NATURE

SATURDAY, SEPTEMBER 20, 1924.

CONTENTS.

Editorial and Publishing Offices :
MACMILLAN & CO., LTD.,
ST. MARTIN'S STREET, LONDON, W.C.2.

Editorial communications should be addressed to the Editor.
Advertisements and business letters to the Publishers.

Telephone Number: GERRARD 8830.
Telegraphic Address: PHUSIS, WESTRAND, LONDON.

NO. 2864, VOL. 114]

Coal and Electric Power.

A STRONG plea for an improved utilisation of coal as a source of motive power is made in the second part of the volume "Coal and Power,"[1] the Report of an Enquiry presided over by the Rt. Hon. D. Lloyd George, the first part of which has been referred to already in these columns (August 23, p. 265). The Committee of Liberal Members of Parliament and other persons responsible for the Report has examined the present system of generation and distribution of electrical power in Great Britain, and has come to the conclusion that "immense saving and improvement can be effected in this respect."

The waste that occurs in the methods now in vogue in connexion with the utilisation of coal for industrial and other purposes is a subject which has been under close study on the part of engineers in Great Britain, as well as in other parts of the world, for several decades past; the measures by which this waste can to some extent be reduced have been repeatedly indicated by them. The subjects of coal conservation, home-grown food, and the better utilisation of our labour were, for example, chosen for the theme of the able and brilliant presidential address which Mr. S. Z. de Ferranti delivered on November 10, 1910, to the Institution of Electrical Engineers (see Jour. I.E.E., 1911, vol. 46). In this address, Mr. de Ferranti directed attention to many of the matters which are dealt with, under the title "Power," in the Report before us, and pointed clearly to the direction in which a reduction in the cost of production of electrical energy should be sought, indicating, at the same time, that the increased use of electricity was a matter that depended almost entirely on the cheapness at which it could be sold. In view of the slow progress which has been made in Great Britain in extending the use of electricity for industrial and domestic purposes, and for the reason that important benefits would follow on its extended use, it is all to the good that the Committee should, in its Report, have again directed attention to the advantages to be gained from the electrification of our industries and our homes.

The Committee points out that the reorganisation of the coal-mining industry which it is advocating, though a matter of the utmost importance, is only part of a programme which aims at the rejuvenation of British industry, and it frankly admits that it is seeking the solution to the problem of how to increase wages without at the same time increasing the cost of manufactured commodities. The Committee shows that there is nothing incompatible in aiming at attaining

[1] Pp. xiv + 139 + 16 plates. (London: Hodder and Stoughton, Ltd., 1924.) 1s. net.

both these ends simultaneously. "A survey of the chief industrial countries of the world reveals," says the Report, "the extremely significant fact that those people are best paid and most prosperous that make most use of the resources of science"; the reason for this state of things being found in the fact that the average level of earnings must depend on production, and production increases as the use of power per head of the population increases.

Attention is directed in the Report to the circumstance that Great Britain became, in the first half of the nineteenth century, pre-eminent in the world as the greatest of all manufacturing countries because it was the first country in the world to realise the potential powers of steam. British engineers led all other countries; and, in the matter of railways, our system was the pioneer one. In the early days of steam engineering it was Great Britain that other countries copied: but now, in the matter of electrical development, the rôles are reversed. The Committee alludes to the activities of other countries which are our competitors in the world's markets, and mentions the fact that most of them are pressing ahead with schemes of electrification. "When one surveys the modern industrial world from this angle, it almost seems," says the Report, "as though we alone are content to mark time." An authoritative estimate indicates that the increase in the production of electricity in Great Britain during the period 1913 to 1922 was 130 per cent., an increase which is less than that achieved in any of the countries of our chief competitors. Again, whilst the development in Great Britain has hitherto been almost entirely in the direction of adding units to existing small and scattered local supply stations operating independently each of the others, foreign countries have in recent times been concentrating on larger power supplies on modern methods linked up and co-ordinated by main transmission lines.

A brief examination is made in the Report of the electrical development in certain foreign countries. This examination discloses the fact that the United States of America leads the way, its output having quadrupled since 1912; Chicago alone produces five times as much electricity as the whole of the North-East Coast plant, the largest scheme of electrification in England. The output in France had, up to April 1924, increased more than three and a half times as compared with 1913; the network of transmission lines is now so widespread that the ordinary hydro-electric stations are linked up with the glacier stations, and both with the thermic stations, and all with the consumers in the industrial region. It is expected that, by 1927, sixty-nine per cent. of the population will have electricity available. Germany, though harassed by many adverse factors, has made a greater advance in the direction of electrical development along coal-saving lines than has Great Britain; its output has more than doubled since 1913. Lignite, a mineral of very poor qualities, is now supplying nearly one-half of the electrical power of Germany.

