Process Overview for Planning, Designing, Executing, and Evaluating Geotargeted Non-Wires Alternative Distribution System Projects

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ABSTRACT

Electric utilities across North America are conducting pilot non-wires alternative projects. The primary driver of these projects is to defer distribution system capital investment. Following a comprehensive review of and participation in these projects, our team developed this best practice process overview. The first step is to identify the suite of measures that the utility has at their disposal. The process uses a litmus test that leverages yearly utility capital planning analysis to identify candidates with capital investment needs. Next, a small number of substation candidates are selected for further review based on a stage gate process using size of capital investment, load reduction need, and availability of evaluation data. The next step is to gather data for these candidates including load from the most recent peak season, customer demographic information, and load growth projections that is used to estimate the load reduction potential for each of the measures. The process now includes conducting a cost-benefit analysis by stacking the options starting with the lowest cost option until the load reduction need is met. The next major steps are to design the project, procure the resources, deploy the solution, and operate it over the project lifecycle. Evaluation of the project will begin during the first peak season. The process outlined in this paper will showcase a roadmap that utilities may use to plan, design, execute, and evaluate non-wires alternative projects for pilots or on a path towards operationalizing into their planning, engineering, and operations groups.

Introduction

Electric utilities across North America are conducting pilot non-wires alternative projects with the primary driver of deferring distribution system capital investment. This overview spans the non-wires alternative process in a staged manner starting with planning, progressing to designing, transitioning to executing, and concluding with evaluation as shown in Figure 1 - Non-Wires Alternative Stages.

Figure 1 - Non-Wires Alternative Stages

The plan stage of the non-wires alternative process includes steps that must be completed independent of order. Clearly understanding and explicitly defining the drivers of non-wires alternative projects is important throughout the process. It is best if the determination of which types of distributed energy resources (DER) are candidates for incorporation in a non-wires project happens during this stage. The project selection stage gate process is the most involved step of the planning stage and incorporates input from stakeholders, qualitative inputs, and quantitative data. Quantification of the need is a step that is expensive to perform and typically aligns with a reduction in candidates in the project selection step. Stakeholder engagement is a step in the process that ensures that internal and external stakeholders

are aligned with the drivers, DER measures, the project selection process, and quantification of the need. The outputs of the planning stage of the process are a well understood need, a set of projects for consideration, and the types of DER aligned with drivers and internal and external stakeholders.

The design stage includes foundational steps of DER portfolio selection and scenario definition and follow on steps of marketing and incentive determination, cost estimation, and net present value calculation. DER portfolio selection needs to align with the need identified during the planning stage as well. The need is determined by analyzing yearly load shapes and the specific MW reduction need of the substation or circuit. There is wide variability of hourly demand on peak load days dependent on weather and other factors and analyzing multiple years of load data is recommended. At a minimum, reviewing two years of load is required and up to five years of data can better define the peak load reduction needed. The next foundational step is to define the marketing and incentivization scenarios to influence participation and ultimately the peak load reduction achieved by the project. This may be done in several ways, but bracketing the existing, likely, and maximum peak load reduction is a simple and effective way of performing this step. Once the DER portfolio and scenarios are defined, establishing the cost of additional marketing and incentives to affect the programs is necessary. The final step of this stage is to calculate the net present value of the cost of the programs per scenario including the relevant DER portfolio and compare this to the present value of the benefit stream or streams. Typically, the value of infrastructure upgrade deferral is the largest benefit stream with other benefit streams an order of magnitude smaller.

Following the design stage closely is the execute stage. This stage consists of procuring the resources for the non-wires alternative and putting these resources into production usage during the project. The steps in this stage are procure, implement, operate, and monitor. Procurement may take several forms but if most often done with an RFP. Implementation of the procured resources may be a long and complicated step depending upon the DER portfolio selected for the non-wires alternative. Operation of the resources may take several forms per the DER mixture. Finally, monitoring the performance of the resources and the net impact to peak load reduction is a critical element of the execute stage. The result of implementing and operating the non-wires alternative must be evaluated and measured as part of the following stage, evaluate.

