

SOCIALISM IN ACTION

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**THE REORGANISATION  
OF THE  
ELECTRICITY SUPPLY  
INDUSTRY**

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## The Reorganisation of the Electricity Supply Industry

THE official Labour Party Policy on the Electricity Supply Industry is set out in the following Report. The Resolution, which embodies the main principles of the Report, was adopted by the Annual Conference of the Party held at Leicester in October, 1932, subject, however, to one important qualification. In view of division of opinion on the position of the Workers in the Industry in relation to Direction and Management, it was agreed that this particular question should be further examined and reported on.

TRANSPORT HOUSE,  
Smith Square, London, S.W.1.

*November, 1932.*

# RESOLUTION

This 1932 Annual Conference of the Labour Party, believing that the national ownership and control of the Electricity Supply Industry is an essential step in a programme of nationally-planned economic development, proposes:

(1) That Electricity Generation and Distribution should be brought under national ownership and control.

(2) That a National Electricity Board,\* appointed by the Minister of Transport, should be established; and that the Board should be responsible for securing the efficient direction and management of the nationally-owned industry, subject to such Ministerial and other direction as may be provided for by statute.

\* See prefatory note.

# THE REORGANISATION OF THE ELECTRICITY SUPPLY INDUSTRY

(1) It is only since the establishment of the Central Electricity Board, in 1927, that the national planning of the electricity supply industry has become a possibility; and even now, despite considerable progress in certain directions, and notably in the control of public generation, a great deal remains to be done which necessitates much wider powers being conferred on the central authorities. Indeed, the complete co-ordination of generation and distribution on a national scale cannot be effectively achieved without unification of ownership and the power of executive direction which that alone can bring.

## I.—HISTORICAL SURVEY

(2) When the first general Electric Lighting Act was passed in 1882, the use of electric energy for industrial purposes was still in the experimental stage. The cost of generation was high, the problem of economical transmission over long distances had not been solved, and the existing undertakings concentrated entirely or mainly on lighting. Thus there were numbers of small independent undertakings in the centres of population for small areas of supply; and the 1882 and 1888 Acts dealt with the situation as they found it, and gave local monopolies to individual undertakings.

(3) The first stage of development extended, broadly, from 1882 to 1900. By the end of 1900, 639 Provisional Orders authorising supply had been granted by the Board of Trade, of which 119 had been repealed or revoked, and two had not come into operation; and of those in force, 354 were granted to, or held by, local authorities, and 164 were granted to, or held by, companies. In the large towns and industrial districts the powers were exercised by local authorities in the great majority of cases. Meanwhile, considerable technical progress was being made, and the 1882 and 1888 Acts were, in some important respects, ill-adapted to the changing conditions. The practical application of three-phase energy, the development of the electric motor and other technical improvements, rendered possible generation on a large scale at high voltages, with distribution over wider areas. Costs were reduced, and the use of electric energy in industry became a more reasonable proposition.

(4) The second stage of development started, therefore, round about 1900, with the promotion of electric power companies by means of individual Power Acts which embodied for the most part the appropriate provisions of the Electric Lighting (Clauses) Act of 1899. These companies were given powers of supply over wider areas, and could supply energy in bulk to authorised distributors or direct to consumers. Unlike Provisional Order companies, they were not liable to purchase by local authorities; but they could not supply energy in the area of an authorised distributor without the distributor's consent, although provision was made that such consent should not be unreasonably withheld. While their scale of operation was much more consistent with electrical and industrial development, the economic advantages of large-scale supply were definitely limited by the retention of local monopolies in most of the large towns, so that in only a few cases were really comprehensive systems of supply achieved. By the end of the War there were about thirty power companies in operation.

(5) During the War, there was a rapid extension in the application of electric energy to industry, and particularly to the manufacture of armaments and munitions. Actually, the output from authorised undertakings doubled in four years. As the Electricity Commissioners have recorded, "it was

recognised to an increasing extent that an abundant supply of cheap power was almost as essential as labour and materials for rapid and economical production in all forms of industry, and it was only by the aid of electricity and by the ready and efficient adaptability of the electric motor to the tools and machinery used in workshops and factories that the necessarily urgent expansion in the production of munitions was accomplished." At the same time, it was strongly felt that the organisation of electricity generation and distribution was, in many respects, inadequate for modern purposes, and this was emphasised by three important Government Committees appointed during the War to consider various aspects of the situation: the Electrical Trades Committee, the Coal Conservation Committee, and the Electric Power Supply Committee.

(6) The independent existence of many hundreds of comparatively small generating stations supplying restricted areas, with a considerable number of different systems of supply, pressures and frequencies, not only made technically difficult or financially impracticable the linking-up of adjoining undertakings for mutual assistance and interchange of energy, but had other serious results on facilities and cost. The Electric Power Supply Committee pointed out in 1918 that in London, for example, there were some 70 generating stations representing between them 50 different systems of supply, 24 different voltages and 10 different frequencies. As the Electricity Commissioners stated in 1921, "it is now recognised that this lack of co-ordination has resulted in unnecessary expenditure of capital, wasteful consumption of coal, and generally higher charges for electricity than would have been the case had there been larger areas of supply, a greater concentration of generating plant in larger units, and more economically situated power stations. These factors have reacted adversely on the application of electrical energy for power purposes in industry, and owing in many cases to the small size and relatively high running costs of public stations, manufacturers have been compelled in the interests of their business to adopt the unsatisfactory course of installing their own generating plant, thus extending the wasteful system of generation on a small scale in a multiplicity of small stations. Moreover, the adoption of many different systems of supply, frequencies, and pressures has involved the manufacture of corresponding types of electrical plant and apparatus, and thus deprived those concerned of the advantages that would have accrued both in home and foreign markets from concentration on the production of a few standard types."

