



Smart Electric
Power Alliance

Customer Impact

Keeping Customers at the Center of
Grid Modernization



Introduction

Maintaining a focus on customers to ensure they are provided with reliable electric service at a reasonable price is the primary goal of every utility and public service commission. Similarly, utilities and commissions are concerned with equity issues and cost shifting across customer classes. These are basic tenets of utility operations and public service commission regulatory policy.

Maintaining this focus as part of grid modernization planning requires a deliberate and focused approach. The industry is ripe with examples of utility grid modernization programs that were denied or significantly altered due in part to customer equity and price issues. In 2018, twelve investment proposals that focused on Advanced Metering Infrastructure (AMI), demand response, and/or energy storage were fully approved, while ten were partially approved, and seven were rejected. AMI-only focused proposals in Kentucky, Massachusetts, and New Mexico were rejected, while more expansive grid modernization plans put forward by utilities in North Carolina, Rhode Island, and Virginia were scaled back substantially, with commission requests for revised plans and budgets for the rejected elements.

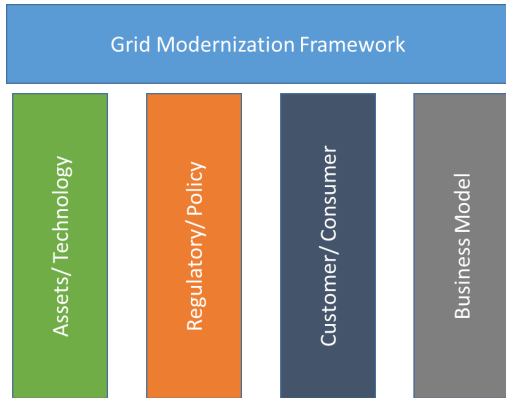
In the case of Virginia, the Virginia State Corporation Commission turned down the majority of Dominion Energy Inc.'s 10-year,

\$6 billion grid transformation proposal, finding that the utility had not shown that the costs were prudent. The agency rejected major elements related to AMI infrastructure, IT upgrades, and grid hardening, arguing that such an expensive plan should demonstrate adequate benefit for the additional costs that customers will bear in their monthly bills. As the Virginia case demonstrates, grid modernization efforts tend to be very focused on ratepayer benefit/ impact from specific technology implementations.

According to Enerknol Research¹, spending on metering infrastructure doubled over the last 10 years as utilities upgraded to smart meters with the capability of enhancing customer interaction and smarter applications using real-time data. The challenge has been ensuring such investments actually deliver enhanced services to the customer.

This paper, written as part of the SEPA Grid Modernization Framework, offers guidance and recommendations for ensuring grid modernization programs result in value and benefits to all customers. It offers perspectives on how to balance policy, technology, and business models with customer benefits to ensure a fair and equitable grid modernization program.

¹ PUR-2019-00100



Source: SEPA Grid Modernization Framework, 2019.

The Challenge

If customers are foremost in the minds of utilities and commissions, why do grid modernization plans often fail to adequately address them? The name “grid modernization” itself provides the answer. Most grid modernization plans focus on the distribution grid and related policy issues or specific technology modernization upgrades that improve grid performance. Enerknol Research has documented that utility expenditures on distribution system upgrades rose 54% over the past two decades, with the largest share of that investment going to more traditional equipment upgrades such as poles, wires, and substation transformers. These types of expenditures help the grid endure storms and facilitate greater use of intermittent resources such as wind and solar. While these investments in technology ultimately affect customers directly, the full implications are often

overlooked during grid modernization proceedings.

For example, due to technical advancements and decreasing price points, energy storage is becoming a viable grid modernization option. Utilities envision storage providing value as both a grid connected resource in front of the meter, as well as a potential grid asset for voltage, frequency and capacity support as a shared resource behind the customer meter.


Customer topics related to residential storage program design, anticipated customer behavioral changes, or even impacts resulting from more complex programs such as combined EV charging with storage, are typically addressed from both a revenue and grid management perspective. Issues of equity, affordability, and any potential cost shifting between classes of customers are addressed as part of regulatory proceedings but may not be fully factored into resulting utility program design.

