

Southeastern Division—Appalachian Electric Power Company

Foreword

The Virginia Committee on the Relation of Electricity to Agriculture was formed in 1924, at which time electricity was available only in the cities and larger towns with few exceptions. This committee consisted of representatives of the farm organizations, the State Agricultural College, Department of Agriculture and the leading power companies. It fostered and supervised a 2-yr program of research in rural electrification, which laid the ground work for the progress since made in the state.

The work of the Virginia Committee created some interest on the part of the power companies, but there was no uniform practice for the building of rural extensions.

In 1928 the Governor appointed a special joint committee on rural electrification to work out a uniform plan for making rural extensions. This plan has been generally adopted by the power companies throughout the state.

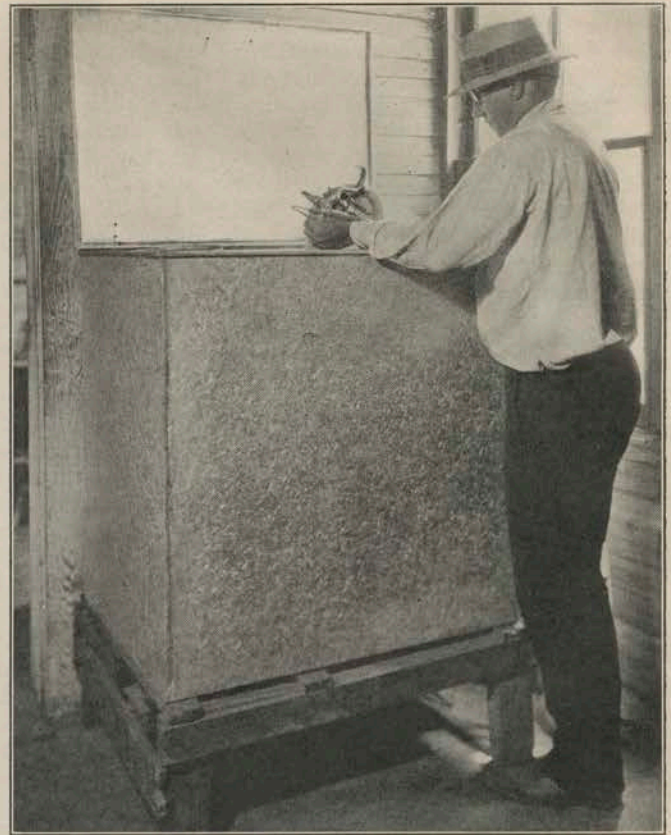
Prof. Charles E. Seitz, Head of Agricultural Engineering Department of the Virginia Polytechnic Institute, the State Agricultural Engineering College, who instituted the rural electrification program in Virginia, and was chairman of the Virginia Committee on the Relation of Electricity to Agriculture, has sponsored educational programs, including several experimental rural lines, assisted power companies in establishing rural service departments and has directed studies of the application of electricity to farming operations.

The Appalachian Electric Power Company, a subsidiary of the American Gas & Electric Company, supplies power service in a large part of the western half of Virginia and in southern West Virginia. This analysis will be confined to the Roanoke-Lynchburg Division, where particular attention has been paid to rural development during the last 5 yr and more intensively during the last 3 yr.

In the Roanoke-Lynchburg Division of the Appalachian Electric Power Company there are 2 district offices, one located in Roanoke, with a population of 70,000, and the other in Lynchburg, with a population of 40,000.

The territory served by this division covers 1,040 sq miles with a population of approximately 175,000. Included in the territory are the cities of Roanoke and Lynchburg and 46 towns and

Fig. 2—Dairy Equipment Sterilizer Which Has a 2 Kw Heating Element



rural communities varying in population from 50 to 3,500 each, in the counties of Albermarle, Amherst, Bedford, Botetourt, Campbell, Craig, Fluvanna, Franklin, Montgomery, Nelson and Roanoke. There are 33,126 customers in the division of which 4,172 are farm and rural customers outside of the cities and of towns with a population of 1,000.

Agricultural Characteristics of the Territory

In the Roanoke-Lynchburg Division is much fertile agricultural land in the valleys between the Blue Ridge and Alleghany Mountains and the foothills east of the Blue Ridge. Much of it is mountainous and unsuited for agricultural purposes. The territory is traversed by the James and Roanoke Rivers and many smaller feeder streams. It has much scenery of unsurpassed beauty, and a desirable all-year climate.