#### **The Electricity Commissioners**

(7) Following the report of the Electric Power Supply Committee in 1918, the Electricity (Supply) Act, 1919, was passed. In its original form, the Bill proposed to establish regional control under a central body of commissioners, and to create a system by which large generating stations might be provided and the work of interconnection carried out on an adequate scale. Unfortunately, as the British Electrical and Allied Manufacturers' Association has placed on record, "the forces of reaction ruled otherwise, and the Bill emerged from the House of Lords shorn of everything calculated to effect the necessary reforms." Briefly, the 1919 Act provided for the appointment by the Minister of Transport of Electricity Commissioners, not exceeding five in number, to promote, regulate and supervise the supply of electricity, and to exercise powers under the Electric Lighting Acts delegated to them by the Minister; but there were very few compulsory powers.

(8) Provision was made for the creation of electricity districts administered by advisory boards or joint electricity authorities under the control of the Electricity Commission, but no real authority was given to the Commission or to the district boards to compel any fundamental change. The Commission could arrange generation and distribution in the electricity districts, but only

with the consent of the undertakings in the area, and without powers of direction or control over any undertaking which stood out of the scheme. The Commission had, what have proved unsatisfactory, powers generally to fix maximum prices, through the Minister; its consent was required for new power stations and extensions, and for additions to generating plant; it could examine new projects for electrical development; and it could require the compilation of proper statistics. But no power was given to overcome the system of small monopolies, to compel interconnection of existing systems, to require directly an undertaking generating at excessive cost to obtain power in bulk from a more efficient station, or to deal with minimum prices and service.

### Central Electricity Board

(9) It was soon found that co-operative action on a voluntary basis was quite insufficient. Various regional schemes for centralising generation in a relatively small number of large stations, under joint electricity authorities, were investigated; but although some progress was made, it was obvious that compulsory powers were absolutely essential to achieve co-ordination of generation on any comprehensive scale. As a result of this experience, the Weir Committee was appointed, and reported, in 1925. The principal recommendations were that generation should be concentrated in 58 selected power stations, 15 being new, while 432 stations should be closed down; that a high-tension main transmission system should be erected, interconnecting the selected stations and linking up with existing regional transmission systems; and that to carry out this work a central electricity board should be created. As a result of this report, the Electricity (Supply) Act of 1926 was passed.

(10) The 1926 Act provided for the establishment of the Central Electricity Board, the members of which are appointed by the Minister of Transport, as an executive body to carry out schemes of development for the whole country prepared by the Electricity Commissioners. The schemes involve the concentration of generation in a limited number of selected stations, which, although remaining in local authority or private ownership, are operated under the control of the Board. The Board purchases the entire output of these selected stations, and sells it to authorised distributors. The selected stations feed the main transmission system, or "grid," which is owned by the Board, and from which supplies are provided in bulk to the authorised distributors.

(11) The Act has enabled a real start to be made with the national planning of the electricity supply industry; but much more is needed. Thus, private generating plants, which are not subject to control by the Commission or the Board, account possibly for nearly a third of the total electric energy at present generated in Great Britain; there are various disadvantages in the local ownership of selected stations; the position of distribution and sales organisation, which remain in local hands, is on the whole very unsatisfactory; and both the Commission and the Board are handicapped by a number of other limitations on their powers.

## II.—ELECTRICITY PROGRESS IN GREAT BRITAIN

(12) Prior to the War, the largest output in any one year from the 500 or so authorised supply undertakings in the United Kingdom was about 2,000 million units (kilowatt hours); in 1918 the output had reached 4,628 million units. Progress in Great Britain since the War, in respect of authorised undertakings, has been as follows:

Year	Capacity of generating plant installed (thousand kilowatts)	Units generated (million kilowatt hours)	Units sold per head of population
1922-23 ..	3,093	4,541	88
1924-25 ..	3,724	6,022	117
1927-28 ..	5,258	8,451	158
1929-30 ..	6,600	10,400	195

(13) The following figures, issued by the Electricity Commission, show the output of authorised undertakings in Great Britain for recent calendar years:

Year					Units generated (million kilowatt hours)
1927	..	..	..	..	8,234
1928	..	..	..	..	9,073
1929	..	..	..	..	10,294
1930	..	..	..	..	10,914
1931	..	..	..	..	11,402
1932	{	first quarter	..	..	3,185
		second quarter	..	..	3,385

It should be noted that authorised undertakings do not cover generating plant in railways and tramways, certain non-statutory undertakings, nor private generating plant.

(14) In 1931, the total capacity of generating plant in authorised undertakings alone was about 7,027,000 kilowatts, in railways and tramways about 473,500 kilowatts, and in private generating plants about 3,240,000 kilowatts. Including authorised undertakings, railways, tramways and certain non-statutory undertakings, the output was about 12,245 million units; and inclusive also of private plants, between 17,500 and 18,000 million units. Thus, if all the plants were brought under the public system, its output could be increased by nearly 50 per cent., which would be a great advantage in economical generation and distribution.

(15) At March 31, 1931, the authorised undertakings in Great Britain were as follow:

	England & Wales	Scotland	Total
Local authorities .. .. .	347	32	379
Companies and persons .. .. .	247	32	279
Joint electricity authorities .. .. .	3	—	3
Joint boards (representative of local authorities) .. .. .	4	1	5
	<hr/> 601	<hr/> 65	<hr/> 666

Including the Central Electricity Board, which is itself an authorised undertaker, and allowing for two companies with undertakings in England and Scotland, the number of separate undertakers was 665. At the end of 1930, the public authority undertakings had 250 generating stations and the company undertakings 245 stations, a total of 495 stations belonging to authorised undertakings; the railway companies had 28 generating stations, tramway authorities 20, and certain non-statutory undertakings 16; giving a grand total of 559. It is estimated that the total number of generating stations in Great Britain is about 4,400, of which about 2,700 are in industry other than coalmining and have an average capacity of not much more than 960 kilowatts, as compared with an average of over 14,800 kilowatts in public supply undertakings. Of the total units generated by authorised undertakings in 1930, public authority undertakings were responsible for about three-fifths.

