

AN ECONOMIC HISTORY OF
THE SCOTTISH ELECTRICITY SUPPLY INDUSTRY
1878 - c 1930

VOLUME I

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SUMMARY

The influence of legislation on the Scottish electricity supply industry was great and by 1931 promoting greater national efficiency. Until the mid-1890's private installations underpinned the development of electricity supply but were being overtaken by the more efficient central generating stations, and after 1900 by the establishment of power companies. Until 1931 the industry was broadly divided between local authorities and private enterprise, the former concentrated in the larger urban cities and towns and the latter in the less industrialised areas; the promotion of power companies complicated this simple analysis. Hostility between these sectors inhibited progress and lack of co-operation necessitated more positive government intervention in 1926.

Superficially electricity supply was vested in numerous autonomous undertakings. However, the private sector was governed by international holding companies. Foreign investment was substantial and aided private development: it was not benevolent and a price was exacted in financial and contractual obligations.

The thesis also examines the industry in the context of the general Scottish economy. The effect of the trade cycle is considered and the application of electricity to established sectors of the economy. Comparisons have been made with the experience of the rest of the United Kingdom economy.

In the period examined demand continually grew as the market - industrial, commercial and domestic - widened; this was evident nationally. Moreover, the industry's ability to meet this expansion also improved as individual units increased in scale: greater efficiency was introduced in generation and transmission; even the adverse effects of the trade cycle could not detract from the overall growth of the industry. In 1931 there were still weaknesses but the industry was firmly established and the 1926 legislation had provided a framework to promote greater national efficiency. Future growth was certain.

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TECHNICAL TERMS AND ABBREVIATIONS

AC	Alternating current: an electric current which reverses its direction of flow at a regular rate.
B.T.U.	Board of Trade 'unit': the production or consumption of electricity measured in kilowatt-hours. One kilowatt used for one hour equals 1 kWh. Alternatively this is often referred to as an electricity 'unit'.
cp	Candle power.
O.V.E.P. Company	Olyda Valley Electric Power Company.
d	Old penny (12d - 1 shilling, 240d - £1).
DC	Direct or continuous current: an electric current flowing in one direction.
hp	horsepower.
Installed capacity	The total generating capacity installed in a power station, including auxiliary and standby sets, which is normally available for operation.
KW	Kilowatt (— 1000 watts): a Kilowatt is approximately equal to 1.34 horsepower: one horsepower is approximately 746 watts.
kWh	Kilowatt-hour.
Load factor	The ratio of the amount of electricity produced or supplied during a given period to the amount that would have been produced if the maximum demand had been maintained throughout the period.
m	million.
maximum demand	The largest demand for electricity at any moment in a given period.
p	New Penny (100p - £1).
power company	Those supplied 'bulk' electricity to undertakers but did not necessarily sell it to the public unless authorised to do so by statute.
R.O.	Registrar of Companies.
£	Old shilling (= 12d). 20 shillings - £1.
R.R.A.	Strathclyde Regional Archives.
R.R.O.	Scottish Record Office.

Chapter I.

Scottish Interest in the Development of the Electricity Supply Industry in the Period Before 1878.

It is normal to date the birth of the modern electrical industry from 18th December, 1878 when Joseph Swan¹ demonstrated the first practical incandescent carbon lamp at a meeting of the Newcastle-on-Tyne Chemical Society. However, there had been conscious awareness of electricity for a number of centuries prior to this date and, indeed, during the nineteenth century itself the basic foundations had been laid which allowed the achievement of Swan, and later Edison, to be developed.

One of the earliest exponents of electrical lighting was Sir Humphrey Davy who in 1808 produced an 'arc light' by passing an electric current into two charcoal rods whose tips were barely separated. Despite the potential revealed

-
1. Sir Joseph Wilson Swan was born at Sunderland on 31st October, 1828 and educated at Hendon Lodge and Hylton Castle near Sunderland, under the Rev. John Wood who interested him in science and encouraged him to study such scientific books as were then available. At the age of fourteen he was apprenticed to a firm of chemists and druggists at Sunderland where he obtained considerable experience in operative and experimental chemistry. Before the end of his apprenticeship he joined the business of John Mawson, a chemist of Newcastle, where he continued his experimental researches. Swan's early interests were in photography and printing but his name is more widely known in connection with the development of incandescent electric lighting and electricity generally. Swan was knighted in 1904 and died on 27th May, 1914. Dictionary of National Biography 1912-1921, (1927) p.p. 518-519. Who Was Who Volume 1 1897-1915, (1926).

by Davy at this time, it was not until 1831 that the major breakthrough took place which was to underpin future developments. In that year Michael Faraday made the fundamental discovery of electro-magnetic induction, demonstrating that electricity could be generated by mechanical means. However, many years elapsed before machinery was available for electricity production on a commercial scale and before apparatus for its utilisation was developed. Meanwhile the development of the carbon arc lamp continued. Between 1845 and 1848 W.E. Staite and W. Petrie demonstrated the possibilities of the arc lamp in a series of lectures and demonstrations. Swan was, in fact, present at a lecture given by Staite at the Athenaeum, Sunderland in 1845. The experiments conducted by Staite and Petrie failed because the primary cells from which the lamps were supplied were too costly in up-keep. However, arc lights, which gave an intense bright light and were too costly for general application, continued to be exploited for particular uses. Between 1856 and 1870 Professor F.H. Holmes pioneered the illumination of lighthouses by carbon arc lamps, supplied by magneto-electric generators for which he

took out a series of patents² during these years. Experiments were conducted in 1857 at Blackwall and South Foreland and in 1862 at Dungeness, while the installation in 1870 at Souter Point, near Sunderland, remained in service until 1900. Moreover, in 1866/1867 the principle of self-excitation of magneto-electric machines (dynamos) was developed independently by Dr. H. Wilde, C. and S.A. Varley, Sir Charles Wheatstone and Dr. Werner Siemens in Germany. Later in 1876 P. Jablochhoff, a Russian officer working in Paris invented his famous 'electric candle', consisting of two carbon rods placed side by side, and thus introduced the first arc lamp to be used on a large scale. In consequence of these innovations the viability of the production of electricity on a commercial scale was proven, but its application and exploitation to the fullest possible extent as yet remained questionable since the arc lamp was inappropriate for domestic lighting and, by comparison with gas lighting, unsuitable. This final obstacle of sub-dividing the electric light was, as noted

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2. Alphabetical Index of Patentees and Applicants for Patents of Inventions, (1858-1870). Patent Number 1998, 20th July, 1857 - Magneto-electric and electro-magnetic machines. Patent Number 2628, 14th October, 1857 - Magneto-electric machines. Patent Number 2512, 4th November, 1859 - Apparatus for transmitting light. Patent Number 2221, 1st August, 1867 - Apparatus for the production of the electric light. Patent Number 2307, 10th August, 1867 - Apparatus for the production of the electric light. Patent Number 2060, 26th June, 1868 - Electro-magnetic and magneto-electric machines. Patent Number 1744, 5th June, 1869 - Electro-magnetic machines.

above, overcome by Swan in 1878 with the aid of a Sprengel pump which evacuated air from glass bulbs thus allowing the electrically excited filament within the bulb to glow but not burn. Swan's first lamp patents were taken out in January, 1880³ by which time Thomas A. Edison had (in 1879) patented his incandescent carbon filament lamp in the U.S.A. and in Britain.^{4,5} In 1882 the differences between both men and

3. Ibid., Patent Number 18, 2nd January, 1880 - Electric Lamps. Patent Number 250, 20th January, 1886 - Electric Lamps.

4. Ibid., Patent Number 4576, 10th November, 1879 - Electric Lamps. Patent Number 5127, 15th December, 1879 - Electric Lamps.

5. Thomas Alva Edison was born in Milan, Ohio on 11th February, 1847. His father, a jack-of-all-trades, was of Dutch descent and his mother, a former teacher, was of Scottish descent. Edison, in fact, received little formal schooling but was taught by his mother. At the age of twelve years he sold fruit and papers on the Grand Trunk Railroad. In 1862, using his small handpress in a baggage car he wrote and printed the Grand Trunk Herald which was circulated to 400 railway employees. In 1862 also he became a telegraph operator; during the American Civil War he was exempted from military service because of deafness. From 1862 until 1868, when he joined the Western Union Telegraph Company in Boston, Edison was a tramp telegrapher working at various places in both the U.S.A. and Canada.

In 1869 Edison opened his first factory in Newark, New Jersey with profits realised from his partnership in a New York electrical firm. At this 'invention factory' - a distinctive feature of Edison development - he hired chemists, physicists and mathematicians to collaborate on inventions. In this manner Edison received patents for over 1000 inventions in many diverse areas. Apart from his contribution to the electricity industry generally, Edison was responsible for inventions in telegraphy, printing, phonography, plate glass, cement processes, motion pictures, armaments manufacture, synthetic rubber and in many other areas. Encyclopaedia of World Biography Volume 3, (New York, 1973), p.p. 518-520. Who Was Who Volume 3 1929-1940, (1941) M. Josephson, Edison, (New York, 1959).

their respective companies were settled by the formation of the Edison and Swan United Electric Light Company to manufacture lamps and instal and operate lighting systems.⁶

Thus by 1878 the commercial viability of the infant electrical industry had been established, but in the post-1878 period several developments took place which ensured that such viability was permanent. The most important was the filing on 23rd April, 1884, by Charles Parsons⁷ of two

6. : L. Hannah, Electricity before Nationalisation, (1979), p. 4.

7. Sir Charles Algernon Parsons was born in London on 13th June, 1854, the youngest of the six sons of the third Earl of Rosse. He was brought up at the family seat Birr Castle, Parsonstown, Ireland. Parsons was not sent to school but received private tuition by men of scientific calibre. At the age of seventeen he entered Trinity College, Dublin and after two years proceeded to St. John's College, Cambridge in 1873 where he studied mathematics and attended lectures on mechanism and applied mechanics. After graduating in 1877, Parsons began a four years' apprenticeship with Sir William Armstrong and Company which was followed by a further two years (1881-1883) with Kitson and Company of Leeds where he experimented on the propulsion of torpedoes by means of rockets. In 1884 he acquired a junior partnership in the firm of Clarke, Chapman and Company of Gateshead and it was with this firm that he developed the steam turbine. However, to develop the new invention to its fullest extent, Parsons in 1889 founded the firm of C.A. Parsons and Company at Heaton, near Newcastle-upon-Tyne. Apart from its use in the electricity supply industry, Parsons also developed the steam turbine for use in marine propulsion for both the Royal and Mercantile Marine. Parsons also interested himself in the field of optics and made many scientific and mechanical improvements in the processes employed in the manufacture of optical glass. Parsons was knighted in 1904 and died on 11th February, 1931. Dictionary of National Biography 1931-1940, (1949), p.p. 672-675. Who Was Who Volume 3 1929-1940, (1941).

Patents⁸ on the steam turbine. This development with its attendant improvements meant that the reciprocating steam engines, which in the 1880's and 1890's were commonly used in power stations as prime movers, were relatively quickly replaced by high speed steam turbines which were quieter, cheaper and much more efficient; also by making possible long range AC distribution they did much to settle the 'battle of the systems' between AC and DC in favour of the former.

Although experiments had taken place in the 1870's and 1880's into utilising the new form of energy as a source of power for industrial and heavy traction uses and thus widening the market for electricity, they had proved both unreliable and inefficient. However, Nicola Tesla⁹, a Serbian emigrant to the U.S.A., after 1887 developed and perfected the induction motor and the polyphase system which were to underlay electrical power transmission.

Ultimately, of course, the success of generating electrical power depended upon both the physical, and cost, efficiency of distribution. In this respect Britain was fortunate in having a long tradition in the telegraphic field. As early as 1881 vulcanised bitumen

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8. Alphabetical Index of Patentees and Applicants for Patents of Inventions, (1884). Patent Number 6734, 23rd April, 1884 - Electric Generators; working same by fluid pressure. Patent Number 6735, 23rd April, 1884 - Electric Motors and Pumps.
9. R.A.S. Hennessey, The Electric Revolution, (Newcastle-upon-Tyne, 1972), p.p. 180-181.

cable was developed by W.O. Callender and manufactured by a new company set up at Erith under the management of his son, Thomas O. Callender. These cables were laid in compound filled troughing, the so-called 'solid system', and were extensively used for many years for low voltage distribution. However, in 1886 oil-impregnated paper insulated lead-covered cables were introduced in the U.S.A. by the Norwich Wire Company of New Jersey. In 1890 the newly formed British Insulated Wire Company of Prescott acquired from the American company rights enabling it to manufacture paper/lead cable. By the end of the following year the manufacture of both low and high voltage cable had been commenced at Prescott.¹⁰

The most obvious feature of even a cursory examination of nineteenth century developments in the electrical industry is the limited contribution made by Scotland during this embryonic stage prior to 1878. This may be at least partially explained by the pattern of development within the Scottish economy. Throughout the nineteenth century the Scottish economy was to a large extent dominated by what was happening in the heavy industrial sector. The contribution of shipbuilding to the development of the Scottish economy after 1870 was great and in the development of shipbuilding Scotland played a prominent part. The

10. The Electricity Council, Electricity Supply in Great Britain, A Chronology, (1973), p.p. 1-8.

earliest experiments in steam navigation took place in 1788 in Dumfriesshire under the guidance of William Symington, a mining engineer at Wanlockhead, who conducted further successful experiments with the Charlotte Dundas on the Forth and Clyde Canal. In 1812 Henry Bell launched the Comet built by Woods of Port Glasgow, engined by John Robertson of Glasgow and with engines made in the foundry of David Napier. Scotland was also to the forefront in improving the efficiency of boilers. In 1857 Scotts of Greenock experimented with a water tube boiler and in 1862 James Howden developed a cylindrical tank boiler which was the prototype of the Scottish boilers used until the First World War. Engine improvement also took place under the guidance of A.C. Kirk of Napier's who developed the triple expansion engine.¹¹ However, the next stage in development that of the steam turbine did not, as already noted, take place in Scotland but was innovated by Charles Parsons in 1884 while the final stage, the diesel engine, was developed on the Continent. Thus it can be seen that, although Scottish engineers had played a very prominent part during the initial stages in the development of propulsion, they played little or no part in the later stages. This lack of Scottish involvement at this particularly crucial period in the development of new

11. R.H. Campbell, Scotland Since 1707 (Oxford, 1965), p.p. 225-231.

engineering techniques may, in fact, have been detrimental to the growth of domestic electrical engineering skills - and knowledge - within Scotland. It can, therefore, be reasonably argued that Scottish commitment to improving steam engines piecemeal operated against the switch both to turbines and to electrical motors. Moreover, while coal was cheap, the stimuli to search for new sources of energy may have been retarded. By the same token the provision of an excellent gas supply¹² and the use of small oil engines created an adverse reaction towards change and diversification.

However, despite the assertion that Scotsmen played a far from prominent part in the early development of the electrical industry, Scotland did have a minor interest. For example, it was reported that as early as 11th April, 1834 J.B. Lindsay, a teacher in Dundee who had formerly been a lecturer at the Watt Institution, was experimenting with electric lighting and that on Saturday, 25th July, 1835 he had succeeded in obtaining a constant electric light.¹³ Unfortunately no other details are available, and the report cannot be substantiated.

Greater importance, however, can be attached to reports made in 1839 of experiments conducted by Robert Davidson, an Aberdonian. On 7th October, 1839 Dr. Forbes

12. Vide, M.S. Cotterill, The Scottish Gas Industry up to 1914, unpublished Ph.D. thesis, University of Strathclyde, 1976.

