a lesser power of penetration in fogs, in which respect it is inferior to oil or gas; but even this has in the present year been more than compensated for by the successful application of "wireless telegraphy," by which, in any weather, communication between the ship and the shore can be established. The shores of the St. Lawrence from the Atlantic to the lakes are lined with water power which can be used to light, in fair, or protect, in foul weather, the passing vessel; to ring the bell or blow the horn. When water is applied for light and power purposes, its economy is always the important factor; but it is chiefly to its value for electro-chemical industries that Canada will look to reap the greatest benefits, because in these it is not merely a question of competition of power producers, but one in which intense electricity has the monopoly, and in the case of some of them, as in the production of aluminium, calcium carbide, carborundum, etc., their existence depends upon ample supplies of an intense electric current, for the generation of which abundant and cheap water power is indispensable.

Touching electro metallurgical processes, Mr. Preece says: "Every electrolyte requires a certain voltage to overcome the affinity between its atoms, and then the mass decomposed, per minute or per hour, depends solely upon the current passing. The process is a cheap one and has become general. Three electrical h.p., continuously applied, deposits 10 lbs. of pure copper every hour, from copper sulphates, at the cost of one penny. All the copper used for telegraphy is thus obtained. Zinc in a very pure form is extracted, electrolytically, from chloride of zinc produced from zinc blende, in large quantities. Caustic soda and chlorine are produced by similar means from common salt. The passage of electricity through certain gases is accompanied by their dissociation, and by the generation of intense heat. Hence the arc furnace. Aluminium is thus obtained from cryolite and bauxite. Phosphate is also separated from apatite and other mineral phosphates. Calcium carbide, obtained in the same way, is becoming an important industry. Electrical energy can be generated on a coal field, where coal, of good calorific value, is raised at a cost of three shillings per ton, cheaper than by a water fall, even at Niagara."

Eastern and Western Canadian coal fields are separated by thousands of miles, but water power is abundant throughout nearly all this coalless region. Our Western coal fields are vast and their market at present limited. If coal can be raised cheaply enough and the raw material for the work be discovered in the neighborhood, they may give rise to electro-chemical and electro-metallurgical industries without the intervention of water power. The commercial production of calcic carbide (acetylene gas) by electrolysis, is the discovery of T. L. Wilson (a grandson of the late Hon. J. M. Wilson, of Saltfleet, Ontario), who has established works on the water powers of the Welland Canal and has shipped this product all round the world. The electric production, commercially, of caustic soda and chlorine, is under the patent of Ernest A. Lesueur, son of the Secretary of the General Post Office Department, Ottawa. This manufacture is now being carried on by a Boston company at a New England water power.

There is another field nearly as widespread as our water power in which electricity is destined to play a most important role, and this is mining, which is now spreading over the Dominion with the same rapidity as the utilization of our forests for pulp and paper purposes. Over this area minerals have been discovered and in many cases tested and successfully worked, and from recent results we appear to be on the threshold of remarkable developments in this direction, especially as so small a portion of so great an area has been prospected sufficiently for mining purposes. For power purposes alone, electricity is invaluable in mines, and its multifarious uses (as enumerated by Mr. Preece) are "for moving trams and for working hoists; it lights up and ventilates the galleries, and, by pumping, keeps them free from water. It operates the drills, picks, stamps, crushers, compressors, and all kinds of machinery. The modern type of induction motor, having neither brushes nor sliding contacts, is free from sparks and free from dust. Electric energy is safe, clean, convenient, cheap, and produces neither refuse nor side products." The Canadian mining districts are well supplied with water power, and all the wonderful effects of electricity are available for us upon a larger and more economical scale than elsewhere. In connection with this abundance of water power, and from the fact that a large proportion is at present situated remote from present railways and present settlements, the question of profitable limit of electrical transmission is most important—if indeed, it be now possible to put a limit on anything connected with electricity, with or without the aid of a wire. If, as reported, Lord Kelvin has placed the profitable limit at 300 miles, this is sufficient to utilize the greater part of the water power upon the two watersheds north of the St. Lawrence river. Professor Elihu Thomson says: "Up to the present time it was practicable to transmit high pressure currents a distance of 83 miles, using a pressure of 50,000 volts. If a voltage higher than that were used, the electricity would escape from the wires into the air in the form of small luminous blue flames." As showing how far we are yet behind nature, Professor Thomson says the estimated voltage from a lightning discharge ranges from twenty to fifty million volts. Wherever the raw material for electro-chemical, electro-metallurgical, or other industries, affords sufficient inducement, and the water power is at hand, the forest will be penetrated much more rapidly than heretofore, and settlements advanced in new directions. What can be done in this direction is best illustrated by the development of a single industry in the wilds of Minnesota, north of Lake Superior, and adjoining Canadian territory. Over four hundred miles of standard gauge railways have been built, through what was a trackless wilderness in 1885, to reach iron ore beds, the ore from which is shipped to Lake Erie and thence again railroaded 200 miles into Pennsylvania. This one business has, in mines, railways, docks and fleets of steamers, required an investment of $250,000,000, and has led to as low a rate, by water, as 1 cent per bushel for wheat between Chicago and Buffalo, and 20 cents per ton for coal from Lake Erie to Duluth, nearly 1,000 miles. One-half of the charcoal iron, and more than half of the pig iron made in the United States, is smelted from Lake Superior ore.

The substitution of electricity for steam as the motive power for railways on many roads is regarded as inevitable sooner or later. It has already taken place