The evaluate stage of the process includes foundational tasks and then steps built upon the foundational tasks. The foundational tasks include defining a detailed evaluation plan and the associated data collection process. Once the foundational tasks are complete, subsequent steps include determination of ex ante and ex post verified net savings, process evaluation, and economic analysis. The ultimate step of the evaluation stage is to revisit and evaluate results of the non-wires alternative evaluation and construct inputs into the regulatory or stakeholder process if a one-time project or into the larger planning and operational process if more non-wires alternatives are going to be undertaken.

The stages of a non-wires alternative will be covered in detail in the following sections in addition to a discussion of how the linear process flow described may be modified to introduce iterations as the process matures. For a utility to operationalize this process or to incorporate learnings from a non-wires alternative pilot into subsequent efforts the iterative nature of a mature process becomes more important. This paper describes the processes linearly but expect that it will need to be adapted to each organizations goals, situation, and maturity.

Plan Stage

The plan stage includes stakeholder engagement, driver identification, determination of the DER portfolio candidates for the non-wires project, selection of the project or projects, and then quantifications of the need of the selected project or projects steps as shown in Figure 2 - Planning Stage Overview. The process in the plan stage is described as a linear flow of steps starting with stakeholder engagement and finishing with quantifying need. In practice this process is rarely as straightforward and

linear as described. Utilities will have completed some steps of the process prior to starting a non-wires alternative pilot project and will not even know that they need to perform other steps as part of the planning stage. In addition, there is the possibility of an iterative loop between the planning and design stages of the process before project selection can be completed that is discussed later in this paper. In the simplest case the linear process flow here can be used with appropriate limitations and constraints. In practice, creating an operational process to incorporate non-wires alternative projects into the distribution planning and operational executing is likely to be more complicated than that portrayed here, but this process is a starting place for adoption.

Figure 2 - Planning Stage Overview

Stakeholder Engagement

A foundational step in the process of establishing a non-wires alternative is stakeholder engagement. This step may be done in parallel with others, but needs to be granted a high priority to ensure visibility into the effort and to get buy-in from both internal and external stakeholders. Within the utility key stakeholders include distribution operations, distribution planning, demand side management, and corporate or strategic planning groups. The ability to use non-traditional (non-wires) solutions in an operational manner may be met with hesitation. Getting buy-in from operations early in the process is a critical task in this step. The planning organization is always under pressure to do more with the resources allocated to them. Non-wires alternatives may be a way to do more with the allocated capital upgrade dollars for the year. A challenge with some non-wires programs is that it will most likely take multiple years of investing in non-wires programs, technology, or measures to meet the required need for peak load reduction. Educating and getting buy-in from planning is key to gaining a proponent of non-wires solutions. A group that can assist in gaining stakeholder engagement is corporate strategy. This group is the best mechanism to support non-wires alternative adoption by reticent groups within the utility. Next on the list of stakeholder groups is the demand side management organization. This group is typically familiar with non-wires programs and measures, but may require a broader way of viewing how to deploy programs and measures than just for demand side management usage.

External stakeholders are also important to include in the process. Regulatory groups or governing bodies may act in one of two manners, partners or drivers. Once educated on non-wires alternative solutions, they may become partners in establishing non-wires use to support efficiency in capital upgrade deferral. Alternatively, they may push use of non-wires alternative solutions to the utility. Engaging these groups early in the process, educating them on the potential, and keeping them appraised of the progress of non-wires projects can be a significant benefit.

