

The Role of the Consumer-Centric Utility

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Introduction

The National Rural Electric Cooperative Association (NRECA) is the national service organization for America's Electric Cooperatives. The nation's member-owned, not-for-profit electric co-ops constitute a unique sector of the electric utility industry – and face a unique set of challenges. NRECA represents the interests of the nation's more than 900 rural electric utilities that own and operate 42 percent of the U.S. distribution, and are responsible for keeping the lights on for more than 42 million people across 47 states. Electric cooperatives are driven by their purpose to power communities and empower their members to improve their quality of life. Affordable electricity is the lifeblood of the American economy, and for 75 years electric co-ops have been proud to keep the lights on. Because of their critical role in providing affordable, reliable, and universally accessible electric service, electric cooperatives are vital to the economic health of the communities they serve, and to the future expansion of electrification.

NRECA's submission builds on previous reports submitted to the 51st State Initiative. As defined in NRECA's phase 2 response, the term Consumer-Centric Utility (CCU) refers to a utility that integrates and optimizes a portfolio of resources on behalf of consumers. These resources include central-station generation, transmission, distribution, and Distributed Energy Resources (DER) such as energy efficiency, demand response, distributed generation and storage, and community-scale generation and storage.

This paper seeks to answer the following question: "what is the role of the electric utility?" The paper begins with and expands on the following premises:

- 1) Electricity is a service, not a commodity
- 2) Consumer-Centric Utilities are best positioned to provide safe, affordable, reliable, and resilient electricity services because they possess economies of scale, efficiencies of scope, integration, long-term vision, and consumer focus

Based on these premises, this paper argues that the role of the utility should be to continue to integrate and optimize the system for the benefit of all consumers. The utility should also be able to ensure fairness among consumers, and be able to compete in any area that provides value to consumers.

Electricity is a service, not a commodity

Consumers do not want electricity. Consumers want the assurance that their beer will be cold when they open the refrigerator, and that their lights will turn on when they flip the switch. Put differently, when someone goes to the hardware store to buy a drill, what they really want is the hole. In other words, consumers want the service that electricity enables.

CCUs do not sell a commodity (kilowatt hours). CCUs may bill based on kWh as a matter of historical convenience. But, CCUs really sell safe, reliable, and affordable electric service at reasonably stable rates over the long term. In order to provide this service, CCUs manage risk and optimize the system to meet various business and regulatory goals, including safety, affordability, matching resources to load profile, support for new technologies, job promotion, economic development, fuel diversity, fuel efficiency, temporal diversity (long, medium, and short-term resources), regulatory compliance, environmental sustainability, reliable operations, power quality, locational value, utilization of non-generation alternatives, and counter-party risk. In other words, cooperatives sell the assurance that the lights will turn on when you flip the switch and your beer will stay cold, all at an affordable and reasonably stable cost.

CCUs are best positioned to continue to provide safe, affordable, reliable and resilient electricity service

In a recent book, the National Academy of Engineering named electrification the greatest single achievement of the 20th century.¹ This feat did not come easily since the electric utility industry is the most capital intensive of all industries. But, it was partially achieved thanks to the significant economies of scale of America's electric utility companies. Consumer-Centric Utilities will utilize those same economies of scale to build on and modernize the existing grid. While investing capital, the challenge is to determine and make investments that will bring the most value to the system as a whole. This ensures that optimal investments are made and the infrastructure resulting from those investments are optimally utilized irrespective of the nature of grid evolution. Consumer-Centric Utilities are best positioned to make such investments in technology and infrastructure at the lowest cost to the consumer. Consumer-Centric Utilities are also well positioned to partner with technology companies because CCU's can leverage economies of scale to bring new technologies to consumers at the lowest cost, and in a way that works for all consumers.

Electric cooperatives are set apart, perhaps, from other CCUs in that additional economies of scale are inherent within the cooperative business model. These provide significant opportunities to cost-effectively meet local needs and consumer interests. Within the "family" of cooperatives, NISC, SEDC and ATS provide data services to the vast majority of co-ops. Co-ops invest in renewable opportunities through NRCO and telecomm technologies through NRTC. CFC and CoBank offer financing instruments and NRECA's research and development program has assisted co-ops in becoming leaders in developing community solar business models. Some co-ops even obtain poles and transformers from their statewide organizations or solar panels from their G&Ts' solar franchise.