Another important area of focus is rate design. To the average utility industry insider, nothing would seemingly be more directly impactful on customers than rates. This is true if the only customer engagement considered is that of the customer paying their utility bill. But, in today's evolving electric industry, new technologies and business models are spawning many more customer engagement opportunities both between the utility and the customer as well as

between third party service providers and the customer. In fact, grid modernization should theoretically enhance this customer engagement opportunity.

In reality, customer engagement is often more of an afterthought in the rate design process. Rates may sometimes be designed to leverage grid modernization investments to allow for more active customer participation in the market, but more often, the real focus becomes grid efficiency and reliability. While these are very important, the rate's effectiveness at encouraging customers to participate in the value and benefits offered through a smarter grid should be considered.

Part of the challenge for utilities and regulators lies with customers themselves. Until recently, customers have been somewhat indifferent on energy topics. Similarly, most states with retail choice have not seen significant residential switching of providers from the default utility even as technology advancements and changing business models have seen the introduction of new services and third-party providers.

Participation in residential retail choice
share of total electricity customers 

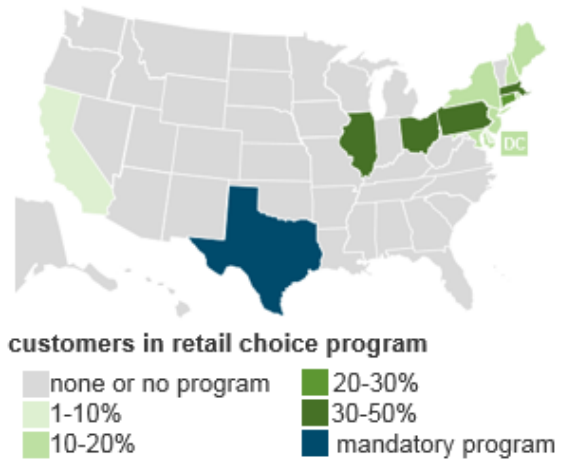


Figure 2: Annual Electric Power Industry Report, US EIA

Grid modernization technology investments should help to advance competitive markets by providing the data and tools customers need to more easily access their energy information. This should lead to more options for customers to manage their energy use and make energy-related decisions. Additionally, many customers are now more aware of the connection between their personal energy use and its resulting environmental impact. These customers do pay attention to their energy usage and are looking for advanced services. This is becoming more prevalent in both regulated and deregulated states as new renewable energy options, providers, and grid edge offerings continue to proliferate.

In summary, grid modernization programs often fail to adequately address customer impacts. Not doing so can ultimately derail



grid modernization planning efforts or add significant cost to all stakeholders involved in approving those grid modernization plans. These issues can be avoided by taking proactive steps toward keeping customers at the center of grid modernization.

SEPA Recommended Approach

Providing quality electric service that is reliable, safe, and affordable is the ultimate goal for all utilities and regulatory commissions. Grid modernization creates both opportunities and challenges to accomplishing this goal. SEPA is focused on helping the industry make a smart transition to a clean energy future and grid modernization initiatives are a critical component of this transition.

Not fully addressing impacts across all customer classes as part of the transition to a modern grid can be costly and unnecessarily time-consuming. SEPA's work with various clients on grid modernization topics has identified the following best practices for addressing customer impacts:

1. All customers should have the opportunity to participate in the benefits of grid modernization.
2. Grid modernization should give customers flexibility in accessing energy information and in making energy decisions.
3. Protection of customer data should be paramount.
4. Information on utility, state, and federal customer programs should be easily accessible, relevant, and up to date.

Let's take a look at each of these in more detail.

All Customers Should Have the Opportunity to Participate in the Benefits of Grid Modernization

Often, utility customers and the general public are not familiar with grid modernization. They may not understand the need for such programs or how grid modernization might impact them personally. Planners of grid modernization initiatives should be aware of this and engage the public as a key stakeholder in the design process. This could include conducting customer/ stakeholder surveys or conducting workshops or town halls. With this proactive approach, programs and investments will be more likely to address all customers.

