Broadband Case Study:
Blue Ridge Mountain Electric Membership Corporation

Cooperative Profile

Blue Ridge Mountain Electric Membership Corporation (BRMEMC) distributes electricity to some 44,000 members across two and a half counties in northeastern Georgia and most of two counties in western North Carolina (see Figure 1).

Its 6,100 miles of distribution lines and 39 miles of transmission lines cover a service area spanning approximately 1,179 square miles. With 8.3 meters per mile of electric line, the population density in this mountainous region of the southern Appalachians is fairly typical of electric cooperatives nationwide. BRMEMC's membership base is almost entirely residential and electric usage is very low, partly due to the prevalence of seasonal homes. The terrain is rugged and mountainous.

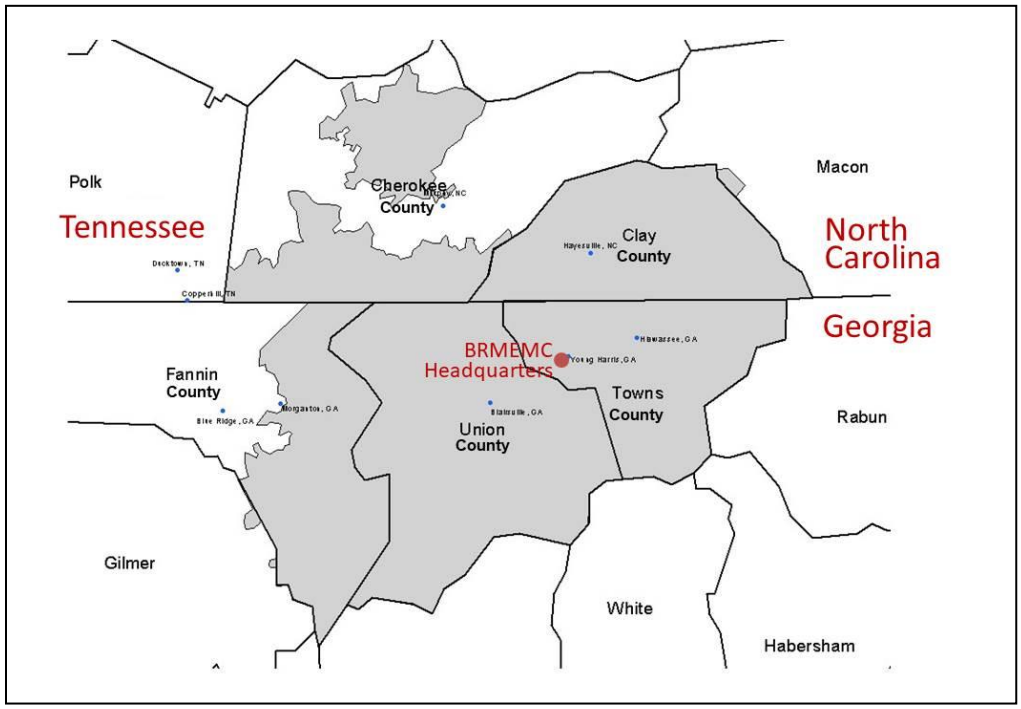


Figure 1. BRMEMC's electric membership area.