### Comparison with Other Countries

(16) It is not surprising, in view of the history of the electricity supply industry and of the competition of the gas industry, which is a factor of considerable importance, that the progress of electricity supply in Great Britain has been less rapid than in other countries where development started later and advantage was taken of the experience gained elsewhere. The report of the Weir Committee of 1925 stated that "generally speaking, we are still to-day neither generating, transmitting nor distributing electrical energy as cheaply as we might, nor are we consuming electrical energy to anything like the same

extent as other highly civilised industrial countries." In support of this statement, the following figures for authorised undertakings were given:

	<i>Consumption per head of population (units)</i>
California .. .. .	1,200
Chicago .. .. .	1,000
Canada .. .. .	900
N.E. States of U.S.A. .. .. .	800
Switzerland .. .. .	700
Tasmania .. .. .	550
U.S.A. as a whole .. .. .	500
Norway .. .. .	500
Sweden .. .. .	500
Sydney .. .. .	161
Shanghai .. .. .	145
Great Britain .. .. .	110

It was estimated that if private generation at that time were taken into account, the British figure would be raised to about 200, but that the increases in other countries would probably be relatively less.

(17) Since then, thanks largely to the efforts of the Electricity Commission and the Central Electricity Board, a material change has taken place and considerable progress has been recorded, although very much more is possible given a properly-planned industry. The following particulars in respect of the United States and Germany relate to all sources of generation; but it must be emphasised that the figures are only very approximate.

U.S.A.			
<i>Year</i>	<i>Capacity of gener- ating plant installed (thousand kilowatts)</i>	<i>Units generated (million kilowatt hours)</i>	<i>Approximate num- ber of units sold per head of population</i>
1928 ..	35,400	114,000	745
1929 ..	37,500	126,000	830
1930 ..	42,200	121,000	800
GERMANY			
1928 ..	11,102	27,871	368
1929 ..	12,405	30,660	404
1930 ..	13,500	29,403	388

The table may be very roughly compared with the 1931 total British figures, given previously, of approximately 10,750,000 kilowatts generating capacity, and an output of between 17,500 and 18,000 million units, with a sale of about 340 units per head of population.

(18) Comparison is difficult; but taking into account such varying factors as the density of population, the degree of industrialisation, the availability of coal and water for generation, the competition of steam-power, gas and oil, and the effects of the world trade depression, the comparative information available appears to indicate that Great Britain is still far from being in the forefront in the use of electricity for industrial purposes. Undoubtedly a substantial change is taking place, and progress continues despite the depression, because of the direct public control of two-thirds of generation; but, as is shown below in more detail, a much greater degree of co-ordinated development, based on the unification of the industry as a whole, is essential.

### III.—THE PROBLEM OF GENERATION

(19) Before proceeding further, it is perhaps desirable to indicate the basic economics of electricity supply. The chart on page 20 shows, as an example, the load curve of the Hackney Metropolitan Borough Council electricity undertaking on December 22, 1931, Hackney being a fairly average London borough. It will be seen that the demand for electric energy during the hours of the night was very low, and that it rose in the early hours of the morning when people



began to move about, and still higher when the factories started work and demanded industrial power. There was a drop when some of the factories stopped their plant for the mid-day meal, the curve rising again afterwards. Between the hours of 4 and 6 p.m., the peak load was reached because a supply was required at the same time for industrial, lighting and domestic purposes; but thereafter there was a steady decline to the accentuated valley period of the night hours.

(20) It is obvious that if there was sufficient generating plant to carry the peak load between 4 and 6 p.m., it was only partly in use during the rest of the day and very little used during the night hours. And since the plant installed has to be paid for whether it is fully or partly used, the larger and more even the output the less is the overhead cost per unit produced. The progressive manager of a supply undertaking desires, therefore, to encourage the diverse use of electricity in the hope that he will somehow fill up those annoying valleys in the load curve at the slack hours of the day. For example, if he can persuade a large number of housewives to use electricity for cooking, he will improve his curve when breakfasts are being prepared, before the demand of the factories for power begins; the housewife will also tend to use the electric cooker during the middle hours of the morning in preparing the mid-day meal, in the late hours of the afternoon for the evening meal (which may not help the manager very much), and possibly for supper. Similarly, the increased use of electricity for lighting, heating, vacuum cleaning and other household purposes will tend to even out the load.

(21) The importance of a diversified demand which will help to even out the load curve can be illustrated in many other ways. The basic fact to be faced is, that if each of many supply undertakings—whether for general purposes, or for traction, or primarily for industrial purposes—independently generates its own supply, it must install sufficient of the very expensive plant to meet a peak load which may only be required during a few hours out of twenty-four, and this involves a substantial waste of the productive power of the plant during a large part of the day.

(22) The foregoing is a very over-simplified and incomplete illustration of a fundamental problem of generation; but it does suffice, without going into further detail, to show the importance of obtaining the steadiest and fullest use of the generating plant. It is also apparent that as the area of supply of an undertaking becomes wider, the more likely is there to be in the normal case a greater diversity of demand. But whether this results or not, it is clear that if one large undertaking is substituted for a number of small ones in an area, the proportion of stand-by plant (for use during peak-load periods) is likely to be appreciably less than when each of the smaller plants had its own stand-by plant; and there is therefore a saving in cost.

### **Significance of 1926 Act**

(23) The technical and economic case for concentration of generation has been fully stated by the various Government Committees on the subject, and it is unnecessary to elaborate it here. The policy has, of course, been adopted by the Electricity Commission and the Central Electricity Board, and is now being applied through the national grid scheme. Under the Electricity (Supply) Act, 1926, the Conservative Government responsible said in effect to the industry: "We will not let you do what you like with your generating plants. If you are well placed and efficient, we will make you a selected station to be retained and even developed; and we will require you to give a bulk supply to other supply undertakings at cost, including fixed rates of interest. If you are not so well placed or efficient, we will permit you to exist for the time being; but even so, we reserve the right to put you out of action except for the period

of peak load when you shall operate and supply your own consumers and/or the grid, in order that the selected stations shall not maintain additional expensive plant for the peak load supply. If you are so badly placed, or your plant is so out of date, that you have no useful economic part to play, we will close your station down as soon as possible." Provision was made for compensating the undertakings whose plant was closed down, for allowing fixed interest charges to the undertakings whose surplus energy was diverted to the grid, and for compensation for any workpeople displaced.

