseload electric demand during summer around the BQDM peak hour. This initiative is anticipated to achieve up to five MW of peak load relief by summer 2018. CHP systems will be installed and commissioned May 2017 - May 2018, with the performance capability period during the summer 2017 and 2018.

Energy storage has also come into play. Con Edison has released a Request for Comment (RFC) to advance contracts for "shovel ready" battery storage projects to maximize customer-side load reduction opportunities for commercial properties within the BQDM area. Any battery projects within BQDM will need to prioritize and fulfill specific needs for the summer of 2017 and 2018. As for project size, Con Edison is funding energy storage projects that must have a minimum capacity/energy of 100kW/400kWh per installation and a total project size, including all storage, of at least four MWh.[40]

Latest Developments in New York

In New York, the utilities are at varying stages of procuring DER through NWA solicitations. For example, Con Edison's BQDM project has finalized various solicitations to meet reliability needs for years 2016 through 2018. Other utilities have recently released NWA RFIs or RFPs, and each utility has discussed additional NWA opportunities in filings in compliance with the Track One Order and/or in their initial DSIP filings. The following tables showcase NWA projects in New York that are either proposed or in the procurement stage.

Proposed Projects for Potential NWA Solutions				
Company	**Project**	**Description**	**Status**	**DSIP**
National Grid	Golah Avon line 217 and 216	Line reconductoring	RFP to be issued late 2016	Initial DSIP National Grid
	Buffalo Station 53 rebuild	Asset condition and capacity components		
	Gilbert Mills Transformer Upgrade	Replace the existing transformer w/ a larger transformer		
	Stoner 52- Mohawk Drive Conversion	This project is to relieve an overloaded ratio bank		
	Brooklea Drive	This project is to relieve an overloaded ratio bank		
	Van Dyke Road Station	Improve capacity in the Town of Bethlehem due to new load		

[40] Wood, E. NY Utilities Seek Energy Storage and Non-Wire Alternatives. Microgrid Knowledge. (March 2016), Available at: https://microgridknowledge.com/energy-storage-and-non-wire-alternatives/

	Old Forge Area, NY	Address issues of reliability via dispatchable assets		
Central Hudson	Extend Circuitry along Rt. 17k	Extend the 4025 circuit from Governor's Drive to the intersection of Rt. 17K and Rt. 300.	Submitted for budget year 2017	Initial DSIP Central Hudson
	Maybrook Substation	Maybrook upgrade will provide capacity relief to the Coldenham Substation	Permitting and design phase	
Con Edison	Glendale Area Station	Installs a new transformer for 60 MW load transfer	NWA candidates under review	Initial DSIP Con Edison
	West 65th St. No. 1	Upgrading synchronous bus sections or installing cooling for both synchronous busses		
	Glendale Load Transfer	Transfer 60MW load from Brooklyn to Queens		
	Flushing Crossing	Addresses capacity constraints at six feeder crossings		
	Yorkville Crossing	Two new crossing needed from Bronx to Manhattan		
	Penn Network Feeder Relief	Additional reinforcement to maintain reliability to customers		
NYSEG/ RG&E	RG&E Station 117	Replace #1 transformer bank and convert three circuits to 12Kv	Procurement of NWA is in the 2019-2021 timeframe	Initial DSIP NYSEG & RG&E
	RG&E Station 46	Replace #3 and #4 transformer banks		
	NYSEG Crafts	Add second transformer and fourth 13.2kV feeder position		
	NYSEG Hilldale	115kV source, add transformer bank, second 12kV distribution feeder		
	NYSEG Holland	Replace Transformer bank		
	NYSEG Orchard Park	Add a second transformer		
	NYSEG West DavenPort Substation	Replace transformer		
O&R	There were various projects evaluated for potential NWA solutions, but did not prove adequate for NWA and must be constructed as a traditional infrastructure solution.			Initial DSIP O&R

NWA Procurements To-Date in New York from the Joint Utilities DSIP [41] and PSEG Long Island				
Company	**NWAs**	**Type**	**Status**	**Notes**
NYSEG/RG&E	• Java Station • Station 43	RFP	• Technical Review • Reviewing responses	Identified seven additional potential NWA projects in Initial DSIP filing which warrant consideration for future RFPs
Central Hudson	• Northwest Area • Philips Road • Meritt Park • Coldenham • Ohioville	RFP	• Implementation • Implementation • Implementation • Under development • Did not pursue	• Ohioville was included within the initial NWA procurement, but was not cost justified. • Coldenham was identified in the DSIP as a potential NWA that is currently being evaluated.
Con Edison	BrooklynQueens Demand Management (BQDM)	RFI, RFP, RFC, RFQ, Auction	Implementation	•Solicitations have led to executed agreements and commitments to pursue and implement customer projects by the years 2017 and 2018. • Identified nine additional potential NWA opportunities in Initial DSIP filing
National Grid	• Baldwinsville • Kenmore	RFP	• Reviewing responses • Implementation	Identified seven additional potential NWA projects in Initial DSIP filing
O&R	• Pomona • Wurstboro • Monsey Substation	RFP	• Implementation • Identified/early stages • Identified/early stages	•Plans to issue subsequent RFPs for solutions identified in the Pomona portfolio development process. • Released an expanded RFI due to limited responses to the initial RFI.
PSEG Long Island	•Far Rockaway •South Fork •Glenwood	RFP Western Nassau RFP	•Issuance of contracts •Reviewing responses •Reviewing responses	• Several contracts to be released through Q3 of 2017

