

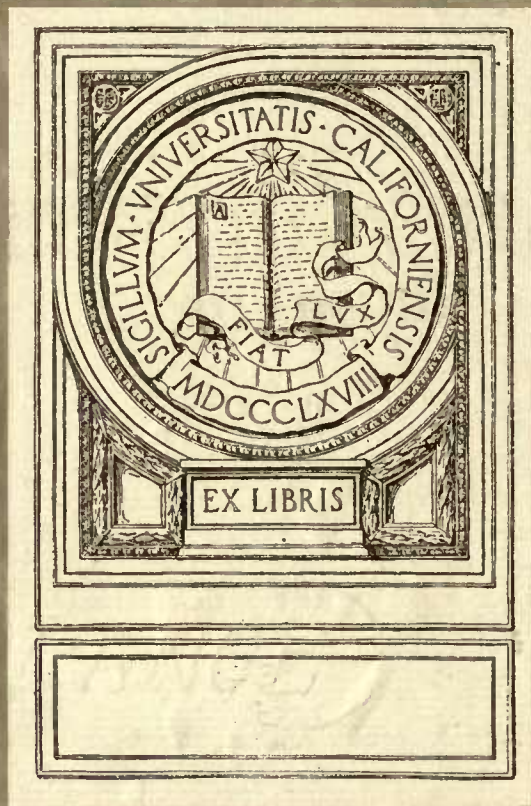
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gt. Brit. Board of trade  
Committee on electric power supply

# ELECTRIC POWER SUPPLY COMMITTEE.

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## REPORT

OF THE

# COMMITTEE APPOINTED BY THE BOARD OF TRADE

TO CONSIDER THE QUESTION OF

# ELECTRIC POWER SUPPLY.

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Presented to Parliament by Command of His Majesty.

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ELECTRIC POWER SUPPLY COMMITTEE

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# ELECTRIC POWER SUPPLY COMMITTEE.

To the  
RT. HON. SIR ALBERT H. STANLEY, M.P., President of the Board of Trade.

SIR,

WE have the honour to report as follows:—

1. The task entrusted to us is governed by the following terms of reference:—

“To consider and report what steps should be taken, whether by legislation or otherwise, to insure that there shall be an adequate and economical supply of Electric Power for all classes of consumers in the United Kingdom, particularly industries which depend upon a cheap supply of power for their development.”

Terms of  
Reference.

2. Shortly after our appointment the Reports of the Coal Conservation Sub-Committee of the Reconstruction Committee, and of the Electrical Trades Committee appointed by the Board of Trade, were laid before us. In view of the investigations of these Committees, and other information, we, on 14th May, 1917, unanimously came to the following conclusions:—

Preliminary Resolutions.

- (1) That when British industry is subjected to the test of keen international competition after the war, its success will depend upon the adoption of the most efficient methods and machinery, so as to reduce manufacturing costs as much as possible.
- (2) That a highly important element in reducing manufacturing costs will be the general extension of the use of Electric Power supplied at the lowest possible price, and it is by largely increasing the amount of power used in the industry that the average output per head, and, as a consequence, the wages of the worker, can be raised.
- (3) That the present system under which a supply of electricity is provided in a large number of small areas by separate authorities, is the result of a policy adopted at a time when the applied science of electrical engineering was in its infancy, and is incompatible with anything that can now be accepted as a technically sound system.
- (4) That the interconnection of existing electrical supply stations, recommended by the Board of Trade in their letter of the 25th May, 1916, however desirable in itself, cannot alone meet the requirements of the situation.
- (5) That a comprehensive system for the generation of electricity, and, where necessary, re-organising its supply, should be established as soon as possible.

3. It was then decided to invite representative Associations throughout the country to give evidence before us with regard to the best methods of giving effect to these conclusions. In carrying out our work we have had valuable assistance from the personal evidence of the following witnesses:—

Witnesses.

Mr. Lewis Beard, Town Clerk of Blackburn; Mr. C. N. Hefford, Manager of the City of Leeds Electricity Department; Mr. R. A. Reay-Nadin, Town Clerk of Sutton Coldfield. *Representing*.—Association of Municipal Corporations.

Sir Harry Haward, Controller. *Representing*.—London County Council.

Mr. W. P. Nicholas, Clerk of the Rhondda Urban District Council; Mr. A. H. Dykes, Hon. Secretary of the Association of Consulting Engineers. *Representing*.—Urban District Councils' Association.

Mr. Alexander Stevenson, Councillor of the City of Edinburgh, and ex-Councillor of the Electric Lighting Committee. *Representing*.—Convention of Royal Burghs of Scotland.

Mr. W. B. Woodhouse, Engineer and Manager of the Yorkshire Electric Power Company. *Representing*.—Incorporated Association of Electric Power Companies.

Mr. C. P. Sparks, President of the Institution of Electrical Engineers (1917). *Representing*.—Institution of Electrical Engineers.

Mr. H. Faraday Proctor, Hon. Secretary of the Incorporated Municipal Electrical Association. *Representing*.—Incorporated Municipal Electrical Association.

Mr. S. L. Pearce, Chief Engineer and Manager of the Manchester Corporation Electricity Department. *Representing*.—Committee for the Inter-connection of the Lancashire and Cheshire Electricity Supply System.

Mr. D. A. Starr, General Manager of the Clyde Valley Electrical Power Company. *Representing*.—Association of County Councils in Scotland.

Mr. Henry Riddell, Councillor of the City of Belfast. *Representing*.—Municipal Authorities in Ireland.

Mr. Roger T. Smith, Electrical Engineer to the Great Western Railway; Mr. Phillip Dawson, Consulting Electrical Engineer to the London, South Coast Railway. *Representing*.—Railway Executive Committee.

Mr. A. S. Blackman, Electrical Engineer to the Corporation of Sunderland. *Representing*.—Six Corporations supplying electricity on the North-East Coast.



Mr. L. L. Robinson, Electrical Engineer to the Borough Council of Hackney. *Representing*.—Authorities of Greater London owning electricity undertakings.

Mr. G. Marshall Harriss, General Manager of the Dublin United Tramways Company, Limited. *Representing*.—Electric Supply Companies in Ireland.

Mr. W. F. Fladgate, M.V.O., Chairman of the Charing Cross, West End and City Electricity Supply Company, Limited; Sir Alexander Kennedy, F.R.S., Engineer-in-Chief to several London Electric Supply Companies. *Representing*.—London Electric Supply Companies.

Mr. W. C. Thorne, Solicitor; Mr. T. M. Newell, Engineer-in-Chief. *Representing*.—Mersey Docks and Harbour Board.

Mr. W. H. Hannay, Councillor of the City of Glasgow; Mr. W. W. Lackie, Engineer and Manager of the Electricity Department of the City of Glasgow. *Representing*.—Conference of nine Municipalities in the West of Scotland.

Mr. R. P. Sloan, Director and Manager of the Newcastle-upon-Tyne Electric Supply Company, Limited. *Representing*.—North-East Coast Electric Power Companies.

Mr. Arnold B. Gridley, Director of Electric Power Supply of the Ministry of Munitions. *Representing*.—Ministry of Munitions.

Mr. H. B. Renwick, Managing Director of the County of London Electric Supply Company Limited, and other Companies, also Chairman of the Provincial Electric Supply Committee of the United Kingdom. *Representing*.—Provincial Electric Supply Committee of the United Kingdom.

Captain H. Ryall Sankey, C.B., R.E. *Representing*.—Federation of British Industries.

Mr. J. P. Crosbie, Director and Works Manager. *Representing*.—Messrs. Hadfields, Limited, of Sheffield.

Sir John A. F. Aspinall, General Manager of the Lancashire and Yorkshire Railway. *Representing*.—Railway Companies' Association.