Identify Drivers

As part of the planning stage, identifying drivers is important at the beginning of the process and to ensure alignment with stakeholders. Drivers for non-wires projects vary widely across the US and can be the result of both internal or external pressures. In some jurisdictions, notably California and New York, regulators are constructing a framework, a proscriptive way of valuing non-wires alternatives, and pushing utilities to conduct pilots and to operationalize non-wires alternative projects into the capital planning process. Other jurisdictions do not have regulatory pressure, but instead have limited capital upgrade dollars. The allure of doing more with less may drive utilities to explore incorporating non-wires

alternative projects into an operational context. The opportunity to defer capital investment projects for several years may enable the utility to use the capital dollars freed up from the non-wires alternative deferral to perform other high-importance upgrades or improvements. Another area related to drivers is the overlap of grid modernization investments with non-wires alternatives. As utilities explore the use of battery storage with solar PV, for example, it may make sense to incorporate projects into a non-wires framework. The enabling infrastructure of grid modernization including communications and control, monitoring, and optimization systems has direct applicability to operating, monitoring, and evaluating non-wires projects. There may be synergies identified that may help drive or align with non-wires projects. Finally, determining the value of DER for incorporation into non-wires projects through a market mechanism may provide value to utilities and establish a baseline for different types of programs and measures for incorporation in subsequent non-wires projects. Whatever the drivers in place in the specific region it is recommended to identify and understand these drivers early in the process before moving forward with the non-wires planning process.

Determine DER Portfolio Non-Wires Alternative Candidates

The types of DER that can be included in a non-wires alternative varies by jurisdiction similarly to drivers. Assessing the DER types that are candidates for incorporation into a project early in the planning stage is important. The first step is to identify the suite of measures that the utility has at their disposal to deploy for a non-wires alternative project in the intended time frame. The options available to the utility may vary significantly based on the regulatory framework, the specific driver for the non-wires alternative pilot project, and distributed energy resources (DER) potential.

To determine the portfolio, use a structured process to down select from the entire list of energy efficiency and other types of measures to those that will help meet the non-wires objectives. First, identify the specific measures that may have a measurable impact on peak load reduction. Some measures may be low cost and effective at reducing energy usage, but unless they have the necessary peak load reduction profile they may be of limited value in a non-wires alternative peak load reduction program. Correspondingly, demand response measures are usually a good fit for non-wires alternative projects because these measures are dispatchable and programs may be tailored to meet the specific need at a substation. Specifically, if a substation has a peak load reduction need during a three-hour time window then demand response measures can be dispatched during the appropriate period to affect the necessary load reduction. On the DER side, solar PV and solar PV with battery storage are becoming more common on the distribution grid and may be a fit as well. The emergence of advanced inverters in front of these DER provides an opportunity to make these resources dispatchable with direct utility control providing the opportunity to not only reduce peak load but to potentially act as distributed generation. Finally, any DER with the ability of the utility or 3rd party aggregator to control or dispatch the resource may be a candidate for incorporation into a non-wires alternative. As more of these resources become available on the grid using them in a cost-effective manner can provide a great benefit to the utility in this framework.

Project Selection

The foundational steps of this stage are prerequisites to selecting and evaluating projects in the regulatory, stakeholder, and DER measure environment. Identifying and selecting initial candidates, defining a stage gate process, and running initial candidates through the stage gates are follow-up steps.

Identify and select initial candidates

Identifying and selecting initial candidates is the next step for consideration. It is possible to create a stage gate process and evaluate every substation or feeder candidate through the process, but

this is expensive. Reducing the total number of potential projects by applying a litmus test to the candidates will reduce the workload in the stage gate process. Simply applying non-wires heuristics determined early in the foundational steps to the candidate population is recommended.

Inputs into this process may include:

- Capital planning analysis to identify candidates with capital investment needs in the appropriate timeframe. (Nominally the next five years)
- Is the potential project (substation, feeder, or combination of substations) predicted to be over firm rating in the five-year timeframe?
- Is the root cause of the predicted over-firm situation due to load growth or due to equipment aging? (Non-wires solutions typically work best with well-performing assets that are not at end of life)
- Is the potential project a high priority to planning or operations? (If there isn't a perceived problem what does a non-wires project solve?)

Using an initial litmus test, the total number of candidates may be reduced to a manageable number for further refinement and ranking in the stage gate process.

Stage gate process

The goal of the stage gate process, shown in Figure 3 - Stage Gate Process, is to reduce the remaining non-wires candidates to a manageable number of viable alternatives. In addition, the stage gate process can provide a relative ranking of the non-wires projects that can be useful for stakeholders and decision makers to select the top candidates or to apply qualitative criteria to further narrow the list. The top candidates can then be subjected to further detailed review.