No section of Virginia offers more diversified agriculture. There are hundreds of square miles of orchards and in the western end of the territory is a celebrated blue grass grazing re-

gion. Many farms throughout the territory specialize in dairying, fruit growing, trucking, tobacco raising, poultry, stock and game.

Modern, well-kept farm buildings are the rule. Roads are good and automobiles in general use, including many trucks and tractors. There is an average of 3 customers per mile of rural line.

The average farm has about 100 acres. Dairying, fruit growing and trucking are the most important types of farming. Poultry raising and egg production are important side lines on nearly every farm. There are many small canneries for tomatoes, peas and other garden crops scattered throughout the communities. Most of the grain and hay is fed on the farms. With the exception of fruits and canned goods, most of the farm products are sold at nearby local markets.

In order to gain some knowledge of the agricultural territory according to the U. S. Department of Commerce, Bureau of the Census, there is a total of 23,345 farms with a total acreage of 2,453,205 and valued at \$121,818,735 which includes farm building. Ap-

proximately 74.5 per cent of these farms are owned by the farmers who operate them.

How the Company Meets the Farm Customers' Needs

The farm development work is assigned to rural service departments, one located in the Roanoke district and one in the Lynchburg district. The agricultural engineers in charge of the departments report direct to the district managers. While these departments sell no merchandise or farm equipment, they do actively foster load building in various ways described herein. They offer to the farmer free advice and consultation on electric service and equipment—sell him the electric idea and do the promotion work. The Appalachian Electric Power Company's merchandising departments, local dealers, manufacturers and mail-order houses sell him electrical equipment. The rural service departments prepare all estimates of the cost of rural line extensions, working in close cooperation with the distribution departments.

Rural Extensions

In the development of rural electrification, 3 factors are recognized as of primary importance: (1) A plan under which lines can be financed and built on an equitable basis fair to both the consumer and the company; (2) the proper design and construction of

rural lines to provide adequate, dependable and economical service; (3) the building up of loads on rural lines, in order to place the business on a profitable basis.

In 1928 the company put into effect a rural extension tariff in accordance with the state-wide rural electrification plan, offering farm and other rural customers electric service upon liberal terms and on a definite basis. This plan has met with favorable reception on the part of rural customers.

Briefly, under this plan the company constructs, owns and maintains at its own expense rural electric line extensions, including transformers, along public highways provided the customer or customers will guarantee to pay monthly 2 per cent of the construction cost for a term of 4 yr. Individual lines on private property are constructed, owned and maintained by the customer. Monthly guarantees are reapportioned at the beginning of each calendar year on those lines where additional customers have been added during the year.

An extensive study was made covering a period of several years of the design and construction of rural lines to provide adequate, dependable and economical service. Economical construction may lower the guarantee of the consumer, but if that alone is considered and the lines are not properly designed for the rural load as it develops, the customers' service will not be satisfactory. Aluminum core, steel

reinforced wire, with long-span construction, is now being used and has been found to best meet the requirements for this class of lines.

Rural Rates

Under the uniform state-wide rural extension plan effected in 1928:

1. The company finances the line on a monthly guarantee basis.
2. The monthly guarantee is equal to 2 per cent of the construction cost of the line, including transformers, required to serve one or more customers on a particular extension, for a period of four years. The minimum monthly guarantee includes the consumption of energy under the scheduled rate.
3. The energy rates are as follows:

For Lighting Only:

For the first 100 kwhr	8¢ per kwhr
For the next 500 kwhr	5¢ per kwhr
For the next 500 kwhr	4¢ per kwhr
For all over 1,100 kwhr	3¢ per kwhr

Minimum monthly charge—One Dollar.

