

## Electrifying Rural America

During the Great Depression, communities banded together to bring electricity to America's farmland.

BY TIM SABLİK

The electric industry that powers so much of modern life was originally born out of a desire for better lighting. At the turn of the 19th century, people relied on candles or oil and gas lamps to light their homes. While these sources produced some light, they also gave off heat and smoke and required fuel and regular maintenance. The introduction of electric lighting, first arc lamps in the 1870s for city streets followed by the incandescent light bulb in the 1880s, heralded a much brighter future.

Electricity was initially a novelty for the rich, but utility companies soon discovered ways to take advantage of economies of scale in power generation and distribution, making it more affordable and accessible. Inventors created new machines using electric power in factories and homes, spurring growing demand. As a result, by the end of the Roaring '20s, most American cities were electrified. City dwellers enjoyed brightly illuminated homes and streets, indoor heating, and modern appliances like electric stoves.

Access to electricity was far from universal, however. By 1930, nearly nine in 10 urban and nonfarm rural homes had access to electricity, but only about one in 10 farms did. It wasn't that farmers had no use for electricity. In 1923, the National Electric Light Association, a trade organization of electric companies, conducted a study in Red Wing, Minnesota, where a handful of farms were given access to electricity and electric appliances. Those households reported significantly higher productivity and happiness.

In the Red Wing experiment, electricity was provided to farmers free of charge. But most utility companies balked at the cost of connecting farmers to the grid. Most farms were in remote places, far from the cities where municipal power plants were located. Utilities estimated that it would cost as much as \$2,000 per mile — more than \$30,000 in 2020 dollars — to build

transmission lines out to farms. Additionally, because rural areas were more sparsely populated than cities, utilities could not take advantage of economies of scale. As a result, the costs of electricity for rural customers who did have it were often significantly higher than for urban customers.

Some utilities did extend service to farms, but most remained unconvinced that they would be able to recoup the upfront costs. That meant the electrification of America's farms proceeded at a much slower pace than that of its cities.

### A Cooperative Solution

In May 1935, President Franklin Roosevelt issued an executive order creating the Rural Electrification Administration (REA) "to initiate, formulate, administer, and supervise a program of approved projects with respect to the generation, transmission, and distribution of electric energy in rural areas." The REA was part of the suite of public works projects under the New Deal designed to counteract the Great Depression. Congress set aside \$100 million (\$1.88 billion in 2020 dollars) for the new agency, enabling it to make loans to finance the construction of electricity generation and transmission to rural areas.

Initial meetings between REA leaders and private utilities seemed promising. But when the utilities submitted their proposal to the government, it exceeded the \$100 million budget and fell short of the government's goal of widespread coverage. The utilities also maintained that without assistance to help finance the wiring of rural homes and the purchase of electric appliances, farmers would not have enough demand for electricity to make the service sustainable.

Congress would ultimately take that suggestion to heart; in 1936, the Rural Electrification Act formally established the REA as a government agency and authorized it to also make loans to wire homes and to outfit them with lights and appliances. But by then, private utilities had become increasingly reluctant to work with the REA.

"There was some unfavorable language in the loan offers to the private utilities that placed restrictions on what they could do if they took the money, and they couldn't work those details out," says Carl Kitchens, an economic historian at Florida State University who has studied rural electrification.

With private utilities reluctant to get involved, the REA turned to another vehicle that was quite familiar to farmers: the cooperative, commonly referred to as a co-op.

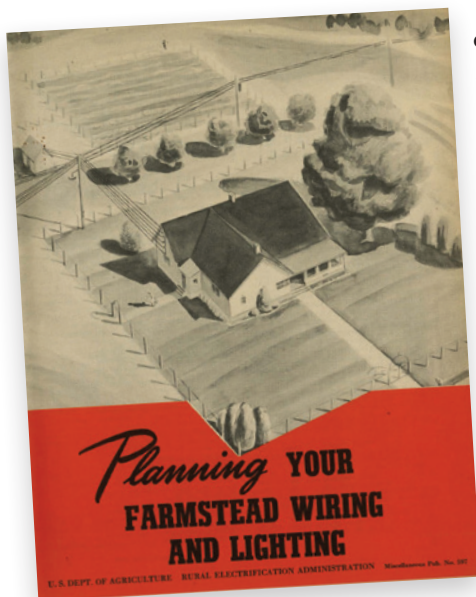


IMAGE: LOUISIAN E. MAMER RURAL ELECTRIFICATION ADMINISTRATION PAPERS, ARCHIVES CENTER, NATIONAL MUSEUM OF AMERICAN HISTORY, SMITHSONIAN INSTITUTION

