Non-Wires Alternatives

Incorporating NWAs into Your Grid Modernization Program
Introduction

The power sector is making significant investments in modernizing the grid to address multiple business objectives. As examples, Ameren, FirstEnergy, and Pepco are developing grid modernization programs that exceed $7.5B total. These investments are to replace aging transmission and distribution system infrastructure. Moreover, these investments enable the grid system to be flexible and agile in a new utility environment that includes distributed energy resources (DERs) such as energy efficiency, demand response, combined heat and power, electric vehicles, and microgrids.

As the penetration of DERs increases, the utility planning process should change to accommodate these new energy sources. Utilities are focusing on determining the most cost-effective approach without compromising reliability, safety, and efficiency as a key objective.

Providing new grid services using DERs, while also deferring the need for traditional grid investments presents new opportunities for utilities, customers, and third parties. These opportunities are being labeled as non-wires alternatives (NWAs). SEPA, through our research and advisory work, has developed recommendations for NWA policies and programs. Recently, SEPA consulted with the D.C. Public Service Commission in paving the regulatory path forward to launch PowerPath DC. SEPA worked with District stakeholders to arrive at a definition for NWAs (see below) to inform its regulatory treatment and to address how to incorporate NWAs into the distribution planning process.

“Non-wires alternative (NWA)” is any action or strategy in the energy delivery system domain that uses non-traditional transmission and/or distribution solutions – such as distributed generation, energy storage, energy efficiency, demand response, and grid software and controls – with the intent to defer or replace the need for specific energy delivery system equipment investments. An NWA must meet energy delivery system needs and be more cost effective consistent with the guiding principles of sustainable, well-planned, secure, affordable, and non-discriminatory.

The question for utilities and regulators is: can the utility planning process create a marketplace for NWAs without jeopardizing the affordability, reliability, security and safety of the grid?

This paper, part of the SEPA Grid Modernization Framework, answers this question and offers an approach for incorporating NWAs into grid modernization. It outlines best practices for utilities and regulators to create a stakeholder-informed system planning process that supports a marketplace for NWAs to integrate DERs without sacrificing system safety, affordability and reliability. A major paradigm shift is occurring around system planning in the electric power...
industry and this paper outlines changes necessary to the planning process to accommodate NWAs.

**The Challenge**

Today's electricity delivery system planning process is a proven blend of utility load forecasting, system assessments, project recommendations and capital expenditure plans. It often culminates in an annual regulatory filing addressing rates and new project approvals.

The ability of DERs to contribute to operational flexibility and locational value creates opportunities for utilities to leverage these solutions to provide low capital cost options to traditional grid investments. Part of unlocking the full potential of DERs relies on utilities and regulators to unpack today's system planning process to determine where NWAs fit. This paper delves into this along two key problem statements.

**Problem Statement #1:**

Existing system planning processes lack stakeholder engagement which leads to contentious rate cases and proceedings challenging 1) utility load forecasts and 2) utility proposed projects.

The wide variety of stakeholder perspectives creates challenges when incorporating stakeholders into the utility planning process. SEPA’s experience facilitating industry working groups yields the following observations about stakeholder informed grid planning.

- Environmental and consumer advocacy stakeholders favor a planning process that fairly evaluates DERs against traditional grid investments, aligns with clean energy policy goals, and positions customers at the center of all decision making. Information flow has to be bi-directional and the utility has to be open to big ideas and specific solutions.

- Utility stakeholders tend to be primarily focused on reliability, safety, and affordability. For these stakeholders, the utility is accountable for the system and must have authority to identify locational constraints and grid needs and to manage and control the risks of integrating DER assets.

These different perspectives often create differences in opinion about the role each
stakeholder group should play and mistrust between stakeholder groups. This fosters a confrontational environment often leading to a lengthy and expensive decision-making process.