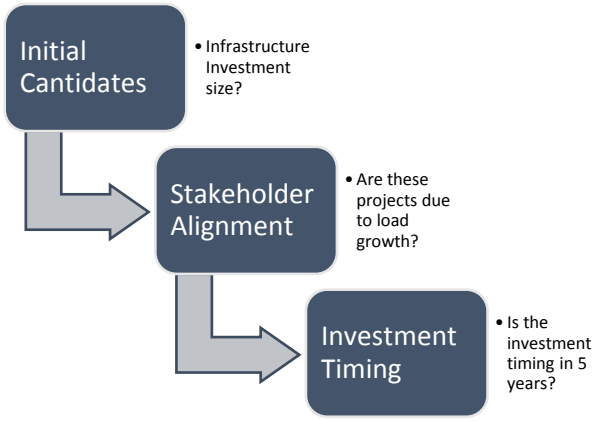

Figure 3 - Stage Gate Process

The gates of the stage gate process can be configured to look at each of the candidates screened from the litmus test and compare aspects of the potential non-wires project including infrastructure investment size, upgrade projected due to load growth, investment timing horizon, and priority to internal or external stakeholders. The stage gate process is designed to combine information obtained from the stakeholder foundational step of this stage and codify it into a repeatable process. The exact content of each of the stage gates depends upon the specific drivers, environment, and DER capability in the geotargeted region of the potential projects. Incorporation of customer demographic information may be advantageous when considering energy efficiency programs, demand response programs, and solar PV non-wires solutions in that different mixes of residential, commercial, and industrial customers on feeders and substations can dramatically influence the viability of non-wires solutions.

Preparing several technically and economically viable alternatives is prudent, as changes to the forecast load in the engineering, planning, and operations processes can sway project economics dramatically. Maintaining engagement with operations and planning is key to the success of the process and the selection of the right project for the organization. Outputs of the stage gate process are a small number of viable non-wires projects along with information on the relative ranking of these projects that can be used for the more expensive and time consuming analysis required to assess the specific technical and economic viability of the solutions.

Quantify Need

Taking the results of the stage gate process and starting with a manageable number of viable non-wire alternative project options, the next steps are to gather relevant data for these candidates such as load at the minute increment for the most recent peak season, customer demographic information, and the most recent load growth projections based on known development in the targeted region. Leveraging this data is necessary to identify the load reduction need at every hour throughout a 24-hour period during the peak season. In addition, this information will be used to estimate the load reduction potential for each of the measures identified at the beginning of this stage using engineering judgement, knowledge of customer propensity to participate, and DER potential studies. There are multiple options available to determine a cost in terms of $/kW/hourly interval of need for the different measures.

Determine Required Peak Demand Reduction Requirements

The next major step for each candidate is to determine the required peak demand reduction in detail over the course of the program. The starting point is to examine the historical load on the substation transformer in question using a yearly load curve recorded by distribution operations in a SCADA system. By looking at historical data, the number of days that exceed the substation transformer's rating may be observed. Adding anticipated load growth to the transformer's yearly load curve over the course of the program provides an estimate of the number of peak demand reduction events needed during the deferral period. The substation loading graph, Figure 4 - Yearly Substation Load Data, shows loading over the year with key load violations occurring during the summer months as is typical for a summer-peaking utility substation. Additional consideration could include normalizing the peak load reduction for weather and considering the load growth impacts on the daily load shapes.