(24) The Act of 1926 represented a somewhat severe interference with the rights of private property on the part of a Conservative Government, and an insistence, within limits, on the need for national planning on the generating side of the supply industry. Since then, the Central Electricity Board, which is appointed by the Minister of Transport, has proceeded vigorously with the construction of the national grid. By overhead (and some underground) main and secondary transmission lines, the selected generating stations for the whole of Great Britain are being interconnected, largely for the purpose of preventing individual supply undertakings carrying plant for their peak loads very much beyond their average requirements, the aim being to secure the most economical use of the generating plant throughout the country. Behind the Board is the Electricity Commission, primarily a technical body, which prepares technical schemes for the Board.

### Work of Central Electricity Board

(25) The Board began operations in 1927. Its duties, as laid down in the 1926 Act, are to concentrate generation in a limited number of stations selected for their efficiency and low operating costs; to construct a transmission system interconnecting these stations and so improve the load factor and general operating conditions; to standardise frequency of generation at A.C. 50 cycles throughout the whole country, so that interconnection can be carried out; and to take over the entire output of the selected stations and sell it to authorised distributors, the selling price to consist of a fixed charge based on the kilowatts of maximum load and a running charge covering the costs of production. The total capital required for the scheme was estimated at between £45 millions and £50 millions; standardisation of frequency accounting for £18½ millions, and the construction of the main transmission system for about £25 millions. The Board is entitled to recover its expenditure from the industry as a whole, by methods laid down in the Act.

(26) The Board does not own the generating stations, although it has powers of control; and it has no control over distribution. Its function is to make production more efficient through concentration of generation and co-ordination, the instrument of co-ordination being the main transmission system or national grid. It has powers to compel owners of generating stations to enter into the national scheme, and in the case of a supply undertaking refusing to operate a selected station under its orders, it may acquire the station after a somewhat complicated Parliamentary procedure.

(27) The Board is empowered to purchase the total output of the selected generating stations, and to sell back to them what is required for their own purposes, the latter selling price including a certain charge to meet the Board's expenses unless the selected station can show that its cost of production would have been less under independent operation than under the Board. Where generating stations are closed down, the Board is also required to prove that its price for electricity will be less than the price represented by the working costs, plus appropriate capital charges, of the stations concerned. In practice, however, the concentration of generation in 135 stations, and the increasing demand for electricity, will give the selected stations a much greater output;

and the Board, through its power to concentrate on the low-cost stations and only use the higher-cost stations for peak-load purposes and intermittent operation, should be able to bring down cost to a point where no station outside the national scheme can compete.

(28) For the purpose of the co-ordination of generation, Great Britain is divided into ten areas, each to have a technical scheme. The smallest schemes, East England and South Scotland, should really be regarded as part of the neighbouring schemes, South-East England and Central Scotland respectively; while North Scotland will ultimately be part of a scheme covering the whole of Scotland. Thus the country is effectively split into seven principal areas. It is expected that the grid will be completed in 1933, when it will consist of over 4,000 miles of transmission line, about 3,000 operating at 132,000 volts and the remainder at 33,000 and 66,000 volts. From the grid points, numbering over 250, authorised distributors will take their supplies. At each selected generating station, a transforming station will raise the voltage to the transmission voltage of 132,000 volts, while at the other end of the circuit a second transforming station will reduce it to 33,000 volts, the pressure at which it is generally supplied to authorised distributors. The distribution sub-stations will then transform from 33,000 volts down to the voltage required for supply direct to the consumer. The grid, therefore, carries out about half the process from generation to consumption, the remaining half being carried out by the authorised distributors.

(29) This is a point of considerable importance. The Board does not deal with the consumer direct; no matter how important the latter may be, whether a railway company, an industrial firm, or a public utility, the Board must work through a supply undertaking with distributive rights in the area concerned. Consequently, the cheapening of the cost of production through the national scheme does not mean a proportionate reduction in the price to the consumer, since the cost of secondary transmission, distribution and service must be taken into account.

#### IV.—THE PROBLEM OF DISTRIBUTION

(30) Although, as is pointed out elsewhere, nothing short of unification of ownership will enable the best results to be achieved from the national scheme of co-ordinated generation at present being carried out by the Central Electricity Board, it is broadly true that the scheme is making a substantial contribution towards a solution of the problem of generation. The distributive side of the electricity supply industry is, however, in a much less satisfactory condition.

(31) The average revenue received by authorised undertakings from the sale of electricity to consumers (excluding intersales in bulk) in 1929-30 was 1.38*d.* per unit, of which about half (0.68*d.*) represented distribution costs, including capital charges. It will be appreciated that this average includes energy sold in bulk at very low prices for industrial and traction purposes; and actually, it is a weighted average of the average revenue received from the following classes of consumers: lighting and domestic purposes 2.86*d.*, public lighting 1.61*d.*, traction 0.81*d.*, and power for industrial and other purposes 0.82*d.* There are also big variations in the prices charged to consumers in different areas. Of 634 undertakings making 1929-30 returns for lighting and domestic supplies, 143 charged under an average of 3*d.* per unit, 219 between 3*d.* and 5*d.*, 138 between 5*d.* and 7*d.*, 80 between 7*d.* and 9*d.*, and 54 charged 9*d.* or over per unit. Of 586 undertakings making 1929-30 returns for power for industrial and other purposes, 134 charged under an average of 1*d.* per unit, 217 between 1*d.* and 2*d.*, 188 between 2*d.* and 4*d.*, 37 between 4*d.* and 6*d.*, and 10 charged 6*d.* or over per unit.

