(29)

The report of the Government Chief Electrical Engineer makes a great feature of the saving to be obtained by displacing coal by water-power.

(30)

It is worthy of note, however, that the coal which would be displaced by the hydro-electric scheme for the Auckland district is chiefly slack, which is produced in the hewing of household coal, and will be produced and brought to the surface in any case.

(31)

It may be deplorable that water should flow through the Arapuni Gorge unharnessed, but it is equally deplorable that slack coal, after being brought to the surface, should go to waste. The price of slack coal at the Waikato mines is from 3s. to 5s. per ton, and the freight to Auckland is 7s. 11d. per ton. If hydro-electric power from Arapuni displaces coal the Railway Department will lose this revenue.

(32)

The country generally will lose thrice: first, by the adoption of an unprofitable scheme; second, by the loss of revenue to the Railway Department; and third, by turning slack coal into a waste product.

(33)

It is not clear from the reports of the Chief Electrical Engineer that steam-power for the generation of current can be entirely dispensed with. To quote the report of 20th August, 1917 (Public Works Statement, 1917, page 47): "Arrangements have been made with the Christchurch Tramway Board for the use of the whole of their steam plant, amounting to 2,000 kilowatts, for stand-by purposes. This provision will enable the Department to dispense with a spare unit at the power-house and to utilize the whole of the plant for revenue-earning purposes. It also enables the Department to maintain a local supply up to 1,000 kilowatts in the event of the breakdown of the transmission-lines." And, further on: "A similar arrangement is under consideration for the use of some spare plant belonging to the Christchurch City Council, and which they are putting in order for stand-by purposes."

(34)

And in the interim report of the 19th February, 1917 (Public Works Statement, page 51), with regard to the scheme for the Wellington district, it stated, "In the present instance I propose that the stand-by unit should be a complete steam set. The advantage of a steam stand-by set in this scheme is that not only does it serve the purpose of a spare unit, but it also provides means of tiding over short periods of exceptional or abnormal low water, thus enabling the available water to be used to a larger extent. The additional cost of the steam unit over water-power is not great, and the cost of running on infrequent occasions would be a negligible proportion of the total operating-cost, whilst the additional security and value conferred on the water-power plant is out of all proportion to the added expense."

(35)

In view of these quotations it seems to be a reasonable conclusion that in order to make reasonably sure of continuity of supply we must either have two transmission-lines, each capable of carrying the whole load, laid by different routes to the city, so that in case of accident to either the other can be used, or, alternatively, a complete steam-generating plant in the city.

(36)

Duplication of the transmission-lines would add enormously to the cost of the scheme, and perhaps also cost more than a steam plant; therefore it is likely that a steam plant capable of supplying all demands would have to be maintained as a stand-by. If this is so there would be no saving of capital expenditure at the city power-station, but quite the reverse, as there would be required both a steam-generating plant and a transformer plant for breaking down the high-tension current from the hydro-electric station to the ordinary pressure of supply.

(37)

The report of the 19th February, 1917 (Public Works Statement, page 49), lays down some interesting conditions, to which no exception can be taken:—

(1.) "All things considered, the capital cost of headworks, power-station, and plant, including everything up to the point of transmission, should not exceed £20 per horse-power of plant, otherwise, when account is taken of the cost of transmission, the extent of the capital expenditure will tend to swamp the advantages to be derived from substituting water-power for fuel."

(2.) "As regards the area to be supplied, there is an economic limit to the area over which a given amount of power can be distributed."

(38)

In the *New Zealand Journal of Science and Technology*, January, 1918, page 50, Mr. Parry states, "The capital cost of an electric-power-supply system, including generating plant, transmission, distribution, and transformation, is about £40 per horse-power of generating plant when fully developed."