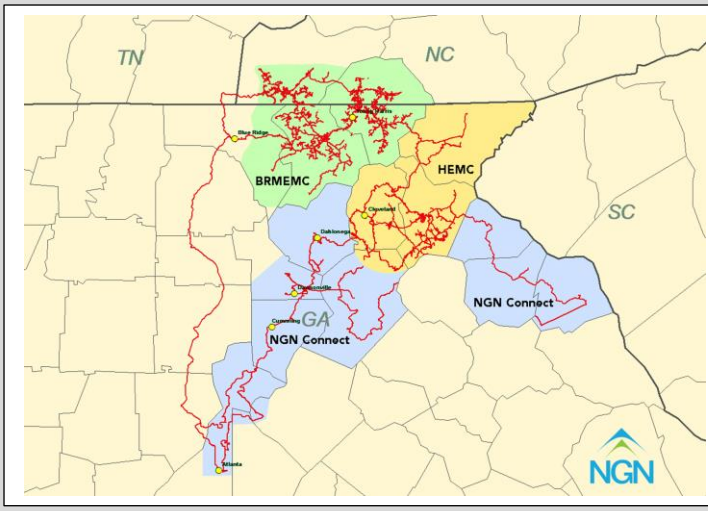
Almost twenty years ago, BRMEMC's general manager (now retired), Joe Satterfield, looked into the future and considered what would be needed to create sustainable economic development, moving beyond new home construction as the area's primary engine of economic growth. He determined that it would take investment in broadband communications. Area residents' broadband options in those days were extremely limited and, where available at all, high cost. And as broadband communications began to expand in cities across the Southeast, residents with second homes in northeast Georgia were becoming

accustomed to having high-speed Internet access. In 2002, BRMEMC began to respond to the needs identified by Satterfield, entering the communication services business. The co-op has since offered at various times DSL (Digital Subscriber Line), wireless, broadband-over-power-line, and dial-up services. Not all of these technologies offer the speed and bandwidth to qualify as broadband by today's standards, however. By 2006, the co-op was working with small, rural communities to enhance Internet access by deploying fiber optic lines. One important piece was missing though — a high-speed, regional communications transport link to major metropolitan hubs.

BRMEMC soon found itself in the right place at the right time. The federal government was looking for "shovel-ready" infrastructure projects under the newly enacted American Recovery and Reinvestment Act of 2009 (ARRA) and BRMEMC was ready to go. With a neighboring cooperative, Habersham Electric Membership Corporation (HEMC), BRMEMC created the North Georgia Network Cooperative (NGN–see sidebar), using $33 million in ARRA funding and another $9 million in local funding to build the first regional transport link to Atlanta. NGN acts essentially as BRMEMC's wholesale provider for broadband. In the nearly fifteen years since it began deploying its own distribution fiber, BRMEMC has invested $30 million in a broadband network that spans 1,100 miles and has 7,900 active subscribers. The third largest bank in Georgia is on the network, as are several other large companies. Former GM Satterfield's vision is well on its way to being realized.

Creating a Strategic Partner: North Georgia Network Provides Regional Connectivity for Its Members

North Georgia Network (NGN) is a member-owned cooperative operating over 1,600 miles of fiber optic infrastructure in North Georgia. The cooperative provides core connectivity to major markets to its members, which are the end-user service providers in their respective communities. In addition to this network access, NGN also offers its members centralized Network Operation Center (NOC) services and technical support, so that all subscribers served off the core network receive a uniform customer experience.



NGN's transport network and its connections to its members' networks.

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The company was formed after a multi-county partnership of economic developers and community leaders saw a need for high-speed infrastructure in the north Georgia region. Eager to address this need in their own service areas, two of NGN's members, Blue Ridge Mountain EMC and Habersham EMC, combined their utility resources to support the creation of NGN. In 2009, NGN was formed and, together with the coalition of community partners, the company applied for and was awarded the first Broadband Technology Opportunities Program (BTOP) grant nationwide. NGN's third and final member – NGN Connect – was created at the end of the grant period to reach underserved consumers outside the two EMC's service areas.

Today, NGN serves over 15,000 subscribers and continues to serve as the fiber backbone and strategic partner for the three members and their rural broadband initiatives.

– Courtesy of Alyssa Sellers
NGN Interim Director of Finance & Administration

Business Drivers of the Broadband Investment

BRMEMC's fiber optic communications network is first and foremost a response to unmet economic development needs in rural northeast Georgia and western North Carolina. Current general manager Jeremy Nelms prefers that the success of his co-op's broadband investments be measured in jobs, stating, "It's all about how many jobs have been created or maintained." While hard employment data may not be readily available, it is clear that the regional economy has directly benefited. Local industries and "anchor institutions," such as fire and police stations, other government facilities, hospitals, and schools, are all connected. In the case of one manufacturing company, a $3,500 per month bill for a T1 landline has been replaced by a $300 charge for fiber broadband with superior speed.