(32) Under the national grid scheme, the authorised distributors will obtain electricity in bulk at a low price common to an entire area, and this should largely cut out such part of the differences in price, and such part of excessive prices, as are due to differences and excesses in present generating costs. But generation, as has been shown, accounts for only half the average price to the consumer; and the distribution costs will not be directly affected. Therefore, unless a drastic change takes place in distribution, the consumer will continue to pay an unnecessarily high price in very many areas. For not only are distribution costs, in striking contrast to generation costs, practically standing still, but there can be no substantial reduction while distribution is parcelled out amongst over 600 independent undertakings of all shapes and sizes, some efficient, many quite inadequate. Neither the existing powers to amalgamate, nor the option of local authorities to purchase company undertakings after a certain period, offers any hope of a more rational system.

### **General Inadequacy of Distribution**

(33) At first glance it might appear that electricity distribution in Great Britain is fairly complete. 90 per cent. of the urban population and 82 per cent. of the rural population was included, at March 31, 1930, in distribution areas already authorised; but in fact, development has usually taken place only in the more populous districts. A company or a local authority may become authorised to distribute over a given area, but whether intensive development takes place will depend upon the nature of the area and how far the company or municipality is energetic and pursues a progressive policy. There are real difficulties in developing isolated areas, particularly in rural districts where capital costs are substantial in relation to consumption, and where the load factor may be poor. So long as the electricity system of the country is broken up between so many separate undertakings, of which a fair number are very small, there must remain a considerable territory which is inadequately catered for. The facts show that this is indeed the case.

(34) A population of about 40 millions was theoretically included in the areas of authorised undertakers at March 31, 1930. The actual number of consumers being supplied, however, was 3,470,000, which, at  $4\frac{1}{2}$  persons per dwelling, corresponds to about  $15\frac{1}{2}$  million persons, which is rather more than one-third of the population; and even the inclusion of privately generated electricity supply would not alter the argument. The grid aims at an output of 500 units per head of the population per year, but only 107 undertakings, representing about one-sixth of the undertakings for which 1929-30 figures are available, sold 200 units or over per head of resident population in their area of supply; while 369 sold less than 100 units per head, and 248 less than 50 units. It is not necessarily the newer undertakings which are backward, for many concerns which have been working for over a quarter of a century have only achieved an output of less than 60 units per head; and the reason for poor development is not only poor management in many cases, but the unsuitability or smallness of areas.

### **Excessive Costs**

(35) In examining the problem of generating costs, it was seen that load factor and the fullest possible use of the capital employed were vital; and somewhat similar considerations arise as regards distribution costs. It has already been mentioned that the average price charged by authorised undertakings in 1929-30 was  $1.38d.$  per unit, of which about half represented the cost of distribution. This price is the average for the whole country; and it can be shown statistically that in the case of the smaller undertakings, for instance, those selling under five million units per year, the average cost of distribution is very much higher. In three typical cases the cost of distribution

is found to be an average of 1.51*d.*, while many of the smaller concerns exceed 2½*d.* There can be no material improvement as long as the undertakings are conducted on a self-contained local basis.

(36) The excessive costs of many smaller undertakings can also be shown by the capital charges per unit. In 1929-30, 139 authorised undertakings each sold between one million and five million units, the average capital expenditure on generation and distribution being £42 per 1,000 units sold; while 215 undertakings which sold over five million units each had an average capital expenditure of £21 per 1,000 units sold. Although accurate comparison would involve various qualifications, the difference between the larger and smaller undertakings is sufficiently striking evidence of the advantages of large-scale operation, an advantage which relates not only to generation, but also to distribution. Generally speaking, it is true to say that where distribution costs and electricity charges are relatively low, sales per head of population are relatively high. Reductions in price nearly always result in an increased demand; but there are considerable numbers of small undertakings in sparsely-populated areas where the capacity to reduce charges is strictly limited.

(37) The argument becomes still clearer if comparison is made with the letter-carrying business of the Post Office. If the collection and delivery of letters were organised upon the basis of local government areas, instead of nationally, it is clear that a much higher charge would have to be made for the service in sparsely-populated areas, or in very poor areas where letter-writing was not so prevalent as in commercial or relatively prosperous districts. The very fact that the charges were higher in some cases would itself discourage the practice of letter-writing in these areas, while there would be a limitation on any reduction of postal rates in the difficult areas, owing to the fixed overhead and maintenance charges which must be met and the fact that in such areas the traffic could not in any case be developed beyond a moderate point. As it is, everybody, whether living in a town of great population or in a distant rural parish, pays the same rates for inland postage, and it is sound business that this should be so. While charging the same rates for similar classes of electricity supply throughout Great Britain is not immediately practicable, it is nevertheless an aim towards which the industry ought to work.

### **Lack of Technical Standardisation**

(38) The multiplicity of distributive undertakings results not only in varying and often excessive costs and prices, and the neglect of large areas, but it has numerous other disadvantages of no less gravity. Thus, one of the aims of national electricity policy is to establish alternating current (A.C.) throughout the country, instead of direct current (D.C.), and to have common voltages; the standardisation of frequency is, of course, already being comprehensively dealt with under the 1926 Act. In 1929-30, 145 authorised undertakings were supplying D.C. only, whilst 274 were giving both A.C. and D.C. Most of the undertakings were operating within a field of about nine principal voltages, ranging from 200 to 400 in A.C. and from 220 to 480 in D.C.; but there were still 46 declared voltages in operation between 100 and 480, while 41 undertakings were each operating with five or more different declared voltages.

(39) The chief significance of these technical matters lies in their effect on the electrical manufacturing industry, which has considerable export interests. So long as the manufacturers of electrical machinery and apparatus have to cater for A.C. and D.C. current and a wide variety of voltages, they will be unable to achieve that degree of standardisation which is essential to economic production. Many consumers, also, have realised the disadvantages of moving

from an A.C. area to a D.C. area, by finding that wireless sets, electric irons, vacuum cleaners and other utensils have either become useless or cannot be used without comparatively expensive alterations. It is no less obvious that excessive costs are incurred where a supply undertaking provides both A.C. and D.C.