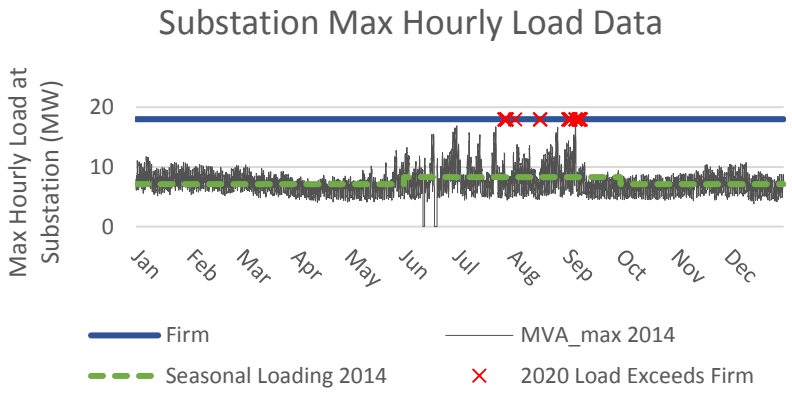

Figure 4 - Yearly Substation Load Data

The load analysis next requires an examination of the actual and forecast peak days and bucketing the projected load reduction needed into fixed length load reduction blocks of defined demand reduction. This analysis will produce daily projected load shapes in discrete chunks that can be matched to DER

portfolio components through manual, optimization, or market-based processes. An important organizational disconnect is often highlighted in this process. Operations will often express the need in MVA while the energy efficiency group and planning may describe the energy efficiency, DR, and DER supply capability in kW or MW. It is important to gather the typical power factor at the substation transformer to ensure seamless conversion of units.

Design Stage

At the start of the design stage, Figure 5 - Design Stage Overview, many of the substantive questions have been addressed in the non-wires alternative project as outputs from the plan stage. Who are the stakeholders, what are the drivers, what DER measures may be used in a non-wires alternative portfolio, what limited set of projects are candidates, and what is the amount of need for each candidate have all been addressed. This stage now addresses how to take the DER portfolio and define scenarios, arrive at reasonable marketing and incentive strategies, determine costs, and calculate the NPV of each of the options. This will address if a specific scenario for a non-wires alternative is feasible (does the potential meet the target peak load reduction) and is the proposed project economically feasible (is the PV of the cost greater or less than the PV of the benefit or benefits).

Figure 5 - Design Stage Overview

Scenario Definition

The DER portfolio available to build a scenario may vary based on constraints identified earlier in the process and varying scenario drivers. The goal of scenario definition is to be able to stack the various DER candidates to estimate the available load reduction throughout 24-hour period on a peak day. A non-wires alternative scenario may include many different types of DER such as energy efficiency, commercial and residential demand response, solar PV, and solar PV with battery storage. Figure 6 - DER Portfolio Creation shows a hypothetical set of programs that could be combined to defer substation peak load. Portfolio option A represents base load reduction such as commercial lighting upgrades. Portfolio option B and C could be shorter term resources such as residential demand response or battery storage.

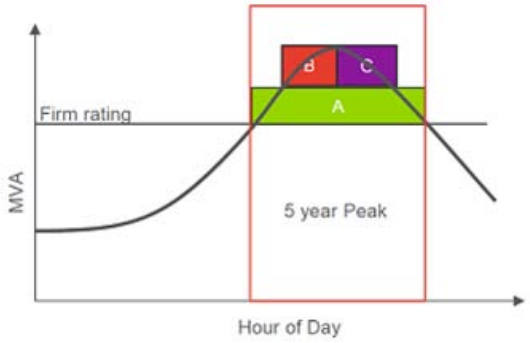

Figure 6 - DER Portfolio Creation

Results of previous DER potential studies can be leveraged for the scenario development. However, if the potential study covers the entire service territory, adjustments may need to be made to consider the difference in the customer characteristics within the non-wires alternative project area.

Customer demographics can also help determine which portfolio options are the most suitable. The potential peak reduction is also tied to the level of incentivization and marketing. In such cases, it is important to consider multiple levels. To do this, first estimate savings given current incentive and marketing levels. Next, estimate savings while keeping the incentive level the same but boosting the marketing for the geotargeted area. Also, it is possible to increase incentive levels with the geotargeted marketing. Last, consider maxing out incentives at 100% of incremental cost and boost marketing to estimate the highest potential adoption. For DER options, independent of customer participation, the goal of the scenario development stage is to determine the cost range per kW savings while incorporating decreasing cost with increasing size. A least cost stack involves stacking the options for peak load reduction starting with the lowest cost option and moving to the next higher cost option as needed. Once the entire load reduction need is met, the list of options and their associated costs comprises the least cost stack.