Mr. D. Milne Watson, Managing Director of the Gas Light and Coke Company, and Chairman of the Executive Committee of the National Gas Council; Mr. H. E. Jones, President of the Institution of Civil Engineers and President of the National Gas Council. *Representing*.—National Gas Council.

Mr. A. S. Highfield, M.Inst.C.E., Consulting Engineer to the Metropolitan Electric Supply Company, Limited, and other Companies.

We have also had written evidence from Mr. M. Ruddle, Electrical Engineer to the Corporation of Dublin, and Mr. J. F. Delany, Engineer to the Corporation of Cork, representing Municipal Authorities in Ireland, and have had the opportunity of reading the evidence given before the Electrical Trades Committee by Mr. Stephen Sellon on behalf of the Tramways and Light Railways Association.

In addition we have received a number of written statements, and have had before us numerous papers dealing with various aspects of the subject of our enquiry. The practical and technical knowledge of individual members of the Committee has also been of great value to their colleagues.

4. We recognised that it was our duty to consider the terms of reference from a national point of view so that our recommendations might lead to a practical scheme for providing the vital requirement of cheap power throughout the country. The supply of such power is now seen to be virtually as essential as labour and materials in so far as it affects economical production. The value of the application of electricity to practically all classes of machinery and processes has been increasingly demonstrated in a striking manner during the war, especially in the manufacture of munitions and other work of national importance; while the rapid expansion of munition factories was only rendered possible by its aid. The extent to which electricity may be further applied to cheaper and better mechanical production, to improved railway service, to electro-chemical and metallurgical processes, to agriculture, and to domestic labour-saving apparatus is altogether incalculable.

5. We have necessarily had to take into account any seeming conflict of national and local interests, and in the proposals set forth below it is hoped that the respective claims of national economic interest and principles of local self-government will be equitably adjusted, and that great advantage will accrue to the whole community from the changes which we recommend.

6. A study of the legislative history of electric supply in this country during a period of over 35 years makes it clear that thorough revision is required of the whole situation if we are to avoid at the end of the war a continuance of conditions which are manifestly unsuitable for the full development of the application of electrical science to industrial production.

7. Electricity is at present generated and distributed mainly by authorised undertakers under the principal Electric Lighting Act, 1882, and the amending Act, 1888, which Acts were framed at a time when electricity was used principally for lighting, and its application for power purposes was almost unknown.

8. In 1898 a Joint Select Committee of the House of Lords and the House of Commons, presided over by Lord Cross, reported on proposals to supply electricity over wide areas, and,

National  
Aspect.

Past and  
present  
conditions  
of Elec-  
tricity  
Supply.



as a result, facilities more consistent with the development of the application of electric power to industry were granted in several private Acts, although these were restrictive and burdensome in many particulars, and have not been effectual in providing a comprehensive system of supply. These Acts usually did not admit of a general supply of electricity for lighting, and, in the area of an authorised distributor, a provisional veto, in practice amounting virtually to an absolute veto, was given to that distributor even in regard to a supply for power purposes. Other areas were in most cases unremunerative when dealt with by themselves, owing to the paucity of consumers or the long distances between them.

9. A general Act passed in 1909 gave somewhat wider facilities to electrical undertakers, but it may be said that the laws affecting the public supply of electricity are unsuited to the present times, and that legislation has hitherto been influenced by an insufficiently large and comprehensive outlook.

10. We may give without adopting in its entirety, the following extract from a letter written by the Electrical Trades Committee to the President of the Board of Trade on 19th January, 1917.

“Witnesses have been unanimous in showing how greatly the electricity supply industry is now handicapped by the following facts:—

- (a) Electrical legislation in the past has restricted the proper expansion of the supply industry—the electrical areas are too parochial and entirely discordant from the economic area of electrical supply. The result has been a great growth of small uneconomical stations, with resultant waste of coal and generally higher charges for energy than would have been the case from larger areas and greater concentration of plant in larger units, and more economically placed power stations.
- (b) Past lack of foresight in the granting of authority for the supply of electricity has allowed even adjacent undertakings to establish works differing, not only in type of plant and mains, but also in pressures and frequencies, with the result that linking-up and interchange of power is now extraordinarily difficult and costly.
- (c) At the present time all new or extension orders authorising electric supply must be sanctioned by the Board of Trade and afterwards confirmed by Parliament. All administrative matters affecting electrical undertakers generally are determined by the Board of Trade.
- (d) In the case of Municipal Electrical Authorities, loans for extensions or for new projects have to be submitted to and sanctioned by the Local Government Board, or in the case of the County of London, by the London County Council. These authorities confine themselves mainly to a consideration of the financial position of the local authority, and the financial record of the undertaking, or to questions affecting lands, and have little regard to the efficiency or suitability of the projected expenditure.

There is no authority at the present time, nor is there any effective legislation which empowers any authority to ensure that the best system shall be adopted in the national interest in any district.

- (e) Electricity supply is of such vital importance to the military needs, and the industrial welfare of the nation and to future economy of coal, that the Committee feel it is essential that the direction of all matters concerning the future development of this industry should be in the hands of a new and independent Board of Commissioners, free from political control and untrammelled by past traditions. The Committee consider that all questions of extensions, whether municipal or company, interconnection of stations, new Orders, extensions or modifications of existing areas, wayleaves, and all technical questions connected therewith should be decided by this Board, to whom should also be entrusted the general administration of the Electric Lighting Acts.
- (f) The Committee feel very strongly that such a Board should be created *without delay*, so as to be in a position to remove present difficulties and to be prepared for the great expansion of electricity supply which must inevitably take place after the war, and to meet in the best way possible the arrears now being accumulated in very many districts.”

11. It has been conclusively proved that a Municipal or Local Government area is not necessarily, and in fact is rarely, the most economical area of electrical supply. The Electric Lighting Act, 1882, provides that powers may be granted thereunder in respect of any area and that a local authority may be authorised “to supply electricity within any area although the same or some part thereof may not be included within their own district,” but in practice applications for Provisional Orders have been generally limited to the area of one local authority. This may be accounted for, in part, by the operation of provisions relating to local authority consent, and, in part, by the prospective operation of provisions relating to purchase.

The state of uncertainty as to whether or not action will be taken under the purchase provisions of the Electric Lighting Act, 1888, and as to their interpretation, has undoubtedly been adverse to the full and proper development of company undertakings subject to these provisions. As the time of purchase approaches, the effect of this uncertainty must be



increasingly felt, and any substantial extension of generating plant by companies owning such undertakings, will become impossible by reason of the difficulty in raising the necessary capital.

Expedients have been introduced into later Acts to enable suppliers to distribute electricity to premises partly within and partly without, or wholly without their areas, and what are termed "Fringe Orders" have been granted by the Board of Trade to authorise this class of supply, but these measures are both inconclusive and unsatisfactory.

12. The right of veto exercisable by Borough, Urban and Rural District Councils in England and Wales and Ireland, and by County Councils and Police Commissioners in Scotland, on the erection of overhead wires, is another factor which has greatly militated against expansion and development, and has raised the cost of the electricity supplied.

13. Owing to the chaos of different systems, and the absence of any attempt to standardise pressures and frequencies, co-operation between neighbouring authorities is difficult and expensive. In London, for example, there are seven railway and tramway systems which generate electricity for the purposes of traction at differing frequencies—one at 50, two at 33½, and four at 25—thus rendering exchange of electricity between them impracticable except at the great expense involved in converting it. Again, there are in the area of Greater London 70 authorities who supply electricity to the public, and own some 70 generating stations, with 50 different types of system, 10 different frequencies, and 24 different voltages.