[41] Joint Utilities. *Supplemental Distributed System Implementation Plan Case 16-M-0411.* RG&E, National Grid, O&R, NYSEG, Central Hudson, ConEdison, Pg. 112, (November 2016), Available at: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7b3A80BFC9-CBD4-4DFD-AE62-831271013816%7d

Conclusion

Innovative change is taking place in the Northeast and Mid-Atlantic states through NWAs. The scope of initiatives recently undertaken by states within the region - either through policy or continued efforts on NWA projects - is vast and impressive. The ability of a non-wires alternative to reduce, defer, or eliminate a T&D infrastructure investment has been considered through suitability criteria, pilot projects, energy efficiency planning, and though the development of an NTA Coordinator position. There are many benefits that have been realized, such as localized avoided costs, which provides a granular picture of the benefits of NWA, as well as customer targeting, resource planning, and non-energy benefits.[42] As states realize the potential for NWA in their T&D planning, each state has taken initiative to evaluate the extent to which NWA solutions are applicable to projects within state plans, as well as to identify gaps and barriers that may prevent NWA procurement from taking off.

There are similarities as well as differences that can be seen in the region by evaluating the types of progress made within each state. For instance, in evaluating NWAs for the Tiverton/Little Compton pilot, National Grid uses the total resource cost (TRC) test, supplementing it with the additional benefits derived from the net present value of deferring the traditional asset investment. However, there is an even greater opportunity for NWA solicitation through localized cost-benefit evaluation, as was suggested within the Dunsky proposal, because more granular data can be evaluated to better understand the locational value of NWAs. This methodology can reflect the value of NWA and its ability to defer or delay capital T&D investments within a constrained area, but also has implications for system planning in general. Through best practices and gained experience, transparency across utilities and states will help to further facilitate the use, or consideration of NWA within the region.

New York, Rhode Island, and New Hampshire have well-defined suitability criteria. Rhode Island and New Hampshire criteria have been created by utilities within the state. National Grid and Liberty Utilities each have a criteria that they use to screen projects for NWA solutions. New York is creating a suitability criteria proposed by the Joint Utilities. This criteria will standardize the evaluation process across New York utilities and provide a reliable method for sharing NWA solutions. A noteworthy difference from the criteria developed by New York compared to Rhode Island and New Hampshire, is the inclusion of asset conditions. An asset condition includes work for a planned repair, replacement, or enhancement of existing infrastructure to maintain minimum safety and reliability performance. If the need for the project is based on asset conditions, neither Rhode Island nor New Hampshire will pursue an NWA solution, whereas New York considered it a project category applicable for NWA. In New York, NWA in this area must also include the repair or replacement of the assets that were driving the need for the project recommendation. Rhode Island and New Hampshire also require that the NWA solution should be less than 20 percent of the total load in the area of defined need. New Hampshire provides a 24 month timeframe for the wires solution, whereas Rhode Island provides 36 months. While New York has not defined these variables, time, project type and cost are the three main matrices within their suitability criteria. While there are differences across the established suitability criteria as to the type of project, timeframe, and cost, the overarching categories used to define the criteria are the same.

[42] Boulanger, F. *Geo-Targeted DSM- Cost Effectiveness Methodology on a Local Scale, Redacted Version*. Dunsky Energy Consulting. Pgs.7-9. (September 2015) Available at: http://www.dunsky.com/wp-content/uploads/2016/09/NGrid-Geo-Targeted-DSM-Final-Redacted.pdf

New York is the leader in NWA project solicitation with over 25 projects in the works. The progress thus far in NWAs will provide vast experience and enable the criteria used to evaluate the potential for NWA to modify and grow and enable more opportunities. Rhode Island is working to implement a partial solutions process that will enable further NWA deployment for projects that would have otherwise gone with traditional wires solutions.

Maine is the only state in the region that uses the term non-transmission alternatives versus non-wires alternatives, distinguishing their projects at the transmission level, whereas other states in the region consistently use NWA, with a combination of distribution and transmission level projects. A majority of the projects are at the distribution level. PSEG Long Island is the only entity that does not refer to their load deferring projects as non-wires alternatives in their plan.

The Northeast and Mid-Atlantic States' innovative projects and policies in non-wires alternatives are demonstrating that geographically-targeted energy efficiency and customer side resources can be deployed to meet transmission and distribution system needs in a cost-effective manner and with greater benefits to ratepayers than traditional solution projects.