### **Failures in Salesmanship**

(40) On the sales side, the method of electricity charge and tariffs must influence the whole development of an area. There are large numbers and diversity of methods, and the problem of securing greater uniformity has received the constant attention of the Electricity Commissioners. A special Committee, appointed by the Commissioners, examined the whole subject in 1929-30 and issued a report which shows in some detail how consumption is handicapped by many of the unsatisfactory methods now adopted.

(41) Increased consumption is also dependent on the facilities offered for wiring and the installation of electrical apparatus. A special Committee, appointed by the Electricity Commissioners in 1929, found that out of 650 authorised distributors at the end of 1928-29, no fewer than 230 had not incurred any expenditure on facilities for assisted wiring, or on the hire or hire-purchase of apparatus; 213 had incurred expenditure on assisted wiring only, and 304 on the hire or hire-purchase of apparatus only; while only 187 had incurred expenditure on facilities for both purposes. "These figures," declared the Committee, "serve to show the large scope that still exists for the provision of facilities by additional undertakers, apart from the question as to the adequacy or possible extension of the facilities in cases where such were being given."

(42) On assisted wiring, the Committee concluded that "the offer to consumers of financial assistance in meeting the initial expense of wiring premises is a most important factor in extending sales of electricity, such assistance being essential to the full development of the business of electricity supply. There is scope for a large increase in the number of authorised undertakers offering such facilities, while the facilities already offered are in most cases capable of further extension. Adequate facilities should be available to existing and potential consumers in all areas of supply. All undertakers should make arrangements so that facilities are available, and the existence of such facilities should be made known by advertisement, propaganda and canvass to prospective customers." On the hire and hire-purchase of apparatus, the Committee stated that although "facilities are available to the consumer from sources other than the authorised undertaker," it was "nevertheless of opinion that as a means of increasing sales of energy, the sale on easy terms or rental of apparatus should form an integral part of the activities of all authorised undertakers."

### **Unification of Ownership Essential**

(43) It does not appear necessary to go into further detail on the many and serious disadvantages of entrusting distribution to over 600 different undertakings. As things are, it is impossible to secure throughout the country as a whole any reasonable uniformity of charges, or the necessary development of difficult areas, or a real pushing sales policy, or a sufficient service organisation. The character and policy of the undertakings vary enormously. Some undertakings are enlightened, under good technical and commercial management; some have good technicians; some cannot, or do not, pay for first-class staff; some have tariffs based on the doctrine of high charges, good profits, no development, and an easy life; many lack the resources to carry out adequate development.

(44) There is no likelihood of any substantial change in the position so long as multiple ownership continues. Generation is being dealt with on a national scale. But distribution is local and diversified, and inefficient as a whole; and although exhortation and pressure may improve the position, they provide no satisfactory solution. The unification of ownership would greatly contribute to the success of nationally-planned generation, and this alone would justify unification. But for distribution, which obviously must also be planned on a national scale, unification is absolutely urgent and vital.

## V.—NATIONAL OWNERSHIP AND CONTROL

(45) It is therefore proposed that a National Electricity Board should be established, to which would be transferred all the authorised electricity supply undertakings, the national grid, railway and traction generation, and certain non-statutory undertakings. The statute setting up the Board should make specific provision for such transfer to national ownership, and should also give powers to the Board to take over (through the Minister of Transport) all or any privately-owned generating plant if and when desired. It is intended that the Board should take the place of the existing Electricity Commission and Central Electricity Board, and that it should be responsible for the proper direction and for securing the efficient management of the nationally-owned undertaking.

(46) The members of the National Electricity Board should be appointed by the Minister of Transport.\*

(47) It is not proposed that the new national electricity undertaking should be organised on the lines of an ordinary Government Department. The case against this type of organisation for transport is stated in some detail in the Labour Party policy, "The National Planning of Transport," and it is submitted that similar considerations are applicable to electricity supply. Broadly speaking, although the departmental type of organisation is suitable for the kind of work to which it is normally applied and has certain advantages in the special case of the Post Office, it is ill-adapted to permit that discretion and fluidity which are essential to a commercial undertaking like electricity supply. Moreover, it is very undesirable that a Minister should be held personally responsible to Parliament and to his constituents for every detail of administration of a nationally-owned industry.

(48) It is, of course, vitally important that Parliament should be in a position to make sure that its general policy is effectively carried out; and the statute establishing the National Electricity Board should, as far as practicable, lay down such policy and define the respective responsibilities of the Minister of Transport and the National Board. Thus, the Board should be responsible for the effective direction and management of the industry, subject to any limitations or Ministerial or other checks as may be laid down by statute; and the Minister should have full access to information. Full reports on the work of the Board would, of course, be published; and by questions in the House of Commons, and by debate on the Ministry of Transport vote and possibly otherwise, there would be ample opportunity for general Parliamentary discussion.

(49) In addition, it is proposed that a National Consultative Committee should be appointed by the Minister of Transport, consisting of representatives of various interests such as industrial and domestic consumers, labour in the industry, local authorities, and so on. The Consultative Committee would meet at regular intervals, and there would be opportunity for full and frank

\* In view of the special examination being made (as explained in the prefatory note) of the position of the workers in the industry in relation to direction and management, parts of sections 46 and 55 of the original Draft Report submitted to Annual Conference, 1932, are omitted.

discussion with the Board in which complaints could be ventilated and proposals made and examined. The Committee, however, would not be an executive body, nor would the Board be able to avoid responsibility by sheltering behind it.