13. Telegraphic Journal, Vol. XI. 16/9/1882.

of King's College Aberdeen forwarded to Michael Faraday a letter in which he described how Davidson had used electricity to supply power to a small lathe and to a locomotive carriage capable of carrying two people across a rough wooden floor. Davidson had, apparently, spent his private fortune on such experiments and helped by Forbes had tried to interest railway management in his locomotive but without success until 1841 when he held an exhibition of his inventions in Edinburgh which included not only the lathe and the locomotive but also a sawmill and a printing press all of which were operated by electricity. Among those in attendance at the exhibition were representatives from the Royal Scottish Academy and from the Edinburgh and Glasgow Railway Company which was at that time nearing completion. An undisclosed sum was given by both bodies to allow Davidson to build an enlarged version of his locomotive suitable for propulsion on rails. The finished machine was a four wheeled open truck, measuring 16X6 ft., and weighing five tons. The vehicle was low set with the axles passing over the flooring. Three parallel iron bars were fastened to each axle and eight magnets were fixed to the floor, with two on each side of the axle pointing inwards and towards it. Current was supplied from batteries housed in boxes at each end of the vehicle and this produced the rotary motion in the axles.

David Mackie C.E., lecturer in Mechanical Philosophy, cautioned that there might be a danger to passengers of hydrogen gas escaping from the batteries. However, he was

of the opinion that such gases could be collected and used to produce light and heat. A proposed alternative source of light was a piece of carbon inserted in the circuit which when ignited would afford "the most intensely brilliant light imaginable." The directors of the railway company, allegedly far seeing since most could remember when steam locomotion seemed far-fetched and since they realised that there was no way of knowing the potential of electricity, agreed to further tests being carried out on the Edinburgh and Glasgow railway in 1842. However, even with additional batteries the locomotive only achieved a top speed of four m.p.h. The general consensus was that Davidson had the correct idea but lacked the means of supplying current in sufficient quantity.¹⁴ Moreover, there is little doubt that, apart from the obvious deficiencies of Davidson's machine, it was lacking in commercial viability by comparison with haulage by steam.

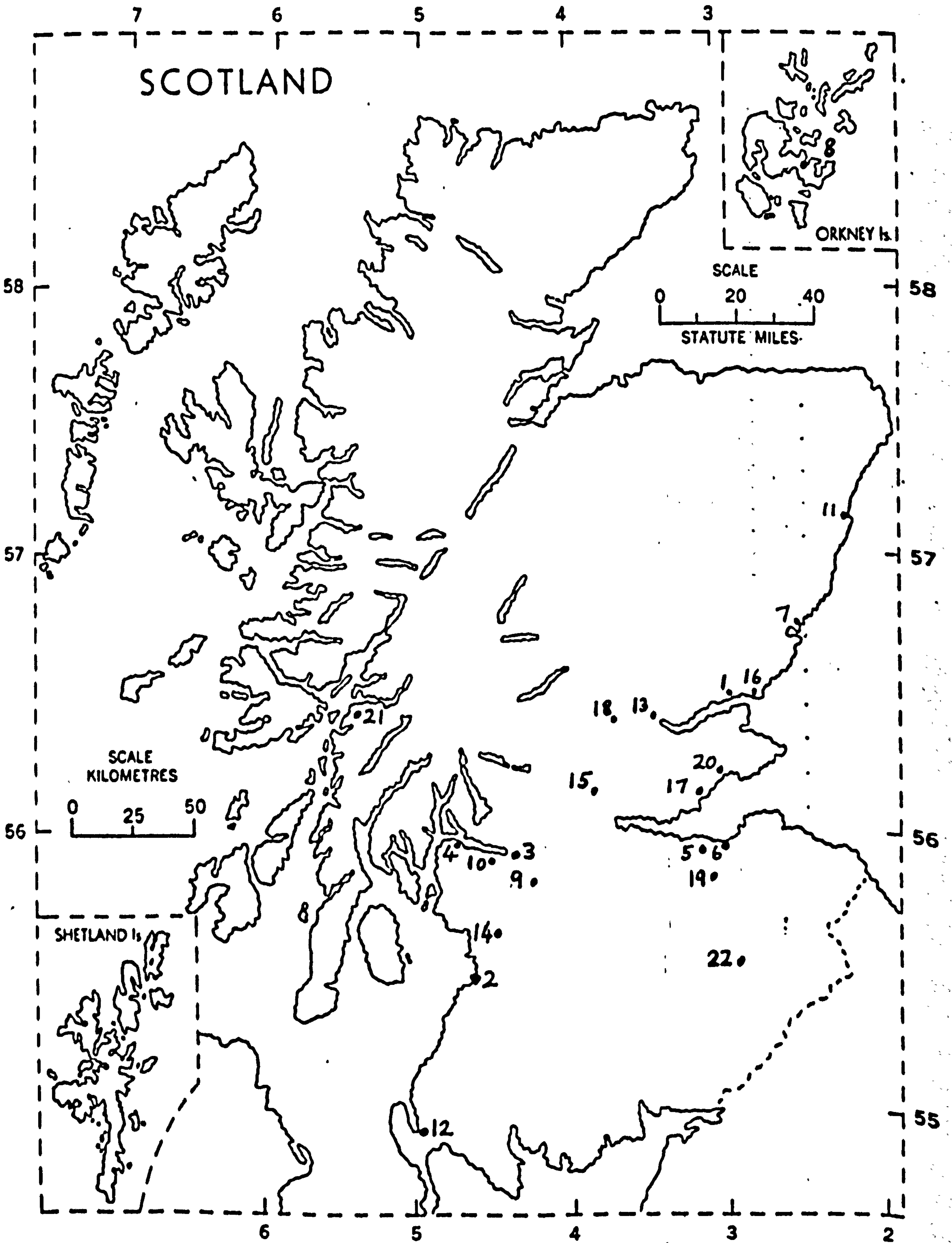
The evidence presented above concerning Lindsay but more especially that concerning the activities of Forbes and Davidson does indicate that Scotland was not entirely dis-interested in electrical development. Moreover, it would seem logical to assume, despite the lack of extant evidence, that these were not wholly isolated examples and that interest in this new field did not end in 1842. However,

14. S(trathclyde) R(egional) A(rchives). General Notes
Vol. 10. No 238.

it may be assumed that for further developments to take place additional investment and/or sponsorship was required and that during the ensuing period much more profitable avenues for such investment were readily available in more traditional industrial sectors.

Key to Map I

1. Dundee
2. Ayr
3. Glasgow
4. Greenock
5. Edinburgh
6. Portobello
7. Montrose
8. Kirkwall
9. Hamilton
10. Paisley
11. Aberdeen
12. Stranraer
13. Perth
14. Kilmarnock
15. Stirling
16. Broughty Ferry
17. Burntisland
18. Crieff
19. Dalkeith
20. Kirkcaldy
21. Oban
22. Hawick



See Reverse Side for Key.

Chapter 2

Early Experiment and Experience

In the decade following Swan's discovery Scotland displayed an interest in and an awareness of the new source of energy. However, the reception given was mixed. During this period the focal points of interest tended to be concentrated in the more urban and industrialised areas of both the west and east of Scotland, although a few isolated examples can be cited in both the Highlands and in the Border country (see Maps 1 and 2). Moreover, interest was primarily shown in electricity as an illuminant rather than a source of power and most of the systems tested or adopted were of the arc type run off dynamos driven by traction engines. Nevertheless, the evidence of this period indicates that not only was the incandescent lamp proven but also that it was being adopted. An examination of this period reveals that, although many local authorities indicated an interest in electricity, a much more positive enthusiasm was shown by private companies and private individuals.

(1) Local Authority Progress 1878-1888

After 1878 those responsible for the administration of the major industrial cities of Glasgow, Edinburgh, Dundee and Aberdeen did indicate an interest in electricity but not such an interest as would allow them to take responsibility for providing a public supply. Dundee, in particular, tended to take a rather negative attitude.

As early as August 1878 the Dundee Town Council considered a proposal to light the town with electricity with the motive power being derived from the 'Reekie Linn', which was a waterfall in the neighbourhood.¹ However, it would appear that the inherent caution of the Dundonians prevailed, since in August 1881 the notion of lighting the city by electricity was still being considered; the Police Commissioners decided that Dundee should await the results of experiments being made in other large towns before taking any steps to introduce electric lighting into Dundee. Moreover, the Dundee Gas Commissioners, who had an obvious vested interest in the new form of energy, also appointed a committee to investigate the electric light when they discovered that several of their large consumers had adopted the new means of illumination.² Several months later, in October 1881 the clerk to these commissioners reported that, having had communications with a number of English and Scottish electric light companies and with other local corporations, the general opinion was that the electric light could not and would not be brought into general use. Despite such optimism the commissioners resolved that no private companies "or other adventurers" should be allowed to supply electric lighting, generally, in

1. Telegraphic Journal, Vol. VI, 1st August, 1878.

2. Ibid., Vol. IX, 15th August, 1881.

Dundee and that if it was desired then the commissioners themselves should supply it. Moreover, to ascertain the suitability of electric lighting and the cost of its production they instructed that experiments should be conducted at an expense not exceeding £200.³ In due course a three light apparatus was hired so that they might master all the details of electric lighting "within themselves and astonish the town with the results."⁴ Dundee, however, had to wait until 1890 before the corporation obtained a provisional order and until 1893 before a public supply began.⁵

The situation in Glasgow does not appear to have been much better despite the fact that a more progressive attitude was adopted initially. In March 1881 the corporation accepted an offer by the Crompton Lighting Company to light for one week only, and free of charge, George Square by means of two large electric arc lamps. If the experiment was successful, the company offered to light the Square for either three or six months at a cost of £60 and £120 respectively;⁶ the offer was not apparently taken up. However, in November 1881 a proposal to apply to Parliament for the exclusive right of generating and supplying electric light to the city and

3. Ibid., 1st October, 1881.

4. Ibid., Vol. X, 1st April, 1882.

5. E. Garcke, Manual of Electrical Undertakings, Vol. I.

6. Telegraphic Journal, Vol. IX, 15th March, 1881.

the suburbs was carried by twenty-eight votes to six at a corporation meeting.⁷ The eventual outcome of this proposal was only realised in 1890 when a provisional order was obtained and a public supply began in 1892.⁸ Meanwhile in October 1882 the corporation agreed to an application by the Universal Electric Company to position an arc lamp on the top of either the clock or the shelter at the city's Bridgeton Cross.⁹ Yet, despite the fact that a special committee under the chairmanship of the Lord Provost was established in February 1884 to investigate the whole question of electric lighting in the city,¹⁰ the first major involvement by the corporation was the lighting of the new municipal buildings. In 1888, after deliberating on a municipal undertaking, the corporation accepted a supply from the firm of Muir, Mavor and Coulson which had by that time established its own central undertaking.¹¹

Edinburgh, as befitted its status as the capital of Scotland, was in some respects much more adventurous than the other major cities, despite the fact that its provisional order was not obtained until 1891 and that a public supply was not given until 1895.¹² In July 1881 Princes Street, North Bridge and Waverley Bridge were

7. Ibid., 1st November, 1881.

8. Garcke, op. cit. Vol. I.

9. Telegraphic Journal, Vol. XI, 28th October, 1882.

10. Ibid., Vol. XIV, 16th February, 1884.

11. Ibid., Vol. XXII, 10th February, 1888 and 9th March, 1888.

12. Garcke, op. cit. Vol. I.

experimentally lit using the Brush system. The cost of the three months experiment - Glasgow had experimented for one week only - was estimated at £390. However, if the experiment was a success, the entire system could be purchased for £2,400, less the £390 already mentioned. In addition to the areas mentioned, it was contemplated that a circuit should be extended to Holyrood Palace so that the Palace Square might be well lit during Her Majesty's sojourn in the city. Moreover, the directors of the North British Railway Company had arranged with the town council that Waverley Station would be lit from the corporation circuit.¹³ The system was put into operation on 25th August, 1881 and, although the Waverley Station experiment was successful and despite the fact that the Palace Square was successfully lit by three arc lamps during Her Majesty's stay in the city, the local authority's experience with the experiment was less than satisfactory. On the first night, after burning for only a short time, the light went out due, it was alleged, to the lack of water for the engines, and, on the second night the engines failed altogether after a brief period.¹⁴ After numerous complaints the Edinburgh Town Council decided in December 1881 that the Brush system was not a suitable illuminant for the city's streets. By that time it had been in use for approximately three months and had cost £838. Moreover,

13. Telegraphic Journal, Vol. IX, 1st July, 1881.

14. Ibid., 15th September, 1881.

despite the fact that the Brush company offered to supply the light at 2d. per hour per lamp, the Gas Light Company offered an improved light for almost half of that sum.¹⁵ In consequence the contract between the corporation and the Brush company was terminated in January 1882. For its part the town council based its decision on the grounds of expense and inefficiency while, by way of a partial explanation, the company stated that "the flickering of the lamps is caused by the shaking of the wires by the wind and the consequent derangement of the apparatus."¹⁶ After 1882 the direct involvement of the Edinburgh Town Council appears to have been minimal until March 1888 when, as a result of a visit to Glasgow, it was decided to illuminate Edinburgh Public Library by the installation of seventy incandescent lamps and twenty-two arc lamps at an estimated cost, including wages and depreciation, of £400 per annum.¹⁷ In July 1889 six companies notified the corporation of their intention to apply for provisional orders for electric lighting within the city.¹⁸ In consequence, the corporation itself applied for such an order in November 1889.¹⁹

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15. Ibid., 1st December, 1881.
 16. Ibid., Vol. X, 14th January, 1882.
 17. Ibid., Vol. XXII, 23rd March, 1888.
 18. Ibid., Vol. XXV, 19th July, 1889.
 19. Ibid., 8th November, 1889.

In a similar manner experiments were conducted by the Brush company by agreement with Aberdeen corporation. The experiment at Aberdeen began on 24th December, 1882 and lasted until 29th April, 1883 when the contract was terminated. After initial technical problems the system appears to have operated satisfactorily. From the financial point of view the estimated cost of operating the sixteen arc lamps of 13/4d. per night, seemed "to please the Aberdonians." However, on the basis of aesthetic value and as an efficient means of illuminant, there were objections. The lamps were, allegedly, not pretty and were stuck on rude wooden poles twenty feet high in such a way that they threw shadows towards the street and light on the side of the houses where it was not wanted. Moreover, the lamps were placed too far apart while the globes were of clear glass from which rays emanated, regarded as too piercing and casting deep shadows.²⁰ After 1883 there appears to have been a positive lack of interest by the corporation until October 1889 when it was decided to apply for a provisional order.²¹ The corporation obtained a lighting order in 1890, and a public supply began in 1894.²²

An examination of local authorities on a national basis, excluding these four major cities, indicates a

20. Ibid., Vol. XII, 6th January, 1883 and 5th May, 1883.

21. Ibid., Vol. XXV, 11th October, 1889.

22. Garcke, op. cit. Vol I.

national awareness of electricity but apathy, indecision and parochialism obstructed progress in the use of the new form of energy. Thus, during this embryonic stage of development, a negative attitude was adopted generally by many of the smaller burghs. As early as September 1878 the corporation of Ayr resolved to carry out a series of experiments in lighting the town with electricity,²³ and yet it was not until eleven years later that it decided to apply for a provisional order, which was granted in 1890, and the supply of electricity did not begin until January 1896.²⁴ In August 1881 the corporation of Portobello decided that, in view of the progress being made in the use of electricity for lighting, it would be unwise to adopt the Burgh Gas Supply (Scotland) Act 1876.²⁵ However, it was not until 1897 that Portobello decided to obtain a supply from the city of Edinburgh.²⁶

The year 1883 witnessed an increased interest in electric lighting by local authorities and also a widening in the geographic base of such interest. However, the interest shown did at times take long to reach fruition. In June 1882 Montrose corporation petitioned

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23. Telegraphic Journal, Vol. VI, 1st September, 1878.
 24. Garcke, op. cit. Vol. VI.
 25. Telegraphic Journal, Vol. IX, 15th August, 1881.
 26. Electrical Review, Vol. XLI, 8th October, 1897.

