been investigated with such care as that of the North German Plain, but the general conditions which have led to their production are seen to be similar, although local circumstances, especially the extent to which they were subjected to an intermittent influx of sea-water, have modified the nature, relative amounts, and distribution of their various saline constituents. T. E. THORPE.

NATIONAL POWER SUPPLY.[1]

THE interim report issued by the Coal Conservation Sub-committee presided over by Lord Haldane will be read with great interest, as it crystallises the considered opinions of eminent engineers. The committee has little difficulty in proving that the present system of electrical power distribution in this country is most uneconomical. If it had all to be done *de novo* the Committee would divide the country into some sixteen districts. In each district there would be several large inter-connected super-stations for generating electric power, and these would be controlled by a single authority. The sites of these stations would not be chosen, as they too often are at present, mainly to secure that the "rates" payable on the electric works may come to the local authority working the undertaking, but they would be chosen on the lines laid down by Kelvin in 1878. They would therefore be either near the pit's mouth, where coal dross could be used for working engines of the most economical type, or in places where plenty of condensing water is available, where coal transport is cheap, and where they would be near the centre of gravity of the probable demand. If this were done it is calculated that as many as 55,000,000 tons of coal would be saved per annum, a saving that would far more than counterbalance the interest payable on the new capital necessary.

We agree with the Committee that it is in the national interest that the change should be made as soon as possible, and we think that the probable saving that would be effected has been somewhat under-estimated. Both Mr. C. H. Merz and Mr. C. P. Sparks, who are members of the Committee, have shown by the stations they have designed the great commercial possibilities of "supply in bulk," and what a boon it is in industrial areas. They are not inviting the country to take any speculative risks—the pioneer work has all been done. Dr. Ferranti, Lord Crawford, and Mr. Ince thoroughly appreciated the main facts of the problems in 1888, when the Deptford power station was first designed.

The Committee is right in saying that the difficulties which stand in the way are "political" rather than "engineering." There are too many vested interests at stake—those of engineers as well as capitalists—to make the course of any national power supply scheme a smooth one. The suggestion of a Board of Electricity Commissioners is a good one, but the powers of the Board will have to be very carefully defined. Everyone will agree that the Board should be empowered to stop the extension or multiplication of uneconomical stations for public supply, and that it should aim at ultimately securing the adoption of a bulk supply scheme somewhat similar to that outlined in the report under notice.

It will be interesting to see how far the conclusions of the report will be endorsed by the Board of Trade Electric Supply Committee, which is at present sitting, and on which municipal engineers are represented. In any event the Sub-committee is to be congratulated on having made excellent and timely suggestions.

[1] Reconstruction Committee: Coal Conservation Sub-committee. Interim Report on Electric Power Supply in Great Britain. Cd. 8880. (London: Imperial House, Kingsway, W.C.2.) Price 3*d*. net.

ECONOMISING SUGAR.

OUR contemporary, *La Nature*, devotes an article in a recent number (December 1) to a consideration of the use of substitutes for sugar, in view of the present shortage of that commodity. Sugar is a foodstuff; but as a nutrient it can be replaced by other carbohydrates, such as those contained in farinaceous foods and vegetables. The essential thing as regards sugar is to find a substitute with sweetening properties. Glucose, obtained by hydrolysing starch with sulphuric acid, is the only sugar other than the ordinary supplies producible in large quantities; but it has a low sweetening power, is not economical, and has reached an almost prohibitive price in France. There remain the sweet chemical products, of which the two chief are dulcin and saccharin. Dulcin, para-ethoxyphenyl urea, is obtained from phenetidine and urea, and has about two hundred times the sweetness of cane-sugar. It has not, however, been much used as a sweetener, since saccharin is cheaper and much more effective. This compound, it may be recalled, has for its parent substance toluene—the coar-tar product which serves also to provide the explosive trinitrotoluene. In making saccharin, toluene is converted first into its sulphochloride and then into the sulphonamide, which is oxidised with potassium permanganate to produce orthosulphamidobenzoic acid. Saccharin is the anhydride, or imido-derivative, of this acid; it is claimed to be about five hundred and fifty times as sweet as cane-sugar. It is not very soluble in water, and is generally employed in the form of its sodium or ammonium salt (sucramine), both of which are readily soluble.

Before the outbreak of war saccharin was chiefly made in Germany, but had been produced in this country to a small extent, and the manufacture has again been taken up here quite recently. In France four factories have lately been equipped to produce it. As regards the raw materials, ordinarily these would be accessible enough and cheap enough, but at present there is, of course, a great demand for toluene, and potassium salts are scarce. Nevertheless, a certain quantity of toluene can presumably be spared for urgent wants, and there is no absolute necessity to use *potassium* permanganate as oxidising agent. In any case the French factories are proceeding with the manufacture, and, as our contemporary observes, "*la pro-*

chaine apparition de la saccharine sera la bienvenue."

The writer of the French article suggests that it might be well, perhaps, to utilise the saccharin solely for mixing with sugar, as is done in Italy. This economises sugar, since a smaller "ration" will suffice, and is better than selling a substance which has no nutritive value at all. Moreover, it would diminish the rather unpleasant after-taste of saccharin used alone, and would also facilitate the employment of certain nourishing foodstuffs, such as cocoa, rice, and farinaceous foods, which require sweetening to make them palatable to most people. A suggestion that saccharin might be therapeutically objectionable is dismissed as of no serious weight, in view of the experience obtained with it in the past.