Co-ops partner with Nest on various smart thermostat pilot programs. CoServ in Texas, for instance, offers its members a \$100 discount on Nest thermostats if they enroll in a voluntary demand response program called Nest Rush Hour Rewards. The program is extremely popular. CoServ's goal of selling three thousand thermostats in the first year was achieved in only four weeks. This example illustrates the power of beneficial partnerships with technology companies, and the optimization of controllable distributed assets such as thermostats for the benefit of both the individual consumer and the community. CCUs are in a strong position to successfully carry out such programs since they can tailor these programs local consumer preferences, load patterns, detailed data and experience from operating their distribution grids.

CCUs have efficiencies of scope, and a broad perspective as stewards of their distribution grids and power supply. They see how assets on the system in front of and behind the meter can be optimally utilized. Such a perspective leads to purposeful and practical innovation because the CCU can recognize how new technologies can provide value across the breadth and depth of grid operations, power supply, satisfy consumer needs and be "in sync" with short term and long term planning objectives. For instance, electric cooperatives lead the industry in Advanced Metering Infrastructure (AMI) adoption because they understood that AMI would reduce costs, empower consumers, and better optimize the system to ensure reliability. Investments in grid modernization such as smart sensors and data analytics capabilities improve the ability of CCUs to "see" the system from wholesale generation down to behind-the-meter resources, for efficient and reliable grid operations.

¹ www.greatachievements.org

CCUs do not innovate for innovation's sake. CCUs innovate when, where, and to the extent that it helps to provide consumers with safer, more reliable, more affordable, and more environmentally sustainable energy. CCUs innovate at the pace of value, not because a technology is new. While many CCUs may decide that certain technology investments are worth pursuing, it may not be a fit for all CCUs. For instance, investing in new communications devices to better integrate DER may make sense in some areas. But it may not bring the most value to consumers in areas that are not expecting significant DER growth. Co-ops in particular are in a good position to make those judgements since they are consumer-owned and not-for-profit.

CCUs focus on maximizing consumer value through the integration of new technologies and services. They do this by managing risk. "De-risking technology integration" is a key concern for many utility CEOs. Risks that need to be managed include inadequate grid infrastructure that can adversely impact integration of new technology, loss of interoperability, potential cyber and physical vulnerabilities, and insufficient cost-recovery. It is critical to ensure technology development and innovation enables utilities to focus on what they do best – an efficient integrator and optimizer of generation, transmission, distribution and consumption of electricity, a safe and reliable grid operator, and provider of affordable, high quality, resilient electricity for everyone.

Efficiencies in integration of distributed energy resources are best achieved by enabling the CCUs to continue integrating and optimizing the system to maximize value of all investments in new technologies for all consumers. Today, consumers are beginning to transition from passive consumers to active prosumers. DERs are increasingly used by these prosumers for a variety of reasons, including demand response, renewable energy supply, backup power and load control for maximizing arbitrage. These grid-connected DERs are sometimes not visible to, or controllable by, the utility, resulting in an inefficient outcome for the system as a whole.

When properly monitored and optimally integrated, consumer-owned DERs can provide multiple, stackable benefits to both the utility and the consumer. In its report "The Integrated Grid", the Electric Power Research Institute (EPRI) argues: "To realize fully the value of distributed resources and to serve all consumers at established standards of quality and reliability, the need has arisen to integrate DER in the planning and operation of the electricity grid and to expand its scope to include DER operation."

Smart thermostats are used by consumers to save money and manage their heating and air-conditioning. However, additional control by the utility of all thermostats at the grid level can result in demand response capabilities that can benefit the entire community. Similar conclusions can be reached for rooftop solar and distributed energy storage. As the operator of the grid and accountable to its consumers for providing safe, reliable, affordable and resilient electricity delivery, the CCU is best positioned to leverage DERs and other technologies to optimize the performance of the grid.

Utilities carry out a long-term vision through long-term investments. The challenge lies in the ability to predict and leverage the benefits of new resources, infrastructure, and R&D results for the entire set of consumers.

Efficient and effective long term planning for ensuring the reliability of the power grid is continually challenged by the ongoing transformation of the grid - from "top-down" optimization to "bottom-up" evolution; from one way to two-way flows on the distribution system; from highly visible, and controllable central generation to somewhat invisible and uncontrollable distributed generation in absence of the associated infrastructure; from static and predictable loads to dynamic, interactive, transactive and unpredictable loads; from centralized

decision making on planning and operations to decentralized actions; from passive consumers to active prosumers.