14. It would be wrong, however, either to minimize the progress which has been made or to attribute the slow progress in certain directions entirely to legislative and administrative mistakes. There are other causes which have retarded electrical progress in the United Kingdom. Manufacturers have been slow to take a public supply of power partly through a mistaken reluctance to being dependent on others for anything they can make themselves. The same tendency has been shown in the past by most of the railway companies. We are glad to notice from the evidence that has been given to us that a change of view is taking place, and that it is generally recognised that in electricity supply there must be more co-operation—less isolation—if the country is to progress with the rapidity which new circumstances demand.

15. The efficiency and wide extension of the gas industry has also to some extent accounted for the fact that electrical progress has been slower than might have been expected, especially in the smaller towns and villages. The most pressing need for electrical development is in those directions in which gas can least efficiently compete. We were glad to hear from important witnesses representing the gas interests that they look forward to more mutual assistance in the future between gas and electricity undertakings in the public interest.

16. The disappointing results shown by some companies cannot be ascribed entirely to legislative restrictions. Serious technical mistakes in some cases led to financial collapse. This made it very difficult to find capital for other enterprises which were technically and economically sound.

17. To sum up as regards the present position, the evidence given before us was unanimous in declaring it to be unsatisfactory, and the opinion of practically every witness was that something must be done and as speedily as possible. Our investigation confirms fully the opinion of the Coal Conservation Sub-Committee and the Electrical Trades Committee regarding prevailing conditions, and leads us unanimously to the conclusion that the present state of affairs is contrary to the national interest, wasteful of fuel resources, deprives industries of the advantage which a well devised system of generation and distribution of electricity would give, and thereby handicaps them in competition with other countries.

Future  
outlook.

18. It should be fully recognised that cheap electrical power is a matter of first-class importance, and will in the future be essential to the industrial progress of this country. Concentration of larger generating units in larger and fewer power stations, wherever practicable, is urgently required in order to reduce the cost of industrial power to a minimum, and to conserve coal and get the fullest value from every ton consumed.

19. Where power is distributed electrically from central stations, the capital required for starting new industries will be considerably less than where such power does not exist. Intending manufacturers need not expend capital on a separate prime-mover. They can at much less expense instal an electric motor or motors and can add further motors as the business develops. Available building space can be better utilised, and where individual electric drives are employed, lighter and cheaper buildings may be erected.

20. The Coal Conservation Sub-Committee's investigations have shown that in the United States of America the amount of power used in industries, expressed in terms of the number of operatives employed, is greater than in this country. In practically all our industries, the horse-power per operative could be increased with advantage both to capital and to labour, as is shown by the results obtained in the United States of America, where both the "net output" per operative employed and the standard rates of wages are higher. The greater speed of machine tools, and their control during effective and ineffective parts of any particular operation, enable not only a larger return to be obtained upon the capital invested, but also enable the operator to produce more in a given time. Electric power has a great advantage in its facility of application, range of speed, &c., possessed by no other form of power. The provision and utilisation of cheap power is one of the best methods for enabling increased wages to be earned, while its more extended use, assuming it be produced cheaply, assists the manufacturer to meet increasing cost of labour.



21. There are to-day about 600 bodies generating electricity for public purposes, apart from the large number of manufacturers, collieries, and others generating their own power. We have no doubt that these separate stations can be reduced to a relatively small number in the course of time, and that the country will greatly benefit thereby. Past and present conditions have encouraged manufacturers to set up small independent installations, in the belief that it is cheaper to generate electricity themselves than to buy it from existing public electricity undertakings. Most of these independent small plants involve an unnecessary expenditure of capital and comparative waste of fuel and labour. The parochial system of generation and distribution should give place to more economical methods, involving wider areas of distribution and the combination of diverse kinds of industry in order to obtain the fullest use of larger generating plant. It may be laid down as an axiom that, in order to ensure a cheap supply of electric power for all consumers in industrial districts, all should unite in taking their supply from a common system.

22. After the war the position of delayed extensions of generating plant and mains throughout the country will require immediate attention, especially as the greater number of stations are now working without spare plant. There is also an accumulation of new business requiring a supply, but not yet connected to the distributing mains, while the rapid development of electrical furnaces is overtaking some existing stations. Unless on the termination of the war there is the necessary organisation ready and prepared for developments on right lines, there will be a perpetuation of present disadvantageous conditions. The evil will grow until it is beyond remedy. Thus the matter is urgent, and it may well be that our industrial future depends greatly upon a wise and farsighted decision at this time.

23. Our land is not favoured by immense available water power as in Canada, the United States, Norway, and elsewhere, but, having in view the volume and comparative concentration of our industries, which will enable losses in transmission of electricity to be minimised, there is every reason to believe that with well situated modern generating stations, based upon coal as fuel, and by the pooling and centralisation of electrical generation, we shall be able to compete with many places where water power is used, and at least to equal in cheapness of power most of our foreign manufacturing competitors.

24. We have been impressed by the evidence placed before us in regard to the North-East coast system. The costs of the electricity delivered over this wide area bear out in practice the contention as to the advantages to be gained by centralisation of the control of generation and main transmission over large areas. There are instances in the country of low costs in small areas where the load is very concentrated, but the object to be kept in view is not merely to have exceptionally low costs in one or two small and specially favoured spots, but rather to have the same or lower costs available over wide industrial areas.

25. In the Coal Conservation Sub-Committee's Report it is pointed out that the tendency hitherto has been to take into account the immediate future, rather than the position over a period of years, and to consider local conditions rather than the national interests. We cannot emphasise too strongly our opinion that it is necessary to take a comprehensive view of the situation, and that it is of paramount importance that a cheap and plentiful supply of electricity should be available over the widest areas possible.

26. It may be well to set out some of the conditions governing a cheap supply. They comprise:—

- (1) Combined generation within suitable areas.
- (2) Well-situated stations, having regard to condensing water, fuel, and distance from consumers.
- (3) Modern and large units of generating plant.
- (4) Uniform standards of system, frequency and pressure, so far as now practicable.
- (5) Greater freedom for overhead wires and wayleaves.
- (6) Good technical and business management.
- (7) Adequate and cheap capital.

To the above might be added reduced valuations for rating purposes, especially in the case of transmission lines, and the economies which may be obtained by gasification of coal and recovery of by-products in certain districts.

27. The terms of our reference require us to report "What steps should be taken to ensure that there shall be an adequate and economical supply of Electric Power for all classes of consumers in the United Kingdom, and particularly industries which depend upon a cheap supply of power for their development." Electricity  
Commissioners.

28. If it had been possible in the light of present day experience to work upon a clean slate, it would have been comparatively easy to devise a scheme under which a central authority should fix standards and supervise a national and uniform system of generation and supply. We are, however, faced with the existence of a patchwork system and must endeavour, as best we may, to adapt it to new and improved conditions.

29. The general consensus of the evidence given before us was that the need for the creation of one central authority to regulate generation and distribution of electricity in Great Britain and Ireland is urgent, and that in the national interest steps should immediately be taken to establish it. With this view we are in complete agreement. This new authority, we suggest, should be known as "The Electricity Commissioners." The powers connected with the generation and supply of electricity, at present exercised by the



Board of Trade, Local Government Board, Local Government Board for Ireland, and Scottish Office, should be transferred to the Commissioners. Many of our witnesses were strongly of opinion that the new authority should be independent of any existing Government Department and of Parliament. We cannot entirely concur in that view. Our recommendation is that the Commissioners should be appointed by the President of the Board of Trade, and that they should be in direct communication with him, and through him responsible to Parliament. We are of opinion that the Commissioners should be endowed with very full powers. We feel that their duties should not be confined to framing and administering regulations and deciding questions brought before them, but that they should include the *encouragement* of the supply and distribution of electricity.