BRMEMC's internal business requirements played little or no role in its early investment decision making, although the fiber was taken advantage of in its electric system. BRMEMC has implemented distribution system automation and automated reclosers for outage management. Automated meter reading is currently supported by a dedicated powerline carrier (PLC) technology, but Nelms and his team know that their fiber assets will play a major supporting role in their future plans as they transition to AMI (advanced metering infrastructure). However, enabling distribution system automation is not the only benefit. Nelms notes that selling broadband services also helps his co-op diversify its revenue base at a time when electric usage is flat or declining.

Project Overview and Deployment Approach

BRMEMC's approach to deploying fiber for high-speed Internet access is simple: "work within our budget." The co-op's current plan is to invest $4.5 to $5 million on network expansion in 2019, $750,000 of which is for middle-mile fiber that will extend the network's potential reach to an additional 1,000 electric accounts. A $3 million U.S. Department of Agriculture Rural Utilities Service Community

Connect grant awarded to BRMEMC in November 2018 is providing significant help in supporting extension of broadband service to the hardest to reach areas of BRMEMC's territory.[1] Engineering Director Daniel Frizzell explains BRMEMC's network expansion plan as a series of incremental steps that allow the co-op to test new marketing strategies. Frizzell says, "We want to make sure our efforts are a good investment for our membership."

While its focus is on serving customers within its electric service area, the cooperative also provides fiber connectivity to non-member areas when asked. One example is the town of Murphy, North Carolina, a municipality served by the Murphy Electric Power Board and located about twenty miles from BRMEMC's headquarters in Young Harris, Georgia. And in conjunction with WNC-EdNet (Western North Carolina Educational Network) and other collaboration partners, BRMEMC brought fiber optic connectivity to all rural schools in the six westernmost counties in the state. The co-op has a goal of allowing students to "fully realize the benefits of one-to-one device initiatives being introduced in our school districts." According to Frizzell, the ability to reach these students' homes with fiber broadband service would "level the educational playing field" for students who had lacked the technology to compete with students in more urban and "connected" locales.

