

## LAKE COLERIDGE HYDRO-ELECTRIC-POWER SUPPLY.

1. The year under review is the fourth year of operation. From its commencement the plant has operated under war conditions, and the outstanding event of the year has been the cessation of the war in November last. This was immediately followed by the influenza epidemic, which seriously threatened the continuity of service. Earlier in the year the worst snowstorm recorded in Canterbury was experienced, resulting in a serious interruption of service and a temporary isolation of the power-house. In spite of these unprecedented experiences and the abnormal war conditions, the financial results of operation have shown satisfactory progress, the revenue of £37,324 exceeding interest and operating charges by £4,494. Depreciation reserve at the rate of 2 per cent. on the capital outlay is provided for by statute, amounting to £7,329. The revenue, therefore, does not yet provide for the whole of the charges, but normal development has not been possible under existing conditions. The non-arrival of new plant ordered two years ago has indefinitely extended the period during which heavy capital charges are being paid on portions of installed plant which cannot yet earn their share of revenue. Under the circumstances, therefore, the financial position may be considered satisfactory.

2. *Capital Outlay.*—The capital outlay at the end of the year was £403,156, as compared with £389,754 at the end of the previous year. Details of capital expenditure are shown under various heads in Table A.

3. *Financial Results of Operation.*—Detailed results of financial operation and load output are given in Table B, which shows an increase of  $8\frac{1}{2}$  per cent. in the power-house maximum load during the year, and a 22-per-cent. increase in the units output; while the total cost per kilowatt sold and per unit sold continue to show a satisfactory decrease.

The working-costs for the year are compared in detail with those of the previous year in Table C. These tables give only the expenditure and revenue to the Department, but the full statement of the Lake Coleridge undertaking should include the activities of the local bodies who purchase from the Department and administer their own supply systems. An examination of the statements of all the distributing bodies connected with Lake Coleridge produces the gross financial results given in Table D, the figures being correct to within a very close limit. From the table it will be seen that the 23,387,546 units sold last year to wholesale consumers (subject, of course, to ordinary distribution losses) cost them £87,787, or an average of 0.9d. per unit; or, allowing a loss of 20 per cent. in retailing, 1.125d.; as against 1,260,725 units sold at an average price of 3.74d. per unit in 1914—the last complete year of operation of the City Council steam generating plant now superseded by the Lake Coleridge scheme.

4. *Extensions.*—The additions to the plant at the power-house are still delayed as a result of war conditions. Preparations for the installation of the fifth unit have progressed to the extent of providing the necessary foundations, draught-tube, and tail-race, but war conditions in England continue to delay the completion of the generator and pipe-line.

The 11,000-volt distribution system has been increased during the year from  $60\frac{1}{4}$  miles to  $65\frac{1}{4}$  miles, all main feeders being in duplicate. The Department's 3,000-volt reticulation has been increased by half a mile during the year, making a total of  $10\frac{1}{2}$  miles. Six additional transformer-stations have been erected by the Department during the year, representing a further installed transformer capacity of 200 kw. Five additional wholesale consumers were also connected up during the year, making a total of thirty-seven wholesale consumers, exclusive of local bodies.

In connection with local-body reticulation, an outstanding feature is the extent of street-lighting now installed, more particularly in country districts previously considered outside the range of such advantages. The total number of street-lamps now installed is 3,168.

5. *Connected Load.*—The total connected load (Table F) shows an increase for the year of 3,202 kw., making the present total connected load 23,189 kw., an increase of 16 per cent. This was supplied without exceeding a maximum load on the Addington substation of 5,340 kw. The relation between the connected load and the maximum load necessary to supply it was therefore 4.34. This diversity factor indicates that with the nature of load met with in Christchurch district the use of energy by consumers at different periods during the twenty-four hours makes it possible to supply a given amount of electrical equipment with a plant capacity of less than one-quarter the aggregate of the load connected. This diversity factor of over 4 compares very favourably with that on similar plants elsewhere.

6. *Plant-operation.*—The general operation of the plant during the past year, apart from the snow and epidemic, which are referred to separately, has been characterized by the need of continued restriction of load, and the running of the whole plant during day hours without having available a spare generator—any attention required to operating equipment being done at night or on Sundays. In spite of this inability to lay off a machine for repairs or overhaul, the whole plant has operated satisfactorily, and no troubles arising from this circumstance have been experienced.

The transmission-line insulators continue to give a considerable amount of trouble, but it is satisfactory to note that up to the present no insulator which has been put up as a replacement has failed, indicating that the method now adopted of drying out and varnishing the joints, and carefully testing, has made it possible to eliminate faulty insulators before they are put into service.

Apart from that due to the snow, no interruption of service of more than a few seconds has occurred during the year. The total insulator replacements during the year were eighty-four, or  $1\frac{1}{2}$  per cent. on the number of insulators in service. Trial lots of new insulators purchased during the year showed a marked improvement in the design and manufacture since the original purchase for the Lake Coleridge line was made. A considerable number of insulator troubles have been traced to the effects of bark from gum-trees. An endeavour to deal with this trouble by the removal of trees has resulted in a certain amount of opposition. The matter is, however, a vital one, directly affecting continuity of service.