Cost Determination

A common practice is to use an in-house estimate of the $/kW for the different DER options even if the portfolio will be put out for an auction or RFP. There are a few cases when an auction may be a good method to procure DER for a non-wires alternative. These are cases when the need is well defined and there are many vendors interested in bidding into an auction. A RFP is much more common because it allows for more nuanced analysis of the DER procurement. Best practice is to choose a cost estimation method based on the specific situation at the utility. For the feasible scenarios, where the load reduction potential exceeds the load reduction need, the total project cost needs to be determined.

NPV Calculation

Comparing the economics of the portfolio with the economics of the deferral are the desired outcomes of this step. It is recommended that the project be cash flow positive against the net present value (NPV) of the deferral. Calculation of NPV assumes that the value of deferral is based upon a single large infrastructure cost that is deferred for some period. Given the information on capital planning for a substation non-wires alternative project, the investment without a non-wires alternative would need to be made at some point in the future. For example, a five-year deferral would push the investment out five years from the planned investment date assuming constant load growth.

Execute Stage

The execute stage, Figure 7 - Execution Stage Overview, consists of procuring the resources for the non-wires alternative and putting these resources into production usage during the project. The steps in this stage are procure, implement, operate, and monitor. Procurement may take several forms including working with existing implementation contractors, going to market with RFP, or advanced options such as auctions. Implementation of the procured resources may be a long and complicated step depending upon the DER portfolio selected for the non-wires alternative. Operation of the resources may take several forms per the DER mixture. Finally, monitoring the performance of the resources and the net impact to peak load reduction is a critical step of the execute stage.

Figure 7 - Execution Stage Overview

Procure

After a set of programs and measures have been determined for use in a non-wires alternative project then the actual resources must be procured. This may take several forms in that the utility may choose to implement the programs or measures themselves, work with an existing implementation contractor, go out to bid with a RFP for new implementation contractors, or construct an auction process to let the market determine the price for non-wires capabilities. If no existing implementation contractors exist in the geotargeted area of the non-wires alternative the most common approach is a RFP process. This may include vendor screening, vendor selection, implementation contractor incentive determination, and contracting as activities in this process step. The output from this process step is a vendor or list of vendors prepared to create, expand, or refine the program or programs in the geotargeted area.

Implementation

Once the programs have been determined and a vendor or vendors selected it is time to implement the non-wires programs. These may take the form of traditional demand side management program implementation in a geotargeted area for energy efficiency measures, expanding demand response programs, installing more DER, or expanding the types of DER that are being used on the distribution network. It is entirely probable that a mixed program is being used to support the non-wires alternative project that will require multiple programs including EE and DR along with solar PV with and without battery storage, and electrical vehicle charging stations. The entire implementation process for non-wires alternative projects is a large enough area that this paper doesn't cover it in detail other than to note that it depends upon best practices for implementation new programs, new technology, and alignment with operations that the utility organization has already developed. Combining multiple programs and DER types makes the challenges of implementation more complex.

Operate

The non-wires project has now progressed to the operational step. The operations and DSM groups are now going to operate the non-wires programs and measures that constitute the non-wires alternative. For typical peak reduction projects this typically has a weekly operational rhythm. Outputs on a weekly basis include project meetings, status reports, updates to key stakeholders, and decisions on intra-program incentive modification. Considering historical peak load weeks, adding forecast temperature and load, and overlaying any operational considerations and maintenance schedules results in an advanced forecast of when the non-wires alternative programs and measures will need to be dispatched if dispatchable or available if non-dispatchable. The weekly rhythm is a good starting point to schedule and assess the non-wires programs and measures, but it is possible based upon the specific need that this timeframe may be reduced to daily or even in the most extreme case hourly. Looking at peak load reduction needs in a narrow timeframe combined with dispatchable peak load reduction may reduce the timeframe for operation of the non-wires alternative. Corresponding, if they peak load reduction is broad in nature and only energy efficiency measures are in play then the non-dispatchable nature of these resources may extend the operational timeframe.