30. It is essential that the Commissioners should be men of high standing and ability. Our recommendation is that they should in the first instance be five in number. Three of these Commissioners should be appointed on the terms that they should not hold office beyond the age of 65; that they should have substantial salaries, not less than £3,000 per annum; and that their whole time should be given to the service. They should also have adequate pensions. The ordinary Treasury scale of pensions does not appear to be suitable in this case. The other two Commissioners might be appointed for a short term of years, and neither the age limit of 65, nor the right to a pension need apply to them. Engineering qualifications and business experience of the highest order should be represented in the personnel of the Commission. The staff employed should include a Secretary and such electrical engineers and inspectors as may be necessary. The work falling on the Commissioners at first, and for some years, is likely to be heavy, but it is probable that later three Commissioners will suffice. We think the whole expenses of the Electricity Commissioners might be recovered from the electricity undertakings of the country by a charge levied upon them *pro rata* to revenue.

Organisa-  
tion in  
New Areas

31. As soon as possible after their appointment the Commissioners should proceed to delimit suitable electrical districts. The Report of the Coal Conservation Sub-Committee suggested that Great Britain should be divided into some 16 districts, in each of which there should be one authority dealing with all the generation and main transmission. It should be borne in mind that, even after the creation of large new stations, all generation in a district would not take place in one station. There are, depending on the circumstances, limits to the distance of economical transmission, whether by underground mains or overhead wires. There would probably be, in course of time, in a district which included industrial areas, several new generating stations, the sites of which would have to be carefully chosen with due regard to all the circumstances. These would be linked up with one another, and with existing stations, unless or until the latter were superseded as being uneconomical.

We do not express an opinion as to any exact number of districts, preferring that the Commissioners should have a free hand; but we are of opinion that they should in most cases be large, and cover ultimately the whole of Great Britain and Ireland. The great industrial districts should first be dealt with and especially those in which there is now no combined supply. It will not be necessary in the first instance to delimit districts in portions of the country where no important electrical development can immediately be anticipated, but it appears to us that whatever developments take place meantime in any area which has not yet been made part of a delimited district, should be so regulated as to fit in, so far as possible, with the national system.

32. When the Commissioners have provisionally delimited a district, it will be necessary to hold a local enquiry in order that those interested may be heard. Thereafter the Commissioners should fix the boundaries of the district, but power should be reserved to them to modify or alter the boundaries at some future date if, owing to unforeseen developments, and upon representation from those interested, it appears desirable to do so.

33. We do not attempt to decide which areas should be dealt with first as regards reorganisation of the supply. We may, however, point out that the question is evidently very urgent in the Lancashire district, where interconnection of existing generating stations has already been considered, although it has not been possible to carry it out. The same urgency applies to the area around and including Birmingham, and to certain Yorkshire industrial districts. In London the matter has been pressing for a considerable time; indeed ever since 1905, when the question of reorganisation of the supply was raised in Parliament.

34. At the present time there are several different classes of undertaking, which may be found in any large area, namely:—

- (1) Local authority, whether a Corporation or District Council.
- (2) Electric lighting company.
- (3) Power company.
- (4) Tramway company.
- (5) Railway power station.

In most areas local authority undertakings, or those of electric lighting companies with a limited franchise, predominate. In some areas power companies give most of the supply.

35. While some localities, or the large towns in them, may already be well served by existing undertakers—company or municipality as the case may be—in practically every instance, some important change will be found to be necessary, in order to secure the cheapest possible supply. It is important to remember that the existing business represents but a small proportion of the business yet to be done, and that, in order to obtain this additional business, it is essential to secure the highest economy in production.



36. Municipalities in some cases have desired power to supply electricity to areas outside the borough boundaries; but the complications involved in extension of areas of municipal supply so as to cover the area of other towns, or other local authorities, are great. We do not think a satisfactory solution of the problem can be found along these lines, viewing the matter from a national standpoint, and in the interests of consumers generally.

37. We have given much consideration to the possibility of finding a solution which might unite, without altering, existing undertakings, and provide for new generating stations under Joint Boards. But the influence of local susceptibilities, the divergence between those whose tenure is permanent and others whose tenure is limited, added to the difficulty of raising new capital in such circumstances, convince us that the most satisfactory scheme must be based upon single ownership in each district of the generating stations and main transmission system. **Ownership**

38. After full consideration we have come to the conclusion that in the national interest, generating stations and main transmission lines ought, as a general rule, to be publicly owned, and for this purpose a District Electricity Board should be set up in each of the districts when constituted, to which the generation and main transmission system should be transferred. The Order of the Commissioners which delimits the district should incorporate the District Electricity Board.

39. We recommend that District Electricity Boards should be established:—

- (a) To acquire all the generating stations and main transmission systems within their districts (excepting stations for private supply).
- (b) To link up and develop the supply of electricity.
- (c) To erect new stations as and where necessary.
- (d) To acquire and utilise wherever practicable surplus electricity and waste gas and heat and other sources of power.

40. We are of opinion that District Electricity Boards should have power to acquire generating plants of magnitude at present owned by railways, tramways, or other public utility concerns, and that the supply to these undertakings should be combined with that to other consumers of power. Main line electrification may not take place immediately, but will undoubtedly come. Meantime, large extensions of the use of electric power for railways in connection with urban, suburban, and special goods traffic, are imminent. The importance of combining the supply to railways, tramways, and other classes of consumers, is beyond doubt, and we believe that each of them will benefit thereby. Combination will also save duplication of capital expenditure on reserve generating plant which would otherwise be necessary.

41. We quote the following from the evidence of witnesses connected with the railways—

Sir John A. F. Aspinall, General Manager of the Lancashire and Yorkshire Railway, representing the Railway Companies Association:—

Q. At any rate, the principle as I understand it—and I am a layman—is that you get a better result for the railways and for the public if you can combine the load of both?

A. Yes.

Mr. Roger T. Smith, Electrical Engineer to the Great Western Railway, representing the Railway Executive Committee:—

Q. If you have a combined load of Railway Companies and other concerns, you can generate more cheaply on the whole?

A. Certainly, the greater the pooling of loads, the better the effect on cost.

Mr. Philip Dawson, Consulting Electrical Engineer to the London, Brighton and South Coast Railway, representing the Railway Executive Committee, stated as follows:—

“We fully appreciate the great benefits to be gained by cheaper electricity, by the centralisation of supply in super-stations, and we should be glad to assist this movement in every possible manner, provided our interests as regards procuring a safe, cheap and regular supply, are not prejudiced thereby.”

42. Except in the case of public utility concerns, it is not our suggestion that there should be restrictions in regard to ownership or the setting up of private installations, where electricity is generated for the owner's own use, and not for sale. We apprehend that if the supply of electricity over wide areas is properly organised, very few private generating plants are likely to be installed. We are, however, of opinion that in cases where new private generating plant is installed, it should be subject to regulations of the Commissioners as to type of current, frequency and voltage, in order that it may fit in with the general system.

43. As regards operation in each of the new districts, some witnesses favoured company operation, others public operation. The former pointed to the need of technical knowledge and business acumen; to the temporary or permanent losses which have to be risked in laying down plant and mains to foster, or in anticipation of, demand; to the necessity of differentiation in price, in addition to the usual scale based on load factor, quantity, distance, and coal prices. They suggested that company management, based on the expectation of profits, is alone able **Operation**



satisfactory to undertake such an intricate and difficult business. On the other hand, evidence was given to the effect that the paramount importance of technical knowledge, business ability, and the necessity for taking risks and facing losses inherent in the present stage of the country's electrical development, were equally associated with publicly operated undertakings, and that this was already exemplified in the case of the larger municipalities.