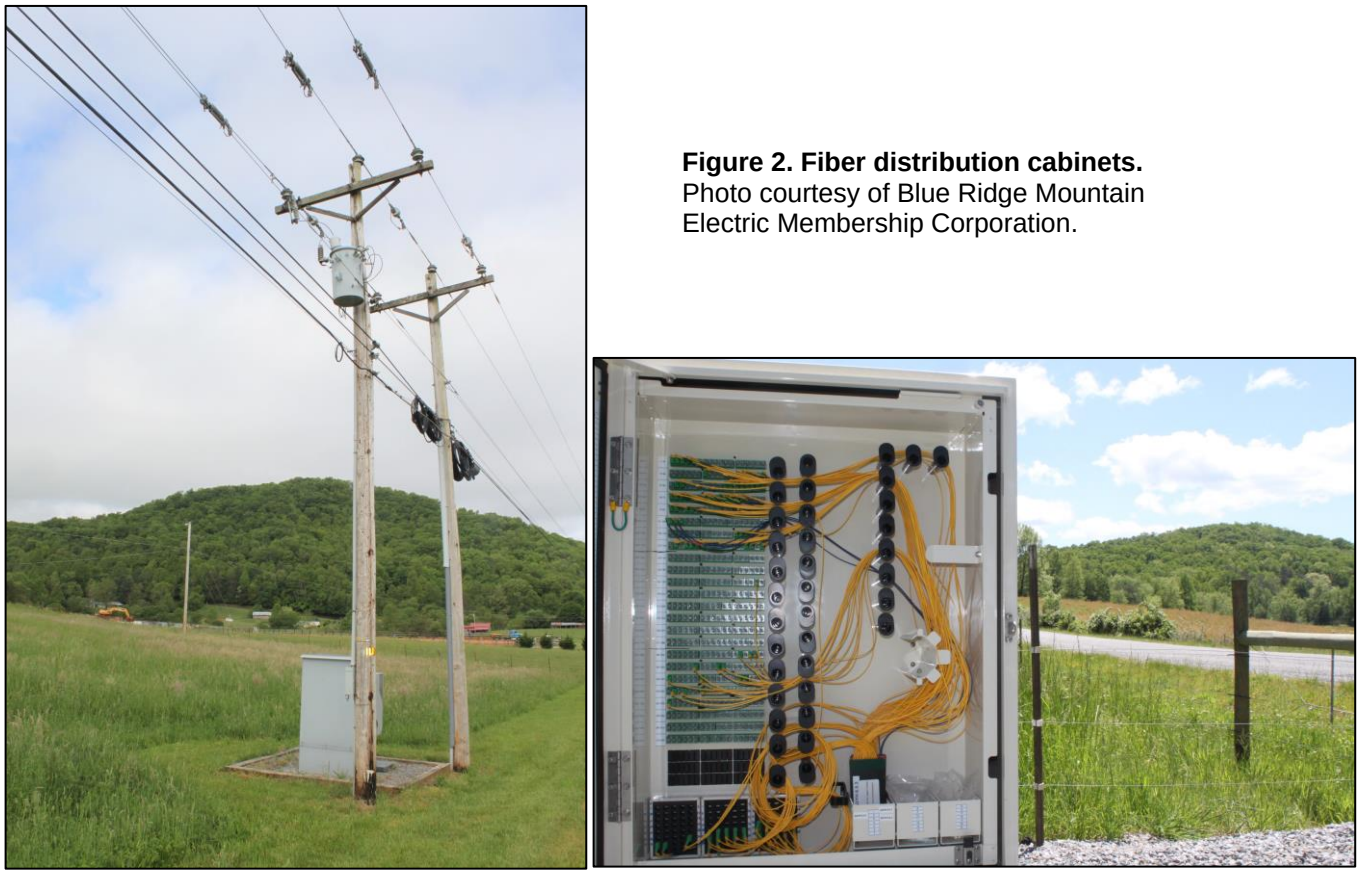

Figure 2. Fiber distribution cabinets.
Photo courtesy of Blue Ridge Mountain Electric Membership Corporation.

[1] https://www.rd.usda.gov/newsroom/news-release/usda-partners-blue-ridge-mountain-emc-bring-high-speed-broadband-e

Broadband Business Case

BRMEMC has invested $30 million so far in its fiber optic network, including network electronics and middle-mile fiber, not including its ownership stake in NGN. Projected 2019 broadband revenues are $7 million, against expected operating expenses of $5 million.[2] Erik Brinke, the co-op's Director of Administrative Services and External Relations, says that BRMEMC initially used member resources to develop its fiber network and has since taken advantage of several grants to expand it. Although these grants have underwritten part of the investment, general manager Nelms sees a fairly long investment recovery period. His realistic assessment of the payback period is 8 to 10 years. Some of the benefits of BRMNEMC's fiber network are not quantifiable — Nelms says his broadband network is helping overcome barriers to businesses locating in the area. He adds, "It's also great PR for us."[3]

Broadband Business Model

BRMEMC's broadband business unit is an operating division of the cooperative, in parallel with the electric business. It is not structured as a subsidiary. Currently, the unit operates simply as BRMEMC, offering fiber optic services. However, that will soon change as the Georgia legislature recently passed a new law requiring that cooperatives in the state that offer broadband services must do so through an affiliate and publish their cost allocations with the Georgia Public Service Commission. A dozen, dedicated staff run the co-op's broadband services business — six fiber splicers, three admin and billing staffers, and three inside installers/troubleshooters. However, these individuals are assignable to electric functions when necessary, such as assisting with power restoration work during storm outages.

