Opportunities for Rural Electric Cooperatives to Adopt New Cooperative Business Models

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Introduction

A number of inter-related changes are impacting rural electric cooperatives (RECs) and other utility providers in rural communities. Demand growth for electricity has plateaued due to continued efficiency improvements and the growth of distributed generation. RECs face a changing regulatory environment reflecting goals to decrease carbon dioxide emissions from power plants and other sources. All of those factors have encouraged RECs to invest in information technology such as automated meters and interactive load management systems. Some RECs are developing residential scale generation and storage projects for sub-groups of their memberships. Other RECS are partnering with other RECs, municipal government and outside firms on community scale generation and storage projects. As REC's business environment shifts there is an emerging need to modify or augment their cooperative business models.

Background

The Energy Information Administration forecasts residential electricity sales to increase by an average annual rate of just 0.3% through 2040, well below the growth in households which is forecasted at .8% (U.S. EIA, 2016). In 2015 RECs experienced a 1.89% decline in kilowatt-hour sales (NRU-CFC, 2016). That marked a turning point from 2.49% growth in 2014 and a decade long trend of slow but steady growth. The major factors contributing to slowing electricity usage growth are increased energy efficiency and distributed generation.

Energy efficiency for most major residential uses including lighting, space cooling and heating and water heating have been steadily increasing. The U.S. Department of Energy also created Energy Star® standards for water heaters and clothes washers and other appliances in 1992. Energy Star® labels are applied to the appliances in different categories that rank in the top 25 percent of those available on the market in terms of energy efficiency. The market penetration of Energy Star® products varies by end use, and is as high as 95 percent for some categories (U.S. EPA, 2014). The Energy Independence and Security Act of 2007 (EISA) reinforced the trend. EISA established higher energy efficiency standards for refrigerators, freezers, dishwashers, and power supplies for electric plug loads U.S. EPA, 2007).

In addition to the effect of energy efficiency REC's business model has also been impacted by distributed generation (DG). DG involves the creation of power closer to the end user relative to existing large scale generation. DG is often structured around renewable sources such as wind and solar generation but it can also involve convention sources such as natural gas fired generation. DG encompasses various scales form residential level to community level, but all significantly smaller scale than utility scale power plants. While non-utility-generated power sources, such as emergency and standby power systems, have always existed, that generation has typically operated with minimal interaction with the electric power grid. DG typically involves some degree of interconnection of smaller scale generation with the overall power grid. At the very least it shifts the level and pattern of electricity use as the DG owner substitutes the generation for purchased power. In addition, most DG owners seek to sell any power generated in excess of their usage back to the utility. DG creates a number of issues for RECs including the reliability of the power grid, allocation of costs for interconnection and system reinforcement, insurance and rates (Miller and Ye 2003). RECs are also part of a federated cooperative system, purchasing power through generation and transmission cooperatives. Many RECs have "all-requirements contracts" under which the distribution cooperative agrees to purchase all of its wholesale power from the generation and transmission cooperative. These contracts and their interpretation can affect whether a REC can pursue DG under its existing business structure.

RECs are also investing in energy storage technology (Cunningham, 2012). RECs are using both centralized (community scale) and distributed (residential scale) energy storage to better integrate wind and solar generation into their systems. Community scale electricity storage can allow a REC to better match their community scale DG production, which varies throughout the day, to its peak load level. It can also help them maintain system reliability and avoid outages and voltage changes caused by intermittent generation from residential scale DG. Residential storage systems, which can be stand alone or coupled with DG, can be designed to provide a backup power system when the utility supply is disrupted. While customers are primarily interested in the backup storage feature, it can be logical for a REC to partner in the investment. A REC could conceivably use a centrally controlled network of residential storage systems to create the same demand response benefits as centralized storage.