For full domestic electric service (including lighting—one meter) to rural customers engaged principally in agricultural pursuits, having connected and in regular use any or all of the following equipment:

- An electric range or other cooking equipment of not less than 1,500 w connected capacity;
- A standard motor driven outfit for household refrigeration;
- A standard waterheater permanently installed and connected of not less than 1,000 w connected capacity;
- A space heater permanently installed and connected of not less than 1,000 w connected capacity;
- A motor driven blower used as an auxiliary to domestic heating furnaces;



Fig. 3—Overhead Irrigation System—a 7½ Hp Motor Operates the Pump

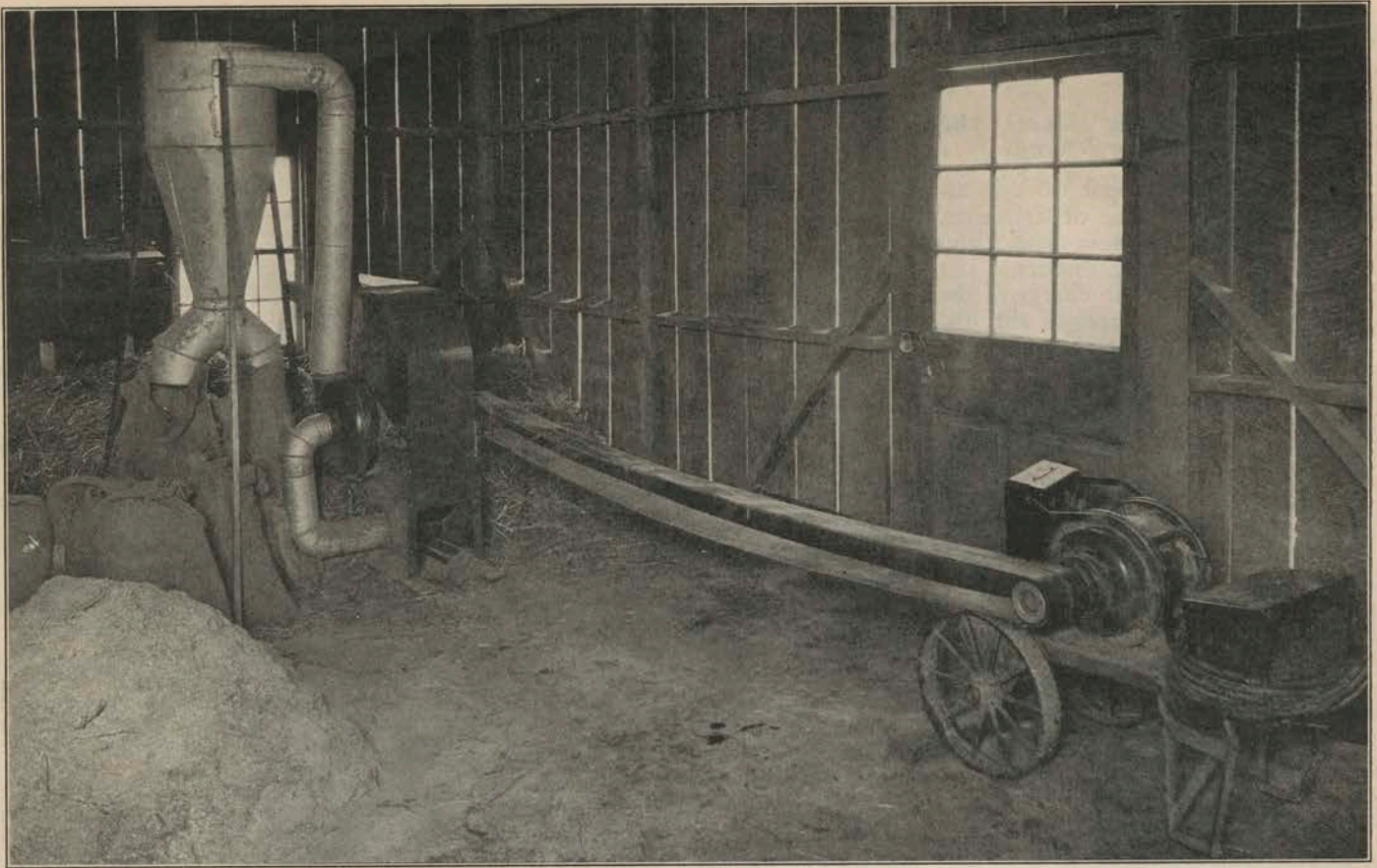


Fig. 4—Portable Electric Motor and Feed Grinding Mill

A motor driven pump used for household water service;
 Heating apparatus and motors driving equipment for the exclusive use of the customer in connection with his farming activities;
 A monthly customer charge of 50¢ plus an energy charge of

6¢ per kwhr for the first 25 kwhr
 4¢ per kwhr for the next 50 kwhr
 3¢ per kwhr for the next 225 kwhr
 2¢ per kwhr for all over 300 kwhr

Minimum monthly charge One Dollar, plus 50¢ per hp or fraction thereof for capacity in excess of 1 hp in each individual motor.

