

The Teviot scheme is one where the conditions are fairly favourable for partial development.

In partial developments it will be essential, to avoid future loss, to make the conduits full size at first, as they cannot subsequently be enlarged without stoppage in working for a considerable period.

The cost, so far as electric plant is concerned, in the above estimates is for the most part based on prices obtained by the consulting engineers in England from manufacturers of high standing. It will now be the best course to send full information to the consulting electrical engineers for the colony in London, and, through them, and on conditions to be laid down by them, to obtain from the leading companies manufacturing electric and hydraulic plant prices for the plant required in each case.

Tenderers would submit offers for the types of their own standard design of turbines, generators, and other machinery and appliances. It would be advantageous to select one type of machinery for all plants if possible to insure uniformity throughout as much as possible; the consulting electrical engineers in London to advise on offers.

There are two technical conditions which influence the cost of transmission-lines—the frequency of the alterations and the voltage of transmission, low frequency and high voltage being favourable to economy in the transmission-line. Low frequency increases the cost of the transformers, and greatly increases the capacity of a line for transmitting energy. As there are practically no restrictions here as in other places where power-installations have been made, the most favourable frequency and voltage should be adopted.

Until a transmission-line is actually located it is not possible to give more than a general average value for the cost; forming roads, clearing bush, &c., may in some cases increase the cost very materially, but generally very little bush would be traversed.

In most of the schemes the cost of the hydraulic works—weirs, dams, conduits, and pipes—much exceeds the cost of the electric plant.

A somewhat full investigation into the probable costs at which power can be got from many of our power schemes appears to show conclusively that it will be possible to supply power at relatively very low rates—sufficiently low to insure a certain sale for all the power which at present it appears prudent to generate.

A considerable amount of information has been obtained through the High Commissioner about the process now at work in Sweden for the manufacture of nitrate-of-lime fertilisers. This information has been got direct from one of the inventors, Professor Birkeland. He claims that the process is successful, and that about 0.4 of a ton of nitric acid may be got per horse-power year, giving about 0.52 of a ton of nitrate of lime per horse-power year. From Manapouri and Te Anau Lakes, diverted to the Sounds, about 600,000 tons of nitrates could be made a year, at present rates worth £6,000,000. Employment would be given to about four thousand men. The expenditure required would be about £10,000,000 to supply the electric energy; the cost of the works and plant for the manufacture of the acid I have no information about at present. The works would be situated near or alongside deep water. Similar factories could be established at other points on the West Coast Sounds and at numerous other places—Hauroko, Lake Hawea, Tekapo, Rotorua, Waikaremoana. It has been stated that within the next few decades the demand for nitrate fertilisers will greatly increase, while the only natural deposit at present known is being rapidly worked out. Most of the other hydro-electric chemical industries are of lesser apparent importance than the nitrate one, and the perfection of the process to insure its successful commercial working would make the full development of many power schemes possible in New Zealand with every prospect of profitable returns being obtained therefrom.

To illustrate the amount of money it is thought it may be profitable to spend on the development of water-power, out of 1,250,000 h.p., the estimated resources of Norway in water-power, concessions have been already granted for the development of 550,000 h.p. The estimated cost for development is stated to be £55 per horse-power—a high figure; and unless it includes more than providing the hydro-electric works, New Zealand power schemes would appear to be more easily developed than Norwegian, the cost per horse-power for the schemes herein dealt with varying from about £20 to £38 per horse-power.

Information has been obtained from England about suction gas and other plants likely to compete with hydro-electric power. Seeing that immense developments of electric power are now in progress at Niagara, it is a fair conclusion that for general industrial supplies of energy gas-engines as motive power are not at present able to supplant electric power when generated from economic water-power schemes.

The Hon. the Minister for Public Works.

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Engineer-in-Chief.

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