44. In using the term "operation," we mean it to include the installation and extension of the generating plant and main transmission lines, and the management and working thereof.

45. There are three methods, we think, under which this generally should be carried out:—

- (1) Operation by the District Electricity Board.
- (2) Operation by a company under lease from the District Electricity Board, such company preferably to be composed largely of consumers within the area affected.
- (3) Operation by an existing power company under lease from the District Electricity Board.

46. The method of operation should be decided by the District Electricity Board, and should be subject to the approval of the Commissioners, to whom appeal by those interested may be made. Whichever method is decided upon should apply to the whole district.

47. If the first method be adopted, then, as the object aimed at is the supply of electricity at the lowest possible price, it is essential that the District Electricity Board should make no divisible profit. The Board will, of course, require to provide for repairs, renewals, depreciation, obsolescence, interest and amortization of capital, and may place sums to reserve and carry forward credit or debit balances from one year to another, as may be prudent.

48. We turn now to the constitution of the District Electricity Boards, and realise that in approaching this part of the problem we are dealing with a subject which is difficult and controversial, both on public and financial grounds. The constitution and status of those Boards will necessarily vary according to the amount of financial responsibility undertaken.

49. The transfer, even if gradual, of the whole of the electricity undertakings from their present owners to the Boards will be a large operation, and will involve the raising of considerable sums in future for extensions and new generating stations. It may be necessary to finance the Boards in whole or in part by funds raised with Government assistance, or on the other hand, it may be possible to finance the Boards locally without resort to such assistance.

50. In dealing with so big and complex a problem, we think it would be a mistake to attempt to tie the hands of the Commissioners in the preparation of schemes. It is sufficient to give certain general indications as to the broad lines to be worked along by them, and then to leave them a free hand to deal with the variety and complexity of the situations they will undoubtedly meet with in each district.

51. Boards might be of three types:—

- (a) Nationally financed.
- (b) Locally financed.
- (c) Mixed Boards, *i.e.*, a combination of (a) and (b) in varying proportions.

In every case we strongly recommend that the Boards shall be as small in size as possible. We believe that this policy will tend to secure the selection of the most suitable persons and will otherwise conduce to efficiency.

52. Having in view that our main recommendations are based upon the principle of combination, we are of opinion that a District Electricity Board should be composed as follows:—

- (I.) *Boards which are nationally financed* should be composed of representatives of—
  - (a) local authorities and companies which are at present distributors of electricity,
  - (b) large consumers,
  - (c) railways using electricity within the district of the Board.

- (II.) *Boards which are locally financed* should be composed of representatives of—
  - (a) local authorities, whether distributors of electricity or not,
  - (b) companies which are at present distributors of electricity,
  - (c) large consumers,
  - (d) railways using electricity within the district of the Board.

(III.) *Mixed Boards* should be composed of representatives of the interests mentioned in (I.) or (II.) as may be determined by the Commissioners, according to the relative proportions of financial support provided from local and national sources respectively.

53. One of the duties of the Commissioners when holding a local enquiry would be to find out whether the necessary capital would be raised locally. The various interests desiring to be



represented on the District Electricity Board would have to state what financial responsibilities they were prepared to undertake and on what terms.

54. In the case of District Electricity Boards which are *nationally financed*, we do not attempt to fix the number of representatives of each class, but we are of opinion that such Boards should be composed of representatives of the various interests as referred to below:—

- (a) The local authorities now supplying electricity within the electricity district should have a number of members representing them upon the Board, which number should be determined by the Order of the Electricity Commissioners. Their selection should be by ballot of an electoral body nominated *ad hoc* by the several authorities every three years. The electoral body should consist of one representative nominated by each local authority now supplying electricity, the whole or the greater part of whose district is within the boundaries of the electricity district. Where the electricity consumed within the area of any such local authority exceeds a number of units to be fixed by regulations made by the Electricity Commissioners, the authority would be entitled to an additional representative or representatives. The representatives thus nominated should, under the supervision of the Electricity Commissioners, and in accordance with regulations made by them, proceed to elect by ballot the prescribed number of persons to serve on the District Electricity Board. This duty accomplished, the electoral body will have completed its functions.
- (b) So long as there are within the electricity district companies (including power companies) distributing electricity, they should, in our opinion, be represented on the District Electricity Board practically in the same way as local authorities. The number of their representatives would be fixed by the Order with some regard to the relative consumption of electricity, and the method of election would be by an electoral body formed under regulations of the Electricity Commissioners.
- (c) We suggest that every consumer taking electricity for his own use, either from the Board directly or from a local authority or company supplied by the Board, and paying £200 per annum or over for electricity, should have one vote for each £200 paid, and that these consumers should elect a number of members of the Board, which number should be fixed by the Order in each case, having regard to the circumstances of the district. Regulations under which consumers elect their representatives should be framed by the Electricity Commissioners.
- (d) In addition to the members representing local authorities, distributing companies and consumers, we recommend that one or more members should be nominated, under regulations made by the Electricity Commissioners, by the Railway Companies using electricity within the electricity district.

Power should be given to the Commissioners to fix by Order the proportion of the representation of each interest in a district. To ensure continuity of direction, members of the District Electricity Boards should be elected for six years; and where more than one member represents any class of interest, all such members should not retire at once. Occasional vacancies should be filled by co-option.

Bodies entitled to separate representation would have no vote as ordinary consumers.

55. If a satisfactory scheme for a *locally financed* or mixed Board is proposed for the district and accepted by the Commissioners, when settling the proportion of representation of each interest on the Board they would necessarily take into account the financial responsibilities undertaken by those bodies which become responsible for providing the capital to buy out existing generating stations and/or undertakings, and to construct new stations and main transmission lines.

Subject to our general recommendation that there should be one comprehensive system for the generation and main transmission in each district, it may be advisable in an exceptional district, the outstanding feature of which is an undertaking, whether municipal or company, already supplying power on a large scale and over a large area and able and willing to develop that supply at its own risk, that the municipal authority or the company, as the case may be, should continue, subject to conditions laid down by the Commissioners.

56. District Electricity Boards should be charged with the following, among other duties:—

- (a) To acquire all generating stations within the district, belonging to local authorities, electric lighting companies and power companies. They should also have power to acquire similar stations belonging to railways, tramways, dock and other public utility undertakings. In exceptional cases, where the generation is trivial in amount, or where the undertaking is so situated as not to lend itself to a general scheme of generation and supply, the Electricity Commissioners may, on the request of the District Electricity Board, exercise a dispensing power either temporary or permanent.
- (b) In the case of generating stations belonging to local authorities, electric lighting companies and power companies, all should ultimately be taken over by the District Electricity Board—good and bad. We recommend that the terms should generally be payment of the actual amount expended on lands, buildings, and plant for generating purposes, less depreciation, reserve funds, renewal funds, and sinking funds which have been provided, and which are properly applicable to the generating stations. Exceptional cases may require special treatment.

Powers and  
Duties of  
District  
Electricity  
Boards.



- (c) In the case of railways, tramways, docks and other public utility undertakings, the District Electricity Board should have power to take over the generating stations on the basis of the actual amount expended on lands, buildings, and plant for generating purposes, less depreciation, reserve funds, renewal funds, and sinking funds which have been provided and which are properly applicable to the generating stations. An undertaking should in such cases be given that electricity will be supplied to them at least as cheaply as they could have produced it themselves in similar circumstances of coal, labour, and other costs, including capital charges, with their existing plant and output.
- (d) The District Electricity Board may realise any generating stations taken over which are not required, and, according to the anticipated requirements of the district, will acquire new sites, and by themselves or their lessees, but at the cost of the Board erect new stations, and lay new main transmission lines, subject to the general regulations of the Electricity Commissioners.