By definition, utility electric service is designed and regulated to provide a basic level of service to all customers regardless of class, location on the grid, etc. Rates are set at the customer class level (with the exception of custom rates established for large industrial customers) and are designed to spread the costs of utility



investments equally across the customer base using cost allocation techniques which are ultimately set by regulators.

In this way, utilities have historically accounted for all customers in their investment decisions. Investments made by the utility to address a specific customer needs are paid for by that customer and not passed through to other ratepayers unless an argument can be made that the investment would result in value to all customers. Distributed Energy Resources (DERs) like rooftop solar further complicate this issue as they are often implemented on behalf of specific customers at specific locations on the distribution network but do still potentially provide benefits to the larger grid.

So how does all this relate to ensuring all customers can benefit from grid modernization? Rooftop solar is a good case study to consider. By installing rooftop solar, customers can reduce their consumption (and their energy bills) through the energy solar produces. While utilities may offer incentives or rebates to promote rooftop solar, only the most engaged customers may be aware of these programs or have the financial capability to participate. In some circumstances, low to moderate income (LMI) customers or customers living in multi-family housing have not had as much opportunity to participate in these types of solar incentive programs. Usually this is due to factors such as program cost, locational limitations,

or a lack of awareness of program availability.

Utilities are addressing this through community solar initiatives that may include an LMI carve out. While different models exist around the country, the basic premise of community solar is that anyone wishing to participate in solar can do so by subscribing to the output of a local or regional solar farm. New Jersey addressed this specific customer class by implementing an earmark of 40% of the overall community solar program capacity to LMI customers. The New York Public Service Commission (NY PSC) approved a Low-Income Solar program for Consolidated Edison that allowed the utility to own and manage solar panels on company property for the purpose of servicing low income customers. Customers were thus able to participate in clean energy investments and see a bill reduction.

The goal should be to create programs and offerings in which all customers can participate. To achieve this, utilities must gain visibility into their entire customer base by mapping physical distribution network characteristics with customer and geographic information to understand how all customer types and classes may be interacting with the grid. Design of programs can be challenging given the diversity of customers, their limited knowledge of energy concepts, and their

lack of proactive engagement with the utility.

Investments targeted at specific grid locations can then be evaluated for customer impacts and for customer engagement opportunities. As part of this exercise utilities should identify LMI customer populations and other vulnerable customer groups. Utilities should also evaluate existing programs targeted to such populations to ensure maximum value in coordination with any grid modernization efforts. Vulnerable populations may not always be determined by economic status but by geography, environmental quality, and other demographic factors.

Grid Modernization Should Give Customers Flexibility in Accessing Energy Information and in Making Energy Decisions

This second tenet highlights the conflict between investments to make the grid more interactive, but that may also increase rates and decrease security. Clearly, the distribution grid in the US is aging and is in need of infrastructure upgrades to ensure continued reliability of service. These investments must be made. More debatable are investments that deploy advanced technologies to enable increased services and enhanced interactivity. These same investments increase access points to

the grid and enable more sharing of system and customer data but also create challenges for utilities and regulators attempting to keep rates reasonable while balancing grid security needs.

In California, energy services firm, Home Energy Analysis (HEA), delivers energy savings to customers and PG&E through a pay for performance construct. HEA accesses customer usage data and provides those customers with analysis, tools, and coaching to help them reduce energy usage. Savings are delivered to the utility and HEA is paid for MMBTU of measured savings.

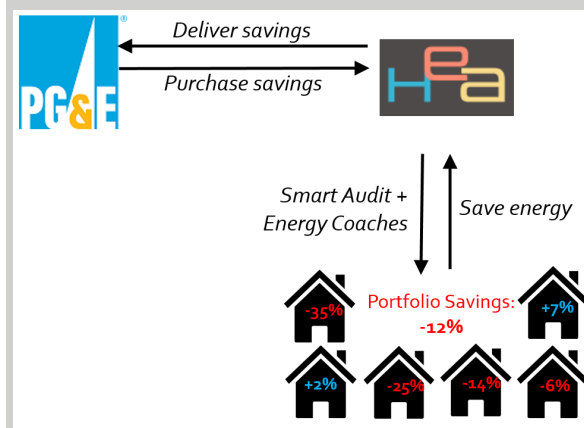


Figure 3: P4P Savings Purchase Agreement, Lisa Schmidt of HEA

This model requires sharing of customer usage and billing data between the utility and HEA and benefits from the availability of granular smart meter data collected daily or even hourly. Services of this type strike a balance between being interactive and secure.

