1916.
NEW ZEALAND.

IRON

REPORT ON THE ELECTRIC SMELTING AND REFINING OF), AND THE PRODUCTION OF BASIC SLAG.

Laid on the Table of the House of Representatives by Leave.

REPORT BY E. PARRY, B.Sc., M.I.E.E., ETC., CHIEF ELECTRICAL ENGINEER.

Electric Smelting and Refining of Iron.

Public Works Department, Wellington, N.Z., 3rd August, 1916.

Memorandum for Under-Secretary.

IN reply to your inquiry dated 2nd August, regarding cost of electric smelting and refining of iron, I have all the information necessary to give a detailed report on this subject, but in order to answer the question satisfactorily it will be necessary to localize the works and form an estimate of the market. Without going into detail, however, I may state that the cost of electric smelting of iron-ores in Sweden is less than the cost of the blast-furnace process, but the Swedes have a particularly pure ore to deal with, and moreover charcoal is used instead of coke for reducing purposes, whilst the furnaces are much smaller in size than the blast furnaces in England and America. The consequence, therefore, is that where water-power is cheap, and where a special grade of iron is produced from pure ores with the use of charcoal, electric smelting is cheaper than the blast-furnace smelting. This is particularly the case if steelmaking and refining of the iron is carried on simultaneously with the smelting operations, so that the waste gases resulting from the smelting of the ore can be utilized for converting into steel and for refining. On the contrary, where lower grades of ore only are obtainable (and this applies to the vast bulk of ore in the world), and where coal is cheap, and where the demand is such that pig iron can be produced on a large scale at the rate of 700 to 2,000 tons per week per furnace, electricity has not a hope of competing with the blast furnace under these conditions—that is to say, where pig iron has to be produced of ordinary everyday quality from average quality of ore, a blast furnace is unrivalled.

Next, as regards the use of electricity for remelting and refining of iron, electricity is coming into general use at a very rapid rate for this purpose. It will not, however, supersede the Bessemer process or the open-hearth process for ordinary classes of steel in bulk, but is being used, and will in the future be used, to a large extent as an ancillary to these processes for refining purposes and for preparing the higher quality of steel. It is also being used at a rapidly increasing rate for foundry purposes, and is specially adapted for this class of work, as it will deal with a greater variety of material than the ordinary converter in use in foundries and engineering-works is capable of doing. Another use to which electric furnaces are being put very largely is for reheating and annealing purposes, and it has a special field all its own in the production of special alloys of iron which cannot be produced in any other way, or if produced cannot be done so economically.

As regards New Zealand, the two principal sources of iron are the Parapara iron and the Taranaki ironsands. The Parapara iron-ore is of medium quality as regards the iron-contents, and can probably be more economically produced and smelted by the blast-furnace process as long as coke is available in New Zealand. As regards the Taranaki ironsands, I believe that there exists here a source of considerable industry which will be developed in course of time for making a special quality of pig iron in which titanium will play an important part, and also for the purpose of making alloys of iron and titanium for special purposes, and, given a demand for special-quality pig iron and ferro-titanium alloys, these could be more economically produced from the ironsands by means of an electric furnace than by the blast-furnace process. The reason of this is that the fine grains are not suitable for use in a blast furnace, because they tend to choke the furnace, and also are liable to be carried away by the blast. Consequently some form of