CASE STUDY:

Mid-Carolina Electric Cooperative

As electric utilities grapple with how to better align rates and costs, the Mid-Carolina Electric Cooperative (MCEC), serving some 55,000 accounts across five South Carolina counties, switched from a traditional two-part charge for its members to an innovative three-part rate in January 2016. Bob Paulling, the chief executive officer of MCEC since 2013, was the man responsible for implementing those new rates. *THE WIRE* spoke with him about why MCEC made the change and what its experience with the new rates has been.

***THE WIRE:* What were you trying to achieve with the new rate structure?**

Bob Paulling: We wanted a structure that accurately reflects our costs. We knew that more than half of our wholesale power cost is related to members' peak usage, rather than how much they use overall. Yet most of our costs to serve members were bundled in an average charge per kilowatt hour. That meant high users paid a disproportionately higher share of our costs, and low users paid disproportionately little.

***THE WIRE:* What's your new rate structure, and what has been your experience with it so far?**

BP: Our new residential rates have three components. First is an account charge of 80 cents per day, covering the costs related to members just having an account. Next is the demand component, the cost of our distribution system—what we call the On-Peak charge. That's $12 per kilowatt-hour for residential, based on each member's hour of peak demand during the times when overall demand is highest. For us, On-Peak hours are 6 to 9 a.m. in the winter and 4 to 7 p.m. in the summer. Finally there's the energy component—4.7 cents per kilowatt-hour a member uses. The same structure applies to commercial members, who pay $1.10 per day for the account, 5.7 cents per kilowatt-hour, and $14.75 per kilowatt for On-Peak demand.

We think this does a much better job of reconciling our costs with our revenue. Calendar year 2016 was an extremely hot year here in South Carolina, and we sold more kilowatt-hours than ever before. Yet we paid the lowest demand cost ever on our wholesale power.

***THE WIRE:* How did you educate your members about the new rates, and what has been their reaction?**

BP: We made sure everyone—from our board, crew leaders and supervisors to every other employee—had a thorough understanding of what we were doing and could explain it. Then I wrote to members to explain the new rates and offer tips on how to take advantage of the new structure. All of this information is clearly spelled out on our website (mcecoop.com). But the biggest thing we introduced was an app called SmartHub that lets members pay their bills, check energy use, and compare their bills on the old versus new rate structures.

Compliments about the new structure outnumber complaints by about 200 to 1. Most complaints have been from low users, whose bills may be higher. We've gotten almost no complaints from high users.

***THE WIRE:* How has smart meter technology enabled MCEC to get a better sense of appropriate rate structures?**

BP: For more than a decade we were able to get hourly reads from every meter—that's what told us how our costs broke down, when our times of peak demand were and what each member's peak usage was.

***THE WIRE:* What advice would you give to other cooperatives facing similar challenges?**

BP: I can't say this enough: You have to understand your costs. Your situation is going to be different than ours. But energy efficiency is improving everywhere, and if you're still depending on volumetric rates, you're going to have to figure out what to do next. ■

LETTER, from cover

in terms of automatic meter reading and remote disconnects, the next evolution toward a truly smart grid is pairing AMI technology with a communication network such as broadband infrastructure—the only communication network that can transport real-time information dynamically and reliably with instantaneous feedback. Other backhaul networks today may have delays of 20 to 60 seconds, while others may not communicate for hours or even days.

Smarter grids for electric cooperatives provide significant benefits, including improved reliability, enhanced grid security, advanced safety mechanisms, and better flexibility to support energy efficiency and renewable energy integration, as well as operating cost savings and overall lower rates to consumers. But there's an important cooperative member benefit to a smarter grid as well. Co-ops can use the fiber in their smart grid deployments to offer their members additional services such as high-speed internet, phone and TV.

As these co-ops know, broadband is no longer a luxury item but a necessity for economic growth, and nowhere is this truer than in rural America. Precision agriculture is hastening a revolution in data usage on the part of America's farmers. According to a recent survey by the American Farm Bureau, more than half of all farmers were planning to add new precision or data technology in the next two years. Last year, a corn and wheat farmer in Kansas told CoBank that his cellular data requirements were quadruple what his farm had used just three years prior.

"Rural broadband enhances economic development," U.S. Secretary of Agriculture Sonny Perdue said to the House Agricultural Committee in its May 17 hearing on the state of the rural economy. "The connectivity out here in rural areas is as important as roads, water, sewer and other things for economic development in today's society."

As Secretary Perdue says, agriculture isn't the only industry that is relying more on broadband data. Increased bandwidth is critical to health care, manufacturing, schools and even tourism. And obviously, broadband has become vital for residential customers as well, who rely on the Internet to keep them connected to the rest of the world.