Parliament in favour of the Electric Lighting Bill of that year.²⁷ In January 1883 an offer by the Brush Electric Light and Power Company of Scotland to light the town on a trial basis was deferred, apparently indefinitely.²⁸ Enthusiasm for electric lighting was regenerated in April 1894 when a deputation from the council visited Glasgow, Edinburgh and Coatbridge.²⁹ The installations at the two major cities impressed the deputation but they decided to recommend to the town a station similar to that of Coatbridge which was at that time controlled by the Scottish House-to-House Electricity Company. Accordingly, in January 1895 the corporation of Montrose decided to support that company in its application for a provisional order for the town.³⁰ However, progress was not made and negotiations apparently broke down since in April 1897 it was reported that negotiations were now being conducted with Edmundsons' Electricity Corporation.³¹ In September 1897 the town council itself decided to apply for a provisional order and make it over to Edmundsons,³² and in October 1897 such an agreement was signed with that company.³³ However, the matter did

27. Telegraphic Journal, Vol. X, 10th June, 1882.

28. Ibid., Vol. XII, 13th January, 1883.

29. Electrical Review, Vol. XXXIV, 13th April, 1894 and 20th April, 1894.

30. Ibid., Vol. XXXVI, 25th January, 1895.

31. Ibid., Vol. XL, 23rd April, 1897.

32. Ibid., Vol. XLI, 24th September, 1897.

33. Ibid., 5th November, 1897.

not end there. The provisional order was obtained by the town council in 1898 and made over to Edmundsons'. Edmundsons', in turn, transferred the order to the Angus Electric Light and Power Company which in October 1904 became the North of Scotland Electric Light and Power Company;³⁴ the latter companies were subsidiaries of the former company.³⁵

The town of Kirkwall in the Orkneys took even longer to realise its hopes. In June 1882 the town council considered the advisability of lighting the town with electricity because the quality of the gas supply was so bad.³⁶ However, a provisional order was not obtained until as late as 1923 and a supply was only provided in February 1924.³⁷ In the West of Scotland the largely residential town of Hamilton decided in October 1882 to apply for powers to supply electricity for public and private purposes within the burgh but did not do so at that time.³⁸ In October 1893 a request by the Caledonian Electric Supply Company for permission to apply for a provisional order was refused by the town council.³⁹ It was, in fact, only in November 1897 that the town

34. Garcke, op. cit. Vol. IX.

35. The relationship between Edmundsons' and its Scottish subsidiaries is fully discussed in Chapter 7.

36. Telegraphic Journal, Vol. X, 17th June, 1882.

37. Garcke, op. cit. Vol. XXIX.

38. Telegraphic Journal, Vol. XI, 28th October, 1882.

39. Electrical Review, Vol. XXXIII, 27th October, 1893.

council decided to apply for a provisional order⁴⁰ and a supply did not begin until March 1903 when Edmundsons' began a public supply.⁴¹ In November 1882 Paisley town council also applied to the Board of Trade for a provisional order to supply electricity for the public and private lighting of the town.⁴² Paisley's intention was specific. Paisley town council wished to keep private companies out of the town. Paisley eventually obtained a provisional order in 1891, but construction operations only began in 1896, and the actual supply began in September 1899.⁴³ In 1882 certain town councils were more decisive, even if the decisions taken were negative. In 1882 the town councils of Stranraer, Perth, Kilmarnock and Stirling decided not to apply for powers to supply lighting to their towns for reasons which are not stated.⁴⁴

In the year 1883 activity continued but with no positive result. The Brush Electric Light and Power Company of Scotland brought the advantages of electric lighting to the notice of a number of the smaller local authorities viz., Forres, Broughty Ferry, Burntisland, Crieff, Dalkeith and Kirkcaldy, but their reaction was

40. Ibid., Vol. XLI, 5th November, 1897.

41. Garcke, op. cit. Vol. IX.

42. Telegraphic Journal, Vol. XI, 4th November, 1882.

43. Garcke, op. cit. Vol. IX.

44. Telegraphic Journal, Vol. XI, 11th November, 1882, 18th November, 1882 and 25th November, 1882.

negative.⁴⁵ In 1884 the town of Oban also decided to adopt a negative attitude. In March 1884 the Edison and Swan United Electric Light Company called a public meeting in the town's Station Hotel to consider the desirability of introducing the electric light to Oban. Despite the fact that the company's Scottish representative C.T. Grant was present, no decision was taken.⁴⁶

It would appear, despite the inadequacy of the evidence, that the town of Greenock, for a brief period, led the vanguard of momentum among the Scottish local authorities. In 1883 Greenock obtained a provisional order,⁴⁷ and in March 1884 it was reported that the town council were making arrangements to experiment with electric lighting.⁴⁸ However, by May 1887, by which time power had been supplied for an unknown period of time, it was concluded that the experiment was not a success. From the evidence it would appear that motive power for the local sugar mills was supplied from the abundance of water which, as a general rule, coursed down the adjacent hillside in a lade. The local authority exploited this situation by placing a turbine on the lade which was then used to turn dynamos from which power was supplied, at an allegedly minimal cost, to the Roxburgh Street Lighting Company. However, dis-satisfaction arose either from the

45. Ibid., Vol. XII, 13th January, 1883, 7th February, 1883 and 17th February, 1883.

46. Ibid., Vol. XIV, 8th March, 1884.

47. Garcke, op. cit. Vol. V.

48. Telegraphic Journal, Vol. XIV, 8th March, 1884.

company which was dis-satisfied with the light or from the local authority which found that the undertaking was not a paying concern. The source of the grievance is not known, but in May 1887 both parties were negotiating to have the contract terminated. The Electric Lighting Committee agreed to give the company a rebate of twenty-five per cent on the cost of the electric light for the previous twenty months on condition that the contract was terminated on 7th May, 1887 and also that the company should use gas until September 1888. This offer was accepted by the company and the electric light was discontinued, although arrangements were made for preserving the turbine and the dynamo in good order.⁴⁹ A public supply did not begin again in Greenock until November 1899.⁵⁰

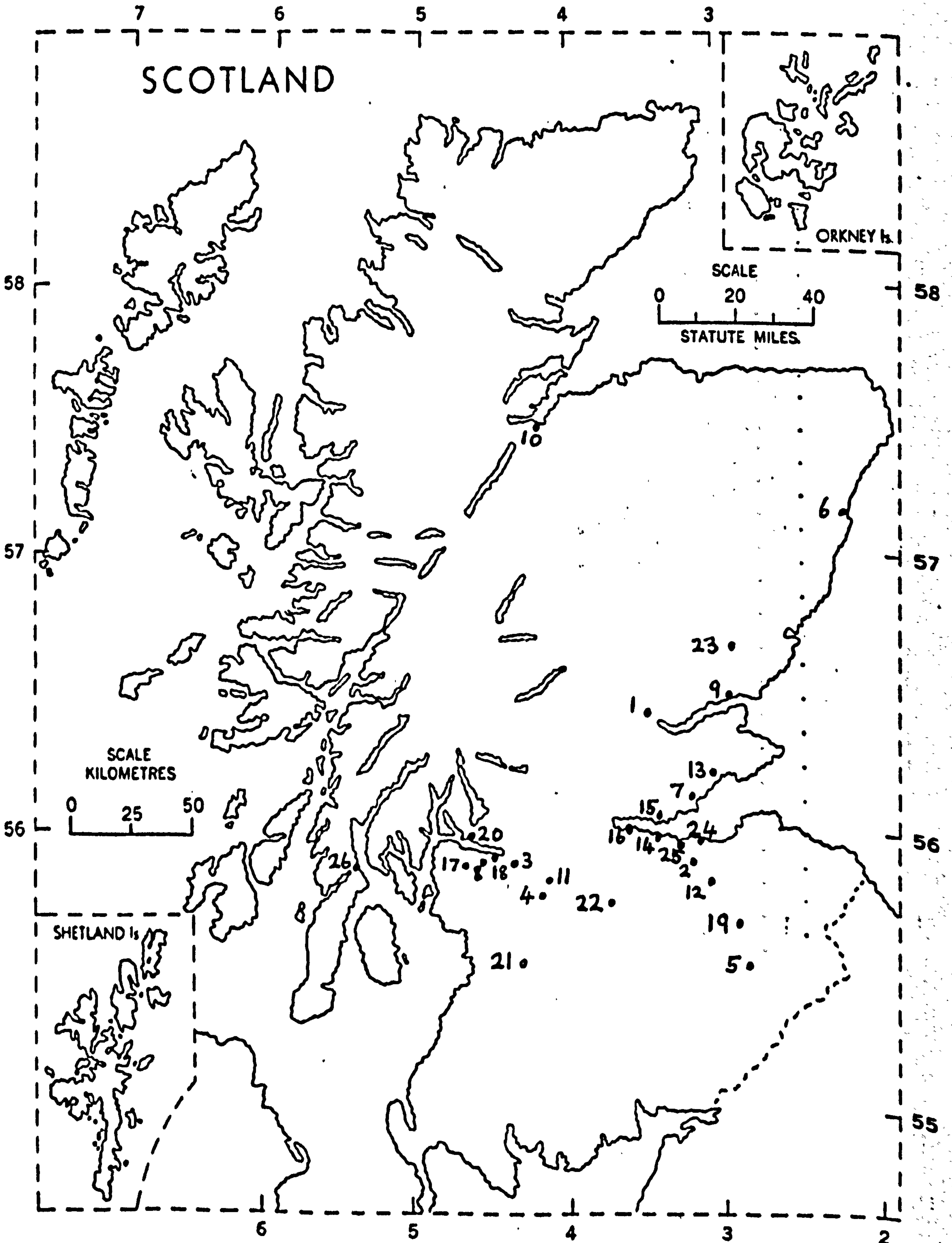
In December 1884 successful experiments in street lighting were conducted by the firm of Anderson and Munro of Glasgow in the town of Hawick.⁵¹ However, despite the reported success, the town council did not establish electric lighting as a permanent feature until much later. Between 1884 and 1888 the position in Scotland appears to have been gloomy and, despite the inadequate nature of

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49. Ibid., Vol. XX, 27th May, 1887,
D.G. Tucker, Hydro-Electricity for Public Supply in Britain, 1881-1894.
Industrial Archaeology Review, Vol. I, Number 2,
1977, p.p. 182-183.
50. Garcke, op. cit. Vol. V.
51. Telegraphic Journal, Vol. XV, 20th December, 1884.

Key to Map 2

1. Perth
2. Edinburgh
3. Glasgow
4. Hamilton
5. Hawick
6. Aberdeen
7. Kinghorn
8. Paisley
9. Dundee
10. Inverness
11. Motherwell
12. Dalkeith
13. Kirkcaldy
14. South Queensferry
15. North Queensferry
16. Grangemouth
17. Johnstone
18. Govan
19. Galashiels
20. Dumbarton
21. Cumnock
22. Lanark
23. Forfar
24. Portobello
25. Leith
26. Tarbert

Map 2. Known Private Installations Providing an Electricity Supply, 1878 - 1888.



See Reverse Side for Key.

P.W. 4

available evidence, it would appear that no other local authority made a positive attempt to introduce electricity within its boundary.

(2) Private Sector Progress 1878-1888

In contrast to the relatively slow reaction of local authorities, private enterprise was quick to realise the potential of this new form of energy. Map 2 provides some indication of the geographical spread of private installations and indicates their concentration in more urban and industrialised areas of east and west Scotland. However, the map does conceal the fact that most of the towns represented had more than one private installation. The industries which adopted electricity in the decade between 1878 and 1888 were representative of the mainstream of Scottish industry. Examples can and will be cited from the iron and steel industry, mining, textiles, shipyards, dyeworks and distilleries as well as churches, theatres, shops, houses and mansions and sport. Moreover, although electricity was used mainly as an illuminant, there are several examples indicating its use as a source of power. By the same token, although arc lighting was the more dominant form of illuminant, the incandescent lamp was becoming increasingly prominent.

Despite the fact that for much of the period gas was cheaper, many private firms and public concerns favoured the use of electricity for a variety of reasons. The quality of lighting was often better than that provided by gas mantles, but the gas industry enjoyed the advantage that it had weathered any earlier problems relating to operating efficiency. Gas lighting and heating often made for less healthy working conditions and in certain circumstances it was clearly much safer to use electricity.

The list of private installations in Scotland in the decade after 1878 is a lengthy one but, nevertheless, particular installations do stand out as being, apparently, notable 'firsts' and of obvious interest. The introduction of electric lighting in Pullar's Dye Works at
Porth

was one of the first indications of commercial usage in Scotland, and certainly the first in Perth, where apart from any other advantage over gas, electricity displayed delicate colours in their true tints.⁵² In 1880 in Edinburgh, the Rosebank Iron Works, which were experimentally lit by a Crompton arc lamp, were then permanently lit by three such lamps.⁵³ In 1880 also Crompton was entrusted with the lighting of the Glasgow Post Office and the goods station of the North British Railway Company.⁵⁴ The substitution of electricity for gas at the Glasgow Post Office not only meant a reduction in room temperatures, thus causing employees to feel fresher and free from headaches, but also allowed several sorters to dispense with their spectacles. The installation at the goods station may have resulted from any one of several factors or from a combination of such factors. It may have represented savings on cost but this is not known. It may simply have represented a desire for modernism or more importantly an increased safety measure. Equally important it may have given a better ability to see fine work. Whatever the reason it would most certainly have reduced the risk of any pilfering.

52. Ibid., Vol. VI, 1st November, 1878.

53. Ibid., Vol. IX, 1st January, 1881.

54. Ibid.

In late 1880 the first application in Glasgow of electricity for street lighting, in a permanent form, took place at the new buildings in Buchanan Street of the Glasgow Herald. Moreover, the proprietors had also contracted for the public offices and the composing rooms to be lit by electricity.⁵⁵ In May 1881 the first exhibition, on a practical scale, of Swan's incandescent lamp in Glasgow took place at the Sauchiehall Street offices of D. and G. Graham who were at that time the licencees for Scotland. The offices were lit by thirty Swan lamps which, importantly, were "arranged and adapted to suit every description of gas fixture."⁵⁶ What is believed to have been the first installation of electricity at a Scottish colliery took place on 9th August, 1881 at the Earnock Colliery, near Hamilton, belonging to the well-known Scottish coalmaster, John Watson. Swan incandescent lamps, which had been modified for use in mines, were installed and the motive power was provided by a steam engine which was also used to drive a saw-bench. Publicity for the incandescent lamp was probably assured by the fact that, on the day of opening, blasting with gun powder took place without affecting the

55. Ibid., 15th January, 1881.

56. Ibid., 1st June, 1881.

lamps in the slightest.⁵⁷ On the day of the actual opening of the installation, which also included Watson's house, Swan was represented by A. Jamieson, Principal of Glasgow College of Science and Arts.⁵⁸

An extensive use of electricity as an illuminant can be seen in the construction of the Forth Bridge which

57: Ibid.