In this country saccharin has already been employed to a small extent in a somewhat similar manner, namely, to sweeten milk-sugar for sale as a sugar substitute. The supply of milk-sugar, however, is restricted. If our own authorities have not already done so, they might perhaps find it worth while to consider the plan suggested by the French writer. Five hundred pounds of sugar *plus* 1 lb. of saccharin would have about the same sweetening value as 1000 lb. of sugar used alone.

NOTES.

THE trustees of the British Museum have been given notice by the Government that the museum is to be requisitioned as the headquarters of the Air Board. This decision will be received with dismay by everyone who possesses intellectual interests or understands the value of the collections in the galleries of the great building at Bloomsbury. To pack up and store away the many fragile objects in the museum in order to prepare the galleries for occupation means ruin to the specimens, and the ruthless undoing of careful organising work of many years. Sir Arthur Evans, president of the British Association, and one of the trustees of the museum, writes to the *Times* of January 2 to protest against the wanton sacrifice of national treasures involved in the hurried removal of specimens from their cases, or the alternative of letting them remain while the building is used as the headquarters of a combatant department. "Even the bare statement of this proposal," he remarks, "will cause a shudder to run through all civilised countries. Were it carried out it would cover the British nation with lasting obloquy. I write this with the hope that even at the eleventh hour the Government may recoil from a step which could not but provoke a deep and widespread indignation." If the British Museum represented the last extremity in housing the Air Board, the occupation of the building would have to be accepted as an inevitable consequence of conditions of war. We have not, however, reached a degree of national stress which would justify the outrage now contemplated; and we trust that immediate steps will be taken to induce the Government to find a domicile for the Air Board without dismantling our national museum and ruining many of the priceless treasures collected within its walls.

A LONG list of New Year honours was published on Tuesday. Among the names included the following will be familiar to scientific workers:—*K.C.B.* (*Civil Division*): Mr. A. D. Hall, F.R.S., Secretary to the Board of Agriculture; Sir George Newman, Principal Medical Officer to the Board of Education. *C.B.* (*Civil Division*): Mr. F. L. C. Floud, Assistant Secretary to the Board of Agriculture. *Baronet*: Prof. James Ritchie, Irvine professor of bacteriology, University of Edinburgh. *C.I.E.*: Mr. P. H. Clutterbuck, Indian Forest Service, Chief Conservator of Forests, United Provinces. *Knighthoods*: Mr. W. N. Atkinson, who has contributed largely to a knowledge of the dangers of coal-dust in mines; Dr. J. Scott Keltie, editor of "The Statesman's Year-Book," and for many years secretary of the Royal Geographical Society; Dr. A. Macphail, professor of the history of medicine, McGill University, Montreal. In addition a large number of medical men have received honours for services rendered in connection with military operations in the field.

THE report on the production of iron and steel in Canada during the calendar year 1916, which has just been issued by the Canadian Department of Mines, is of exceptional interest at a time like the present, when the preponderating influence of iron output upon the European war is daily becoming more evident. The main outstanding fact is that the production of pig-iron was just above one million statute tons, being an increase of 27·9 per cent. as compared with that of 1915. Only a small proportion, about 10 per cent., of the iron ore smelted was produced in Canada, a little more than half the remainder being Lake ore from the United States, smelted mainly in Ontario, and the rest consisting of Wabane ore from Newfoundland, smelted in Nova Scotia. Thus fully half the ore smelted is of British origin. The total production of iron ore in Canada was only about 250,000 statute tons, approximately one-half of which was smelted within the Dominion and one-half exported to the United States. It is noteworthy that Canada produced in the year in question 28,628 tons of ferro-alloys, including ferro-silicon, ferro-molybdenum, and ferro-phosphorus, smelted in electric furnaces. The total steel production of Canada was 1,428,429 short tons of ingots and castings, being an increase of 40 per cent. above the previous year; of this amount 1,397,703 short tons were ingots, the remainder being castings. Practically all this is open-hearth steel, only 1400 tons of Bessemer steel having been made, whilst about 26,000 tons of steel were made in electric furnaces. The quantity of scrap worked up is quite considerable, amounting to about 47 per cent. of the steel produced and 71·5 per cent. of the pig-iron charged. The increase in production shown all round is very satisfactory, and indicates how energetically Canadian iron-masters have striven to contribute to the Imperial output of this all-important material. There is also a highly significant piece of information, namely, that the production of iron ore in the United States in 1916 was as much as 75½ million statute tons, or an increase of twenty million tons above the 1915 production; seeing that the iron in this increase is by itself nearly equal to the whole iron production of Germany, it is very evident that the part that America can play in the great war is likely to prove a decisive factor before very long.

WE learn with regret that Prof. C. Christiansen, professor of physics in the University of Copenhagen from 1886 to 1912, died on December 28, at seventy-four years of age.

THE *Chemist and Druggist* announces that Dr. M. Louis Martin, head of the Pasteur Hospital at Paris, and Prof. Albert Calmette, director of the Pasteur Institute at Lille, have been unanimously elected sub-