(50) The actual organisation of management must be a matter for the National Board; but whatever regional machinery may be established for administrative convenience, the effective direction of technical and public policy must be on a national basis. Even under the 1926 Act, the tendency will be for generation to be concentrated still further; and under national ownership it will be easily possible to secure any measure of concentration desired, while the national grid may be regarded as one unit or divided into regional units as found convenient. It would appear desirable, however, to treat the local administration of distribution on a regional basis; for it would be difficult to attempt to control from London the details of distribution to millions of industrial and domestic consumers. It is contemplated that there might be a number of regions, each under a board to which certain local functions should be delegated. These regional boards, like the National Board, would make use of the best officers available; but all officers should be employed by the National Board. Each region would be provided with central offices and with district offices and showrooms, and there would be close co-operation with the local authorities by consultation and otherwise.

(51) Great importance is attached to employing the most capable officers and to securing local co-operation. The regional service, no less than the national, requires initiative and ability of the first order, for there is much to be done, in development, sales and service. Local interest is equally essential; and there must be ample opportunity for discussing local problems and proposals, and for ventilating local complaints. At the same time, the National Board will proceed with its task of concluding the consolidation of generation and of consolidating and developing distribution as a whole, including the important work of standardising alternating current and voltages.

### **Terms of Acquisition**

(52) The actual details of the methods and terms of acquisition of the local authority and other undertakings will, of course, depend on the conditions prevailing at the time. In the Labour Party policy, "The National Planning of Transport," various problems connected with acquisition are discussed, and it is suggested that similar considerations apply in the case of company electricity supply undertakings. Briefly, some company undertakings are content with a fairly moderate profit; and here compensation on the basis of the net reasonable maintainable profit might be given. But where the profit is obviously excessive, it cannot be regarded, from the standpoint of the community, as reasonably maintainable, and the number of years purchase should be correspondingly reduced.

(53) With regard to the local authority undertakings, they would be transferred from one public authority to another in the national interest, and the local authorities concerned should not make either a profit or be involved in debt as a result of the transaction. It would probably be equitable to make the transfer on the basis of the outstanding debt of the undertakings, the National Electricity Board becoming responsible for the payment of interest on such debt and any subsequent repayment; and thus the local authorities would be free from all future liability. The undertakings of joint electricity authorities would be treated similarly.

(54) It is not contemplated that the existing shareholders of the company undertakings would be bought out in cash, but that they would receive stock



of appropriate amount in exchange for their present holdings. Such stock might carry a fixed or slightly varying rate of interest, on the lines suggested in the case of transport; but the holders would have no voting rights in the new undertaking. The National Board should have power to redeem stock as found expedient or as may be laid down in the enabling statute. The financial basis of the new nationally-unified undertaking must be such that it is not over-capitalised, that it should pay its way, and that it should aim at a progressive reduction of electricity charges, particularly in areas with high tariffs, together with a wide extension of facilities.

#### **Labour in the Industry\***

(55) There is such a wide field still open for electrical development, that the number of persons employed in the industry will probably tend to grow rather than to decline. Adequate provision, however, must be made in the enabling statute for the compensation of any employees who may be displaced or whose position may be worsened as a result of the passing of the Act.

### **VI.—THE FUTURE OF ELECTRICITY SUPPLY**

(56) It is believed that the root and branch policy recommended in this report will be far more effective than any mere tinkering with over 600 separate undertakings. It is believed that unification of ownership will be of considerable advantage to the scheme of co-ordinated generation at present being carried out by the Central Electricity Board, and that for the proper organisation of distribution it is absolutely essential. The distributive problem is partly technical and partly one of salesmanship and service. As has already been pointed out, technical standardisation is imperative, by the general adoption of A.C. supplies and the reduction of voltages, which, in turn, will facilitate the standardisation of electrical apparatus and lower its cost; while a potent source of inconvenience to the consumer, and a thoroughly bad advertisement for electricity, will be abolished.

#### **Rural Areas**

(57) At the same time, it must be the aim of the National Electricity Board to develop the use of electricity wherever economically practicable. There is a wide field of expansion in rural and other areas which have been financially difficult or in which the authorised undertakings have failed to accept their opportunities. Generally speaking, rural communities suffer great disadvantages in electricity supply. In many areas electricity is not available at all, while in others it is only available at a high charge per unit, frequently coupled with big initial charges for installation. To a great extent it is not available for agricultural purposes, while it is exceptional for it to be in the home of the farm-worker.

(58) Through the pooling of electricity supplies, the national grid system will extend to the countryside very important economies that have hitherto been confined to large centres of demand, and provide energy in bulk at a price very much lower than is possible in rural areas at the present time. The high costs of distribution over sparsely-populated areas, however, remain, and can only be reduced by a large-scale distribution service over a wide area, such as is possible under the National Board, and by securing the maximum number of consumers. In this connection, the addition of railway electrification to the national grid would be of great importance.

(59) In a statement to the Weir Committee on Main Line Railway Electrification, 1929-31, the Central Electricity Board declared that the additional demand, by considerably accelerating the construction of the new and more

\* See note to section 46.

efficient "selected" generating stations, would reduce the average cost of production; that the diversity of railway and other demand would also help to reduce costs; that both the primary and secondary transmission systems would carry a greater load, with a resulting reduction in transmission costs; and that "quite equally important is the consideration that the development of rural electrification will be greatly accelerated, for the secondary lines feeding the railway sub-stations could be tapped to afford general supplies in many areas which, owing to their sparsely-populated nature and low demand for electricity, could not commercially be supplied if it were necessary for them to bear themselves the full cost of the necessary transmission lines."

### **Sales and Service**

(60) It is not less essential that every step should be taken to develop the use of electricity in the urban areas for industrial use, for street lighting and for varied domestic purposes. The development of an effective sales and service organisation is of profound importance both to the industry itself and to the existing and potential users of electricity. Some undertakings have no real showrooms, and in other cases the showrooms are badly run; although it must be recorded that an increasing number of undertakings are realising the importance of modern salesmanship. Advertisement of the advantages of electricity, and of the facilities available, falls far short of what it should be.

