

These figures are exceptionally good, and are the result of the fact that the power load during the day is about equal to the lighting load in the evening.

Current is sold by the City Council for power purposes at various rates below the average cost of production, the lowest published rate being for large consumers, 1½d. per unit for the first 25,000 units per quarter, and 1d. per unit for all units in excess of this quantity per quarter.

The price-reductions to power-users are based on the consideration that they take the current principally in the daytime, when the generating plant and mains would otherwise be lying idle, and that, consequently, anything obtained per unit from the power-user more than the costs of generation and distribution is profit.

The lighting-consumer is saddled with the whole charges, including interest on capital expenditure for both classes of consumers.

At the present time 60 per cent. of the gas sold is for cooking, and the chief cooking load occurs between 5 p.m. and 7 p.m. The cooking demand for gas at lunch-time and breakfast-time is considerable, but is greatly exceeded by the demand at dinner-time. At the latter time gas is required for cooking at the rate of 230,000 cubic feet per hour. This quantity of gas represents a delivery of 124,000,000 British heat units per hour from the gasworks, and to obtain the same amount of heat from electricity 48,342 h.p. would be required.

This heat is required through the greater part of the year during the chief lighting-hours—on the peak of the load, as an electrician would express it. Consequently, if electricity were employed for this purpose, the plant would have to be capable of generating, and the distributing mains would require to be capable of carrying, this amount of current in addition to the current required for lighting. The load factor would thus be reduced, and all charges per unit sold increased, and electricity for cooking would require to be sold at a price which would include its due proportion of all charges.

A consideration of these points makes it clear that it would be ruinous for an electric station to sell a preponderance of its output for cooking purposes at prices approaching power rates. In fact, it looks as though the price per unit for such business should approximate to the price charged for lighting. It would certainly have to be considerably more than the average price already given.

Now, as one unit of electricity has a heating-value equal to 3,420 therms., it is about equal in heating-power to seven cubic feet of gas; but seven cubic feet of gas at 5s. costs 0.42d., in comparison with 5½d. per unit, the flat rate, and a possible average of, say, 4d.(?) for lighting under the maximum demand system of Auckland City Council Electricity Department.

The City of Toronto, Canada, is supplied by current from the hydro-electric installation at Niagara, and the Toronto Consumers' Gas Company is therefore in competition with electricity from water-power. Nevertheless the Gas Company has made progress by leaps and bounds, and doubled its output between 1908 and 1914.

The president of the company, in moving the adoption of the report in 1914, said, *inter alia*, "When it was borne in mind that the amount of gas put out during the past year was nearly double the quantity sold six years ago, the necessity for the large increase in the company's trunk mains would be apparent. It would be noticed that the number of meters installed had just about touched the 100,000 mark, and, taking an average of five people to a family, it would seem that nearly all Toronto was using gas."

Mr. B. Schieldrop, of Bergen, Norway, stated in 1914, "In Norway there is keen competition with exceedingly cheap electricity generated from water-power. Eight years ago the Bergen Gasworks sold 30 per cent. of its make for lighting purposes; at present the sale is probably less than 5 per cent. The proportion cannot be given with any certainty, because there are no separate meters for lighting purposes, but, strange to say, the gas industry has not suffered by the reduction in the supply of gas for lighting. Gas for cooking and heating has more than compensated for the loss. The increase in sales has never been so great as since the competition with electricity set in. The increase in gas made last year over the preceding year for the whole of Norway was 15 per cent. For Bergen alone for the last three years the annual increase in gas sold was between 25 per cent. and 33 per cent., and this in spite of the fact that the population within the district of supply during this period was practically stationary. When the new gasworks at Bergen were put in operation late in 1908 everybody said they were built on too large a scale; but three years later new settings of vertical retorts were installed, and this year (1914) four more settings of verticals will have to be ordered. Electrical energy is very cheap with us, and the producers of it are very eager to sell it. We have to meet this competition; but it is very uphill work for the electric people to compete with gas, for the simple reason that the amount of heat in a unit of electricity falls so very short of the quantity of heat in a unit of gas, having regard to the price to be paid in either instance. Most people, when talking about this matter in a general way, will say, 'There we have a waterfall. It is simply a question of putting a turbine to it, laying a wire to the nearest populated place, and then setting up some apparatus so as to get the energy out again.' And they will add, 'Thus you have heat and light practically for nothing.' But this is not the way it will turn out, as you gentlemen know. To get the energy transmitted is an exceedingly expensive thing itself. Therefore, when every consideration is taken into account, it is found that electricity cannot be sold for nothing. On the contrary, when electricity has to compete with gas as a fuel it is driven to the wall. This does not, however, prevent one project after another coming forward. We have seen them promulgated in such a way that they claim to be able to get several hundred per cent. of activity out of it—that it can be done very economically, and that it can be produced on a very paying basis. Of course, as soon as these promises are tested they fall to pieces, and then we are enabled to laugh at them."