58. Andrew Jamieson (1849-1912) was born at Grange, Banffshire and was the eldest son of Reverend George Jamieson D.D., Old Machar Cathedral, Aberdeen. He received his education at the Gymnasium, Old Aberdeen and at Aberdeen University. His apprenticeship was served with Hall, Russel and Company, Marine Engineers and Shipbuilders, Aberdeen Ironwork. He afterwards entered the service of the Great North of Scotland Railway Company where he attained the position of chief draughtsman in the locomotive and carriage department. At the age of twenty-three he was appointed assistant to Sir W. Thomson (later Lord Kelvin) and to Professor Fleming who placed him in charge of the testing staff, to supervise the manufacture of submarine cables at the Woolwich Works of Siemens Brothers. Later, and for a number of years, Jamieson was chief electrician with the Eastern Telegraph Company but resigned this position in 1880 to become Principal of the Glasgow College of Science and Art. In 1887 when this institution amalgamated with the Mechanics Institute and Anderson's College to form the Glasgow and West of Scotland Technical College - later the Royal Technical College and now the University of Strathclyde - Jamieson was elected Professor of Engineering and devoted himself entirely to electric engineering. Jamieson resigned this position in 1899 to engage in consultancy work for engineering and shipbuilding firms on the River Clyde and for municipal and other engineering undertakings. Jamieson also organised, on a large scale, a system of correspondence tuition to prepare students for various engineering examinations and became well-known as an author of text-books on engineering subjects. University of Strathclyde Archives, S.674. A. Humboldt Sexten, The Andersonian and The Institutions Descended from It, 1796-1894, (1894), p.p. 86, 88, 94, 109-111.

undoubtedly was not well sited or well suited for the provision of a gas supply. In December 1883 at South Queensferry the workshops were lit by sixteen arc lamps and a number of moveable incandescent lamps. Outside twelve large arc lamps lit various lines of rails and the approaches to the workshops. The offices, canteen and other buildings were lit throughout by over two hundred Swan incandescent lamps of 20 c.p. The staging, which began near Hawe's Pier and extended for nearly half a mile into the Firth, had, with its approaches, twelve large arc lamps. On the island of Inch Garvie, in mid-channel, four large arc lamps were used outside and small incandescent lamps in the offices, workshops, old castle and neighbouring buildings. At North Queensferry six large arc lamps served the outside area and a number of small incandescent lamps were used in the interior offices and workshops.⁵⁹ This combination of arc and incandescent lighting, of which there are other examples in the 1880's, allowed the unique features of both to be used to their greatest advantage.

Other examples of lesser importance but which nevertheless indicate the growing acceptability of electricity can be cited. In December 1882 the Stonelaw Skating Pond at Rutherglen, near Glasgow, was the scene of great excitement when it was lit by an arc lamp which was

59. Telegraphic Journal, Vol. XIII, 1st December, 1883.

supplied by the Bridgeton Universal Electric Company.⁶⁰ This is the first known Scottish sporting activity to benefit from electricity. What was probably the first use of electricity as a means of advertising in Scotland occurred in Edinburgh in February 1883. The furniture salon of John Mitchell and Sons of Princes Street was lit by over two hundred incandescent lamps which were artistically arranged in monograms.⁶¹ Another notable 'first' was achieved by the Roman Catholic church of St. John at Old Cumnock in Ayrshire which was built by the Marquis of Bute. In August 1884 it was fitted with electric light under the personal supervision of William Massey of Twyford who was reported to be the electrical engineer to the Royal Palaces. Seventy glow lamps, of twenty c.p., were installed and the current was supplied by a dynamo and a steam engine which were placed in a small house hidden among the trees of the churchyard. It was also intended to generate electricity for working the organ bellows.⁶² One final example which indicates not only the acceptability of electricity in this early period but also its competitiveness with rival illuminants occurred in April 1885. In that month it was reported that the Paraffine Light and Mineral Oil Company, founded

60. Ibid., Vol. XI, 16th December, 1882.

61. Ibid., Vol. XII, 17th February, 1883.



62. Ibid., Vol. XV, 23rd August, 1884.

by James Young,⁶³ had adopted electric lighting at its Newliston Mine, near Edinburgh. Two sixteen-hour arc lamps which were hoisted on fifty foot high poles supplied the light while power was supplied by a dynamo driven by the workshop engine.⁶⁴ Electricity was not, of course, without its critics some of whom were openly hostile. The first known case of vandalism occurred in Glasgow in August 1882. At the Central Police Court in Glasgow, Peter Smith, who had been an employee of the Glasgow and South Western Railway Company, was fined two guineas, with the alternative of twenty days imprisonment, for maliciously extinguishing the electric light in St. Enochs Station; no explanation is given for the behaviour of Smith.⁶⁵

There are several known examples where \wedge electricity was used as a source of power. In February 1883 pumping work at the Lothians Collieries at Dalkeith was being carried out with the use of electricity.⁶⁶ In the same month William Whitlet, a sewing machine manufacturer in Dundee, was working his machines by use of electricity and the experiment was attracting a great deal of attention.⁶⁷ In September

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63. J. Butt, James Young, Industrialist and Philanthropist, Unpublished Glasgow University thesis, 1964.
 64. Telegraphic Journal, Vol. XVI, 4th April, 1885
 65. Ibid., Vol. XI, 12th August, 1882.
 66. Ibid., Vol. XII, 10th February, 1883.
 67. Ibid., 17th February, 1883.

1883 Gilbert, Bogle and Company of Glasgow experimented successfully with an electric launch on the River Clyde at Kilcreggan with the power being supplied from a battery and motor.⁶⁸ A novel application of electric arc lighting was reported in May 1884 at Greenock. The steamer Tilly, which was built for the Batavian fisheries by Hanna, Donald and Wilson, was fitted with a powerful arc lamp of 15,000 c.p. The function of the lamp, which could be lowered into the sea to a depth of ten fathoms, was to act as a lure in drift net fishing. During this apparently successful experiment the lamp was submerged in the River Clyde for four hours.⁶⁹ Finally, it was reported in November 1887 that an electric car had been constructed and tried out in Paisley by a James Gibson; unfortunately no other details are given.⁷⁰

Generally speaking, however, electricity was used for the much more mundane purpose of lighting, and its use^{for this purpose} was widespread throughout Scottish industry in the period from 1878 to 1888. The following section, which is   far from exhaustive, provides a broad analysis of both firms and industries employing electricity at this time. Moreover, in the following section, and in an attempt to provide greater elucidation, the year of the introduction of electric lighting to a particular company

68. Ibid., Vol. XIII, 15th September, 1883.

69. Ibid., Vol. XIV, 3rd May, 1884.

70. Ibid., Vol. XXI, 11th November, 1887.

is given immediately after the company name and the type of system in operation designated by a bracketed letter. For example (A) refers to arc lighting, (B) refers to incandescent lighting while (C) is used where the type of system employed is not known.⁷¹

Iron, Steel and Engineering:-

Edinburgh Rosebank Iron Works 1881	..	..	..	(A)
Girbal Tube Works, Glasgow 1881	..	..	..	(B)
James Goodwin and Company, Motherwell 1882	..	..	..	(A)
Forth Bridge Construction 1883	..	..	..	(A and B)
Neptune Brass, Copper and Iron Works, Glasgow 1884	..	..	..	(A)
Hyde Park Locomotive Works, Glasgow 1884	..	..	..	(A)
Colville and Son, Motherwell 1886	..	..	..	(A and B)

Mining:-

Earnock Collieries Hamilton 1881	..	..	..	(B)
Lothian Collieries, Dalkeith 1883	..	..	..	(Pumping only)

Shipyards:-

John Key and Sons, Kinghorn 1882	..	..	..	(A)
John Elder and Sons, Govan 1882	..	..	..	(A)
Pearce Brothers, Dundee 1882	..	..	..	(A and B)
Denny and Brothers, Dumbarton 1884	..	..	..	(C)

Textiles:-

Pullars Dye Works, Perth 1878	..	..	..	(A)
Clyde Spinning Company, Glasgow 1881	..	..	..	(C)

71. Vide., Telegraphic Journal, Vols. VI - XXIII.

Textiles (Cont'd.):-

Deanston Cotton Works, near Doune, Perthshire 1881	(C)
Finglands Hosiery Factory, Hawick 1881	(B)
P.P. Campbell, Dye Works, Perth 1882	(C)
Brown Brothers, Galashiels 1884	(B)
Clarke and Company, Thread Manufacturers, Paisley 1887	(B)
John Lawson and Sons, Flax Mills, Forfar 1887 .	(B)
James Paterson and Company, Carpet Manufacturers, Dundee 1888	(B)

Docks and Quays:-

Greenock 1881: Grangemouth 1883: Wemyss Bay 1886	(A)
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Commercial (including Offices, Shops
and Warehouses):-

General Post Office, Glasgow 1881	(A)
Glasgow Herald Building 1881	(A)
D. and G. Graham, Glasgow 1881	(B)
Cooper and Company, Glasgow 1881	(C)
General Post Office, Edinburgh 1881	(C)
John Duncan, Ironmonger, Aberdeen 1883	(B)
Aberdeen Journal Building 1883	(B)
John Mitchell and Son, Edinburgh 1884	(B)
Hunter and McMorrisson, Ironmongers, Lanark 1885	(B)

Railways (including Hotels and Stations):-

North British Railway Station, Glasgow 1881 ..	(A)
North British Railway Station, Edinburgh 1881 .	(A)
Highland Railway Company, Inverness 1882 ..	(C)
Caledonian Railway Station, Glasgow 1885 ..	(A and B)

Railways (including Hotels and Stations) (Cont'd.):-

North British Railway Company, Glasgow
Underground Carriages 1886 (B)

Caledonian Railway Station, Cathcart,
Glasgow 1887 (B)

Entertainment:-

Aberdeen Music Hall 1882 (A and B)

Theatre Royal, Edinburgh 1883 (B)

Royal Lyceum Theatre, Edinburgh 1883 (B)

Gaiety Theatre, Glasgow 1883 (A and B)

Royalty Theatre, Glasgow 1888 (B)

Miscellaneous:-

Church of St. John, Old Cumnock, Ayrshire 1884 (B)

Andrew Usher and Company, Distillers,
Edinburgh 1884 (C)

Paraffine Light and Oil Company, Edinburgh 1885 (A)

Heriot Watt College, Edinburgh 1887 (B)

The installations themselves did, of course, vary in both size and scale and this would, initially, be dependent on the size of the individual company unit. Moreover, the evidence only takes into account the initial installation and does not allow for any expansion of lighting at a later date. Full information is not available on all of the installations named. However, within the Iron, Steel and Engineering Sector, where safety was an important consideration, installations could vary in size from the three arc lamps used at the Edinburgh Rosebank Iron Works or even the single arc lamp at Goodwin and Company of Motherwell to the fairly extensive system

employed by Colville and Son which consisted of two hundred incandescent lamps and thirty-two arc lamps which could burn continuously for eighteen hours. In the Textile Sector, where an ability to see fine work is again noted, installations varied from the one hundred and fifty lamps used by Clarke and Company of Paisley to the five hundred incandescent lamp system used by Paterson and Company at Dundee. In the Railway Sector, where safety was important but where also a desire for modernism and service competition were important considerations, the Caledonian Railway Station at Glasgow used forty 2000 c.p. and two 4000 c.p. lamps which could burn continuously for sixteen hours in the actual station, and one hundred and eighty incandescent lamps in the adjoining hotel. The most obvious feature of the above list is that companies adopted the system, either arc or incandescent, according to their own particular needs but were willing to combine both systems to achieve the individual benefits provided by each system. The most obvious example of combination lighting is the railway station and adjoining hotel complex. The Gaiety Theatre, Glasgow, however, provides another excellent example. A large arc lantern which was situated in the ceiling contained three lights, each of 1000 c.p.; four other arc lights of lesser power were fitted up on the stage where they were used for scenic effects. On the other hand the auditorium, passages and so on were lit by two hundred and ninety incandescent lamps.

The one important area which has been ignored so far in this study of the application of electricity to

lighting in the decade following 1878 is the lighting of ships. Two quotations perhaps exemplify the importance of this sector. Bearing in mind the importance of Scotland, and in particular the River Clyde, in the provision of shipbuilding services the quotation from the Telegraphic Journal of June 1883 is of particular note viz.,

"That the electric light should form part of the fittings of vessels of any importance built on the Clyde is now accepted as a matter of fact and it would be easier to record those not fitted than those fitted."⁷²

Moreover, an anonymous report in the same journal of April 1887 stated that,

"The electric light work which is done in Scotland is still chiefly in connection with shipping . . . good business is done by Glasgow and Edinburgh firms."⁷³

The claim made by the first quotation, based on available evidence, would appear to be valid but the second quotation is, perhaps, open to question.

The first known ship, and there were probably earlier examples, to be fitted with electric lighting, and also bells, was the steel paddle ship Normandy which was launched by John Elder and Company from the Fairfield Works in Glasgow on 29th June, 1882; no details are available of the type and

72. Telegraphic Journal, Vol. XII, 2nd June, 1883.

73. Ibid., Vol. XX, 29th April, 1887.

size of the installation.⁷⁴ In March 1883 the steamer Norham Castle was launched, again by John Elder and Company, and was fitted throughout by an unspecified number of incandescent lamps.⁷⁵ In April of the same year the steamer Cavalier was launched by Aitken and Mansel of Glasgow for the MacBrayne line and fitted with fifty incandescent lamps.⁷⁶ In the same month it was announced that the steam ship Oregon, which was being built by John Elder and Company, was to be lit throughout by the Edison Electric Light Company and that the generating plant was to consist of two duplicate five hundred light dynamos and engines.⁷⁷ This would appear to mark the involvement of the Edison company in ship lighting and this company, which was hardly a native Scottish company, appears to have established an early dominance in this sphere since it was reported in June 1883 that the company had in hand all the electric lighting on the River Clyde with one exception.⁷⁸ Moreover, in September 1883 when the directors of the Peninsular and Oriental Company resolved to begin fitting their steamers with electric light - a start was to be made with the Valetta which was then being built at Greenock - the work was again entrusted to the Edison company.⁷⁹ In addition, and in the same month, what was said to have been

74. Ibid., Vol. XI, 8th July, 1882.

75. Ibid., Vol. XII, 3rd March, 1883.

76. Ibid., 24th April, 1883.

77. Ibid.

78. Ibid., 2nd June, 1883.

79. Ibid., Vol. XIII, 1st September, 1883.

the largest shipping contract for electric lighting until that time was concluded between the New Zealand Company's fleet and the Edison company's branch in Scotland.⁸⁰

The Edison company were also associated with the Clan Line in fitting out its steamers.⁸¹ The emphasis given to the Edison company does not mean that Scottish firms were excluded. It is known, for example, that the Electric Carbon Storage and Apparatus Manufacturing Company of Scotland fitted out the steam ship Buninyong in February 1883 and the steam ship Burwak in June 1883.⁸² Moreover, the steam ship Manaos, built at Clydebank, was fitted out in 1884 by Richard Miller, 54 St. Enoch Square, Glasgow,⁸³ and a new paddle steamer, launched in the same year, was fitted out by William Harvie and Company, 222 Broomielaw, Glasgow.⁸⁴ By the same token, however, the steamship Cahors, launched at Kirkcaldy in 1883, was fitted out by Woodhouse and Rawson, 11 Queen Victoria Street, London.⁸⁵ Thus, from the available evidence it would appear that, although Scottish firms benefited from ship lighting, they did not dominate the scene.