(61) In service organisation, many undertakings are now quite good; but large numbers are poor or definitely bad. The industry should put service in the foreground; its engineers should make it known to industrial and domestic consumers that they desire to help in securing the most efficient and economical use of the energy supplied. The wasteful consumer is a liability to the industry; he will probably grumble to his neighbours and friends and will be disinclined to extend his use of electrical appliances. It is sound policy, therefore, for the industry to provide engineering advice, and to have its staff of demonstrators, including qualified women, to explain the most economical way of using equipment, not only when it is installed but on the occasion of subsequent visits.

(62) The industry must obtain the goodwill of millions of satisfied consumers. As the Weir Committee declared in 1926, "the interests of the consumers and the success of the undertaking depend as much, if not more, on the efficient and enterprising management of the commercial side as on the technical management of the stations. . . . The work requires capacity of no mean order, and the best available capacity should be employed." It is only by the national organisation of the industry that the patchiness inevitably associated with its present organisation can be wiped out; instead of having good, bad and indifferent areas in respect of sales and service, it will be possible to lift the distributive side of the whole industry to a high standard of efficiency.

### **The Future of Power**

(63) Although this report is confined to the electricity supply industry, the proposals outlined must also be considered in relation to general policy on coal and power. Suggestions have been made from time to time for a comprehensive national board which would be responsible for coal-mining, the immediate by-products of coal, possibly other chemicals, gas, electricity, and even transport. There is obviously a relationship between coal and electricity, between electricity and transport, and so on; and for that matter there is a considerable degree of interlocking between coal and iron and steel. These facts do not of themselves, however, provide sufficient reason for placing this series of very large industries under the management of one body.

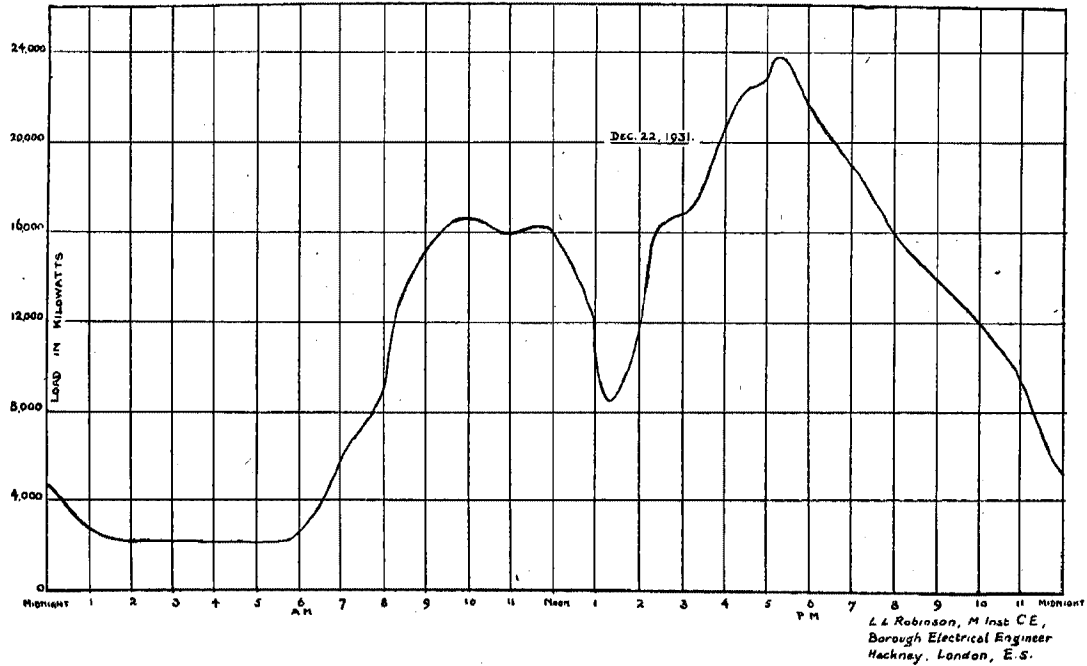
(64) There are serious dangers in over-large units of industrial management; for if the responsibilities of an undertaking are too large or too varied, the management will tend to be choked by red tape, procedure will tend to be slow, and there will tend to be an absence of that rapid and definite decision which is an important aspect of efficiency. This is not to say that there should not be proper machinery for the co-operation and co-ordination of industries with interlocking interests; and specific machinery will certainly be necessary as the coal and power group of industries come under national control. Indeed, when the Socialist reconstruction of industry is sufficiently advanced, some form of national economic council will also probably be found desirable for the general co-ordinated working of the reconstructed industries.

(65) The need for close co-operation between coal and electricity and coal and gas, for example, is specially important in one respect which particularly concerns the trade union movement. It is only reasonable that the miners should share in the economic advantages arising from the more efficient use of coal. The problem of demarcation between the coal-extracting industry as such, and coal utilisation, is no new one; but it is indefensible that the extraction functions should for wages purposes be entirely divorced from the more profitable and better-paid utilisation functions, so that miners' wages tend to be at a permanently lower level than those in other sections of what is in effect the same industrial process. Under the private and multiple ownership of coal and allied industries, it is practically impossible to obtain any satisfactory adjustment; but if the coal, coal utilisation, electricity and gas industries were under national ownership and control, there would be no insuperable difficulty in treating coal extraction as one section of a much larger coal and power industrial process, and of ensuring that the miners shared in the advantages arising from the most efficient utilisation of coal.

(66) It is believed that the proper reorganisation of coal and power, under national ownership and control, is a vital step in economic progress. It is believed that the policy outlined in this report for the electricity supply industry, as an important section of coal and power, will achieve large economies, and that substantial advantages will accrue to industrial production and to the domestic consumer. The nationally reorganised industry will stimulate economic electrification in many directions, thereby producing more pleasant conditions of life and labour and protecting our towns and the countryside from much of the grime and smoke and depression of industrialism. Electricity supply is one of the key industries in any sound policy of national planning; it ought to be under national ownership and control.

## APPENDIX

Chart showing the Load Curve of the Hackney Metropolitan Borough Council Electricity Undertaking on Tuesday, December 22, 1931



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