For full domestic electric service (including lighting—one meter) to customers having connected and in regular use *both an electric range* of not less than 1,500 w connected capacity and an *electric water heater* of not less than 1,000 w nor more than 3,000 w connected capacity.

A monthly customer charge of 50¢ plus an energy charge of

6¢ per kwhr for the first 25 kwhr
 4¢ per kwhr for the next 50 kwhr
 3¢ per kwhr for the next 125 kwhr
 1½¢ per kwhr for all over 200 kwhr

Minimum monthly charge—One Dollar.

The officials of the company consider these low rates, which have proven very satisfactory to the customer, the most important single factor in rural load building. Once a customer is connected, it is relatively easy to get him to build up his load to the point where his consumption equals or exceeds the guarantee.

Realizing the importance of building up loads on existing lines, the Roanoke district in November, 1928, established its first rural service department to aid and assist rural customers in their farm electrification problems. A graduate agricultural engineer, who had received special training on rural electrification work, was placed in charge of this department. After becoming thoroughly familiar with the organization, rates and policies of the company, his first work was to make a survey of existing farms.

A farm record card was used for each farm customer, showing existing applications of electricity and the possible further applications that might profitably be made. Other information listed on this card gave the size of farm, type of farm business, condition of buildings, water system in use, gasoline engine and tractor applications, number of livestock, number of poultry and other data necessary for a correct analysis of the farmers' needs for a fuller use of electrical labor-saving devices in their farming operations. This contact with the customer afforded the rural service engineer opportunity to become personally acquainted and also to explain the company's desire to aid and assist its rural customers.

In visiting the farm customers in 1928 it was found there were a number of farm homes along existing lines not connected for electric service. In order to acquaint these people with our present rural extension plan, a visit was made to each prospective customer to find out existing conditions and the reasons why more customers could not be connected for service, principally between the small towns. A farm record card was used to record pertinent data obtained on these prospective rural customers.

To picture the importance of rural line development, the following illustrative example is used:

Immediately north of the city of Roanoke, in the counties of Roanoke and Botetourt, is an excellent farming section. The land is unusually productive and profitable, its principal products being fruit, stock raising, dairying, trucking, poultry, hay, wheat and corn. A line was built from a point beyond the northern suburbs of the city through this section to the town of Fincastle, a distance of 18 miles. Fincastle has a population (1930 census) of 517. It was incorporated as a town some years before the Revolutionary War. The line passes through the small rural communities of Hollins, Cloverdale, Daleville, Trinity and Am-

sterdam. There had been no electric service in Fincastle or the other communities.

This extension was completed and placed in service about April 1, 1926, with a total of 123 customers, of which 111 were small residence and commercial customers residing in Fincastle and the other small communities. The other 12 were farms. After almost 5 yr of continued intensive effort in building up the load of existing customers and securing new ones, there are now 349 customers, with a total of 90 farm customers. Farms are classified by the United States Census Bureau's definition of a farm as any tract of 3 or more acres for agricultural purposes. There has been practically no change in the population of the territory traversed by this rural line since it was constructed in 1926.

The accompanying data table shows the increase from year to year in the number of customers and annual revenue:

Date	Farm Customers			Other Rural Customers			Total		
	Number Added During Year	Number at End of Year	Annual Revenue	Number Added During Year	Number at End of Year	Annual Revenue	Number Added During Year	Number at End of Year	Annual Revenue
4/1/26	*12			*111			*123		
12/31/26	12	24	**\$ 360	39	150	**\$1,780	51	174	**\$ 2,140
12/31/27	16	40	1,024	28	178	4,264	44	218	5,288
12/31/28	10	50	1,485	22	200	5,292	32	250	6,777
12/31/29	18	68	2,326	7	207	6,120	25	275	8,446
Dec., 1930	22	90	3,982	52	259	8,034	74	349	12,016

* Number connected on completion of the line.