“When you read books from that era, one of the things people always talk about is how rural communities can solve different problems by forming a co-op,” says Price Fishback, an economic historian at the University of Arizona whose research focuses on New Deal programs. “Every county had several co-ops of varying sizes.”

A co-op is an organization that is collectively owned by its members, making them both customers and shareholders. Co-ops had a long history in agriculture. Farmers had banded together to share resources and improve their bargaining power for inputs like seed, fertilizer, and equipment. But there were few examples of co-ops designed to distribute electricity — only 33 electric co-ops existed in the United States in 1930.

Once the REA decided to work with co-ops to accomplish its goals, it set about helping farmers organize. Many states did not have laws in place to govern electric co-ops. So, in 1937, the REA drafted a model Electric Cooperative Corporation Act that states could use as a template for laws authorizing electric co-ops and establishing rules for their governance. The model stated that co-ops were to be nonprofits and governed by member-elected boards, with each member having one vote.

Despite pent-up demand for electricity, acquiring members initially proved a challenge for many co-ops. Farmers were worried that taking loans from the government would put their farms at risk if they defaulted. REA representatives assured them that the electrical equipment itself would serve as collateral for the loans. Membership fees were another sticking point. Co-op members were required to pay \$5 to join, a substantial sum in the midst of the Great Depression (equivalent to almost \$100 in 2020).

North Carolina farmers were early adopters of the electric co-op model. Farmers in the state had actually been exploring electrification through co-ops before the creation of the REA but were unable to secure the finances they needed to undertake the project. In 1936, residents of Edgecombe and Martin counties formed the first electric co-op in the state, the Edgecombe-Martin County Electric Membership Corp., initially serving 82 members.

### The Lights Come On

Once co-ops organized and drafted a proposal, they could borrow at low interest from the REA (between 2 percent and 3 percent) to finance construction of transmission lines and to pay for wiring and appliances for farms and homes. Edgecombe-Martin, for example, received a loan of \$32,000 (nearly \$600,000 in 2020 dollars) at 2 percent interest. In addition to extending the funding, the REA also helped co-ops find ways to reduce costs.

“The REA hired engineers to help design new ways to build the lines,” says Kitchens. Rural electric customers required a different type of load than urban customers, allowing engineers to use single-phase wires and space utility poles farther apart. The REA was also able to make



*A worker at the Popes Creek Power Plant in Charles County, Md., in 1941. The plant was financed through loans from the REA.*

bulk purchases for materials and standardize construction practices to further reduce the per-mile costs.

These techniques allowed the REA to reduce the cost of laying rural power lines to an average of less than \$825 per mile by the end of the 1930s — a significant drop from the roughly \$2,000 per mile utilities had previously estimated.

Another key feature of the REA program was the extension of credit to wire rural homes and fund purchases of electrical appliances. This ensured a demand for electricity from the start, which allowed the co-ops to take advantage of economies of scale and keep usage costs low. Indeed, a 2020 article in the *Journal of Economic Perspectives* by Kenneth Lee of the Energy Policy Institute at the University of Chicago in India and Edward Miguel and Catherine Wolfram of the University of California, Berkeley, found that this was crucial to the success of rural electrification in the United States compared to electrification efforts in other countries that did not provide such support.