However, technologies are also evolving to assist in grid planning and operations – examples include smart inverters, sensors/drones, data analytics tools, dynamic grid analysis, cyber assessment and monitoring. It is important to ensure that these technologies are developed and available at a cost-effective scale to the CCUs. While each entity in the service territory of the CCU acts to maximize their benefit, the utility needs to be able to make continued infrastructure investments that enables sustainable integration of DERs into the grid – while continuing to meet its goal of providing safe, reliable and affordable power to all of its consumers.

Technologies that help in planning and operations of the grid are essential for utilities to continue their mandated and expected roles as stewards of the power grid. As will be discussed later in this document, one of the key risks in continued infrastructure planning and deployment is the uncertainty of adequate and equitable cost-recovery.

Recent technology R&D is more focused on consumer-owned applications. There also needs to be equally intense focus on R&D for ensuring and enhancing the reliability, affordability and resiliency of the grid so that the evolution of grid planning, operations and optimization keeps pace with the technology evolution. Otherwise, we will have a grid not adequately prepared to handle consumer-installed technology – which will adversely impact the provision of electricity to all consumers.

CCUs should continue to have the existing unique and irreplaceable ability to integrate and optimize all system assets for the benefit of the entire community

While competition in the wholesale generation market and the behind-the-meter market can aid in diversifying generation assets and create electricity supply choices, CCU's should have the continued ability to optimize and integrate assets and resources in order to minimize risk and maximize benefit to all consumers. The grid is evolving from central, predictable amounts of generation and load, with associated control – to distributed, somewhat unpredictable and time varying generation and load possessing little native visibility or controllability without additional infrastructure.

Integrating and optimizing the operations of multiple distributed assets provide multiple benefits to the grid including increased reliability and resilience. However, this requires the utility to invest in infrastructure such as communications, sensors and new distribution equipment – both on the grid and at the consumer level to leverage the capabilities of DERs. Future DERs will need various operating modes to shape the energy they produce to meet load requirements and reliability standards. As with conventional generation today, there may be a need for DERs with a variety of loading capabilities – including base, intermediate and peaking, in addition to the capability to supply ancillary services such as voltage support and frequency response. Given that CCUs provide the full range of services to their consumers, they are in a good position to evaluate the technology used to manage and schedule these DER resources in different operating modes, as well as the market mechanisms to deal with these modes delivered by DERs.

Many CCUs are in the process of developing plans and implementing grid modernization investments that will greatly enhance the operational visibility and adaptability of the electric grid their consumers rely on. At the same time, CCUs envision a whole range of enhanced services that can be made available to individual consumers that will improve consumer satisfaction. Some will argue that opening up markets at the retail level for 3rd party technology providers is most efficient. However, many consumer segments, such as remote locations, low income residential consumers, and renters often do not benefit from open retail markets. But,

CCUs can maximize the benefits of those same technologies through integration. CCUs are in a much better position to provide those same technologies because it is more cost-effective for the system as a whole.

An excellent example of this type of integrated aggregation is electric cooperatives' history of successful demand response and load shaping programs through grid-connected water heaters and other demand response programs. These programs result in lower cost of power and lower demand charges, while the consumer experiences no discernible reduction in availability of hot water. For example, Great River Energy, a generation & transmission cooperative in Minnesota and Wisconsin, combines solar, storage, and demand response. It incentivizes its consumer-members to take part in their growing solar network, while storing excess solar energy in hot water heaters. This energy is then dispersed during peak hours. CCUs should be allowed and encouraged to replicate such programs with all DERs because it results in benefits to consumers and the system as a whole.

The evolution of the grid is also fueled by significant amounts of complex data about the system and consumer electricity use. CCUs are in a unique position to broker that data for the benefit of driving asset investment decisions, whether in the technical architecture of the distribution grid or in devices on the grid. It is critical that the appropriate tools are available that can comprehensively analyze such complex and granular data for providing input to decision support processes. Cooperatives have built one such tool - a dynamic modeling tool (Open Modeling Framework – OMF) that performs time-series analyses of the distribution grid to assess the reliability and economics of different investments on distribution feeder systems. This unique and innovative tool is increasingly being adopted by electric cooperatives and the industry to analyze grids with time-varying generation and loads – such as renewables and demand response.