**Evaluating Benefits and Costs of NWAs**

Utilities and stakeholders are continuing to examine best practices for evaluating and balancing costs and benefits of NWA projects. NWAs often can include multiple benefits for the bulk power system, distribution, customers, and society. How to properly account for these resources, and determining how costs should be socialized across customers are still under investigation today. A number of jurisdictions are approaching evaluation differently, with some using standard BCA handbooks, others allowing utilities to develop their own methodology, and others choosing to move forward with least cost best fit methodologies. SEPA is continuing to work on these issues in an upcoming *National Standard Practice Manual* examining principles and cost-effectiveness frameworks for DERs and NWAs, to be released in 2020.

**Problem Statement #2:**

*Existing utility processes do not give customers or DER solution providers sufficient time and information to develop NWA solutions in lieu of traditional grid investments.*

DER solution provider stakeholders are absent from most utility planning processes, thus creating tension with utilities. Utility planning processes are mostly internal to the utility with no or very little information provided to external stakeholders. The only option for stakeholders to participate is to react to the utility's plans during utility rate filings or other regulatory proceedings (See Figure 1).

The challenge of utility DER ownership remains unsolved in some jurisdictions, and is met with innovative regulatory approaches in others. The rules for ownership and operational structure of DERs directly leads to regulators' ability to establish an open and interactive market for DERs as NWAs.
SEPA Has Identified Three Common Applications Fostering Utility Ownership of DERs.

**Serving low- or moderate-income customers:** The New York Public Service Commission (NYPSC) adopted a regulatory policy framework allowing utility ownership of DERs for low or moderate income (LMI) customers.

**Pilots:** Several jurisdictions are starting to allow utilities that aren’t typically allowed to own generation to own DERs in pilot deployments in order to better understand the market and grid implications.

**Grid requirements:** The Maine Public Utility Commission ruled to allow utility ownership of generation and energy storage – only if the asset improves grid reliability and efficiency. California and Massachusetts have implemented rules to allow DER revenue capture by third-parties, utilities, and customers as a way to reach ambitious renewable energy carve outs and mandates. In Massachusetts, utility energy storage ownership is still unsettled. Conversely in Illinois, the Illinois Commerce Commission (ICC) issued a final order determining that ComEd can recover costs of energy storage via distribution formula rates. In D.C., stakeholders recommended the PSC allow utility ownership of DERs for added reliability.

Although utility ownership of DERs is not the focus of this paper, it is important to note the regulatory approaches to the topic and specifically how meeting grid requirements with DERs relates to incorporating NWAs into system planning. Similarly to DER ownership, procuring NWAs can also be utility-owned and managed as well as third-party owned and managed. The following section offers SEPA’s perspective on incorporating NWAs into the utility planning process to address the challenges outlined above. The objective is to specify a utility planning process that ensures stakeholder views are recognized, and utilities, customers, and third parties are able to provide solutions that address grid needs. Doing so will allow the utility to successfully implement NWA projects and contracts that align with their system planning needs.

**SEPA Recommended Approach**

The transition to a clean and modern grid requires a significant investment of capital and time. Incorporating NWAs into a grid modernization program can help optimize the money and time spent integrating DERs. Through work with clients on grid modernization and DER planning, SEPA has developed the following best practices and framework for creating a grid modernization planning process incorporating NWAs:
Planning Process Best Practices

1. Understand the drivers for enhanced system planning and incorporation of NWAs
2. Review the planning process to ensure it can support NWA projects
3. Develop improved load forecasts
4. Ensure stakeholders have access to system-level data to be able to formulate NWA solutions
5. Enable Utility and Third-Party NWA Partnerships

Understand the Drivers for Enhanced System Planning and NWAs

A successful grid modernization program, requires an understanding of all the drivers. The drivers of enhanced system planning are 1) regulatory/policy related, 2) public/community related, and 3) technology related (See Figure 2).

Review the Existing Process

Once there is an understanding of the drivers and objectives for an NWA program, a thorough review of the planning process must be initiated to ensure it can support NWA projects.