No adequate or substantiated reasons can be given to suggest why Scottish firms were, apparently, so little able

80. Ibid.

81. Ibid.

82. Ibid., Vol. XII, 24th February, 1883 and 30th June, 1883.

83. Ibid., Vol. XIV, 6th January, 1884.

84. Ibid., Vol. XV, 16th August, 1884.

85. Ibid., Vol. XIII, 13th October, 1883.

to compete in this particular market; the extant records examined provide no evidence. The Edison company, as indicated above, was established relatively early in the fitting out of ships and thus may have secured a firm foothold and an expertise in this area. Moreover, from the number of occasions the Edison company and its Scottish representative, C.T. Grant, are mentioned in the Telegraphic Journal during this early period, it may well be the case that this company, and its local representative, pursued a much more vigorous sales campaign than its domestic counterparts and in addition, of course, the very name Edison would not be without effect. However, without firm evidence such reasoning must remain conjecture.

Moreover, the importance of the size and scale of ship lighting implicit in the second quotation may be exaggerated. The size and scale of industrial installations has already been noted. By comparison the Cavalier launched in 1883 had an installation of fifty incandescent lamps⁸⁶ and the Burwak launched in the same year had seventy incandescent lamps of twenty c.p. each and two arc lamps of 2000 c.p. each.⁸⁷ The Arawa built in 1884 and the largest ever vessel built at Dumbarton until that time had three hundred incandescent lamps.⁸⁸ Thus, it would appear that the size and scale of electric lighting installations on

86. Ibid., Vol. XII, 24th April, 1883.

87. Ibid., 23rd June, 1883.

88. Ibid., Vol. XV, 5th July, 1884.

ships during this initial period should not be over-exaggerated to the detriment of industrial installations inland.

(3) The Difference Explained.

The differing attitudes of local authorities and private enterprise towards electric lighting cannot be easily explained in this period prior to 1888. To decry the particular type of lighting, either arc or incandescent, on the grounds of suitability would appear to be irrelevant. Both had their particular uses and function and both were indiscriminately ignored by local authorities. On the other hand private enterprise, and industry generally, were exploiting the unique advantages of both forms of lighting, either individually or by combining both forms. The use of both arc and incandescent lighting in the construction of the Forth Bridge provides a classic example, as early as 1883, of combination lighting. By the same token and on the individual use basis Paterson and Company at Dundee had in 1888 a five hundred incandescent lamp system whereas the Caledonian Railway Station at Glasgow had in 1885 an arc system comprising forty 2000 c.p. and two 4000 c.p. arc lamps. Industry had, of course, an initial advantage in the form of power for generation purposes whereas in the local authority sector such power had to be installed and this may have been a mitigating circumstance but one which does not completely vindicate the disregard of the local authorities.

The unit size of individual local authorities and their powers of capital raising can also be considered. Many were relatively small viz., Oban, Crieff, Burntisland, but this interpretation ignores the fact that in the private sector there were many small installations which operated, apparently, successfully. Moreover, in the industrial heartland of Scotland the large urban local authorities, although experimentation did take place, did not consider electric lighting a viable proposition.

Without question, this pattern of development must be set against contemporary thinking which was itself reflected in the legislation of the period, generally favouring local authority undertaking. The dominance of laissez-faire was being questioned in the period after 1850 and the idea of collectivism developed. Thus, the idea that state intervention was necessary for the benefit of the entire community and that the state had an obligation to establish minimum standards to safeguard society from either industrial, financial or social misuse became an ever-growing symptom of government thinking. Such contemporary thinking, together with the ever present fear of monopoly, was reflected in such diverse areas as railway legislation, public health, the company acts of the 1850's and 1860's, trade union legislation and the ever-growing volume of factory legislation. In particular, the Tramways Act 1870 influenced the pattern of development in the electricity industry. This Act stipulated that concessions to companies involved in tramway

undertakings be limited to twenty-one years after which a local authority could exercise an option to purchase the undertaking. This legislation, and the thinking which underlay it, greatly influenced the Select Committee of the House of Commons, chaired by Lyon Playfair, in 1879,

"to consider whether it is desirable to authorise municipal corporations or other local authorities to adopt any scheme for electric lighting."

The Committee favoured the local authorities and stated that,

"it might be expedient to give the Municipal Authorities a preference during a limited period to control the distribution and use of the electric light, and, failing their acceptance of such a preference, that a monopoly going to a private company should be restricted to the short period required to remunerate them for the undertaking with a reversionary right for the Municipal Authority to purchase the plant and machinery on easy terms."⁸⁹

89. P.B. Henderson, *The Development of Statutory Powers Relating To The Electricity Supply Industry On The North East Coast*, Unpublished M.A. dissertation, University of Durham, 1954, p.p. 14-20.
H.H. Ballin, *The Organisation of Electricity Supply in Great Britain*, (1946), p. 7.

The influence of this report, the earlier legislation and contemporary thought can be seen in the Electric Lighting Act 1882, the first Act to deal specifically with electricity supply. The Act provided for the establishment of electricity undertakers in one of two ways. First of all either local authorities, companies or private persons could be authorised by the grant of a Board of Trade licence for seven years, with the consent of the local authority in whose area the supply was to be furnished. Secondly, a new undertaker could be authorised by means of a Provisional Order issued by the Board of Trade and subject to confirmation by Parliament. The Provisional Order could be granted without the consent of the local authority which, it was felt, was sufficiently safeguarded by the right to purchase the undertaking after twenty-one years, or every seven years thereafter at the then market value of the works and plant. Undertakers were further obliged to provide a supply within a specific period of time at a fixed maximum price.⁹⁰

The effect of this 1882 Act on private enterprise is open to question, but it is obvious that it did place local authorities in a strong position. In the case of the Board of Trade licence they had the power to veto and in the case of the Provisional Order they had the strength of the twenty-one year purchase clause.

90. Henderson, op.cit. p.p. 21-22; Ballin, op.cit. p. 10.

The lack of effective competition caused partly at least by statutory interference reinforced an inherent conservatism and resistance to innovation. Thus, this 1882 legislation was partially responsible for the failure of Scottish local authorities, as outlined earlier, to develop a public supply of electricity.

The framework of local administration can also be cited as a retarding influence on the establishment of local authority undertakings. There was, in fact, a conflict of interest among town councils, gas commissioners and police commissioners within the individual local authority over who should control the new form of energy. Thus, as indicated at the very outset of this Chapter, on 1st August, 1878 Dundee Town Council had under consideration a proposal to light the town with electricity. However, on 15th August 1881 it was revealed that the Dundee Police Commissioners were also considering the lighting of the streets with electricity and that the Dundee Gas Commissioners had established a special committee to consider and report on electric lighting. Since this pattern of administration was repeated throughout Scotland and since membership, of what can be considered competing bodies, was not always synonymous, rather than such competition stimulating enthusiasm for the new form of lighting the opposite was true. Thus, the

lack of a clear-cut and dominant leadership in the local authority sector itself inhibited the decision-making process. Primary evidence supports this belief. As late as June 1889 Glasgow Corporation, which was about to apply for a Provisional Order inquired of the Board of Trade to see under which capacity, either town council, police commission or gas trustees, it should make its application. In December 1889 the town clerk of Aberdeen made a similar request.⁹¹

The comparative cost of gas and electricity is, perhaps, of more fundamental importance, though it does not fully explain the large private electrical installations described earlier. Arc lighting for use in streets was considerably more expensive than gas lighting. In Liverpool in 1881 running costs were twice that of gas lamps; in the Aberdeen experiment of 1883 costs were found to be three-and-a-half times the cost of existing gas lamps and further supportive evidence can be cited for such towns and cities as London, Leeds, Birmingham and Blackburn. Indeed, it has been estimated that there were only seven hundred arc lamps in British streets in 1890 and that it was not until much later in the 1890's, as Cain shows for railway companies coal costs were rising,^{91a} that arc lighting came into common use. Over a period of twenty years following 1880 the costs of electricity were markedly falling. In the early 1880's the cost of electricity has been estimated at between 9d and 10d per K.W.H, whereas by the late 1890's the equivalent cost was 2d. Moreover, carbon costs had

91. Scottish Record Office, Records of the Scottish Development Department, DD II/I

91a P.J. Cain, Railway Combination and Government, 1900-1914, Economic History Review, 2nd Series, Vol. XXV, No. 4, 1972, p.p. 623-641.

fallen from 9d. per foot to approximately 1d. per foot over roughly the same period. A broadly similar pattern is revealed in a comparison of incandescent electric lighting and gas lighting. In the early 1880's it has been estimated that one hour's lighting by electricity cost 0.65d. against a national average cost for the country of 0.25d. for the equivalent gas burner. Moreover, although the cost of an hour's electric lighting was substantially reduced to 0.42d. in the late 1880's and to 0.24d. by the late 1890's, this reduction was more than offset by the introduction of the incandescent gas mantle after 1884 which further reduced the cost of gas lighting.⁹²

These figures highlight in a very concise manner the comparative costs of the rival forms of illuminant. However, they do not fully explain the almost total disregard of Scottish local authorities for electric lighting and the outright refusal of some even to consider it. Moreover, in the private sector installations of both the arc and the incandescent variety were applied in both relatively large and small units, and were not only apparently cost effective but also successful illuminants. Many local authorities had, of course, their own gas undertaking and, therefore, a vested interest in preserving it. Nevertheless, the quality of the gas supply was not universally good, and complaints were heard, for instance, at

92. I.C.R. Byatt, The British Electrical Industry 1875-1914, (Oxford, 1979), p.p. 21-23.

Kirkwall and Glasgow,⁹³ and some consumers at Dundee changed to electricity.⁹⁴

No single factor can adequately explain the negative approach adopted by Scottish local authorities during this initial phase. The comparative costs of electricity and gas must, of course, be regarded as of fundamental importance, and the in-built protection afforded by the 1882 legislation cannot be ignored. Nevertheless, other less tangible factors must be taken into account. The division within the local authority administration is of obvious significance. However, apathy and conservatism, parochialism and a selfish regard for local vested interests cannot be discounted. Perhaps, also, many did not consider themselves part of the innovating process.

93. Telegraphic Journal, Vol. X, 17th June, 1882 and Vol. XX, 25th February, 1887.

94. Ibid., Vol. IX, 15th August, 1881.

Chapter 3.

The Early Companies and their experience 1878-1888

By comparison with local authorities, the private sector gave an enthusiastic reception to electric lighting; so much so that Charles T. Grant, who represented the Edison and Swan United Electric Light Company in Scotland, was able to report in January 1884 that the new means of lighting had taken root and its growth would be quicker than most people thought.¹ However, the progress of the numerous electrical companies established was not smooth. Nevertheless, at least forty public and private companies were established in the years prior to 1888 to install and provide electric lighting and its ancilliary machinery (see Appendix 1). Moreover, since this information has been mainly obtained from the one source, the Telegraphic Journal, it is by no means certain that this list is exhaustive.

From Appendix 1 (see page 676) it is clear that these companies varied greatly in size, power and influence. At one extreme can be seen the national and even international companies such as Swan, Edison and Brush which manufactured their own equipment and were capable of supplying energy on a large scale and were, at least, willing to attempt to provide a public supply. On the other hand there were many, virtually, one-man businesses

1. Telegraphic Journal, Vol. XIV, 26th January, 1884.

which purchased equipment from main suppliers and catered for the small private installation. Notwithstanding the disparity in size, the number of firms involved not only produced new employment opportunities and a breeding ground for new skills but also provided the opportunity for greater diversity within the Scottish economy.

(1) Academic Interest in Electricity.

In all fairness, however, it must be noted that the apathy displayed by the public sector and the more general failure to recognise the new opportunities presented was not echoed by all. The vigorous, if not always successful, promotion of firms in the private sector was reflected, in a much more solid and substantial way, by certain academic institutions in Dundee, but more especially in Glasgow; Glasgow had, of course, benefited from lectures given by Swan himself.² At University College, Dundee classes in electrical engineering began at least as early as the winter of 1883, possibly under Professor Stegall who gave a lecture on electric lighting at Coupar Angus in December 1884.³ In 1887 Professor Ewing was giving lectures on all aspects of electric lighting at Dundee.⁴

2. Ibid., Vol. IX, 1st April, 1881.

3. Ibid., Vol. XIII, 29th September, 1883 and Vol. XV, 6th December, 1884.

4. Ibid., Vol. XXI, 16th December, 1887.

At Glasgow such classes began even earlier. In 1881 it was reported that Andrew Jamieson,⁵ Principal of the College of Science and Art, Bath Street, Glasgow, intended to start a class, in connection with the City and Guilds examinations, for telegraphy, telephony and electric lighting.⁶ In October 1886 it was reported of this college that, in addition to the ordinary day and evening lectures on electricity and electrical engineering, a practical 'Testing and Research Class' had been started by Principal Jamieson and his chief assistant, Mr. Livingston of the Postal Telegraphs, Glasgow. This class was not only for those students intending to go forward for honours examinations in the college or for students studying for the City and Guilds of London Institute, but also for those in industry. The success of these classes can be judged from the fact that one of the college students, John Macfie, a telephone inspector at Paisley, had been first in the honours examination in telegraphy of the City and Guilds for which he had been awarded £5 and a silver medal, and he had also been awarded The John Pender Gold Medal with the college diploma in electrical engineering.⁷

In 1888 the Glasgow and West of Scotland Technical

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5. For a short biography of Jamieson, see Chapter 2 p.29
 6. Telegraphic Journal, Vol. IX, 1st June, 1881.
 7. Ibid., Vol. XIX, 15th October, 1886.

College became the venue for such courses which were still being run by Jamieson who by this time had become Professor of Engineering at this college; in 1887 the Glasgow and West of Scotland Technical College incorporated the College of Science and Art where Jamieson had been Principal. Jamieson's students continued to perform well. In 1888 Charles H. Yeaman, who had been second in the United Kingdom in the previous year for electric lighting, gained a first class honours degree in magnetism and electricity. In the City and Guilds examination Yeaman also obtained a first class honours in telegraphy and telephony, while a Mr. Fulton had gained an honours degree in electric lighting and transmission of power.⁸ The success of these classes and the growing interest in them is further revealed in 1890 when it was reported that at the evening class alone, Professor Jamieson was lecturing on electric lighting to 150 students.⁹ Finally, the growing importance of the industry and the growing stature of both the Glasgow and West of Scotland Technical College (now University of Strathclyde) and Professor Jamieson is revealed in 1891. In that year over 90 day students entered electrical laboratory and engineering workshop courses and these students came from such diverse countries

8. Ibid., Vol. XXIII, 17th August, 1888.

9. Ibid., Vol. XXVII, 31st October, 1890.

as India, China, Australia, New Zealand, Mozambique, South Africa, West Indies, Norway and from all over Britain.¹⁰ There is no general evidence to suggest a direct correlation between technical and scientific education provided in this particular area and the growth of both firms and individuals capable of applying the new technology in a practical manner. However, from the above, it is obvious that academic interest in electricity was long established and increasingly underpinned economic developments.

(2) The Problems of the Early Companies.

Knowledge of the many smaller firms of this period is limited in regard to either capital formation, unit size, number of employees or, indeed, to the type and size of installations provided. From the number of firms involved, the industry may well have suffered from competition and many may have failed within this period; technical teething problems could also be expected, of course, during this early period. Moreover, with the evolution of time and the advent of central generating stations in the 1890's, and their attendant cost benefits, it seems reasonable to presume that many would fail or degenerate into being sub-contractors of a minor nature.