RECs are also impacted by the policy environment surrounding electricity generation which has been rapidly changing. Currently, a third of U.S. electricity generation comes from coal with natural gas providing a similar proportion (U.S. EIA 2016). REC generation is much more dependent on coal relative to the entire US generation infrastructure. Coal currently accounts for 70% of REC generation (Cash, 2014). Coal powered generation has been impacted by numerous regulations including the Cross-State Air Pollutions Rule, Mercury and Air Toxics Standards, Coal Combustion Residue Regulations, and the Ozone National Ambient Air Quality Standards (Loris 2012). The Clean Power Plan unveiled by President Obama on August 3, 2015 has been the most recent regulation impacting coal fired power plants (U.S. EPA 2015). The

Clean Power Plan seeks to reduce carbon dioxide emissions from electrical generation by 32 percent within twenty five years relative to the 2005 baseline. The National Rural Electric Cooperative Association estimated the cost for RECs to comply with the Clean Power Plan at $11.7 to $20.3B (Johnson, 2016).

As part of a federated cooperative system, those compliance costs will ultimately be passed on to local RECs and ultimately to their member owners. In addition, clean power plan compliance could change the structure of wholesale electricity rates as generation cooperatives strive to maximize the use of their lowest emitting sources. This could in turn lead RECs to redesign residential rates incorporating block rates, time varying rates and other structures (Lazar and Colburn, 2015). In a block rate structure, the per unit price increases as usage increases. Block rates encourage customers to reduce energy use through energy efficiency measures and/or to adopt residential DG. Time-varying which vary the per unit rate across the time of the day, encourage customers to shift consumption within the day. Time varying rates can be used to better match consumption with low emission generation. New rate structures, and the resulting consumer response, could impact RECs existing revenue stream which is based on consumption. Variable rate systems would also increase members' incentive for DG and power storage technology.

In response to softening electricity demand and a more challenging environment for generation investments, RECs, like other electricity providers have placed greater emphasis on managing electricity demand. Over the last decade RECs have been investing in automated meter reading technologies that allowed them to collect consumption, diagnostic and status data from customer meters and transfer it to a central data base for billing, troubleshooting and analyzing. These investments have been part of their evolution toward a "smart grid". The term

“ smart grid” refers to adding both two-way digital communication technology and automation to devices onto the electricity distribution grid. The automation technology lets the utility adjust and control a single electrical device or millions of devices from a central location.

All of these changes in RECs’ business environment are creating challenges for their traditional cooperative business model. RECs may be challenged with capitalizing their business investments in an environment of decreasing electricity sales. They might want to partner with specific members in residential DG and storage projects. They could want to partner with neighboring RECs, businesses, municipalities and other entities in community scale DG and power storage projects. RECs might also want to exploit synergies from smart grid investments and other information technology. These are simply examples of some of the business opportunities facing RECs. As RECs pursue these opportunities and other new business projections, they may need to re-examine their business model.

RECs’ Current Business Model

RECs purchase electricity wholesale, primarily from generation and transmission cooperatives, and sell it to their user members. The profits from those member-based transactions are allocated to members in the form of retained patronage (which many RECs refer to as capital credits). Unlike agricultural cooperatives, most RECS do not distribute cash patronage. Agricultural cooperatives are subject to taxation under Sub-Chapter T of the U.S. Internal Revenue Code and typically return profits in both cash and retained patronage. Under Sub Chapter T, both the cash and retained patronage are tax deductible to the cooperative and taxable income to the member. In most cases, the cooperative is required to pay at least 20% of the total patronage in cash. RECs are typically exempt from taxation under section 501(c)(12) of the code. The patronage refunds issued by a REC are not taxable to the member unless the member claimed the electricity expense as a business deduction. RECs do not face a statutory requirement for cash patronage.

With the exception of a small membership investment, REC members acquire all of their equity through retained patronage. That equity funds the cooperative's investments in the electricity distribution infrastructure. The retained equity is eventually redeemed in cash and the equity is replaced from current retentions. Most RECs retire equity under a first-in/first-out method. The length of time between when patronage is retained and when it is redeemed for cash is referred to as the revolving cycle. The length of the revolving cycle is a function of the profitability of the cooperative and the funds needed for re-investment in infrastructure. A major advantage of the revolving equity system, from the member's perspective, is that it does not require any out-of-pocket investments.