Monitor

An important predictor of success of non-wires alternative projects is to conduct intra-program monitoring and guidance during the operate stage of the non-wires alternative project. Establishing an operational rhythm between the non-wires alternative team, data team, and the operations team is critical. Working on a weekly basis, it is prudent to evaluate the status of the non-wires alternative

programs in the context of the summer peak season and make changes and refinements. Building monitoring mechanisms into the project operation to establish this rhythm is critical to the success of the project and to getting buy-in from operations. If the non-wires alternative program is not having the impact at peak, it is important to identify and understand this early in the process and then make changes to the program. Monitoring program impacts on a weekly basis during peak season and then planning on making monthly enhancement or changes is a reasonable objective. Using SCADA data from the substations involved in the non-wires alternative and AMI data for participants and non-participants associated with the substations will be used to determine the impact of the non-wires alternative project. Having reserve resources that may be deployed throughout each peak season based on the actual least cost $/kW/hour interval savings monthly is a tangible outcome of the monitoring step of the execute stage of the non-wires alternative process.

Evaluate Stage

Evaluation of the non-wires alternative project is a broad topic and includes a variety of tasks as shown below in Figure 8 - Evaluation Stage Overview. The foundational tasks in this stage of the process are defining a detailed evaluation plan along with the associated data collection process. Clearly understanding data governance, ownership, and stewardship challenges early in the process may result in a better evaluation process and more useful outputs. Once the foundational tasks are completed, subsequent steps such as determination of ex ante and ex post verified net savings, process evaluation, and economic analysis may be conducted. The final step of the evaluation stage is to revisit and evaluate results of the non-wires alternative evaluation and construct inputs into the regulatory or stakeholder process if a one-time project or into the larger planning and operational process if more non-wire alternative projects are going to be undertaken.

Figure 8 - Evaluation Stage Overview

Develop Detailed Evaluation Plan

A fundamental step in the evaluate stage is developing a detailed evaluation plan. The evaluation plan will need to identify the data required for evaluation (e.g., feeder-level data, pilot program tracking data, program tracking data, evaluated installation rate adjustment factors and net-to-gross ratios for selected EE measures). In addition to the detailed evaluation plan it is important to define a data collection process in parallel, including identifying data sources and data transfer protocols (e.g., frequency of data transfer, staff responsible for managing data exchange, amount of data, and ownership and governance of data used in evaluation).

Determination of Ex Ante and Ex Post Verified Net Savings

An important step of the evaluate stage is to develop an ex-ante estimate of verified net savings. To determine verified net energy savings, it is possible to apply the prior years evaluated installation rate adjustment factors and net-to-gross ratios to the deemed savings load shapes for specified EE measures. Comparison will be between an estimate of the ex-ante estimate of peak demand savings and a direct estimate ex post impacts using AMI data. This may be accomplished by developing an estimate using a statistically-adjusted engineering (SAE) model using feeder level data to determine whether there is a

measurable change from the baseline established before the pilot project. An SAE model uses as an input the ex-ante estimate of savings such that the estimated coefficient of interest is a realization rate.

Process Evaluation

A step in the evaluate stage is to analyze differences in the uptake of EE measures, DR, and other non-wires alternative measures in the targeted regions relative to comparable regions not targeted by the project. Comparable regions are defined as those having similar attributes deemed to influence program participation, such as composition of residential and commercial customers, historic program penetration rates, etc. Process evaluation will provide insight into the effectiveness of the targeted campaign. This may be used to tune future non-wires alternative analysis efforts and to better predict the cost and efficacy of programs influenced by geotargeting efforts.

Economic Analysis

An important step in the evaluate stage of the non-wires process is conduct an economic analysis to determine whether measures included in the non-wires alternative were a cost-effective resource. Assessing after the fact the actual cost and the impact at the targeted substation will be valuable input into future non-wires alternative efforts.