**FIGURE 2: Drivers for Enhanced System Planning and NWAs**

- Renewable Energy Mandates
- Other Climate and Energy Policies
- GHG Emission Reductions
- Integration of DERs into the Planning Process
- Resiliency
- Increased Stakeholder Engagement
- Transparency
- System Efficiency with Increased DER
- Locational Load Growth
- Aging Infrastructure
- Increased Distribution System Automation

Regulatory and/or policy related
Public and/or community related
Technical related
Figure 1 illustrating traditional system planning reveals a series of linear steps that typically begin with the utility conducting load forecasts and end with a filing to the Commission. These filings outline all the proposed projects for the next 5-10 years that will address the capacity and reliability constraints projected from load forecasts.

Utility planning processes typically involve a system assessment analyzing capacity and reliability constraints across the system. Utilities on the bleeding edge of enhanced system planning in New York, California, Massachusetts, D.C. and Rhode Island have introduced hosting capacity analysis into the process. Sharing this analysis to DER solution providers via hosting capacity maps provides grid visibility where there are capacity and reliability constraints with potential NWA replacements and deferrals.

**Hosting Capacity Analysis:**

Hosting capacity analysis indicates which grid distribution circuits can easily accept distributed generation without upgrading the circuit. Releasing hosting capacity analysis and maps enables DER solution providers to identify ideal locations for new DER projects and potential NWAs.

Utilities are increasingly evaluating NWAs after conducting load forecasts and pinpointing areas needing replacements and upgrades. At this point in the process, utilities can reasonably consider alternatives to traditional grid upgrades or replacements. This process may differ from jurisdiction to jurisdiction; however, determining where NWA consideration can be introduced into the existing planning process is an important piece to successfully incorporating NWAs into grid modernization programs.

**Grid Needs Assessment & Locational Constraints Report:**

Grid needs and locational constraints reports show assumptions and results of the planning process that yield grid needs related to grid services, such as capacity and reliability. These types of reports present areas of system constraint that could be subject to NWA consideration.

By conducting a review of the planning process, utilities and stakeholders can identify the most logical and beneficial points in the process for increased stakeholder participation and third-party solicitation for NWAs. Utilities still lead the process and external stakeholders gain increased visibility into the planning process, including the ability to contribute NWA proposals.

**Develop Improved Load Forecasts**

An important component of a planning process that supports NWAs is making sure load forecasts see the whole picture, including load growth and increasing DER deployment. Just as it is important for utilities to share data with developers and
third parties, it is equally important to encourage data flow from DER developers to DER forecasts to accurately determine the impact of DERs on the load forecasts. Some utilities may not yet see the need for DER forecasting at current penetration levels. However, it is important to align processes in preparation for anticipated DER growth. The ability to forecast DERs accurately is dependent on the quality of data shared and collected from C&I customers, developers, DER solution providers and EV charging owners. It’s important to understand factors impacting load growth as well as the factors reducing load.

**Two-Way Data Flow:**

Load forecasting is a data driven process. To ensure accurate load growth projections and DER forecasts, it is critical for utilities, customers and third parties to coordinate and facilitate two-way data exchange. Quality load and DER growth forecasting is dependent on load factor inputs from the C&I customer, real estate development, and DER developer communities.

Utilities can take advantage of DERs by properly accounting for them during their system planning. Utilities have the ability to forecast scenarios to reflect low, moderate and high DER penetration. These scenarios could include customer-sited solar, storage and electric vehicle charging stations.

In California – where customer sited solar PV is prevalent – Pacific Gas and Electric (PG&E), Southern California Edison (SCE) and the Sacramento Municipal Utility Department (SMUD) have emerged as leaders in DER load forecasting by integrating system and customer DER data into their forecasts. As part of the California Public Utilities Commission (CPUC) Distributed Resource Plans (DRP) proceeding, Investor-owned utilities (IOUs) in California will be sharing DER growth scenario forecast methodologies.

**Ensure Stakeholders Have Access to System-Level Data**

To ensure viable NWA options from the market, utilities should ensure customers, third parties and developers have access to information on future system capacity. This allows third parties to formulate solutions and ultimately bid on request for proposals (RFPs) for NWA solutions.