(e) With regard to distribution systems:—

In the case of the local authorities, the distribution system may be acquired on terms similar to those proposed in respect of generating stations, in cases where distributors wish to discontinue.

In the case of electric lighting companies, distribution should either be transferred to the District Electricity Board on terms fixed by agreement, or should remain in the hands of the company until the earliest date at which the concession may be terminated.

In the case of the power companies, in some instances, it may be suitable also to buy their distribution system by agreement. Where the District Electricity Board acquires a distribution system, the Board should have, in addition to the powers of the power company, the right to distribute energy for lighting, as well as power, in those places where there is no lighting supply. Where the distribution system is not acquired it would be desirable, in some instances, to lessen the area of distribution, so as to cut out districts not now served which can be better reached from other centres. In return for this limitation, the power companies might be given the right to supply electricity for lighting, as well as for power, where there is now no lighting supply. In the case of power companies which have never operated, their powers should lapse, unless otherwise determined by the Electricity Commissioners.

In all cases where the distribution system is not acquired, the District Electricity Board must undertake to supply the distributors with electricity at least as cheaply as they could have produced it themselves in similar circumstances of coal, labour and other costs, including capital charges, with their existing plant and output. Any disagreement on this point should be settled by the Electricity Commissioners.

- (f) Except in the case of the transfer of undertakings owned by local authorities, in which case the purchase price should be discharged by a terminable annuity to be used by the local authority in discharging their loan obligations, payments should be made in cash, which, in the case of nationally financed Boards, would be provided by issues of Electricity Stock.
- (g) It is essential that the necessary capital should be raised as cheaply as possible, and that, in the case of nationally financed Boards, such competition be avoided as would be involved were separate issues made by District Electricity Boards. For this reason, it is our opinion that, in the case of nationally financed Boards, capital should preferably be raised by the issue through the Treasury of Government Electricity Stock. A request for a loan should, on being approved by the Electricity Commissioners, be passed on to the Treasury, who should issue the necessary amount of Government Electricity Stock, charging the District Electricity Board with the expenses incurred. The Commissioners should, in all cases, make suitable provision for a sinking fund, but allow a reasonable period for development before requiring payments to be made into the fund. Any risk of loss by the Government could only arise in respect of nationally financed or mixed Boards, and the risk would, we think, be small.
- (h) No powers of compulsory purchase by local authorities under the Electric Lighting Act, 1888, or otherwise, should be exercised without the consent of the Electricity Commissioners. The power of purchase should be vested in the District Electricity Boards, as soon as they are created.
- (i) The District Electricity Boards should have powers of laying main transmission lines throughout their areas, and powers of distribution in all parts of their areas where there is now no public supply.

57. In order to ensure that the business of the District Electricity Boards is conducted under proper financial safeguards, provision should be made for:—

- (a) The submission by the District Electricity Board, for the approval of the Electricity Commissioners, of all specific proposals for capital outlay, with estimates and plans, when these proposals exceed a certain sum.
- (b) The submission by the District Electricity Board to the Electricity Commissioners of an annual budget of income and expenditure on revenue account.
- (c) The audit of the District Electricity Board's accounts by an auditor appointed by the Electricity Commissioners.



- (d) The fixing of charges for electricity so as reasonably to ensure financial equilibrium; and reserving power to the Electricity Commissioners, in certain eventualities, to give directions as to the charges to be made.
- (e) An annual report to be made to the Electricity Commissioners of the proceedings of the District Electricity Board.

If thought necessary, provision could be made for Treasury representation on Boards which are nationally financed.

58. In the foregoing paragraphs we have sketched the constitution and functions of a District Electricity Board. We do not, however, attach undue importance to details concerning method of election, exact proportion of representation, &c. In formulating our scheme we have provided for districts in which District Electricity Boards are charged with operation as well as ownership, but in any instance where operation is transferred to a company, we think the same constitution for the District Electricity Board should be maintained. The Board will still have important functions to perform.

59. In cases where operation by a commercial company may be found preferable the District Electricity Board may lease their undertaking on terms to be approved by the Commissioners. As already stated in paragraph 45 such a lessee company might, and perhaps should, preferably be composed largely of consumers receiving a supply in the district, as in this way community of interest is secured as regards price and dividend. Leases.

60. In cases where the interests of an existing power company are very large, and where they have demonstrated their ability to discharge their statutory obligations with satisfaction to the consumers, such a power company may be selected to work under lease.

61. We do not enter in detail upon the relations between a District Electricity Board and a lessee company, nor upon the terms and conditions of any leases which may be arranged. It may, we think, be taken for granted, that the District Electricity Board and the Electricity Commissioners, with whom on appeal the ultimate decision rests, will have due regard to the public interest. We think, however, that in the case of a lease to an operating company, it is essential to the efficient working of the undertaking that the company shall have power, and it should be their business, on behalf of the Board, to instal new plant and to decide upon and carry out extensions, subject in all respects to the approval of the District Electricity Board, and, in case of difference, to the decision of the Electricity Commissioners. Without departing from the principle of public ownership, we think such a lease might provide for part of the capital being found by the lessee company.

62. The terms of any lease should provide, *inter alia*, for the regulation of the amount of the distributable profits by the imposition of a sliding scale, a system of rebates to consumers, or otherwise, as may seem best calculated to secure a community of interest between the lessees and consumers. In fixing a sliding scale, a system of rebates, or otherwise, regard should be had to increased economy in generation and increased output per head of the population of the area.

63. There are a number of precedents in other countries for the operation of electrical undertakings by lessees. In this country the law has hitherto made little provision for this method of operation. Tramways may in every case be leased with the consent of the Board of Trade, but the lease of the smallest electrical undertaking has hitherto required a special Act or Order.

64. Our attention has been directed by several witnesses to a scheme of public ownership and company operation which was prepared by the London County Council and deposited as a Bill in the Session of 1915, but not proceeded with. There is no part of the United Kingdom in which combination in supplying electricity is more urgently required in the public interest. It is to be regretted that both the municipalities and the companies operating in the County of London have made so little use of the existing facilities for combination given to them in the Acts of 1908 and 1910, and we are of opinion that more drastic steps than those proposed by the London County Council in 1915 are now called for.

65. We have already touched on the subject of distribution; but we think it well to state our opinion that, if the supply of electricity were being commenced *ab initio*, it would be found best for generation and distribution to be conducted by one and the same body. In present circumstances, however, our view is that distribution, especially in the case of the larger towns, should generally be left in the hands of present distributors, unless they wish to transfer it. There may be cases in a distribution area, where it would be advantageous and economical if the District Electricity Board, or their lessees, supplied large consumers direct from their high tension mains. The object to be kept in view is the cheapest possible supply of electricity for industry, and where any difference arises in regard to such cases, the Electricity Commissioners should have power to settle them in an equitable and proper way. The majority of the Committee are of opinion that municipalities and other local authorities should distribute electricity without seeking to make a profit for the relief of local rates, and those members of the Committee who do not concur in this view, think that such profits might be limited to a small percentage. We think it is undesirable to hamper industry by overcharging consumers of electricity for the benefit of other ratepayers. Distribu-  
tion.

66. Every Electric Lighting Order fixes a maximum price, and Company Orders empower the Board of Trade to vary this price from time to time. This power has rarely been called into operation, but when it is transferred to the Electricity Commissioners, it should be extended and Regulation  
of price  
and  
facilities,



used so to regulate prices from time to time, by means of a sliding scale, rebates, or otherwise, as to secure to consumers a proper proportion of the benefit of the reduction of cost due to the combination of generation. It will be desirable to fix lower maxima for power than for lighting purposes.