Rural electric cooperatives are perfectly positioned to be the provider that brings these modern necessities to the far corners of America. Given the infrastructure that so many co-ops have already installed to suit their own needs, expanding those services to help their members is the logical next move. ■

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CoBANK

Broadband and Smarter Grids: A Partnership for the New Rural Economy

By BILL LADUCA

Sector Vice President for Electric Distribution, CoBank

The same electric cooperatives that had the vision to electrify rural communities in the 1930s continue to build on their legacy by deploying smarter electric grids to meet the numerous demands of the 21st century. In fact, electric cooperatives in many cases are ahead of the advanced metering infrastructure (AMI) technology adoption curve compared to their counterparts at investor-owned utilities in urban areas. Much of that can be attributed to the cooperative business model and the mission to provide excellent customer service and low electricity rates to their members. Now, many are discovering that the same technology can be deployed on behalf of enhancing member services.

While AMI technology is changing the game for the electric utility industry

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Creating and Selling a More Effective Rate Structure

A roundtable discussion with Ahmad Faruqui and David Hedrick, two of the industry's leading rate design experts

As machines and appliances become more energy-efficient and customers generate more of their own power, rural electric cooperatives and other power companies face increasing pressures to align their rates more closely with their true costs. Many rate experts say that traditional rates for residential customers, who represent nearly 90 percent of all electric utility users, place an unfair burden on some customers, and fail to reflect utilities' true infrastructure costs.

How can cooperatives address these inequities? *THE WIRE* sat down with Ahmad Faruqui, a principal with the Brattle Group, and David Hedrick, executive vice president and principal of Guernsey, to talk about the latest strategies around demand rates and other alternative rate structures, and the best way to educate co-op members on the need for change.

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MORE EFFECTIVE RATE STRUCTURE, from cover

***THE WIRE:* What types of new rate structures are cooperatives considering to bring rates in better line with costs?**

David Hedrick: With a traditional rate structure, there's a nominal customer charge, and then a cost per kilowatt-hour for the electricity that's actually used. That kilowatt-hour charge generally covers pretty much all of the fixed costs of providing service in addition to the variable costs. So as kilowatt-hours go down for some customers, the cooperative can't recover the fixed costs of providing service. And customers who don't have distributed generation end up subsidizing those who do.

One common solution is to increase the customer charge for all residential customers. That lets the cooperative recover more of its fixed costs. Other cooperatives have increased the customer charge only for people with distributed generation. But a more recent development is to create demand rates for residential customers based on their peak demand.

Ahmad Faruqui: Cooperatives are actually further along than municipal and investor-owned utilities in their rate design practices.

> *Cooperatives are actually further along than municipal and investor-owned utilities in their rate design practices.*

Many cooperatives have fixed charges that are significantly higher and closer to the actual cost of serving customers.

And a few already have a three-part rate for residential customers that is intended to mirror the three separate parts of a cooperative's costs for each customer. First is the cost of putting a meter in a house, sending out bills and providing customer service. That applies whether a customer uses any electricity or not. Next is a demand component for the use of the grid—the system of lines, transformers, circuits and feeders that customers tap when they use electricity. Finally, there's the energy cost, for power plants, the fuel they use and the transmission system.

***THE WIRE:* What about a time-of-use rate? Is that an effective way to align rates with the associated costs?**

Faruqui: If you think of the grid as having those three parts—a fixed charge, a demand charge and an energy charge—then a time-of-use rate is purely an energy rate, and energy accounts for only one-third to one-half of a typical bill. But a time-of-use rate does reflect the time variation in energy costs. During peak hours, cooperatives have to run their most expensive, least efficient generation units. During other hours, especially at night, they can run their base load units, which tend to be much more efficient.

Hedrick: Because time-of-use relates only to energy, and energy is only part of a customer's bill, the difference between the on-peak and off-peak kilowatt-hour charges has to be pretty high to be effective in changing behavior. Even then, what tends to happen is that a customer may use somewhat less electricity in the on-peak period, but usage will still reach the same peak at some point. So the cooperative still has to be able supply that peak amount, and it doesn't save any money.

***THE WIRE:* Whatever changes cooperatives make to their rate structures, they need to educate their members about why they're changing and how the new rates work. How can they do that?**

Faruqui: That's the challenge, because most residential customers immediately become suspicious when they have to pay a fixed charge or a demand charge. When they buy clothes, they don't have to pay a fixed charge just to enter the store. They only pay for the shirts they buy. But that store isn't at their beck and call 24 hours a day.