Utilities and regulators should establish a planning process that enables a marketplace for NWAs where customers, third parties and developers are able to access publicly available system-level data with ease to better understand the grid's needs in order to offer up ideas and solutions that fill those needs.
In states with a focus on NWAs, utilities and their partners wish to develop web portals offering solar calculators, hosting capacity maps, restricted circuit maps, and solar heat maps. Third parties can use this data to develop NWA solutions. Examples of utilities who provide these types of portals include:

**Joint Utilities of New York (ConEd, Central Hudson Gas and Electric, National Grid, NYSEG, RG&E and Orange & Rockland)**

**Overview of Currently Accessible System Data**

- **Pepco D.C. and MD Hosting Capacity Map, Solar Heat Map, Restricted Circuit Map**
- **SDG&E Integration Capacity Analysis (ICA) and Locational Benefit Analysis (LBNA) Map**
- **PG&E Distribution Resource Planning Data Portal**
- **Xcel Energy Minnesota Hosting Capacity Map**

Table 1 outlines the system-level data availability by company and data type. Some actions have been regulatory driven and others have been voluntary or market driven.

### TABLE 1: System Level Data Availability

<table>
<thead>
<tr>
<th>Company/ Data Type</th>
<th>Hosting Capacity Maps</th>
<th>Solar Heat Maps</th>
<th>NWA Opportunity Maps</th>
<th>Locational Benefit Analysis Maps</th>
<th>Restricted Circuit Maps</th>
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Source: Smart Electric Power Alliance, 2019.

**Key:**
- RR – Regulatory Requirement
- S – State Led
- V – Voluntarily Provided
- UC – Under Regulatory Consideration
Regulatory Required Hosting Capacity Maps:
In May 2019, solar advocates in Georgia requested the Georgia Public Service Commission to require Georgia Power to produce a hosting capacity map to save DER developers time and money. The recommendation was part of a larger strategic deployment plan for distributed solar resources across the state of Georgia.

Public Access to Data
All system planning data that is publicly available through annual utility filings and rate cases (i.e. load forecasts, DER availability, hosting capacity analysis) should be made easily accessible to provide system transparency to parties seeking to offer NWAs.

To animate the third-party NWA market, utilities should provide an additional report to the public which identifies locational constraints and grid needs. In California, utilities are beginning to develop Grid Needs Assessments identifying public areas on the grid which may be candidates for alternative solutions outside of the normal substation or transformer replacement. In D.C., stakeholders proposed to require Pepco to develop Locational Constraint Reports to act in the same capacity – to identify areas requiring traditional grid investments so that third-parties can offer alternative solutions to meet the utility’s needs.

Data Security and Customer Privacy
It is critical that stakeholders have a level of visibility into the grid in order to propose NWA solutions and DER programs. As discussed in the previous section, third parties’ access to system-level data enables the development of NWA solutions. Despite the importance of being open and transparent with data, utilities are also responsible for keeping the grid secure from bad actors. Utilities should ensure customer privacy and grid security by not disclosing critical energy infrastructure data or customer personally identifiable information (PII) data. The next section of this report outlines utility best practices for developing a secure portal accessible only by appropriate parties under a non-disclosure agreement (NDA) with the utility.

Non-Public Data Sharing
Utilities should consider establishing a secure portal for sharing location-specific grid data to ensure third parties have access while maintaining necessary grid security protections. The primary users of such a portal would be NWA RFP respondents (i.e DER aggregators, solar PV developers, energy storage developers, solution providers) and government agencies developing DER programs. It is best practice to require the users of the portal to sign an NDA, mitigating risks of bad actors.

The relevant system-level data provided would be non-public location-specific data that is required in order to develop an NWA
solution to a specific grid need or locational constraint. This type of data may include: hourly load profiles for service areas, hourly profiles of DER supply load for specific feeders and circuits, peak hours for substations and feeders, and voltage profile for feeders/transformers/reclosers/sectionalizers, etc.

When the utility is responsible for implementing the portal and releasing sensitive data, the utility should also ensure any parties accessing data via the secure web portal are held to strict levels of cybersecurity policies and practices to protect the security and privacy of the data being shared.

