V. THE PROBLEM OF FARM ELECTRIFICATION

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I shall mention several items now which I believe do not constitute the real problem of rural electrification. First, the problem of rural electrification is not a matter of not knowing how to build a rural line, for indeed approximately 100,000 miles of rural line have already been built and are in satisfactory operation today. Second, the problem does not consist in not knowing how to electrify a farm for approximately 500,000 of the 6,500,000 farms in the United States are already electrified. A large number of states report having more than 10% of their farms supplied with electric service. Third, the problem is not wholly a matter of finding uses for electricity on the farm for over 100 uses are already being reported.

If neither of the foregoing is responsible for the somewhat slow development of farm electrification what then is the real cause? We must look for the real problem in farm electrification as in practically all other problems, in whether it will pay out. To illustrate this phase of the problem let us see why it is difficult for farm electrification to be profitable. The number of farms per mile of line ranges from one to five with an average of about three. The cost of fairly well constructed rural lines runs at least $1200 per mile. This makes the investment in line per customer about $400.00. $400.00 is about five times the investment per customer in the average city. Now it doesn't matter who builds the line or whose money is invested, the fixed charges per year on $400.00 are about as follows:

Return including interest, hazard, etc., at 8%	$32.00
Taxes at 1½%	6.00
Depreciation at 4%	16.00
Operation and maintenance at 4%	16.00
Total amount fixed charges	$70.00

This tabulation shows that the annual revenue per customer must be at least $70.00 to merely cover the fixed charges on each farmer's share of the investment. The cost of any energy would be extra. It should also be pointed out that additional pro-rated investment in substation, transmission line, and generating equipment, etc., have not been included in the above table. If these items were included the fixed charges would be still further increased.

Seventy dollars a year is $5.83 per month. This would be the minimum monthly bill whether the farmer used any electrical energy or not. If he should only use the electric service to light his home, or to the same extent as the average city consumer, thereby consuming only about 25 kilowatt hours per month his monthly bill would be $5.83 even if the energy consumed were given to him free. With this limited consumption which represents the average for city consumers in this country the electric service would not be profitable to him nor the serving company. But the farmer may ask, "How long do these fixed charges go on?" The answer must be "As long as wood rots when put in the ground, as long as taxes are collected, and as long as money draws interest."

The real problem, therefore, consists in increasing the consumption per farm customer to at least five times the consumption per city customer. This is because the investment in physical property per farm customer is five times that per city customer as has already been pointed out. If this can be done the rate per kilowatt hour will be less and thus make the service attractive to the farmer as well as the power company. To increase the consumption per farm means the use of electricity in all practical ways to the fullest possible extent.

Today 22 states are organized under the leadership of the National Committee on the Relation of Electricity to Agriculture to study the application of electricity to agriculture, to devise and develop new applications, and to study the savings effected by their comprehensive use. Oklahoma is one of these states. On last October 30 electricity was turned on in the first rural home served from the first strictly rural line. This line is located out of Pauls Valley and is to be one of the lines to be used for observation and investigation by the state committee of the Oklahoma Utilities Association. The inauguration of service on this line is recorded in the Pauls Valley Democrat of November 4, as follows:

"Last Saturday night marked an epoch in the progress of the rural communities of Oklahoma when electricity was sent over the first rural extension line built by any company in the state. The Oklahoma Gas and Electric company, under the direction of W. A. White, is making this experiment over rural lines, while other divisions of the company will watch its success with interest. In celebration of the turning on of the current for the first time in the first rural home, that of Walter Olive, the Good Cheer Club gave a jolly party when Mr. and Mrs. W. A. White were honor guests. The other country homes

being connected this week are those of John Long, Charles Cavender, A. E. Crossfield, Bill Raburn, Tom Shores, R. J. Sparks, two of L. B. Denham's and a rent house of Emory Cochran. Any household appliances used in town may also be used in these homes. Some already have their irons and washing machines. Walter Olive expects to have a motor installed for pumping water for the stock. Another farmer plans to bale his hay next year with electricity."

The Oklahoma committee, of which the writer is chairman, will observe this line to determine the pedcent line losses, peak demands, diversity, load factor, etc., and will also study the uses and economies effected by the various applications of electricity on the different farms. Other lines may be projected elsewhere in the state in the near future and these will also be put under the general study of the committee. Regular reports on the technical phases, economic results, and practical operation of these lines will be issued by the state committee.

It is hoped that a thorough study of th eneeds of each farm will lead to a complete electrification of each farm and that a comprehensive use of the electric service will lead to monthly kilowatt hour consumption ranging from 100 to 300 per farm, thereby assuring the farmer of a reasonable rate and the power company a fair return on the investment.