Figure 3. BRMEMC fiber splicer at work in the co-op's mobile workspace.
Photo courtesy of Blue Ridge Mountain Electric Membership Corporation.

[2] It should be noted that allocation of costs between BRMEMC's electric and broadband divisions has not yet been finalized. The co-op is rate regulated by the Tennessee Valley Authority, whose oversight includes cost of service allocation.

[3] See for example: https://www.electric.coop/georgia-co-op-broadband-fiber-drone-improves-safety/

Network Architecture

Unlike a number of other co-ops featured in this broadband case study series that utilize Gigabit Passive Optical Networks (GPON), BRMEMC's Fiber to the Home (FTTH) network relies on an active Ethernet architecture. According to telecommunications provider Otelco, "An active Ethernet network provides each subscriber with their own fiber link to the network node switch, which links the local network to the Internet. In comparison, a GPON network uses passive optical splitters to connect up to 32 subscribers to a single fiber link to the network node. Active Ethernet makes higher bandwidth possible by the direct link from the switch to the subscriber."[4] The co-op is shifting to GPON as the technology advances, given that it enables greater cost-effectiveness.

BRMEMC is especially sensitive to the security risks associated with an expanding broadband network. Certain parts of its fiber network, such as backhaul of operational data, are electronically segmented to ensure that access to the electric distribution system is tightly restricted to co-op employees and protected against compromise.

Market Setting

Broadband communication options are somewhat limited in the areas served by BRMEMC. Two main competitors operate in the area: Windstream and Frontier Communications. Windstream offers DSL Internet, telephone, and limited cable TV service, and the company has also deployed a very small amount of fiber to serve customers in the area. Frontier also relies primarily on DSL to offer Internet and home telephone services. Of the two, only Windstream appears to have responded to BRMEMC's entry into broadband services, introducing an active marketing campaign. Partnering may be a more apt description of the market situation than competition. For example, BRMEMC provides fiber backhaul and back office support to a local wireless communications company. Overall, the co-op is off to a great start. With 7,900 broadband subscribers on fiber runs that pass 23,000 meters (roughly 50 percent of electric membership), the business has already achieved a very respectable 34 percent take rate.

Lessons Learned

BRMEMC has been in the communications game for almost twenty years, living through several generations of communications technology. Nelms believes that broadband saves jobs in the community and strengthens the ability of the cooperative to continue delivering needed services. His team's advice to their peers in co-op leadership positions?

- **Not every electric co-op needs to be in the broadband business.** If you decide yours needs to be, try to understand and appreciate the potential challenges entry into competitive broadband services may bring. Ask yourself whether you have the ability to develop a marketing strategy. That's something many electric cooperatives have not needed to do before.

- **Don't overlook partnerships.** Consider teaming up with your power supplier, local telco or telephone cooperative, neighboring electric cooperatives, and municipalities to deliver high-speed

[4] https://www.otelco.com/faq/what-is-active-ethernet/

Internet to enhance economic development without taking on undue financial risk. BRMEMC partners with a local telephone company, ETC, to deploy telephone service to its subscribers.

Why is this Case Important?

With his cooperative's lengthy experience in communications services, BRMEMC general manager Nelms is in a position to know how broadband can benefit electric cooperatives and the communities they serve. He encourages other co-ops not to dismiss too quickly the idea that they too might enter the broadband services business, emphasizing that for BRMEMC and many of his peers "electric growth is just not there." While energy efficiency initiatives and expanding renewables like solar may be positive developments for the long-term, they disrupt the traditional electricity supply and demand model, and this has significant business consequences. BRMEMC's experience suggests that a gradual and measured move into broadband can pay dividends without necessarily adding financial risk.

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