The real point of these investments should be the enablement of services from which all customers can benefit, including future

services. This includes a grid that can serve as a platform for the delivery of these services, regardless of service provider, while enabling increased customer engagement. In designing and approving these programs, utilities and regulators must determine the right level of investment to enable the advanced data access and grid services customers desire, and in the most cost effective and secure way possible.

Protection of Customer Data Should be Paramount

Provisions around access to customer data and the protection of such data should be a key component of grid modernization planning. One aspect of increasing customer engagement includes making customer data easily accessible to individual customers for their own use or for use by third party service providers authorized to access data on their behalf. It also includes giving customers tools to support their engagement. This could include online or app-based tools to analyze usage, report an outage, or even submit a service request.

Grid modernization investments should lead to a distribution grid that is more interactive and therefore should reduce or eliminate barriers to this type of data access. To support the appropriate use of these investments, clear policies and procedures should be established to facilitate customers authorizing third

parties to access data on their behalf. While more beneficial in competitive retail markets, data access and protection investments should also foster a more competitive market for energy services benefiting all customers.

Providing seamless access to customer data enables new market offerings and innovative services. For example, Arcadia Power connects customers with services that increase renewable energy on the grid and helps customers lower their utility bills. The service provides access to such programs for residential customers in all 50 states. Customers have access to wind energy, an opt-out retail energy aggregation service, and to a nationwide community solar program. To provide these services, Arcadia must link customer utility accounts to the Arcadia platform where customers pay their utility bills through a monthly Arcadia energy statement.

To protect customers' personally identifiable information (PII), utilities and third parties should have security policies and electronic interface standards focused on data security. Similarly, jurisdictions should have laws in place addressing how individual customer data is anonymized and aggregated as part of larger data sets for sharing purposes. Utilities are sensitive to these topics given their long history of concern for customer data protection. The challenge created through grid modernization is maintaining these

customer protection standards while also ensuring streamlined data access and sharing.

Utilities can enable advanced customer data access by including easy-to-use customer interfaces on their websites. SEPA, in collaboration with the National Institute of Standards and Technology (NIST), responded to a White House Call-to-action in 2012 by developing the Green Button initiative, a streamlined customer utility data access protocol now managed by the Green Button Alliance.

The deployment of the Green Button Download My Data (DMD) and the more advanced Connect My Data (CMD) standard has been or is being adopted by California, Texas, Colorado, Illinois, New York, and New Hampshire. Additionally, Michigan, Ohio, North Carolina, Maryland, New Jersey, Massachusetts, Pennsylvania, Minnesota, Hawaii, and Washington, DC are considering the program.

The Green Button standard is important for grid modernization as it addresses the secure, interoperable communications of energy usage and billing information between entities.

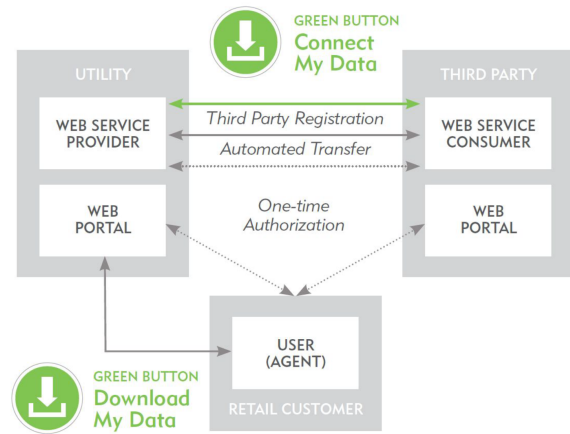


Figure 4: Michael Murray of Mission:data Coalition (missiondata.io)

Incorporation of tools like Green Button should include appropriate customer authorization provisions, as well as non-disclosure agreements with the third-party service providers, to ensure the ongoing protection of customer PII data. Utility tools should also provide customers and third-party data users with clear and complete instructions, dedicated customer support, and test accounts for integration.