In the case of the larger companies there is more extant evidence and some of it is of a primary nature - unfortunately the very availability of such evidence is

10. Ibid., Vol. XXIX, 10th October, 1891.

primarily due to the failure of these companies. Nevertheless, these failures highlight the difficulties experienced by companies during this early period and, thus, are of interest. No one problem beset these companies which were, of course, operating during, very much, the embryonic phase of the industry's development. They were, therefore, pioneers attempting to justify their existence in an alien environment. However, despite their pioneer status, they were numerous but, faced, on the one hand, competition from their fellows and, on the other hand, apathy and even hostility from established interests. In particular several suffered from mismanagement which was, at times, almost fraudulent, and from under-capitalisation. Others suffered from their inception because of the heavy payments exacted by their parent company. These and other reasons, such as the effect of early legislation, helped to account for their failure. What is very obvious from a study of these companies is the fact that there was no shortage of potential shareholders. In fact the failure of one company did not prevent shareholders from immediately investing in a second which was also doomed to failure. Speculation cannot be ignored. In an endeavour to analyse the situation more fully, a small number of companies have been selected to illustrate the main characteristics and business problems encountered in the early years of the industry.

Concessionary payments made for the use and purchase of patents, compounded by financial undercapitalisation,

was a major problem of Scottish concerns and especially for those with national and international relationships. The Scottish Brush Electric Light and Power Company Limited was formed, with a capital of £50,000, on 8th December, 1881 and entered voluntary liquidation seven months later on 6th July, 1882. The company was formed with the objective of introducing the electric light to Scotland for both public and private use and, in addition, to make or sell the Brush Patent Dynamo Electric Lighting Machines and Electric Lamps. The latter objective was reached by an agreement dated 23rd November, 1881 between the Anglo-American Brush Electric Light Corporation Limited, London and William Plenderleith Hope, a merchant of Leith, who was apparently the original promoter of the Scottish company. By the terms of the agreement the latter company was to pay the Brush company a total sum of £10,000, £2,500 in cash and £7,500 in three equal bills at three, six and nine months, and also to provide the Brush company with fully paid up shares to the value of £20,000. In addition, the Scottish company agreed to buy one hundred Brush machines at the published price, subject to a rebate of twenty per cent. In other words, from a nominal capital of £50,000, sixty per cent, represented by £10,000 in cash payments and £20,000 in paid up shares, was disbursed by the concessionaire before the actual company began trading which meant that only £20,000 was nominally available in liquid capital; these figures do not take into account the purchase price of the one hundred Brush machines. By 21st April, 1882, excluding

2,150 shares issued as fully paid, only £3 per share was called on the 905 shares which had been taken up. Thus, at that date the total liquid capital of the company was £2,715, an unlikely sum to allow the agreement to be completed and to allow the company to begin trading.¹¹ Indeed, there is no evidence to suggest that the company either completed the agreement or began trading and, in view of its short life span, this is unlikely.

In May/June 1882 the Anglo-American concern petitioned the Court for the winding up of the Scottish company since it was dis-satisfied with the Scottish company's operations and also interested in the establishment of a new Scottish company.¹² The shareholders opposed the winding-up proceedings and the petition was refused on 22nd June, 1882,¹³ but later on 6th July, 1882, they decided to enter voluntary liquidation.¹⁴ It is not known whether, at the end of the liquidation process, any repayment was made to shareholders on their original investment.

The Scottish Brush Electric Light and Power Company Limited was replaced by the Brush Electric Light and Power Company of Scotland Limited. The latter company was larger and, in many ways, much more grandiose than its predecessor but, unfortunately, in the end it fared no better. The company was incorporated on 25th April, 1882

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11. R(egistrar) of C(ompanies), Dissolved Company Files B.T. 2/1068.
 12. Telegraphic Journal, Vol. X, 3rd June, 1882.
 13. Ibid., Vol X, 10th June, 1882 and Vol. XI, 1st July, 1882.
 14. R.C. Dissolved Company Files, B.T. 2/1068.

and began winding-up proceedings on 28th September, 1883. The first general meeting of the company was held on 17th August, 1882 by which time, from a nominal capital of £300,000 divided into 60,000 shares of £5 each, 22,000 shares amounting to £110,000 were publicly issued. This issue was apparently oversubscribed, since it was reported that 2,677 applicants had applied for 373,553 shares with a total nominal value of £1,867,765, but it was decided not to issue additional capital until the extent of the company's activities in Scotland could be ascertained; no analysis is available of shareholdings. A further 8,000 shares, valued at £40,000, were reserved as part payment to the Anglo-American Brush company for the concession provided, and, in addition, that company also received £15,000 in cash.¹⁵

This company suffered from various adverse circumstances, which will be examined in some detail later, but in its relationship with the Anglo-American concern there were alleged weaknesses which aided its downfall. These allegations were made by one of the company's shareholders, Peter Cunningham, at a meeting of Liquidators held on 29th April, 1884.¹⁶ Cunningham stated that the actual subscribed capital of the company was £55,000, representing £2.50p per share on 22,000 shares and, was of the opinion, that one of the major reasons for the company's

15. Telegraphic Journal, Vol. XI, 19th August, 1882 and Vol. XIII, 29th September, 1883 and 6th October, 1883.

16. Ibid., Vol. XIV, 7th May, 1884.

failure was the enormous amount paid for concessions to the Anglo-American Brush company. As noted above, £15,000 in cash was paid for these concessions - although £14,000 was apparently returned to the Scottish company, at the time of winding-up, because the concessions had been given up¹⁷ - and in addition 8,000 fully paid shares with a total value of £40,000 were also given to the vendors. Cunningham argued that, first of all, this had the effect of reducing the working capital of the company and secondly, the total shares held by the vendors had a disproportionate weighting on the profitability of the company. Cunningham also alleged that the directors, in the event of the company having to liquidate, had made no provision against the vendors' shares having a claim on any assets that might be left for division among those who had provided the actual capital. In consequence, the vendors were now demanding £10,000 because of their shareholding.

In addition to the financial difficulties surrounding such patent concessions, the viability of the Scottish-Brush-associated companies may have been undermined by their relationship with the Anglo-American concern. The American C.F. Brush had reduced costs by the use of multi-arc dynamos which could serve several arc lamps in series. The Brush lamps were simple, robust and cheap and, because of the high voltages used, cable costs were cheap. By 1879 Brush was generating power for sixteen lamps from one

17. Ibid., Vol. XIII, 6th October, 1883.

dynamo. Generally, his innovations had reduced the cost of arc lighting below that of his major competitors. In consequence, the Anglo-American Electric Light Corporation was formed in January 1880 to exploit the British rights to Brush patents. This Anglo-American company which, in view of the information given above, could be considered almost the parent company of both the unsuccessful Scottish subsidiaries, did not withdraw from the Scottish domestic market entirely during the period of operation of the Scottish companies. Thus, it offered competition to them and, possibly, could under-cut their prices since it was the main supplier. The evidence to substantiate this is both secondary and arbitrary. Nevertheless, it is known that the Anglo-American company installed lighting at Princes Street, North Bridge, Waverley Bridge, Waverley Station and Holyrood Palace in July 1881 and that it was responsible for the installation at the shipbuilding yard of John Key and Sons, Kinghorn in March 1882.¹⁸ Moreover, after both Scottish companies went into liquidation, the Anglo-American concern continued to install electric lighting in Scotland. In November 1884 an installation was made at Andrew Ushers and Company, Distillers, Edinburgh, while in January 1886 an extension to the lighting was carried out at Waverley Station, Edinburgh.¹⁹ In 1887 and 1888 further installations were carried out

18. Ibid., Vol. IX, 1st July, 1881 and 15th August, 1881; Vol. X, 11th March, 1882.

19. Ibid., Vol. XV, 8th November, 1884 and Vol. XVIII, 15th January, 1886.

by the company at the Lyceum Theatre, Edinburgh, the Glasgow International Exhibition, the Royalty Theatre, Glasgow and at various hotels in Princes Street, Edinburgh.²⁰ Thus, the Anglo-American company had, apparently, the best of both worlds. It established subsidiary companies from which it obtained more than adequate financial recompense for concessions granted, while, at the same time, it continued to trade within their areas of supply.²¹

The Electric Carbon, Storage and Apparatus Manufacturing Company of Scotland Limited, which was registered on 9th May, 1882 with a nominal capital of £150,000 in £1 shares, was yet another company affected by concession payments, for the use of machinery and/or patents, to another company. By the terms of an agreement dated 28th April, 1882, this company acquired the Sugar House, Coburg Street, Leith and also machinery, together with 390 fully paid shares in the Electrical Power Storage Company of London. The purchase consideration was £15,000 in cash and £7,500 by the issue to the vendors of 15,000 shares paid up to the extent of fifty per cent. This agreement was later modified on 5th July, 1882 when the vendors purchased from the company

20. Ibid., Vol. XX, 13th May, 1887; Vol. XXI, 25th November, 1887 and Vol. XXII, 17th February, 1888 and 20th March, 1888.

21. For a more detailed examination of the several Brush subsidiaries see I.C.R. Byatt, op. cit. p.p. 17-20.

the 390 fully paid shares, referred to above, for £5,000; this amount being deducted from the £15,000 payable in cash. The net purchase consideration was, therefore, £10,000 in cash and £7,500 in shares i.e. 15,000 shares paid up to the extent of fifty per cent.²² At the 30th August, 1882 a call of £0.50p per share had been made, but, since £731.50p remained unpaid, the actual capital of the company at that date was £13,027,²³ which would appear to indicate, taking into account even the amended agreement of 5th July, 1882, that the company suffered from a lack of liquid capital.

Despite the pessimism expressed in the latter part of the previous paragraph and the fact that it is difficult to assess, fully, the enterprise of this company because of the limited nature of available evidence, it would appear that the company achieved a measure of success. For example by August 1882, the company was partially manufacturing carbons and hoping to manufacture dynamos within a short period of time.²⁴ By January 1883 it had a number of fairly large contracts. For example, it was responsible for installing 90 arc and 800 incandescent lamps at the works and offices of J. Fowler and Company of Leeds; the fitting out with electric light of three steamers for J. Key and Sons of Kirkcaldy; an installation at the

22. Telegraphic Journal, Vol. XIII, 25th August, 1883.

23. Ibid., Vol. XII, 10th February, 1883.

24. Ibid., Vol. XI, 19th August, 1882.

publishing works of Kelly and Sons at Kingston; installations at both Edinburgh and Glasgow for B. Hyam and also an installation at an Edinburgh theatre.²⁵ In February 1883 the company obtained further contracts. It had, for example, the contract to carry out pumping work at the Lothian Colliery, Dalkeith; a contract to light up the furniture salon of John Mitchell and Sons of Edinburgh; a contract to provide self-regulating dynamos and storage batteries for the Theatre Royal, Edinburgh and a further contract to install both arc and incandescent lamps in the steamship Buninyong which was, at that time, lying at the Sandon Dock, Liverpool.²⁶ Finally, in June 1883 the company was awarded the contract to install lighting in the steamship Burwak.²⁷ From this limited evidence, therefore, it would appear that the company was thriving and that a probable reason for this was the diversity of its activities as indicated above. However, despite such apparent optimism the company failed and although lack of liquidity, as mentioned earlier, may have been a problem, and consequently an over-reliance on credit, it was compounded by extraneous factors.

On 6th August, 1883 the directors were forced to consider the voluntary winding-up of the company because of the failure of Hope and Company of Loith which had the

25. Ibid., Vol. XII, 20th January, 1883.

26. Ibid., Vol. XII, 10th February, 1883; 24th February, 1883 and 10th March, 1883.

27. Ibid., Vol. XII, 30th June, 1883.

largest shareholding in the company. Neither the background to the failure of that company nor the considerations of the directors of this company are known, but the directors hoped to initiate a new company to complete the contracts of the then present company which, it was estimated would take a year.²⁸ However, by September 1883 the company had been wound-up on the petition of Edward Mather of Alexander Mather and Son, 121 Fountainbridge, Edinburgh, Engineers. The reasons for the petition are not known, but Mather was a founder member and a major shareholder of the company. A provisional liquidator was appointed with powers to carry on the business of the company with a view to its sale as a going concern.²⁹ However, it would appear that the company was not sold as a going concern since the plant, stock in trade and effects were sold by auction at Leith on 20th December, 1883 and realised £2,263.³⁰ Despite this relatively small sum and the costs of further litigation between the liquidator and the auctioneer, it would appear that further amounts were realised, since in January 1888 a final dividend of £0.11p in the £ was declared, making a total dividend payment by the liquidator of £0.61p in the £,³¹ suggesting that more than £0.50p was called up (see above) on the subscribed

28. Ibid., Vol. XIII, 4th August, 1883.

29. Ibid., 29th September, 1883.

30. Ibid., Vol. XIII, 15th December, 1883 and Vol. XIV, 26th January, 1884.

31. Ibid., Vol. XV, 19th July, 1884; Vol. XVIII, 12th March, 1884 and Vol. XXII, 3rd January, 1888.

capital. Thus, in the case of this company the problems of concession payments and undercapitalisation were apparently overcome, for a period at least, by a vigorous marketing programme and the principal reason for the liquidation of the company was the failure of the largest shareholder, Hope and Company, which may have created a lack of confidence in the company in another major shareholder, Mather, causing him to petition for its winding-up.

Two other examples of companies, both London-registered but operating in Scotland, making concession payments can be cited. The Scottish Pilsen Joel and General Electric Company was formed on 25th May, 1882 with a nominal capital of £200,000 in £5 shares to carry on the business of an electric light company and the company intended to purchase certain patent rights subject to the conditions of an agreement of 19th May, 1882 between F.R. Evans and D. McInnis.³² Unfortunately no details of this agreement are available and, indeed, the extant evidence reveals no information to indicate that this company actually carried out business operations within Scotland. In a similar manner the Scottish Gùlcher Electric Light and Power Company Limited was registered in London on 27th October, 1882 and, although this company did begin trading in Scotland, its activities do not appear to have been

32. Ibid., Vol. X, 3rd June, 1882.

extensive. This company, which had a capital of £150,000 in £5 shares, was formed to purchase the exclusive right to use the Gülcher system of electric lighting in Scotland, and, to this end, it was agreed to pay £25,000 in cash and an additional £25,000 in paid up shares for this concession.³³ The subscribed capital of this company is not known and neither is it known if the concession agreement was fully implemented. However, taking into account both the nominal capital and the agreement as stated, this would mean that fully one-third of the nominal capital was absorbed in implementing the agreement. Moreover, taking into account the known business activities of the company during this early period, such concession expenditure does not appear warranted. The Gülcher electric light was exhibited in Scotland for the first time as early as 15th October, 1882,³⁴ and the only other reference to the company, which has been found, occurs in 1886. In December 1886 it was reported that during that entire year the company had put up the following installations:- at the Edinburgh Exhibition 64 arc lamps and 70 incandescent lamps, for W.D. Hart of Edinburgh one arc lamp and 10 incandescent lamps, for P. and W. McLellan of Glasgow 8 arc lamps and one other installation for Alley and McLellan of Glasgow of unknown size.³⁵ Such a record is far from impressive.

33. Ibid., Vol. XI, 4th November, 1882.

34. Ibid., 15th October, 1882.

35. Ibid., Vol. XIX, 31st December, 1886.

Thus, the need to make onerous concession payments either directly by cash or indirectly by means of paid-up shares was a fundamental problem of a number of Scottish companies but it was by no means the only one.