** Nine months—April 1 to December 31.

Wiring

Practically all farms now connected have installed at least a 60 amp entrance switch and 3 wire service. The power company does not take contracts for the wiring of these farms. However, through the rural service department free advice is offered on planning an adequate wiring job for the farmstead. All farm wiring is contracted for by local electrical dealers and licensed wiring contractors. The wiring for each service, both farm and urban, must pass the National Board of Fire Underwriters' regulations. As the wiring system is the foundation on which electric service rests and determines the uses to which electricity can be put, as well as its convenience of application, the company assumes the responsibility of promoting better wiring for its farm customers.

The new business departments of the company contract for the wiring of ranges, refrigerators and water heaters sold by this department.

Merchandising

The company does not merchandise farm electrical equipment, as this would undoubtedly require a larger investment in stock and handling than the demand would justify from the company's standpoint. Farm customers may obtain such equipment from local dealers, factory sales representatives, mail-order houses or manufacturers. The rural service departments assist the customer in the selection and installation of equipment.

The new business departments sell 3 major electrical appliances used in the homes of customers—ranges, refrigerators and water heaters. This equipment is also sold at the same prices and terms by local electrical dealers throughout the territory.

washing machine, milking machine, churn and feed grinding mill, for the purpose of demonstrating to the farmer this equipment in actual operation. A cordial invitation is extended to all farm customers to make use of this practical laboratory in order to receive maximum benefit from their electric service. This enables the farmer to come to us for first-hand information and at the same time the rural service engineer can be of advantage to him by helping select the type of equipment best suited to his individual needs.

Besides demonstrating certain electrical applications in operation, the farmer is given circulars and literature explaining the use of electricity on the farm, is shown pictures of electrical installations used by his neighbors, referred to maps, charts and records showing the types of farms served in the company's territory, and his attention directed to farmers who may be considered as having model electrified farms.

The magazine, "Electricity on the Farm," is sent monthly to every farm customer. In addition to this direct-by-mail publicity, the company does regular advertising in newspapers, telephone directories, farm papers and fair programs. Some billboard advertising is used. All these mediums reach the farmer.

Through the rural service departments the company keeps in close touch with the work carried on by representatives of the State Extension Service, agricultural engineering department of the Virginia Polytechnic Institute, farmers' organizations and country agricultural agents, who are directly interested in rural electrification as an important phase in the development of rural farm communities in the state.

During the months of January and February, 1930, the rural service departments and the agricultural county agents gave free moving pictures at high schools in 9 farm communities. The company used the General Electric Company moving picture—"The Yoke of the Past"—and the county agents gave films made by the United States Department of Agriculture on crops and live stock. Short lectures were given on electric service and equipment for the home and farm. More than 1,000 farm men and women attended these moving picture programs. The pictures were entertaining and instructive for all farm men and women interested in agriculture, and who understand and know the value of electricity on the farm and in the home.

Extension representatives of the

The company employs a home service director in each district, who conducts range and refrigerator demonstrations for the city and farm housewives. In the office buildings of each district the Home Service Director has a model electrified kitchen where the customers may come to group schools conducted to show the proper operation of the range and other electrical appliances used in the home. Demonstrations are frequently held in the smaller rural communities. A greater percentage of farm electric customers use ranges and refrigerators than urban resident customers in the same territory.

A farm demonstration room has been established in the Roanoke office where local dealers and manufacturers are permitted to place electrical appliances, such as portable farm motor, automatic water system, utility motor,

agricultural engineering department of the Virginia Polytechnic Institute have cooperated with the company's rural service department in establishing electrification projects on farms in the territory served. They make available to both the farmer and the power company as rapidly as possible the latest information on the uses of electricity in agriculture. Different types of farms, such as dairy, fruit, truck and poultry, have been selected, and an effort made to get these farmers to use as many practical applications of electricity as possible. The agricultural extension engineer and the rural service engineers assist the farmer in selecting his equipment, and offer

suggestions or advice on wiring, installation and proper operation of such electrical equipment. Meters have been installed to check the practicability of certain electrical applications on farms, such as electric water heaters, sterilizers or milk cooling systems for dairymen, incubators or brooders for poultrymen, and irrigation systems for truck and fruit growers.