With an electrical grid, you can tap it any time you flip a switch, or your refrigerator starts its cooling cycle, or the air-conditioner comes on. If you had a taxi waiting in your driveway around the clock, you'd have to pay for it to be on call. That's basically the fixed charge for having the grid always available. We need to use examples like this to explain to the average household why cooperatives adopt new kinds of rates.

Hedrick: To successfully implement a demand rate for residential customers, you have to have an extensive education program so that customers understand the components, what their rate will look like and what it's intended to accomplish. You have to explain that part of the rate is going to be based on the maximum amount a customer uses in a month.

> *To successfully implement a demand rate for residential customers, you have to have an extensive education program so that customers understand what their rate will look like and what it's intended to accomplish.*

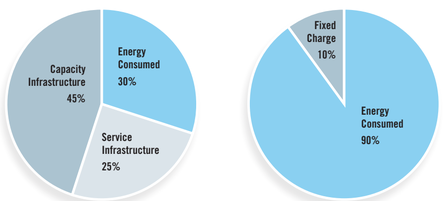
But it's also important to implement the new rate so that folks can become familiar with the demand billing unit they see on their bills every month. With regard to the rate itself, you need to start small and gradually increase to a level that recovers the cost.

***THE WIRE:* What technologies do cooperatives need to deploy so they can bill customers with a new rate structure?**

Hedrick: Many cooperatives already have smart meters and two-way communication so that they can gather data about their customers' use of electricity. These more accurate readings and hourly data allow more options for rate design, such as time-of-use and demand rates. Many have also been working on adding the robust systems that are needed to store and query that data, which will help them better engage with their customers.

Some cooperatives also have technology that lets members look at their account online to see their consumption and what their peaks were. Some even let customers see that in real time.

The Mismatch Between Energy Costs and Energy Pricing



As this example from a Southwestern utility shows, the structure of electric rates and the nature of a utility's infrastructure and other costs are often misaligned.

Source: Barbara Lockwood, "Residential Demand Charges"

Faruqui: With smart meters you get more granular measurement of customer usage, by hour and pricing period. That allows you to design smart rates that are based on the real costs of serving customers.

***THE WIRE:* How effective are new rate designs at altering customers' usage?**

Hedrick: The main objective of the new designs is to ensure that cooperatives get a fair recovery of costs, from all members. So if you add a demand rate or a time-of-use rate, you hope you're at least making people aware of what they're paying in those time periods. And if they can, to reduce their consumption.

But I'm not sure there's enough data to be sure new rates will cause a change in behavior. At a certain point, people just want to be cool in the summer and warm in the winter—even if you set the rate at a point that feels punitive.

Faruqui: I would counter that there are some things we can glean from the data. We've seen enough data to know that as electricity bills change, usage changes. And rate design, including time-of-use charges, is connected to the total bill. Once people begin to see that relationship, they respond. Not every household will change what it does. But if you expose 100,000 households to a changing rate, you will get a price response.

***THE WIRE:* Distributed generation raises problems of its own, making it more difficult to allocate costs across all members. How do three-part rates function as a more accurate cost recovery system where DG is involved?**

Hedrick: With standard two-part rates, which use an energy charge based on consumption to recover much of the fixed cost of providing service, lower consumption for customers with DG means more of that cost won't be recovered. A three-part rate provides for a recovery of that cost based on a customer's peak load requirement instead of energy consumption.

Faruqui: It goes back to what we were talking about earlier, the difficulty that co-ops have in recovering fixed costs. Because distributed generation customers use less power, rates based on volume of use leave higher-using, non-DG customers to shoulder more of the costs of the grid, creating a cross-subsidy from non-DG customers to DG customers. Three-part rates go a long way toward eliminating that subsidy. ■

This Issue's Experts

An internationally recognized expert on rate design, **AHMAD FARUQUI** is a principal with the Brattle Group, which provides consulting and expert testimony in economics, finance and regulation. Faruqui has appeared before regulatory groups, governmental agencies and legislatures in the United States and other countries. He has published four books and more than 150 journal articles. He holds a bachelor's degree from the University of Karachi, and a master's in agricultural economics and a Ph.D. in economics from the University of California, Davis.

DAVID HEDRICK is executive vice president and principal of Guernsey, an engineering and consulting firm. As manager of the firm's Analytical Solutions Group, Hedrick specializes in revenue requirements, cost of service, rate design, and other areas for the electric, water and wastewater utility systems. He works directly with distribution cooperatives, generation and transmission cooperatives, and municipal power systems. He holds a bachelor's degree in mathematics from the University of Central Oklahoma and an MBA from Oklahoma City University.

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