In Holland, production more than doubled between 1913 and 1918. A scheme is now in hand which aims at covering the country with a network of high-tension transmission lines with the view of supplying Dutch industries with cheap power; on its completion, the output of the country will be increased 76-fold. In the case of Italy, special State encouragement is being given to the development of hydro-electric generation; in the year November 1922-November 1923 no fewer than 134 concessions for water-power schemes were granted by the Government. A great scheme intended for the development of the resources of Calabria was begun in 1923. In Czecho-Slovakia an Electricity Act was passed in 1919 providing for financial aid from the State for electrical development. Great activity on the development of hydro-electric schemes has prevailed in Canada in recent years. Although the population of the Dominion is only about one-sixth that of the United Kingdom, Canada will by the end of 1924 be getting from hydro-electric plant alone more power than the engine capacity for the whole of the iron, steel, engineering, shipbuilding, and textile trades in Great Britain. As regards the supply of cheap electric power through hydro-electric plants, Great Britain cannot compare favourably with some other countries. It is, however, becoming more evident every year that water-power is not an indispensable adjunct to many electro-chemical and electro-thermal enterprises, and that other sources of power sometimes possess decided advantages.

The reason for Britain's comparative failure in the field of electrical development is traceable, the Report rightly points out, to the state of our legislation, the effect of which has been gravely to handicap the genius of our engineers; "the power companies established under the Power Acts have never been given an adequate chance to develop. They have suffered from the fact that already there had been established in all industrial centres and in all our great cities, local and municipal power supply undertakings which were organised on a purely local basis." This circumstance precluded free competition between the power companies and the existing authorities. The measures taken to remedy this unfortunate situation are mentioned. As a first step, a Coal Conservation Committee was established in 1917; it made a Report of the utmost importance (Cmd. 9084). The matter was afterwards considered by another Committee, under the chairmanship of

Sir A. Williamson, which made certain specific recommendations.

The Government of the day then took action and passed the Electricity (Supply) Act, 1919 (9 and 10 Geo. V. c. 100), in which was incorporated many of the recommendations alluded to, and under its provisions have been brought into existence the Electricity Commissioners; in this body has been vested the general control over the generation and distribution of electricity in the United Kingdom. The Government did not secure in the Act of 1919 all the powers in relation to electricity supply it was seeking; the Bill was strongly opposed in the House of Lords. Later, the Government sought and obtained further powers under the Electricity (Supply) Act, 1922 (12 and 13 Geo. V. c. 46), which, though it improved matters to some extent, did not effect, and was not designed to effect, the original intention, namely, that of replacing many small stations by a few great power stations, with resultant economies in coal and in money.

Dealing with the place of electricity in modern life, the essential requirement, it is pointed out, is cheap power; so far, this result has not been secured in Great Britain on any notable scale. As an illustration, the case of Lancashire is quoted; this county is, from the technical point of view, the most favourable area in England for the generation and distribution of electricity cheaply, yet, at the date the Coal Conservation Committee of 1917 made its Report, the cost per unit was in Lancashire nearly three times that paid in the North-East Coast district of England. Examples of a similar disparity in the cost of energy are to be found in other parts of the country, and are due to the same cause; whereas in Lancashire a number of corporations are supplying energy in circumscribed areas, in the North-East Coast district a super-power station is transmitting energy in an area of suitable dimensions through well-placed main transmission lines. The need for the elimination of waste, the importance of securing an increase in the use of electrical power and the financial and other advantages likely to accrue to the community from the removal of the smoke evil, the saving of by-products and a revival of rural industries, are all duly emphasised in the Report.

The Committee makes allusion to the very conservative policy which has been pursued by British railway companies in the matter of the electrification of their systems, and expresses the hope that in view of the fact that the financial and technical advantages of electric over other forms of traction are being clearly demonstrated in foreign countries, our railway directors will reconsider their policy in this matter, and further, that in the event of a national scheme of electric supply being undertaken, the railways will give it the advantage of their co-operation. "Railway electrification would do much," says the Report, "to assure the economic and technical success of electrical production on a national scale"; in this view many eminent engineers concur. The Committee also points out that there are many recent processes, *i.e.* (1) the fixation of atmospheric nitrogen, (2) electric smelting, (3) the recovery of dyes, which are only possible economically in a country well equipped not only with electrical plant, but with *modern* electrical plant.

The unemployment problem also receives attention in the Report. The Committee attributes the failure in Great Britain to utilise the great unemployed labour force which has been available for construction purposes since the War partly to the limitation of the powers of the Electricity Commissioners. "We believe that it would have paid the State," says the Report, "to have expended large sums in the development of our resources by the provision of State credits, or the loan of public money at low rates of interest, for by so doing the internal economy of the country would have been improved and non-productive expenditure reduced."

In view of the present situation, the Committee is impressed with the necessity that exists for steps to be taken immediately to remedy the backwardness of Great Britain in electrical development. It recognises that the Electricity Commissioners have since their creation rendered most valuable services, but feels that this body is seriously handicapped owing to the insufficiency of its powers, and to some extent by the vested interests of the local undertakings, which, in the nature of things, are not and cannot be "as efficient as a national system developed in accordance with the most recent practice and supplying electricity in bulk from super-power stations." For these reasons, the Committee recommends that the powers of the Electricity Commissioners should be enlarged; this body could thus be placed in a position effectively to remove the obstacles which now block the way to electrical development in Great Britain.