No attempt has been made to set up any one farm as a model or example of electricity applied to all the different uses on farms in the territory, but rather to select progressive dairy, truck, poultry or fruit farms as outstanding examples in each district, and to direct the farmer's attention to an

electrified farm in his community similar to the one he operates.

Accomplishments

Largely as a result of the extension program and rural service work in this division for the 2-yr period, 1929-1930, the rural customers were increased from 2,828 to 4,172, or 47 per cent, and the farm customers from 294 to 543, or 80 per cent. The 294 farm customers in 1928 used an average of 1,003 kwhr per customer, while in 1930 the average was 1,207 kwhr for the 543 farm customers, or an increase of 20 per cent. The actual revenue from the farm customers was increased more than 100 per cent during the 2-yr period.

Eastern Division—Central Hudson Gas and Electric Corporation

Agricultural and Territorial Characteristics

The extensiveness of the rural development of Central Hudson Gas & Electric Corporation, as any other utility company, is subject to natural limitations, such as climate, topography and soil conditions, together with the activity of the farming industry and the general welfare of the farming population. An understanding of these conditions within the franchise area assures a clear comprehension of the rural electrical development activities of this company.

The present area served extends along both sides of the Hudson River; on the west for a distance of 70 miles; on the east for 40 miles; and inland from the river in either direction approximately 30 miles. The total area served is 2,570 sq miles, bounded on all sides by mountain ranges cross-sectioned with still other ranges and with sizable streams and rivers. The principal ranges in the territory are the Catskills, Shawangunks, Taconic and Helderbergs, on the southern border the "Highlands," and on the extreme east Connecticut's Berkshires, while the northern and western boundaries are formed by the Catskills and Shawangunks. Although a valley, the entire region is decidedly rolling with sharp outcroppings of shale and sandstone formations, bared or laid down by glacial activity. Further evidence that the area may not be mistaken for an expansive plateau of contiguous farms may be gleaned from the fact that census statistics report only 43 per cent of the land as used for crops and pasture, the remaining 57 per cent being mountains, streams, wooded

areas, waste land and woodland pasture.

That portion of the total area suitable for agricultural purposes may be said to be fertile, well drained and adapted to the production of a variety of crops and livestock products which, when linked with the excellent transportation facilities available and the close proximity to consumers' markets, have combined to place the Central Hudson Valley farmers among the most prosperous in the nation. In this section the problem of the sub-marginal farmer and farm land is of little importance as nature definitely solved this problem by sharply marking between the land now considered suitable or not suitable for farming. So carefully is it labeled that few save hardy woodsmen plant the rough mountainous areas while even mediocre effort produces a fair living in the areas nature intended to be farmed.

Three agricultural enterprises predominate within the Central Hudson area, dairying, poultry raising and fruit growing. The area comprises about 5 per cent of total area of New York State, and the value of all crops produced compares very favorably with this percentage. One-eighth of all the state's apples, 5 per cent of the dairy products and 7½ per cent of all poultry products are produced. For this area 56 per cent of the farm income is from crops and 44 per cent is from livestock products. Because of the climatic effect of the large body of water, the lands along the river produce fruit crops almost exclusively. Apples, pears, peaches, cherries, grapes, currants and berries are of major importance. Inland, as frosts

and freezes become more of a hazard, fruit growing tapers off into dairying and poultry raising. Much of the rougher lands where field work is difficult are given over to poultry and on the smaller farms in the more thickly settled areas poultry raising predominates.

Adequate and suitable markets so vital to the continued success of any farming community plan an important part in the agricultural success of this territory. Consumer demand for fresh farm products reaches out insistently from the 10,000,000 appetites of New York City's populace to consume more than 60 per cent of all the products produced. With a ready demand from other nearby population centers, another 20 per cent is easily marketed. Demand from local cities and towns removes the probability of any surplus without resorting to processing or shipping in large quantities to foreign markets. Farmers have been greatly aided by the transportation facilities provided by trucking service, river boats and steam railways. From any point in the territory a shipment made one day arrives in the buyer's hands for delivery the next morning.

This stability and success of the agricultural people in the area have caused an ever-increasing demand from them for central station electric service.

The time had presented itself when reliable information on farm equipment and the advantages of using electricity on the farm should be given the farm people and at the same time it was necessary to develop the usage on rural lines in order that the investment could be put upon self-supporting