While the revolving equity system avoids the need for a large up-front investment, members are often critical over the length of the revolving cycle. During the early years of the U.S. rural electric program, cooperatives generally were unable to retire capital credits held by members because the continued accumulation of equity capital was required to serve member needs and build financial strength (Royer, 2016). This resulted in many RECS having relatively long equity revolving cycles. The National Rural Electric Cooperative Association and the National Rural Utilities Cooperative Finance Corporation appointed a committee to examine the retirement of capital credits in 1976 and recommended that RECs strive for a 10- to 20-year revolving cycle. In a 2005 follow up report, the committee reiterated their position on the importance of revolving equity and encouraged RECs to set electricity rates to generate sufficient cash flows for retiring equity credits (NRUC-CFC, 2005). Royer (2016) examined data from the Rural Utilities Service representing 581 distribution cooperatives. He concluded that the average REC can maintain a 28.2 year revolving cycle at their current level of leverage and electricity pricing.

In recent years, the topic of capital credits retirement has gained the attention of at least one member of Congress. In a 2008 white paper Jim Cooper, U.S. representative from Tennessee, was highly critical of REC revolving periods. He argued that electric cooperatives should increase their leverage levels as a means to reduce equity revolving periods. (Cooper 2008). Royer (2016) examined three alternative strategies for RECs to reduce revolving periods: replacing equity with debt, reducing the rate of equity accumulation and adjusting the electricity rates. Decreasing their equity/asset ratio by 25% would allow the average REC to obtain a 23 year revolving cycle while a 4.84% increase in electricity rates would allow them to maintain a 10 year revolving cycle.

While RECs' existing revolving equity model has successfully financed a system representing over 40% of the U.S. electricity distribution infrastructure, it does have its limitations. As RECs adapt to their rapidly changing business environment and pursue new opportunities, they may want to consider new equity structures and business models. The following discussion illustrates how alternative cooperative models could address some of RECs' current and future challenges.

Financing Traditional Electricity Distribution Services

As mentioned, RECs have traditionally financed their electricity distribution infrastructure with a combination of long term debt and revolving equity. The length of the revolving period is influenced by the RECs profitability and the cash flow required for infrastructure reinvestment. The boards of directors and CEOs of RECs, through their strategic planning exercises attempt to anticipate future growth in electricity sales and manage equity accumulation and infrastructure investment to meet the anticipated future demand (McKee 2011). Many REC members don't understand the need for cooperative equity, much less the mechanics of the revolving equity system. That creates a continuous source of tension between the board of directors who are attempting to maintain the financial stability of the cooperative and the members who feel that equity should be redeemed more rapidly.

Some of this tension relates to what has been described as the "horizon problem" with cooperative equity (Cook, 1995). The horizon problem occurs when the owner's claim on the equity and/or projected use of the cooperative differs from the life of the investments being financed with the equity. This can give rise to differences in investment preferences among members based on differences in their membership horizons. For example, older, overinvested members may pressure cooperative leaders to reduce infrastructure reinvestment and accelerate the revolving equity cycle. Because of the horizon problem there is a general tendency for the membership to disfavor investments with longer payoff horizons as are common in the utility industry.

An alternative cooperative structure to address these issues is the proportional investment cooperative (Chaddad and Cook, 2004). Under this model equity investment is still limited to member users but members are required to maintain investment in proportion to usage. The horizon of the equity investment and usage are matched. The cooperative may still be making long payback period investments but there should be no member opposition since each member will have equity returned when they exit the cooperative or if their business volume decreases. Proportional investment cooperatives typically achieve their structure through a base capital equity management system that matches equity balances with use. Under a base capital plan the board first establishes a desired equity base in accordance with the cooperative's needs and financial condition. Each member's share of the total equity is then compared with their share of the cooperative's business volume. Underinvested members are required to increase their equity investment and equity is returned to overinvested members.

A base capital structure might be more appropriate for RECs than their current revolving equity systems. Many RECs are making large investments in smart grid technology and other capital intensive projects. At the same time they are promoting conservation and anticipate that their electricity volume will actually decrease. These trends may lead to challenges in maintaining their current equity revolving equity systems. A base capital structure might improve equity management and be a more effective vehicle to communicate to members their "fair share" of the cooperative's equity. Some members might be willing to invest in equity to reach their base capital level at the point that they would receive annual refunds (cash patronage). Under a base capital system, the rate at which equity can be returned to inactive members must usually be matched with the rate at which new and under-invested members   A REC seeking to establish an effective base capital system might need to increase electricity rates. Higher rates would allow underinvested members to more quickly build equity through retained patronage while fully invested members would receive cash patronage refunds. Of course, as Royer (2016) pointed out a strategy of higher electricity rates could also be used to reduce the revolving cycle.