67. We have already dealt with the supply to the large consumers. The distributor, whether a local authority, a company under the Electric Lighting Acts, or a power company, should have the right to a supply from the District Electricity Board on arbitration terms. We also propose that in those areas where the power companies continue to exist as distributors, an authorised undertaker should have the same right as a consumer now has against the power company to require a supply on arbitration terms. The Electricity Commissioners would be the arbitrators in every case. Once the principles on which they acted became known, differences would generally be adjusted by agreement.

68. The Electricity Commissioners should have wide powers, on the application of any District Electricity Board, to order any distributor to give reasonable facilities including the establishment of new works of conversion or transmission within their area. In any case where a distributor is unable or unwilling to obey such an order, the Electricity Commissioners should have power to order either that the distributor's undertaking should be transferred to the District Electricity Board on the terms of the Electric Lighting Act, 1888, or that the District Electricity Board should have the power to supply directly for power purposes in the distributors' area.

69. We feel, however, that no penal provisions are likely to be so effective as co-operation between the engineering staff of the District Electricity Board, or its lessees, and that of the distributors. The District Electricity Board, or its lessees, should be advised by engineers of the highest standing, whose advice and assistance should be available in connection with the distribution as well as the generation of electricity. The distributors must recognise that distribution is as important as generation and requires the same skilled technical direction. It would be a fatal policy if the distributors were to attempt to cut down their engineers' salaries, just when the new and cheaper bulk supply ought to make them busier than ever.

**Compensation for loss of Office.** 70. Although under our proposals and the development which may be expected to flow from them, there should be new and improved openings for engineers and other officials, we think provision should be made by which District Electricity Boards may provide compensation for displaced engineers and other officials in cases of hardship.

**Procedure.** 71. We have carefully considered how far the decisions of the Electricity Commissioners should be final. We are of opinion that they should have considerable powers to make final Orders, and that new Orders authorising the supply of electricity under the Electric Lighting Acts in areas with a population of less than 5,000 should not require confirmation by Parliament. This would enable the many non-statutory undertakings which exist, especially in small towns in Ireland, to be put on a legal basis at small cost. But where an Order is proposed to be made incorporating a District Electricity Board, or extending the area of such Board, which involves changes of magnitude or the compulsory taking of important publicly-owned, company-owned or private property, those affected should have a right to appeal to Parliament, or to such a sanctioning authority as has been recommended by the Committee presided over by Mr. Leslie Scott, K.C. Pending the creation of such a sanctioning authority or other change of procedure, we recommend procedure by Provisional Order. We suggest, as recommended by the Committee presided over by Sir George Murray, that the Provisional Order need not go through all the stages of legislation. If unopposed, it should become law after the lapse of a fixed time. If opposed, the Order prepared after a full enquiry by the Electricity Commissioners should be referred to a joint committee of the two Houses of Parliament so as to minimise the loss of time and money.

**Finance.** 72. We have already stated our views as to the method by which new capital should be raised. It may be interesting to give an approximate statement of the capital invested in public electricity enterprises. The figures given below are those applicable to the year 1916. There were at that time 230 companies and 327 local authorities operating undertakings under statutory authority for the supply of electricity to the public. Their capital expenditure had been :—

Companies	...	...	£36,000,000
Local Authorities	...	...	55,000,000
			<hr/>
			£91,000,000

A large percentage of this total has been expended on the distribution systems, which in most cases will not be transferred. Investigations which have been made in numerous cases show that, while the percentages vary greatly, the average percentage of expenditure on lands, buildings, and plant for generating purposes is a little under 50 per cent. of the total. As it is proposed that the District Electricity Boards shall pay for generating stations owned by local authorities by way of terminable annuity, no cash or issue of Electricity Stock would, in their case, be involved.

73. With regard to companies, we have already suggested that payment for what is acquired from them should be defrayed out of the proceeds of sale of Electricity Stock. We cannot estimate closely the sum that may be involved, but where the generating stations only are required, the proportion to capital expended will be about the same as in the case of local



authorities. It should be noted that of the £36,000,000 mentioned above, about £10,000,000 was expended by power companies under special Acts, giving them unlimited tenure. In addition to the above figures, a substantial sum has been expended by railway and tramway companies on generating plant. We are not in a position to give the figures. They will not, however, amount to a large sum compared with the figures we have named.

74. The cost of the developments undertaken during and immediately after the war will be greatly enhanced by the abnormally high cost of materials. It is generally expected that high prices will prevail for some time after the conclusion of peace. The postponement of all developments until a time when prices have receded to what may be considered a normal level would, in our judgment, be most regrettable. The provision of adequate electric power is required for the resuscitation of industry. The problem caused by abnormal costs of new work, we think must be faced. The benefit of industrial activity in the years immediately following the war will be of immense importance to the nation, and anything that contributes to it will be of general advantage. We therefore recommend that the Government should go a long way in giving financial assistance, so that installations which are shown to be urgently required, and which are undertaken during a time when the cost of manufacture and erection is admittedly abnormal, should not be unduly burdened by charges for interest and amortisation. We refrain from suggestions as to what form this assistance should take, but we would emphasise the vital importance of the matter. Cost of New Developments.

District Electricity Boards should have power to pay interest out of capital during periods of development, subject to the approval of the Electricity Commissioners.

75. It should be an important duty of the Electricity Commissioners to fix standards of system, frequency, and pressure, for the whole of the United Kingdom. But regard must be had to existing varying conditions, and uniformity in some districts can only be achieved gradually. Standards

76. We are strongly of opinion that the legislative restrictions with regard to the use of overhead lines should be removed or amended. Under Section 14 of the Electric Lighting Act, 1882, undertakers are prohibited from placing electric lines above ground, in, under, or along any street without the express consent of the local authority, and under Section 10 (b) of the Schedule to the Electric Lighting (Clauses) Act, 1899, in addition to the consent of the Board of Trade, that of the local authority is also required in the case of companies authorised to supply electricity, with respect to the placing of *any* electric line above ground, that is to say, either in streets or across private property. These provisions apply to all undertakings established under Provisional Orders and Electric Power Acts, but in the case of the Power Acts passed in recent years, there is usually a qualification as regards rural districts, where the consent of the local authority to the placing of electric lines above ground is subject to an appeal to the Board of Trade. Although some local authorities have afforded facilities to companies to erect overhead lines, there are numerous instances where local authorities have attached to their consent very onerous conditions or have absolutely refused to give it. Overhead Lines.

77. The future development of electricity in many districts will depend largely upon facilities being granted for the use of overhead lines, and it is of vital importance that restrictions which exist at the present time should be removed or amended. It will not only tend to cheapen the supply to consumers in industrial districts, but will also be an important factor in developing the use of electricity for agricultural purposes.

78. The powers of the Board of Trade which would be transferred to the Electricity Commissioners, should be a sufficient protection against overhead lines being placed along routes which are undesirable. Whilst we realise that the local authority should have a voice in regard to such matters, we are of opinion that their absolute veto on the construction of overhead lines should be abolished.

79. Further facilities should be afforded for the placing of electric lines, either underground or overhead, across private property. Undertakers are at present dependent on obtaining wayleaves from owners or lessees. This restriction has been found in many instances to result in difficulties in arranging for suitable routes across country, owing to the arbitrary action of landowners and lessees in absolutely refusing to consider applications for wayleaves or in demanding exorbitant rents, or making unreasonable conditions. One landowner or lessee is thus in a position to compel an electric supply authority to make alterations in route in respect of which consent had been obtained from other landowners, or even bring about the abandonment of the proposed supply, owing to the heavy additional costs which would be incurred by having to adopt a more circuitous route. We suggest that powers should be given to the Electricity Commissioners to authorise the placing of electric lines over, under, or across any private lands, and that the compensation should be assessed by arbitration after the work has been done, in the same manner as compensation is assessed for the laying of sewers under the Public Health Acts. The existing statutory provisions for the protection of telegraphic and telephonic wires should be revised with a view to modifying the present restrictions. Wayleaves

80. The local rating system as applied to electric transmission mains must greatly, and, we think, unjustifiably interfere with the supply of cheap power and enhance its cost. As the use of electricity has come in since the Acts on Valuation and Rating were framed, it seems necessary that they should be revised. Their application to electricity undertakings and appliances should be settled on economically sound principles and clearly defined. The matter is one which calls for the immediate attention of the Government. Rating.