As stated earlier, the development and adoption of new technologies will change the nature of the grid in the coming decades. This evolution of the grid is best led by CCUs, which can realize benefits applicable to both the consumer and the community. The CCU adopts new technologies and services meeting consumer needs as they become available and seeks to integrate them into its portfolio at the pace of value to all consumers. The CCU also seeks to enable individual consumers to invest in DER technology and services that meet their individual needs and to do so in a manner that balances the needs of the grid as well as other consumers. This is the art of “optimization” that the CCU is in an ideal position to fulfill. NRECA believes that the CCU model is ideally suited to bring about that future in a manner that ensures that electricity is provided safely, reliably, efficiently, affordably, and cleanly; and, that meet consumer demand in the near and long term for all options. The CCU's role will expand and adapt as consumer expectations and technology evolve. Such optimization is essential to the future of environmentally beneficial electrification that improves quality of life, enables economic prosperity, and advances environmental sustainability.

Rates and Price Setting Responsibility

Today's evolving utility marketplace raises important questions regarding how rates and prices are structured. New technologies such as advanced metering infrastructure (AMI) are making new rate designs possible, while advancements in efficiency, distributed generation and energy storage are challenging the viability of traditional ratemaking structures. These new additions to the grid will require new thinking in terms of how people are paying for their energy. At the same time, consumer preferences are evolving. In many cases, consumers are demanding new services and asking for more control over their energy use.

To best mitigate the risks and advance opportunities in this period of change, utilities should have the freedom to develop new rate designs and compensation mechanisms. The utility of the future will need to understand that pricing will need to become increasingly complex. Historically, utilities used a 2-part rate structure, with a low fixed charge and a volumetric charge. With new technologies entering the system, traditional rate designs can lead to both inter- and intra-class cross subsidies and instability in revenue recovery. Given industry dynamics, it is clear that CCUs will need to reassess existing rate structures in order to enable new technologies and ensure fairness and equity for all consumers.

It is important to stress that there is no one-size-fits-all solution. What may be appropriate for one area may not be appropriate for another area. It should be the responsibility of the CCU to balance the science of rate making with the art of tailoring rates to the specific consumer base and system needs. CCUs are well positioned to fulfil this role given their ability to plan long term and see how assets on the system are interrelated.

Competition

NRECA believes that consumers, through the cooperatives they own and govern should have the right to pursue any business enterprise that will assist in meeting their needs and their community needs. Consumers should have the right to decide from whom they want to buy the service, especially if those consumers own the utility. It is important for electric cooperatives to have the flexibility to voluntarily provide local communities with varied customer services.

Due to economies of scale, scope and integration, utilities have a broad perspective and a long term view and the ability to take advantage of pro-consumer efficiencies so they can provide more value to the system as a whole and benefit all consumers. If solar is to be implemented in the distribution system, local cooperatives are well positioned to understand the impact, and how to optimize benefits and minimize costs to consumers.

Electric cooperatives are a trusted resource for their member-owners. This makes them ideally situated to offer consumers the ability to pursue DG projects with local conditions in mind.

In recent years, solar has become the fastest growing distributed resource pursued by distribution co-ops. There are numerous business models available, and many include partnerships with third-party solar vendors. The community solar model offers a very attractive model for increasing deployment of PV solar, allowing any consumer who wishes to do so the ability to buy into the system. This includes renters or those who do not have suitable roof space or credit for installation at their home or business. Ownership can be retained if a participant moves elsewhere within the same utility's territory, or can be sold back or transferred if they move away. The community solar model is a particularly good fit for cooperatives since they are by their nature consumer-centric organizations.

This type of prudent solar deployment could help the economies in parts of rural America and in certain areas have the potential to create value for cooperative member-owners and help put the nation on a course towards a sustainable energy strategy.

Broadband is another area where CCUs can enable a service that benefits all consumers. According to the Federal Communications Commission, 39 percent of rural Americans lack access to high speed broadband compared to 4 percent of urban Americans. In today's global, digital economy, access to high speed broadband is a necessity to ensure a high quality of life. Today's electric utility is also dependent on a strong technology platform that improves a utility's ability to provide excellent electricity service. In the 1930s and 1940s, electric cooperatives spread around rural America because the existing investor-owned utilities would

not electrify rural areas since it was not profitable. Similar to the spread of electrification, many modern day telecommunications companies do not offer broadband service in rural America because it is simply not profitable. In many instances, electric cooperatives are filling this void by offering high speed broadband service to consumers at the same time as they are using the fiber to improve their operations.

Conclusion

NRECA appreciates the opportunity to submit a response to SEPA's 51st State Initiative. The electric grid will continue to evolve. CCUs have inherent strengths such as scale, scope, integration, long-term vision, and consumer focus. As such, they are in the best position to benefit all consumers by innovating, maximizing opportunities and minimizing risks. Moving into the future, CCUs will continue to provide safe, affordable, reliable, and increasingly clean electricity service while enabling new energy services and ensuring equity across the system.