Financing Residential DG and Energy Storage Projects

There are intrinsic advantages for RECs to partner with members on residential energy projects rather than have some members pursue them independently. Partnering on those projects could allow the cooperative to integrate the technology into its load management system. Unfortunately revolving equity has a "free rider problem" (Cook, 1995) that makes it poorly suited to finance member specific investments. The free rider problem exists because new members obtain the same patronage and residual property rights as existing members. This dilution of returns creates a disincentive for investment. In the context of our example it would be unfair for the REC to provide some members with residential solar generation since they would be "free riders" on the other members who generated the capital.

The usage right cooperative model addresses capitalization problems by coupling investment with a defined usage rights (Chaddad and Cook, 2004). While profits are still distributed on the basis of use, members are required to hold equity shares with an associated usage right to gain access to the services. Profit distribution becomes proportional to both use and investment. Members can sell their equity and associated usage rights to other existing or potential members with the approval of the board of directors. That structure provides liquidity to the equity investment as well as the potential for appreciation, if the underlying patronage stream increases.

The usage rights cooperative model would be appropriate for funding DG and energy storage projects. For example, members who were interested in investing in solar energy could purchase stock with a usage right to a given amount of solar generation which could either be installed on their residence or represent a share of a community scale installation. Their share of the generated power would be valued at the cost of avoided wholesale power purchase or similar formula. That benefit stream which could increase over time if electricity rates increase, would provide an incentive for investment. The usage right structure could be integrated into a separate patronage pool in an existing REC. However, it might be more logical to form a new cooperative entity. The formation of a new cooperative entity would provide a separate governance structure and eliminates issues under a power purchase agreement which may preclude or limit involvement in distributed generation.

There are also obvious challenges to the formation of new usage right RECs. A fair value for the generated power or other benefit stream would have to be determined. Valuing distributed generation is often complicated since the customer is still using the power grid and from fairness viewpoint should still pay their share of the fixed costs associated with the grid (Wood, 2013). The valuation has to be fair to the existing REC members and still generate sufficient value to the usage right cooperative member to stimulate investment. The marketability of usage rights can be problematic. In the late 1990's members in Minnesota Corn Processor found it difficult or impossible to sell their stock/delivery rights (Crook, 2004). Because the investment was tied to delivery, the potential market was limited to area corn producers. Farming profitability was low due to low corn prices. Most of the existing members had invested in the cooperatives in their 50's and were now reaching retirement age. While the Minnesota Corn Producers situation was exacerbated by the poor operating performance of the cooperative, the very nature of a usage rights cooperative creates a thin market for the equity which can cease to function. If the membership of a solar generation usage right cooperative were all residential electricity customers an adequate market for the usage rights would likely develop. If large blocks of usage rights were owned by non-traditional members such as neighboring RECs, municipal utilities or businesses, the structure could be problematic since it would difficult to market large blocks of usage rights.

Projects Involving Outside Investors

Many RECs are interested in projects involving non-member investors such as other RECs, municipalities or large retailers. Neither the traditional revolving equity structure nor the usage rights cooperative structure is appropriate for those opportunities since investment in those cooperative models is restricted to member-patrons. An alternative structure which addresses these limitations is the investor-share cooperative (Chaddad and Cook, 2004). The investor share cooperative has two classes of equity shares. One class is held by member-patrons under a traditional, proportional or usage rights model. The other class is held by investor members and may have different structures for profit distribution, transferability and control. Typically, in an investor-share cooperative the total profits are split in accordance to a formula with the cooperative side distributed in proportion to use and the investor side distributed in proportion to investment. Member equity may be managing under a revolving equity, base capital or usage rights system and investor equity is freely tradable.