**Water Rights.** 81. The importance of water for condensing purposes cannot be over-estimated, and facilities should be afforded for the acquisition on equitable terms of rights to use water, other than potable, particularly from canals and other navigable waters.

**Liability for Nuisance.** 82. We think that the Electricity Commissioners should have power, after giving the local authority and owners of neighbouring property an opportunity to be heard, to order that any generating station, whether acquired by the District Electricity Board or constructed by them in the future, should be free from liability for nuisance in the absence of proof of negligence. The Commissioners would impose such conditions for the protection of surrounding property as they might think reasonable.

**Sources of Power.** 83. The question of the most economical sources of power for the generation of electricity may be within the terms of our reference. We have not, however, investigated the subject at length, being of opinion that it will obviously be part of the duty of the District Electricity Boards under the Electricity Commissioners, to consider and make use of the most economical source of power according to the circumstances of each district, whether water power, coal, gas, coke, waste heat, peat or oil. Recent scientific investigations indicate that we have not reached finality as to the best use of various fuels, and that opinions formed now may require to be revised from time to time in the light of future knowledge.

**Ireland.** 84. It was the unanimous opinion of the Irish witnesses from whom we received evidence, that sources of power other than coal had an importance in Ireland that did not obtain in Great Britain, and that, it is desirable that a thorough investigation should be made of these matters from the point of view of the supply of cheap electricity at an early date. In this we concur.

85. From evidence before us, we are of opinion that the administrative areas for Ireland, under the Electric Lighting Acts, should be the Urban Districts and Boroughs, where these have a population of over five thousand, and elsewhere, the County Councils. The powers now vested in Rural District Councils and in the smaller Urban District Councils should be transferred to the County Councils.

These suggestions are not intended to conflict in any way with our recommendation that the whole of the United Kingdom should be divided into suitable electrical districts.

**Resulting National Advantage.** 86. The economy in fuel which would result from combined generation of electricity has been dealt with at length in the Report of the Coal Conservation Sub-Committee. They say: "If the coal so saved were used for the production of further power, it would be possible to generate continuously not less than 15,000,000 horse-power, which would more than compensate for the absence of large water powers in this country and admit of the manufacture here of many products which are at present only made in America and on the Continent." (p. 5, par. 10.)

The Electrical Trades Committee in their Report state that the national advantages to be gained from a well planned scheme of reconstruction will be inestimable. They say: "The items which are capable of reasonable calculation such as saving in fuel, reduction in factory costs and increased output, will together represent not less than £100,000,000 per annum," (p. 6), and again, "witnesses of high authority estimate the loss incurred by the nation through failure to take full advantage of electrical progress at not less than £100,000,000 a year, a loss preventable by concentrating generation under improved administration." Any such advantages as are indicated by these large figures must be regarded as highly important, having in view the financial situation which will be created by the great cost of the war, and the international competition which may be expected at its conclusion. We may draw attention to another aspect of the matter. We believe that as a result of the improvements we recommend, and the development which may be expected to proceed from them, the use of electricity for domestic purposes, such as lighting, heating, cooking, and small power, will greatly increase. The cumulative effect of a really cheap supply of electricity, on town conditions in particular, would be most marked. The saving of labour would be great, while the reduction of air pollution by smoke would result in a lower death rate from bronchial diseases and phthisis. The Coal Conservation Sub-Committee quote a statement to the effect that it has been estimated that the measurable damage done to property in Manchester and Salford alone, by smoke, amounts to nearly £1,000,000 per annum. This is equivalent to about £1 per head of the population. It is also stated that the results of a recent similar enquiry in Pittsburg, U.S.A., show a very much larger proportionate figure. Even allowing that only a portion of smoke damage could be avoided, the saving would be large. No doubt changed conditions would only come gradually, but we look forward with confidence to the advantages which a cheap supply of electricity will bring to both the health and the convenience of the community.

**Necessity for Immediate Legislation.** 87. In view of the fact that the numerous investigations of the Reconstruction Committees, and the proposals made by them, must largely depend for their practical effect upon the supply of cheap power, we would in conclusion emphasise the importance of initiating the necessary legislation with the least possible delay.



## SUMMARY OF RECOMMENDATIONS.

88. We desire to re-affirm our preliminary conclusions in paragraph 2 hereof, and, subject to the conditions set out in our Report, our chief recommendations briefly summarised are :—

- (a) That a new body to be called the Electricity Commissioners should be set up, to whom should be transferred the existing powers of the Board of Trade, Local Government Board, Local Government Board for Ireland, and Scottish Office, relating to the supply of electricity, and to whom large additional powers should be given for regulating and encouraging the generation and distribution of electricity (*paras. 29 and 30*).
- (b) That the Electricity Commissioners should, subject to an appeal to Parliament in certain cases, have general control over the generation and distribution of electricity in the United Kingdom (*para. 71*).
- (c) That the existing system under which electricity is separately generated for small areas should be abolished (*paras. 11 and 32*).
- (d) That the Electricity Commissioners should, after local enquiries, divide the United Kingdom into districts technically suitable for the economical generation and distribution of electricity (*paras. 31 and 32*).
- (e) That in each electrical district a District Electricity Board should be set up which should purchase all generating stations of authorised distributors whether local authorities, companies, or power companies (*paras. 37 to 40, 48 to 53 and 56*).
- (f) That the District Electricity Board should be responsible, by themselves or their lessees, for the future generation of electricity in their district and for the establishment of new generating stations and proper systems for the main transmission of electricity in their district (*paras. 44 to 47 and 58 to 64*).
- (g) That existing electrical undertakers should, if they so desire, retain their power of distributing electricity within their local areas, but should purchase electricity in bulk from the District Electricity Boards or their lessees, due provisions being made for controlling the profits of distributors so as to ensure a cheap supply of electricity to consumers (*paras. 65 to 68*).
- (h) That District Electricity Boards should make no divisible profits (*para. 47*).
- (i) That District Electricity Boards should be financed, in whole or in part, by funds raised with Government assistance, except where it is shown to be desirable and practicable to finance the Boards locally (*paras. 51 and 56 (g)*).
- (j) That largely extended powers should be granted for, *inter alia*,—
  - (a) The use of overhead wires.
  - (b) Wayleaves.
  - (c) Acquisition of water rights.
 (*Paras. 76 to 79 and 81*).

89. We desire to bring to your notice the services of our Secretary, Mr. M. J. Collins, who has discharged his duties with zeal and assiduity.

We have the honour to be,

Sir,

Your obedient Servants,

ARCHIBALD WILLIAMSON (*Chairman*).  
 H. BOOTH.  
 J. F. CROWLEY.  
 JAMES DEVONSHIRE.  
 HAROLD DICKINSON.  
 JAMES FALCONER.  
 GEORGE H. HUME.  
 JOHN KEMP.

VESEY KNOX.  
 H. H. LAW.  
 CHARLES H. MERZ.  
 CHARLES A. PARSONS.  
 CHAS. F. SPENCER.  
 WILLIAM B. SMITH.  
 JOHN SNELL.  
 ARTHUR J. WALTER.

M. J. COLLINS, *Secretary*.  
 29th April, 1918.







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