It is mainly in two directions that the development of our great power-producing organisations is now being hindered: (1) by the existence of a number of small and inefficient local supply bodies; and (2) by reason of the magnitude of the undertaking and the uncertainty of financial success under existing conditions. To overcome the first of these difficulties, the Committee would like to see the Electricity Commissioners endowed with compulsory powers of acquisition, co-ordination, and regulation. To overcome the second of these difficulties, the Commissioners should, it is suggested, be granted full powers to employ every practicable means for encouraging and helping

electrical undertakers, public and private, who are prepared to establish generating stations of suitable capacity and type. Finally, the Report lays particular stress on the need for the Commissioners being authorised to empower electricity undertakers "to acquire compulsorily and at reasonable prices all land, rights of way, rights relating to water, and all ancillary rights, which may be necessary for the adequate execution of a national scheme."

The additional powers which it is recommended should be conferred on the Electricity Commissioners are undoubtedly large; however, few persons, if any, who are familiar with the electricity requirements of Great Britain are likely to cavil at the proposals made by the Committee. The situation which has to be dealt with is a very complicated one, and the reforms indicated, which undoubtedly are all urgently required, can only be brought about expeditiously by vesting in the Commissioners exceptional powers.

An idea as to how complicated the present situation is may be gathered from a perusal of the recitals of the "Order made by the Electricity Commissioners under Sec. 7 of the Electricity (Supply) Act, 1919, constituting the London and Home Counties Electricity District and establishing and incorporating the London and Home Counties Joint Electricity Authority" (H.M.S.O.). This Order was made on July 17 last after an investigation of many days' duration, and has been submitted to the Minister of Transport for confirmation; the interests and rights of the London County Council, the City Corporation, and 14 Power companies are involved, and it has been necessary to promote two Bills in the present session of Parliament in connexion with the Order. Situations which are equally, if not more, complicated exist in those parts of the country which have yet to be dealt with by the Commissioners.

It may well be asked, Why is it that the United States of America lead in the matter of electrical development? The answer to this question is to be found in the presidential address which Mr. W. H. Patchell delivered on March 21, 1924, to the Institution of Mechanical Engineers: this exceptional development, he tells us, is the direct outcome of the skill and zeal of those who handle the sales department of the American electricity supply undertakings. It will be evident, then, that if results similar to those obtaining in the United States of America are to be achieved in Great Britain, not only must additional powers be given to the Electricity Commissioners, but those responsible for the conduct of our electrical undertakings must also take a broad view of the commercial side of the business and adopt active measures for pushing the sale of their commodities.

Nature and Man in Tropical Africa.

Big Game and Pygmies: Experiences of a Naturalist in Central African Forests in Quest of the Okapi. By Cuthbert Christy. Pp. xxxi + 325 + 56 plates. (London: Macmillan and Co., Ltd., 1924.) 21*s.* net.

DR. CHRISTY'S "Big Game and Pygmies," based as it is upon almost twenty-five years' continuous experience of tropical Africa, is a most interesting and valuable book. The "external aspects of organic nature" are not merely being modified by human interference in Africa; they are there being rapidly and almost completely transformed. The value of the observations so faithfully recorded in this volume will therefore steadily increase. When at last the varied face of Africa shall have been reduced to a dead level of cultivated monotony; when all its nobler animals and plants shall have been replaced by peaceful beasts of the farm and dull vegetation of economic importance, this will be one of the books that will enable our heirs to appreciate what sacrifices we made in the names of civilisation and commerce.

An admirable account of the great equatorial rain-forest is given by Dr. Christy. Stating that it must once have stretched as an unbroken belt completely across the continent, he describes its destruction at the hands of men. A good deal of the forest was destroyed before the advent of the whites; and to-day too, the barbarous methods of agriculture employed by the natives are responsible for a great deal. Strip after strip is cleared, by felling and by fire, along the forest margins. Ignorant of the art of maintaining its fertility, the natives soon exhaust the virgin richness of the forest soil and proceed to make further depredations upon the forest. The abandoned clearings are quickly overgrown by grass and bush; but upon their sun-baked and exhausted soil rain-forest never reappears. The forest once destroyed thus goes for ever; and with it must disappear many of its inhabitants. Not improbably much of that progressive desiccation of Africa, about which so much has been written from the days of Livingstone onwards, is to be regarded as a direct consequence of the destruction of the equatorial forest. That is a matter worthy of consideration, and it is possible that the conservation of the remnants of this great forest will loom as largely in African politics in a few years' time as reparations, for example, have done in those of Europe recently.

While native activity slowly but surely results in the replacement of one African type of life by another, white enterprise appears to be leading to the extirpation of the African biota. Enormous tracts of country are being cleared of the indigenous vegetation and replanted by exotic plants of economic importance.