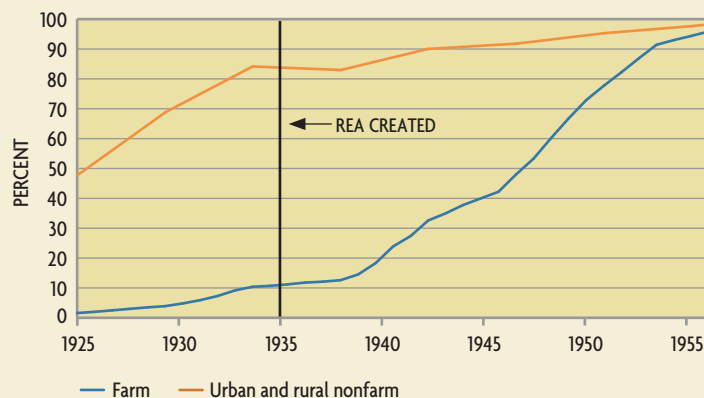
For the most part, rural co-ops did not actually generate power for their members — they purchased it wholesale from private utilities. The REA helped co-ops negotiate terms with utilities, and if they couldn't reach an agreement, the REA stood ready to fund construction of a co-op-owned power source. This threat of competition helped further reduce costs for rural electric customers.

“The REA created competition over territory that hadn't been claimed yet,” says Kitchens. “Private power companies operating in cities may have expected that they would have the opportunity to expand into that territory later.”

Indeed, in his 2016 book, *Selling Power*, John Neufeld, an emeritus professor at the University of North Carolina at Greensboro, cited the prior lack of competition as one reason why private utilities were initially slow to extend service to rural customers. In the 1920s, when cities were being electrified, the power market was much more competitive, and utilities had an incentive to expand quickly to

## Electrification of Farms Accelerated after Creation of the Rural Electrification Administration

Share of U.S. Residences with Electricity



SOURCE: U.S. Census Bureau, "Historical Statistics of the United States, Colonial Times to 1970"

claim territory and customers. By the 1930s, many utilities had consolidated under large holding companies and faced less pressure to expand into rural territory, especially when the profitability of doing so was uncertain. The entry of rural co-ops into the market changed that dynamic.

Progress on electrification temporarily slowed with the outbreak of World War II, but by the end of the war, roughly half of the farms in America had power. After another decade, farms had nearly caught up to cities in access to electricity. (See chart.)

As the early Red Wing experiment in the 1920s had hinted, electricity had enormous benefits for farmers. It boosted productivity for dairy farmers thanks to electric milking parlors and refrigerated storage tanks that reduced losses due to spoilage. Electric heat lamps and watering systems improved the egg production of chickens at poultry farms. In many cases, the gains in productivity meant that these and other machines more than paid for themselves. A recent article in the *Journal of Development Economics* calculated farmers' willingness to pay for electricity at \$2,400 per farm, or 24 percent of the typical farm's annual income.

Electricity also extended many benefits to rural homes and families. Substituting electric lights for kerosene lamps boosted nighttime illumination and reduced smoke inhalation, improving overall health. Washing machines

saved hours of housework — hours that could be reallocated to other tasks. These improved amenities made rural life more attractive, reducing the incentives to move to the city. Electricity also enabled the expansion of other industries in rural communities, such as in the construction and service sectors, leading to long-run economic benefits.

### Tackling the Next Last Mile

In the end, most economists agree that the REA-backed co-op model was an enormous success. Virtually all rural Americans received power within a 20- to 25-year period, and almost all of the REA loans were repaid (the default rate was less than 1 percent).

"It was a pretty amazing program," says Fishback. "For a relatively small amount of money, the government got a huge payoff."

The REA still exists today; it is now called the Rural Utilities Service and is part of the U.S. Department of Agriculture. Nearly 900 rural electric co-ops also still operate, providing electric service to their members. Given the success of the co-op model for electrification, some researchers and policymakers have advocated for the same co-ops to oversee the extension of rural broadband, which the Federal Communications Commission (FCC) defines as download speeds of at least 25 megabits per second for fixed-line services. As with electricity in the past, rural communities today are less likely to have access to reliable, fixed-line broadband than cities.

"It's an essential service now," says Ryan Nance, the economic development director of North Carolina's Electric Cooperatives, an organization that serves 26 electric co-ops across the state. "Just look what we're going through right now with the coronavirus and the need for many people to work from home."

In 2018, the FCC opened its Connect America Fund, established to finance the extension of universal broadband service, to electric co-ops for the first time. The FCC's subsequent Rural Digital Opportunity Fund will also be open to co-ops. Electric co-ops in many states, including North Carolina, are taking steps to extend broadband infrastructure to remote communities, reprising their role in bringing electricity to rural America decades ago.

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