Cost of Power per Horse-power per Annum.

	$
Interest at 4 per cent.	4.64
Labour charges (operation)	12.73
Supplies, half of 1 per cent.	0.58
Repairs, three-quarters of 1 per cent.	0.87
Depreciation, 8 per cent....	9.28
Taxes, 1 per cent.	0.12
Total	28.22

This is the cost of furnishing 1-horse power twenty-four hours per day for one year or for 8,760 horse-power-hours, or a cost of $0.00335 per horse-power per hour. Now, should there be only a period of eighteen hours per day for six days in the week when this power could be utilised, the cost would be proportionately greater, or $0.00502 per horse-power-hour, or $0.00669 per kilowatt-hour.

I have endeavoured to make the figures not very high or very low, but think you will find them conservative. Of course, they are based on American practice. I am in communication with European concerns, and shall soon be able to tell whether they could do better or not. However, the European manufacturers have never built any machinery for very long-distance work, and you would have considerable experimenting on your hand. They do magnificent work, and could in a few years make anything needed after they had sufficient experience.

The figures presented are based on costs of machinery that is now in operation, and which you would know would be satisfactory from the start.

Irrigation and Drainage.

In connection with the electric transmission of energy generated by water-power, the subjects of irrigation of dry and so-called desert lands, and the reclamation of lands periodically submerged by rivers when in flood, or the drainage of shallow lakes, are of vast importance. They not only add greatly to the productive area of the country, but require power from the system to accomplish their object.

The location of pumping plants that are a marvel of simplicity for furnishing water for irrigation of orchards, fields, and gardens, and for drinking-water for cattle, also for removing surplus water from valuable land during or after storms, is possible, and their working, by means of electrically transmitted energy, is accomplished with little expense and the greatest certainty.

You have great areas of land that would be wonderfully productive if they were irrigated; you have also numerous shallow lakes whose beds are wonderfully fertile. Could these be systematically drained they would furnish homes for a great number of people. There are in three of your shallow lakes over 62,000 acres, which, if drained and under cultivation, could support a population of over twenty thousand people. Both drainage and irrigation can be successfully accomplished with energy from the distant water-powers.

Electric Power for Railroads.

There has been endless discussion on this subject. Electric engineers on one hand have claimed that "there is no work of any kind now being done by steam that cannot be done cheaper and better by electricity"; while the steam engineer has attacked the electrical engineer with his breakdowns and unreliable service of pioneer days, and the claim that electricity could not, with a reasonable investment, handle the railroad service of to-day as furnished by steam. Neither are wholly right nor wholly wrong. A middle ground has been taken by our conservative engineers. They are attacking every new problem presented with such skill and thorough sincerity that great undertakings, yesterday thought impossible, are to-day an accomplished fact.

The heaviest service now in operation is probably the Baltimore tunnel; the heaviest under construction is the New York Central tunnel in New York City. The largest straight-away electric railroad is probably the Cleveland, Dayton, and Toledo Traction Company, with headquarters at Hamilton, Ohio. This system spans a great part of the State of Ohio. Both services in operation are, beyond a doubt, very successful.

The method usually adopted where a road is being operated by steam is to instal on the busiest portion a system of electric traction that will not interfere in any way with the steam service; then gradually diminish the steam service and increase the electric; then gradually extend the electric equipment to other parts of the system as the demand and other local conditions dictate.

The New Zealand railway systems would have to be thoroughly studied before any definite outline of a plan could be recommended. There is no question about the water-power of the colony being ample to handle the whole system, nor is there any doubtful engineering question involved. It is purely a question of business policy. I have no doubt that there are numerous places now where it would be very wise and good business policy to equip with electric traction. Some of these places are the suburban sections of roads near Wellington, Auckland, Christchurch, and Dunedin, and the Christchurch-Lyttelton tunnel. These would be excellent places to begin; then as traffic increased, which it is bound to do, you would be well situated to handle it.

The energy for this service is abundant, and with the progress in view for your excellent colony, these matters should be put into condition to meet the demand in sight.

Yours, &c.,

L. M. Hancock, M.A.I.E.E.

The Hon. W. Hall-Jones, Minister for Public Works, Wellington, New Zealand.

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