Enable Utility, Third-Party, and Other Stakeholder NWA Partnerships

NWAs are a new business model for the utility. What traditionally has been a service solely built, owned and operated by the utility to provide reliable, safe and affordable electricity to customers must now rely on a contract between the utility and a third party. This puts a premium on risk management by the utility and the need to establish clear performance requirements as part of executing an NWA contract.

NWA Procurement:

Power sector participants issuing NWA procurements have much to learn about the most effective ways to structure the process. Soliciting stakeholder ideas, designing NWA RFPs, determining DER performance and participation in the wholesale market and contract execution are all components of a robust NWA procurement process.

A successful NWA solicitation, procurement and contracting process relies on up-front collaboration between utilities and third parties. This can take the form of workshops and individual meetings to brainstorm NWA ideas and develop contract mechanisms that both allow for third parties to provide grid services via DERs and allow utilities to maintain grid reliability.

Utility & Third-Party Partnership in New York:

In 2014, ConEd proposed the $200M Brooklyn Queens Demand Management (BQDM) NWA project, which included up to 52MW of non-wires solutions. After approval by the New York Public Service Commission, ConEd released RFPs, evaluated responses and negotiated contracts with third-party solution providers. The portfolio approach taken by ConEd addressed the peak load and the constrained substation load profile. For example, ConEd partnered with the New York City Housing Authority and other New York City Agencies to incorporate demand-side management programs to reduce peak loads. In addition to reducing peak loads on the customer-side, ConEd installed a 12 MWh energy storage system in 2018. For more information regarding ConEd’s BQDM project, read SEPA’s NWA Case Study Report.
When NWAs are owned and operated by non-utility entities, it is important to specify the requirements for NWA performance and the consequences (i.e. financial implications) of not meeting those requirements. For example, if a third-party-owned behind the meter energy storage asset is called on for dispatch as an NWA during a peak event, the dispatch must be properly coordinated between all parties to ensure the asset is serving a grid need. Determining dispatch coordination and managing risks for both utilities and third-parties in NWA contract negotiations is a critical component of a successful project.

Enhanced system planning is a culmination of examining the traditional system planning process and adding in the elements discussed in this paper to improve a utility's system planning in coordination with DERs and NWAs. Figure 3 illustrates an enhanced system planning process that leverages elements of traditional system planning with these added elements.
Summary

Throughout the country, utilities and regulators are at different stages of considering NWAs. On one end of the spectrum is a two-dimensional planning process that does not incorporate NWAs and may result in stakeholder frustration (See Figure 1). This linear process consists of utility forecasts, system recommendations, and construction. On the other end of the spectrum is an iterative and evolved three-dimensional planning process that successfully incorporates and creates a market for NWAs, while keeping customers and stakeholders at the forefront (See Figure 3). Striking the right balance of promoting an interactive and sustainable grid while maintaining a safe and reliable grid is the key challenge many utilities and regulators are facing today.

Incorporating NWAs into a grid modernization program requires the collaboration of all stakeholders. Opening the traditional planning processes to stakeholder engagement is an entirely new way of thinking about grid planning and the role stakeholders can play. The utility's role is evolving to be that of the smart integrator of energy while being responsible for selecting the projects which provide grid safety, reliability and affordability. These new processes allow customers and third-parties to participate in grid planning, provide input into load forecasting, develop ideas for new solutions, and participate in the competitive NWA procurement process.

As more and more utilities incorporate NWAs into the grid, NWAs will become mainstream solutions rather than alternatives. Non-wires projects will just be yet another tool in the toolbox for utilities and developers to use in the 21st century grid.
About SEPA

The Smart Electric Power Alliance (SEPA) helps address the most pressing issues encountered in the smart transition to a carbon-free energy system by 2050. Utilities, industry, regulators and other electric power stakeholders trust SEPA to provide education, research, standards and collaboration around a clean and modern energy future. To learn more and discover our pathways, visit www.seapower.org.

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