The Northern Electric Light, Power and Appliances Company Limited was incorporated on 13th October, 1881 to produce, sell and supply electric light for all purposes in any part of Scotland. It also hoped to generate motive power, construct, let or hire tramways and provide for ship lighting. The capital of the company was fixed at £100,000 in £1 shares, and its registered office was at 104 Commercial Street, Dundee. Despite its national aspirations, the activities of this company were confined to Dundee and its environs, and its parochialism was emphasised by the fact that all the original subscribers and almost all the shareholders were Dundonians (see Appendix 2, page 677). Belief that such parochialism may have aided the promotion of the company's business with local consumers is not evinced either by the marketing activities of the company or by the fact that the company was voluntarily wound-up in March 1884.³⁶ Moreover, the company faced a degree of hostility from local vested interests. In March 1882 the company was discussed by the Dundee Gas Commissioners who, although they did not object to private firms making and using electric light in their own works, wanted exclusive right to supply the city

36. R.C. Dissolved Company Files, B.T. 2/1061.

generally.³⁷

The detailed reasons for the winding-up of the company are not known but, as illustrated in Appendix 2, this was a local company with local shareholders and some business/marketing support might have been expected from that quarter. Whatever the reason - technical and/or financial - such support was patently not given and the company was indicted for catering for too many temporary hires and not concentrating sufficiently on permanent installations,³⁸ although several of the latter were made. In September 1882 the company supplied lighting for a three day floral fete at Dundee and in the same month its offer to light the Kinnaival and Argyll Halls, Dundee was accepted. In November 1882 it installed ten arc lamps at the Dundee shipyard of Pearce Brothers.³⁹ In February 1883 Campbell's Dye Works at Perth was also supplied by the company.⁴⁰ These latter installations may have been permanent, but the only other examples of the company's activity after February 1883 all concern temporary hires viz., the Dundee Horticultural Society's annual show, three evenings for the Perthshire Society of Natural Sciences and the Dundee Fine Arts Exhibition.⁴¹ At Dundee, therefore, marketing was a severe problem. It is not possible to state whether this

37. Telegraphic Journal, Vol. X, 11th March, 1882.

38. Ibid., Vol. XII, 3rd March, 1883.

39. Ibid., Vol. XI, 2nd September, 1882, 23rd September, 1882 and 18th November, 1882.

40. Ibid., Vol. XII, 10th February, 1883.

41. Ibid., Vol. XIII, 8th September, 1883; Vol. XIV, 5th January, 1884 and 19th January, 1884.

was the fault of the company in not pursuing a more vigorous sales campaign or whether it was merely an indication of local conservatism .

The undercapitalisation of several Scottish concerns has already been noted and this probably compounded the the marketing problem of this particular company. The nominal capital of the company was £100,000 in £1 shares, but the total share issue amounted to only £10,000, and, of these £1 shares, only £0.37p (7/6d) was called up. At 23rd February, 1882 £0.25p (5/-) had been called up, amounting to £2,500, less £125 unpaid, which gave a net total of £2,375. By 6th March, 1883 a further £0.12½p (2/6d) had been called up on 9,500 shares; 500 shares had been forfeited. In this second call £7 remained unpaid which meant that a net sum of £1180.50p was received by the company. Thus, since no other calls were made, the total paid up capital of the company amounted to £3,555.50p.⁴²

The Universal Electric Company Limited, which was incorporated on 29th December, 1881 and went into voluntary liquidation in January 1883, was yet another company that experienced very acute marketing problems, though in its failure mismanagement bordering on fraud cannot be ignored; this latter aspect will be examined in detail later. The object of this company was to purchase certain patents for

42. R.C. Dissolved Company Files, B.T. 2/1061.

the improvement of both electric lamps and dynamos from two of the promoters of the company viz., W.H. Akester and R. Kennedy; no details are available concerning any purchase transaction or agreement. The company's office was at 58 Regent Street, Glasgow and its technical operations were at the Baltic Works, Bridgeton, Glasgow. The nominal capital of the company was £20,000, divided into 4,000 shares of £5 each, and by May 1882 these shares were allotted, though not fully paid up. By 12th May, 1882 £5 per share had been called but only £16,425 actually paid, leaving £3,575 unpaid. In August 1882 it was decided to increase the nominal capital to £100,000 by the creation of a further 16,000 shares of £5 each, while in November 1882 it was decided to increase the nominal capital further to £250,000. Fortunately for potential investors no part of this additional capital was issued since the company entered voluntary liquidation proceedings in January 1883.⁴³

This company, like the Northern Electric Light, Power and Appliances Company of Dundee, was a local company and was, basically, founded and financed by Glasgow interests (see Appendix 3, page 679). However, like the Dundee shareholders, the shareholders of this company confined their interests to financial investment and did not actively promote the company's business by participating in its operations. Indeed this company's marketing activities appear negligible. In October 1882 the company supplied

43. R.C. Dissolved Company Files, B.T. 2/1076.

one arc lamp for the top of the shelter at Bridgeton Cross, Glasgow and in December 1882 provided an arc lamp at the Stonelaw Skating Pond, near Glasgow.⁴⁴ In view of the fact that over £16,000 was subscribed to the company between December 1881 and May 1882, it is surprising that no other evidence has been discovered.

The Brush Electric Light and Power Company of Scotland Limited adopted a much more businesslike and sophisticated approach to all of its affairs than any of the other companies examined. As was the case with many other Scottish companies of the period, the Board of Directors had an aristocratic flavour which, presumably, was meant to instil confidence in potential shareholders. The chairman of the company was Lord Crawford and Balcarres and the vice-chairman was the Honourable Ashley Ponsonby. The other directors were Robert Ewing, a second vice-chairman, Thomas Dickson and William Ladd, who was also a director of the Anglo-American Brush company; F.M. Brocklebank was company secretary.⁴⁵ The objective of the company was to light up public streets, public buildings and private houses in Scotland and to this end an administrative framework was established below director level. Thomas Dickson became managing-director and Edgar W. Beckingsdale was appointed chief electrician and manager. Beckingsdale had had eight years experience with the Telegraph Construction and

44. Telegraphic Journal, Vol. XI, 28th October, 1882.
and 16th December, 1882.

45. Ibid., Vol. XIII, 6th October, 1883.

Maintenance Company, with which he had visited all parts of the world, and had also worked with the India Rubber and Gutta Percha Company for an unspecified period of time. Two agents were also appointed to obtain contracts in their own areas viz., Mr. Wylie in Edinburgh and Mr. Martin in Dundee.⁴⁶

However, despite this elaborate administration and the relatively high degree of capital involvement, noted earlier, the company failed to achieve any significant marketing success. Far from successful lighting experiments were conducted in Dundee, Aberdeen and Edinburgh, while other local authorities steadfastly refused even to consider such trials viz., Broughty Ferry, Montrose, Burntisland, Crieff, Stranraer, Forres, Dalkeith, Kirkcaldy and Glasgow.⁴⁷ Consequently, on 28th September, 1883, it was decided to liquidate the company.⁴⁸

The following, admittedly, rather lengthy extract taken from a statement made by the directors expresses more than adequately the difficulties, especially those of marketing, experienced by this company. If this interpretation of the situation, made by the directors, is accepted as valid, it reinforces several points made earlier

46. Ibid., Vol. XI, 19th August, 1882.

47. Ibid., Vol. XI, 11th November, 1882 and 25th November, 1882; Vol. XII, 6th January, 1883, 13th January, 1883, 14th February, 1883, 24th March, 1883, 5th May, 1883, 19th May, 1883, 2nd June, 1883 and 9th June, 1883.

48. Ibid., Vol. XIII, 29th September, 1883.

concerning the 1882 government legislation and also the attitude of local authorities towards electric lighting.

"The attention of the directors has increasingly been given to pressing forward the general business of the company, whether by concessions or sale of plant or by endeavouring to secure Provisional Orders, under the Board of Trade rules, for lighting various towns in Scotland. Notwithstanding that the action of the legislature imposed such serious conditions and took away many rights the directors thought they possessed when the company was formed, every exertion has been made by your Board to sell machinery at a profit, or even to cover cost, but they have been comparatively unsuccessful, although the company at considerable expense exhibited experimental lighting in every variety at Edinburgh, Aberdeen and Dundee to demonstrate its usefulness and applicability. At Glasgow our offer to erect trial lamps for the price of gas met with a refusal, and in our application for Provisional Orders, before the Board of Trade, for Glasgow, Edinburgh, Aberdeen and Dundee, our overtures were

met by such strenuous resistance from the local authorities, supported somewhat by the Board of Trade, that we were compelled to abandon the attempt, except in the case of Dundee, for which a Provisional Order, reduced to fifteen years, has been issued in our favour, but which, in its final form, has been so beset by provisos that it is doubtful whether it could be profitably worked, at least until the demand for electric lighting becomes more general than seems probable at present. The people of Scotland, as represented by town authorities are, at present, adverse to the introduction of the electric light, or only wish it for trial on terms that will not pay this company, while the competition of 24c.p. gas in Scotland is also serious, especially where the inhabitants require heat as well as light in their rooms, and treat with indifference all arguments as to vitiated air, destruction to silver plate, pictures and ornaments, and finally, there is the difficulty and expense of working a concern like this with practically no support from Scotland."⁴⁹

49. Ibid.

Subsequently, the application for a winding-up order was granted on 4th November, 1883.⁵⁰

Such a quotation obscures the fact that, of the companies under examination, a number suffered maladministration and, apparently, technical inexperience which did little to enhance their continuance as viable concerns. The first electrician and general manager of the Northern Electric Light, Power and Appliances Company was George Lowden, a local optician and scientific instrument maker, who was given an annual salary of £60, paid twice yearly, and in addition 300 fully paid-up shares in the company; this holding is not included in Appendix 2. However, as a means of encouragement, it was stipulated that no dividend would be paid on these shares until a dividend of 7 per cent was paid on the other shares issued by the company.⁵¹ Whatever the reason Lowden proved unsatisfactory and was replaced by Oliver Loring of London,⁵² but even this appointment did not improve the company's position and, as indicated earlier, it was voluntarily wound-up in March 1884.

The Universal Electric Company of Glasgow was yet another company where suspicion of, at least, maladministration appears evident. This company, as noted above, began in December 1881 with a nominal capital of £20,000,

50. Ibid., 10th November, 1883.

51. R.C. Dissolved Company Files, B.T. 2/1061.

52. Telegraphic Journal, Vol. XII, 26th March, 1883.

increased this amount to £100,000 in August 1882 and then in November 1882 decided upon a final increase to bring its nominal capital up to £250,000. However, despite the great expectations inferred by such nominal capital sums, the company's activities were confined to two installations, both of a minor nature. Moreover, in December 1882, one month after the company had raised its nominal capital to £250,000, the New Glenduffhill Coal Company presented a petition to the court to wind-up the company; the details of this petition are not known. Consequently, in January 1883 the shareholders of the company agreed that, since "by reason of its liabilities the company cannot carry on its business", voluntary winding-up procedures should be taken and subsequently in March 1883 the court itself decided that the company should be voluntarily wound-up.⁵³

Two of the original promoters, Rankin Kennedy and William Hopkins Akester, whose patents the company had, in fact, bought, did not, from primary evidence, escape with unblemished characters. Kennedy, by this time insolvent, owed the company £200, but, with the aid of friends, made an offer of £25 which the liquidator accepted. Akester, whose claim against the company for over £2,600 was rejected by the liquidator, did not bring to the liquidator mathematical and other instruments or the sum of £15 due for tax and expenses and had left the country. The total amount realised by the liquidator was £3,028.87p and from this sum

53. R.C. Dissolved Company Files, B.T. 2/1076.

a total payment of £2,208.75p was made, leaving a balance of £820.12p:-

Wages to workmen	£109.98
Auctioneers commission	66.60
Expenses of liquidation	607.13
Preferable Claims	800.11
First Dividend to Ordinary Creditors	<u>624.93</u>
	<u>£2208.75</u>

Moreover, when attempts made to have the Baltic Street Works taken over as a going concern failed, the liquidator attempted to realise the heritable property. When this was attempted, it was discovered that the purchase price had been £30,000 and that only £6,150 had been paid at the date of commencement of liquidation. The net result was that eventually only £71.50p remained to be paid to the ordinary creditors as a second and final dividend.⁵⁴ Since so little is known of the activities of this company, it is difficult to make adequate comment. However, it would appear that mismanagement, bordering on fraud, cannot be entirely ignored.

The Brush Electric Light and Power Company of Scotland was, in the opinion of its directors, affected by adverse marketing circumstances (see above), but it was also a company which was, allegedly, badly managed. After the company had entered liquidation proceedings, Peter Cunningham, a shareholder, criticised, what he termed,

54. Ibid.

crushing expenditure by the company. He stated that the accounts made up to 31st July, 1883, a period of some fourteen months, indicated an expenditure of £8,790. This sum was made up as follows:- law expenses £2,360; salaries £2,177; directors' fees £1,537; rent and law charges £1,399; loss on installation £956 and depreciation of plant £362. Cunningham expressed particular surprise at the directors' fees which he said the shareholders had no voice in fixing. He found that the directors had fixed their own fees at £300 each and stated that this was more than that received by the directors of the Glasgow and South-Western Railway Company which had a capital of over £12m. Moreover, Thomas Dickson, the managing director, who was receiving an annual salary of £500, had his own business and could, therefore, only give the company a limited amount of his time. Cunningham also stated that it was impossible for a company with business in Scotland to be successful when it had a large staff "eating up its capital in London in useless expenses."

Moreover, the company prospectus was apparently misleading, if not actually fraudulent, since it stated that the company had the exclusive right for Scotland of the Lane-Fox lamp when this was not true. This was, apparently, admitted by the company chairman. Cunningham also alleged that not only was the share capital deficient by 300 shares at 31st July, 1883 but that there was an unexplained deficiency in the total amount of cash in bank and cash in hand. On 31st July, 1883 this figure had stood at £31,286

whereas on 16th October, 1883 it stood at £30,601, an unexplained deficiency of £685. Cunningham also pointed out that it had cost £4,000 to liquidate the plant and that the liquidators were Ponsonby, Dickson and Ewing, all directors of the company. Cunningham further indicted Thomas Dickson on the grounds of financial morality. Dickson had been allotted 100 shares but shortly afterwards he sold 60 of these shares when they were at a large premium. However, prior to liquidation he began to buy up shares until he eventually held over 500. At that point the meeting, not surprisingly, ended in an uproar.⁵⁵ The allegation made against Thomas Dickson concerning the re-sale of shares becomes much more pertinent when it is noted that in May 1882 there was, in fact, a mania on Brush shares on the Stock Exchange when £10 shares rose to a peak of £68.⁵⁶

These allegations are unsubstantiated and no further reports of later meetings have been found. However, if such allegations are valid, they considerably alter the interpretation given by the directors to explain the company's failure. Mismanagement and financial excess cannot be ignored or easily explained away. Nevertheless, the company was active in Scotland and did attempt to promote the greater use of electric lighting but, as indicated, was faced with a mixture of apathy, disinterest

55. Telegraphic Journal, Vol. XIV, 7th May, 1884.
 56. For this and a more detailed examination of the several Brush subsidiaries, see I.C.R. Byatt, op. cit. p.p. 17-20.

and hostility by local authorities.