Revisit and Evaluate

The final process step is to take the results from the ex-ante and ex-post, process evaluation, economic analysis, and any other evaluation steps and incorporate that into learning for regulatory or other stakeholders or to input the results of the non-wires alternative into the next round of planning. Taking time to determine the success of the project considering the specific project goals and stated objectives and making a frank assessment is important to maturing non-wires alternative capability. Incorporating learnings from this activity back into the next non-wires alternative project will greatly assist in making the non-wires alternative project an operational tool acceptable and usable by the organization.

Iterations of the Process

The staged process outlined in this paper serves as a starting point for utilities looking to map out how to execute a pilot non-wires alternative project or to start incorporating non-wires alternatives into their operational rhythm. There are two areas that iterating in the process may provide benefits. The first area is between the plan and design stages and involves incorporating provisional designs of non-wires programs from the design stage into the project selection step in the plan stage. The other area is in performing intra-program evaluation steps from the evaluate stage during the execute stage. This may be used to identify opportunities for improvement in the programs before they are complete and enable operations to change program execution if allowed.

The plan and design stages are described independently above. It is recommended that elements of the plan and design stages be combined in an iterative manner as shown in Figure 9 - Plan / Design Stage Iteration. Incorporating the non-wires alternative assessment process into the yearly planning and operational rhythm is a long-term goal of many utilities and the iterative approach to evaluate and assess geotargeted non-wires alternative projects may serve as an example of how utilities can incorporate this into their planning and operational processes. With higher penetrations of DER emerging on distribution grids across the country this is likely to take a higher prominence for utilities across the country moving forward.

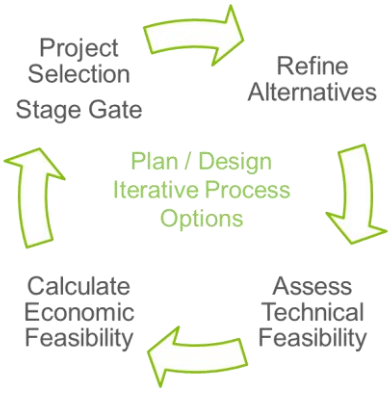

Figure 9 - Plan / Design Stage Iteration

Another opportunity to modify the process from a simple linear process is in the execute and evaluate stages as shown in Figure 10 - Execute / Evaluate Stage Iteration. In the geotargeted non-wires alternative solution domain, operations are likely to take an active role in monitoring the performance of the programs and assessing how they meet the need. This will likely be done on a weekly or even daily basis. Having SCADA information from the head-ends of feeders in substations and being able to review this information will allow operations to understand if they need to call upon traditional wired measures as a backup. Incorporating sensor or AMI information into the mix will allow operations for rapid feedback on the ability of non-wires alternative to influence peak load reduction. This may result in operations pushing for changes or tuning to non-wires alternative programs.

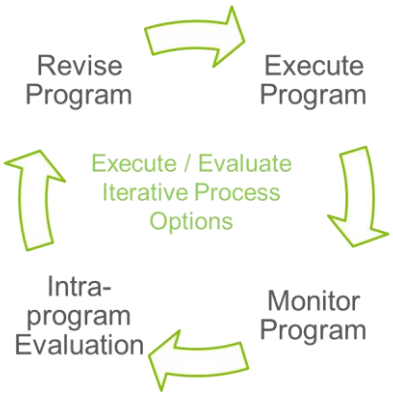

Figure 10 - Execute / Evaluate Stage Iteration

Summary

Non-wires alternatives represent a new and important capability for the planning and operation of the electric distribution network. Realizing the benefits of non-wires alternative solutions requires an updated and cross-functional approach to planning and delivery. These approaches are gaining increasing importance in the industry to help maintain a reasonable cost for safe, reliable electricity delivery, and provide a path toward the much anticipated high-DER future. The staged process outlined in this paper is intended to serve as a blueprint for utilities embarking upon geotargeted non-wires alternative projects. The staged process along with the steps within each stage may be adapted to a utilities specific needs. Invariably there are regional differences in DER types, regulatory environment, and operational needs that will drive customization of geotargeted programs to meet the needs along with determination of economic and technical feasibility.