The investor-share model could be appropriate for a REC that was considering partnering on a distributed generation project, or other investment, with an outside entity. For example, a community solar project could be co-owned by a REC and an outside investor group. On the cooperative side profits would be distributed in proportion to use (KW generated) while the investor side might simply pay a dividend on the invested capital. The cooperative side of the entity could vote on a one member-one vote basis while the investor side could link voting rights to share ownership. The major advantage of the investor-share model is the ability to acquire investment capital from non-member sources. There are typically few restrictions on the transfer of ownership shares on the investor side. That structure provides an exit strategy for investor members.

A possible disadvantage of the member-investor model is that control is shared between the user and investor groups. The two sides could come to have diverging interests. For example, the member side might be concerned that future pricing structure were fair to other

REC members while the investor group could seek pricing structures that increased their dividends. Historically RECs have promoted their one member-one vote structure as a feature distinguishing them from investor-owned utilities..The member-investor model would require the acceptance of a combination one member-one vote and equity based governance structure. The structure of the board of directors can also be controversial in member-investor cooperatives. Enabling legislation for member-investor cooperatives has been passed in numerous states under the title of "Limited Cooperative Associations' (Pitman, 2008). Historically, RECs have been incorporated under state legislation modeled after the 1937 Electric Cooperative Corporation Act. The legal issues of incorporating a member-investor REC would have to be investigated.

Financing Information Technology and Smart Grid Investments

The most challenging opportunity for RECs, at least in terms of business model, is capitalizing on synergies from intellectual capital and information technology. While there are many descriptions of the "smart grid" a common element is the application of digital processing and communications to the power grid. Data flow and information management are central to the concept of the "smart grid: Information technology is notoriously difficult to value. In many case it involves fixed costs that can be spread over more units at a very low variable cost. For example, remote electricity meter reading technology could probably also monitor water meters in the same households for almost no additional costs. It is even conceivable that information on household water use (when the coffee pot is filled up) could be useful in managing the electricity load (when the coffee pot is turn on). The synergies of expanding information management investments are obvious but monetizing the value streams is challenging.

Oklahoma grain marketing cooperatives in Oklahoma and Kansas faced similar challenges when they considered synergies in grain merchandizing. Because all of the transactions were electronic, there were potential scale economies and synergies in combining merchandizing activities across cooperatives. Sharing a merchandiser between two or more cooperatives would necessitate a structure of fees and cost sharing. One of more of the cooperatives would essentially be outsourcing their grain merchandising activities to an outside provider. Instead, the grain cooperatives in both states decided to form grain merchandising alliances. The stand alone structure centralized the information technology and human capital and had its own governance structure. In these cases, the alliances were structured as limited liabilities companies operating in a cooperative manner and taxed under sub-chapter T.

The alliance structure could be appropriate for a REC seeking economies of scale with other entities. An alliance could pursue synergies in advanced metering infrastructure, load management, after hours call centers or other activities centering on information technology. There are inherent advantages in forming an alliance rather than developing contractual relationships. Possible synergies from smart grid technology are still emerging. An alliance would provide a platform for a continual strategic evaluation of opportunities. Issues involving investment, fee structure and profit distribution are always controversial in multi-entity structures. An alliance with a separate governance structure is more likely to maintain satisfaction across those issues relative to inner firm contracts. While many alliances of cooperative firms are incorporated as limited liability companies, the cooperative business form is also a natural fit.

Summary

RECs are operating in a dynamic environment with changes in demand, regulations and technology. This environment creates challenges and opportunities for RECs. As they reposition their business strategies RECs may also want to consider changes in their business model. This paper has highlighted four possible alternative cooperative business models. The proportional investment cooperative or base capital system, might help RECs finance their traditional operations. The usage rights cooperative might be an appropriate model to finance new service areas for sub-sets of the membership. The usage right structure could be integrating into the existing cooperative organization or as a stand-alone entity. The member-investor would a logical structure for the formation of a new business involving non-member investors. A free standing alliance could be an effective vehicle in pursuing synergies in information technology. RECs have a long history of technical innovation and now run state-of-the-art electric distribution systems and customer contact centers. Perhaps it is time for similar innovation in their business model structures.

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