Customer Program Information Should be Easily Accessible, Relevant, and Up to Date

Customers wanting to learn more about how to manage their energy usage or wanting to engage in utility or third-party services should be able to do so easily. Customer programs may be available from the utility, the state energy office, or third parties and information on

these programs may not exist all in one location. This can result in customers being unaware of programs or having difficulty accessing program information. Grid modernization initiatives should include investments on behalf of market stakeholders to ensure that energy information is easy for customers to find and use. Legacy information should be reviewed, updated, and combined with new content in a way that is easy for customers to access and understand.

Information could include such things as: general energy educational material, online calculators, reference manuals, specific customer program links, as well as specific information on grid modernization initiatives and their impacts on customers. Ideally, all such information should be consolidated and housed on a web portal managed by a trusted customer partner such as a public utility commission, electric utility, or consumer protection organization. Efforts to make customers aware of new or updated information should also be taken by utilities and regulators.

Ensuring that the right customers have access to information on the most appropriate customer programs is especially important because a high level of customer engagement in such programs maximizes the value of the enabling grid modernization investment. Examples include ensuring LMI customers have access to information about weatherization

or energy assistance programs, or ensuring full subscription to community solar programs by targeting information about the program to those without access to a solar-friendly rooftop. Helping customers determine the right DER program offerings by providing them with information based on their billing data and demographic information offers the greatest likelihood of both customer and utility success.

Similarly, customers should be fully aware of and engaged in any grid modernization pilot programs that are conducted. This requires readily-available information and outreach to affected customers on grid modernization initiatives and requests for customer involvement in pilot projects. This could also require updates to customer protections and complaint processes to accommodate new business models, offerings, and technologies included in those grid modernization pilots.

In short, grid modernization efforts often generate customer excitement and questions, but can ultimately lead to pushback and concerns if utilities and regulators aren't proactive in their education and outreach efforts. Customers should receive information about the grid modernization initiative, but should also receive the information they need to understand the anticipated impacts to them individually to gain their full buy-in and participation.



Summary

Customer impacts of grid modernization should be of prime importance to all those involved. Keeping a focus on the customer as part of grid modernization will reduce risk and unnecessary delays in approval of such initiatives.

A first step in ensuring customers remain central to any grid modernization strategy or planning process is to include the voice of the customer in those plans. This can be accomplished through stakeholder workshops and meetings that bring together diverse customer and interest groups. The goal of these workshops is to document customer perspectives as an input to technology or program decisions being considered for grid modernization.

When finalizing grid modernization plans, evaluating those stakeholder contributions against the four customer impact tenets discussed in this paper will ensure customer issues remain first and foremost in any grid modernization advancements. This will ultimately help ensure grid modernization investments provide value to all customers and greatly improve the likelihood of approval of those investments.

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.sepapower.org.

About the Authors

Jared Leader researches and develops strategic plans at SEPA for programs, products, and services that drive integration of distributed energy resources, non-wires alternatives and microgrids into utility resource portfolios and business operations. Jared co-led SEPA's consulting engagement with the D.C. Public Service Commission facilitating their grid modernization initiative. Jared earned his BS in Civil and Environmental Engineering from the University of Virginia and his MS in Energy Policy and Climate from Johns Hopkins University.

Robert Tucker works with SEPA clients to develop solutions, define engagement scope and deliverables, and ensure project outcomes that meet clients' objectives. Robert has over 25 years of experience helping utilities with business process and technology solutions solve complex problems or changing regulatory requirements. Robert earned his BS in Mechanical Engineering from North Carolina State University and his Masters in Environmental Engineering from Johns Hopkins University.



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