One particular company of interest at this time, if only because of the personnel involved and the amount of capital allegedly lost at its eventual failure, was the Woodside Electric Works, Glasgow which was in existence as early as May 1884.⁵⁷ This company was under the management of J.D.F. Andrews, described as an inventive genius but with little commercial training who allegedly made the first typewriting machines; in August/September 1887 Andrews was assumed as a partner by Muir, Mavor and Coulson of Glasgow⁵⁸ (see Chapter 4). However, Andrews was not the real owner of the Woodside Works. It has been stated that,

"The capital for this venture was found by the brothers Dick (of Gutta-Percha fame) and before it was closed down, it was said that the Dicks had lost over £80,000."⁵⁹

There is no concrete evidence to suggest why this company failed. It was fairly diversified and not only carried out installations but also manufactured lamps, dynamos and steam engines. However, it is interesting to note that, even before Andrews' departure, Rankin Kennedy, who had been associated with the ill-fated Universal Electric Company and, at its liquidation, been found insolvent (see above), was also connected with this company.⁶⁰ In June 1889, by

57. Telegraphic Journal, Vol. XIV, 17th May, 1884.

58. Ibid., Vol. XXI, 9th September, 1887.

59. W.M. Haddow, My Seventy Years, (Glasgow, 1943).

60. Telegraphic Journal, Vol. XIX, 15th October, 1886 and 3rd December, 1886; Vol. XXIV, 15th March, 1889

which time it is assumed that the Woodside Works had failed, Kennedy, in conjunction with the firm of T. McCulloch and Sons, engineers, founders and boiler makers, became incorporated in McCulloch, Sons and Kennedy Limited.⁶¹

The view that undue speculative investment occurred among the early electricity companies in Scotland is difficult to substantiate. Nevertheless, the relationship between the Electric Carbon, Storage and Apparatus Manufacturing Company of Scotland and the Scottish Brush Electric Light and Power Company is interesting. The former company was registered on 9th May, 1882, before the latter company went into liquidation in July 1882 and yet there is an obvious linkage in the major personnel of both companies. W.P. Hope, J.W. Hope and E. Mather were founder members and major shareholders of both companies, while among the ordinary shareholders F.M. Haldane and R. Lockhart were common to both (see Appendices 4 and 5). However, whereas the earlier company had been incorporated in Edinburgh, the later company was registered in England and had its registered office at 1 Sherborne Lane, King William Street, London.⁶²

The reasons for the demise of both of these companies has already been analysed in some detail but in both companies the name of the Hope family of Leith was very prominent. Indeed, it was W.P. Hope who had proposed to

61. Ibid., Vol. XXIV, 21st June, 1889.

62. Ibid., Vol. XII, 10th February, 1883 and Vol. XIV, 26th January, 1884.

the Anglo-American Brush company that a subsidiary be set up in Scotland and he together with J.W. Hope and E. Mather were among the founder members of the company; W.P. Hope and E. Mather were also directors.⁶³ Moreover, in the formation of the Electric Carbon, Storage and Apparatus Manufacturing Company, the principals to an agreement of 28th April, 1882 which actually established the company were W.P. Hope, J.W. Hope and E. Mather and at 30th August, 1882, when 27,517 shares had been taken up in the company, the Hope Family held 15,400 shares, with J.W. Hope, the president of the company, holding 1,000 shares in his own right. (see Appendix 5 page 684). In the case of both of these companies, therefore, although not proven, the motive of speculation cannot be ruled out.

A major consideration in any examination of the history of the electrical industry in Scotland at this time was the effect of competition. Appendix 1 (page 676) lists some forty known firms which were operating as electrical suppliers and installers in Scotland in the period before 1888. Without additional evidence of a reliable nature the effect of such competition on the industry generally cannot be accurately judged. However, despite the fact that investors were, apparently, reasonably plentiful, the failure of companies and the establishment of companies on what could, probably, be best described as a purely

63. R.C. Dissolved Company Files, B.T. 2/1068.

speculative basis would, it is felt, have an adverse effect on the industry and also have the effect of intensifying competition without necessarily promoting the growth of the industry during this period. This was particularly important during the depression which dogged the 1880's.

Chapter 4

Local Authority Progress 1888-1914

The effect of the legislation of 1882 on the growth of the electricity supply can be exaggerated (see Chapter 2), but it became increasingly evident that the law would have to be revised if the industry was to achieve successful industrial maturity. For example, in 1883 in Britain as a whole, sixty-nine provisional orders were granted, fifty-five to companies, but none of these orders were used. Furthermore, in 1884 the number of new orders had fallen to four and apart from one granted in 1886 no further orders were granted until 1888. In addition, the Institute of Electrical Engineers estimated that between 1880 and 1886 some £23m. had been invested in electrical companies alone and that most of this had been lost. Consequently, the electricity companies sought parity of treatment with gas companies, that is that they should be given rights of supply in a particular area of more or less permanent character, subject to a measure of Government control. Representations were made to the Board of Trade by the companies stating that the power of reversionary purchase after twenty-one years was far too short since a large part of that time was expended in establishing the undertaking in working order. Subsequently, the Board of Trade set up a Committee under Lord Thurlow which made proposals for the repeal of the compulsory purchase clause and for the introduction of a system of control by a sliding scale of profits and dividends. These proposals were encompassed

in a Bill introduced into the House of Lords by Lord Rayleigh in 1886. The Bill made no headway. Two other Bills were introduced in the same year but were again rejected. Lord Thurlow's Bill of 1887 met the same fate but, when re-introduced in 1888, it provided the basis of the Electric Lighting Act of 1888.

The essential features of the legislation of 1888 were that it provided for purchase after forty-two years at the "fair market value ruling at the time of purchase," with recurring rights of purchase every ten years and that, as a compensation to local authorities, provisional orders henceforth required their consent which could only be dispensed with under most exceptional circumstances requiring a report from the Board of Trade to Parliament. In addition company amalgamations were not permitted.¹ This legislation, therefore, was more liberal than the previous Act of 1882 but, in essence, remained restrictive of private enterprise and continued to provide security for local authority enterprise which, unfortunately, did not act with any great alacrity in providing a public supply of electricity.²

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1. H.H. Ballin, op. cit. p.p. 11-14; P.B. Henderson, op. cit. p.p. 22-28; S.R.A. Records of Strain and Robertson, T.D. 83/7.
 2. In this Chapter and in its related Appendices the figures given, unless otherwise stated, have been abstracted from E. Garcke, Manual of Electrical Undertakings, on a quinquennial basis beginning at Volume I, 1896. Such reliance on a single source, undoubtedly, underestimates the true position and 'gaps' are evident. However, it has been decided to accept Garcke's figures because they provide the best series of this period.

(1) The Major Cities.

The City of Glasgow, which obtained its provisional order in 1890, was the first local authority in Scotland to provide a permanent public supply of electricity. However, part of the credit is due to private enterprise in the form of the firm Muir, Mavor and Coulson. This firm had a relatively long history in the electricity industry and in August 1884, when it was operating as Muir and Mavor, it unsuccessfully tendered for the contract to supply electric lighting plant to Greenock town council.³ In 1884/85, by which time it had apparently established a small central generating station, it obtained the contract to re-provide the General Post Office, George Square, Glasgow with electric lighting.⁴ In March 1888, under the name Muir, Mavor and Coulson, it was awarded the contract to supply Glasgow's new municipal buildings with electric current from its John Street generating station at a minimum charge of £250 per annum.⁵ In May 1889, having apparently re-equipped its works it was in a position to offer, for the first time in Glasgow, a public supply; by that date it had facilities to supply 35,000 incandescent lamps of 8c.p.⁶ The success of the company's operations is not known, but in October 1891 and January 1892 discussions took place

3. Telegraphic Journal, Vol. XIV, 23rd August, 1884.

4. Ibid., Vol. XV, 20th December, 1884 and Vol. XVI, 10th January, 1885.

5. Ibid., Vol. XXII, 9th March, 1888.

6. Ibid., Vol. XXIV, 17th May, 1889.

between the company and the town council regarding the purchase of the John Street generating station, and in February 1892 it was agreed that the complete property of the company would be bought, as from 1st March, 1892, at a cost of £15,000.⁷ The taking over of this undertaking, therefore, allowed Glasgow corporation to begin a public supply in its own right. However, the venture was not an immediate success. The first balance sheet of the corporation, issued in May 1893, which, apparently, referred solely to the John Street works, indicated a gross deficiency of £1,773 from a gross revenue of £7,784.27p; the deficiency was made up from the corporation gas undertaking. However, the number of consumers had increased from thirty-seven at the time of purchase to one hundred and eight at May 1893, while the price per Board of Trade unit was fixed to remain at 7d.⁸

Before taking over the John Street works Glasgow corporation had, in December 1891, bought land at Waterloo Street for the sum of £8,000 with the intention of erecting plant for lighting the central area of Glasgow and in September 1892 it was reported that these works would open in four months.⁹ The Waterloo Street station, including building, plant and street mains, cost £80,000 and was opened on 25th February, 1893 and supplied 15,000 lamps of

7. Electrical Review, Vol. XXX, 12th February, 1892.

8. Ibid., Vol. XXXIII, 4th August, 1893.

9. Ibid., Vol. XXIX, 4th December, 1891 and Vol. XXXI, 9th September, 1892.

8c.p.¹⁰ In actual fact, it was only the arc lighting in the principal streets which was lit for the first time on 25th February, 1893 and the current for the incandescent lighting was only operational on 22nd April, 1893. It is also interesting to note that the work at the Waterloo Street station was carried out by Muir, Mavor and Coulson. In March 1894, 382 customers had applied to the corporation for a supply and, from the analysis of this figure given below, the importance of commercial property is evident while the small number of private houses applying for lighting is, perhaps, indicative of the comparative disadvantage of electric lighting vis-a-vis gas lighting for private householders.¹¹

TABLE 1.

Corporation of Glasgow.
Analysis of Consumers at March, 1894.

<u>Type of Consumer.</u>	<u>Actual Number</u>	<u>Percentage of Total</u>
Shops	242	63.35
Warehouses	21	5.50
Offices.	91	23.82
Churches	3	0.79
Private Houses	12	3.14
Clubs, Hotels and Theatres	<u>13</u>	<u>3.40</u>
Total	<u>382</u>	<u>100.00</u>

Source: Electrical Review, Vol. XXXIV, 4th May, 1894.

10. Ibid., Vol. XXXII, 15th December, 1893.

11. Ibid., Vol. XXXIV, 4th May, 1894.

After such humble beginnings, the progress of the City of Glasgow in providing a public supply of electricity was remarkable and, indeed, in the Scottish context it is more than probable, according to all available statistics, that Glasgow experienced the most rapid growth of any Scottish local authority. This, of course, merely underlines the unique position of Glasgow in Scotland. By 1896 Glasgow had an installed capacity of 1939KW and was generating some 1,279,687 B.T.U. In 1901 these figures had risen to 6,402KW and 5,226,818 B.T.U., representing an increase of 230.17 per cent and 308.45 per cent respectively. Although such percentage rises were not to be equalled, on a quinquennial basis, in the period prior to 1914, the trend, both for installed capacity and electricity generated, did remain upward. Between 1896 and 1914 installed capacity rose from 1,939KW to 38,612KW while electricity generated rose from 1,279,687 B.T.U. to 92,286,953 B.T.U. In percentage terms this represents an increase between 1896 and 1914 of 1891.34 for installed capacity and 711.68 for electricity generated. (see Appendices 6 and 7). Such figures also reflect an increase in generating efficiency over the period concerned which in itself not only reflects technical improvement but also the benefits of large scale organisation. In 1896, 1 KW was responsible for 659.97 B.T.U. whereas the equivalent figure at 1914 was 2390.11 B.T.U. These figures also reflect vastly increased consumer demand for the number of customers supplied by Glasgow corporation rose from 855 in 1896 to 30,098 in

1914. Unfortunately no detailed analysis of these consumers is available.¹²

In any assessment of the Glasgow situation certain other factors, particularly boundary changes, have to be taken into consideration. In 1899 the Kelvinside Electricity Company was taken over by the Glasgow Corporation.¹³ In addition, Glasgow supplied the then independent Burgh of Partick until Partick's own station was opened on 19th February, 1902. In 1902, also, Glasgow was authorised to supply outside its own boundaries under the Glasgow Kinning Park Electric Lighting Order 1902. At that time Kinning Park was an independent burgh but in 1905 it was amalgamated with Glasgow, and the 1902 Order was repealed because the area was then within the city. Moreover, in 1906 Glasgow was authorised to supply the Burgh of Pollokshaws and the latter's own Order was transferred to Glasgow in that year; in 1912 Pollokshaws was also transferred to Glasgow. In 1912, also, the Burghs of Govan and Partick were incorporated in Glasgow, and the undertakings of these burghs were merged with the Glasgow undertaking. However, Glasgow was not always so fortunate. In 1912 Shettleston and Tollcross were also incorporated with Glasgow but their electricity orders had been obtained by Lanarkshire County Council, and they were, in fact, supplied by the C.V.E.P. Company. In a similar manner, when Jordanhill and

12. Garcke, op cit. Vols, I and XIX.

13. Ibid., Vol. V, See also Chapter 5. p.p. 166-170

Cardonald were absorbed by Glasgow they continued to be supplied by the Strathclyde Electricity Supply Company, a wholly owned subsidiary of the C.V.E.P. Company.¹⁴ Thus, any consideration of the growth of Glasgow's supply must take into account such extraneous factors as the extension of the city's boundaries and the taking over of other independent undertakings.

The continued growth of public supply by Glasgow throughout this period is also reflected in its authorised loans and in its capital expenditure. (see Appendices 8 and 9). In 1896 the total borrowing authorised for Glasgow was £200,000, whereas, by 1914, the equivalent figure was £2,821,478, representing an increase of 1310.74 per cent. In a similar manner, capital expenditure by Glasgow rose from £131,961.55p., to £2,456,782.46p., which indicates an increase of 1761.74 per cent. Indeed, throughout the entire period under examination Glasgow remained the largest single local authority supplier of electric power in Scotland. This, because of the unique economic and social position which Glasgow held in Scotland, was to be expected and yet the, at times, complete superiority of Glasgow over other local authority suppliers is in many ways surprising. A perusal of Appendices 6, 7, 8 and 9 reveals that on only two occasions did Glasgow not maintain this individual superiority. In 1896, Edinburgh had a greater

14. S.R.A. Records of Strain and Robertson, TD83/6/9.

installed capacity and had expended more. However, after that date, Glasgow maintained superior figures.

Appendix 10 attempts further to clarify the position of Glasgow within the local authority sector in the period from 1896 until 1915/1916. The percentage figures in Appendix 10 have been abstracted from Appendices 6, 7, 8 and 9 and analyse, for the four aspects given, the position of Glasgow as against the position of the total figures given in these appendices for all other local authority undertakings in Scotland. It must be remembered, of course, that in 1896 there were only four local authority undertakers in Scotland and that after that year this figure increased; this can be examined in the aforementioned appendices. From Appendix 10, it can be seen that with regard to installed capacity Glasgow, in the years stated, had not less than thirty per cent of the Scottish total and that in 1910 a peak total of 44.61 per cent was reached. The figures for electricity generated are, in some ways, more interesting since they indicate that, with the exception of 1905, Glasgow was generating well over forty per cent of the Scottish total and that in 1915/1916 Glasgow was, in fact, generating 51.72 per cent. The 'technical percentage figures' given in Appendix 10 indicate, with the exception of the year 1910, the technical superiority of the large scale undertaking as against the diseconomies of the more numerous relatively small scale undertaking. The 'financial percentage figures' for both authorised loans and capital expenditure again reflect the overall dominance of Glasgow in

the Scottish local authority context as well as the onset of individual capital building projects which is revealed in much more detail in Appendices 8 and 9.

Scotland's other major cities, Aberdeen, Dundee and Edinburgh, were quick to follow the example of Glasgow but did not have the benefit of an earlier private undertaking on which to build. Both Aberdeen and Dundee obtained their provisional orders in 1890 with Edinburgh following a year later in 1891.¹⁵ Dundee, having purchased the old cattle market as a site for its new electricity station, was the first to provide a supply for public lighting on, probably, 14th March, 1893.¹⁶ In September 1892 Aberdeen decided to proceed with lighting the eastern district of the town at a cost of £24,000 and by May 1893 had awarded contracts, including buildings, for the electric light installation costing £17,918. By the time the current was turned on by the provost's wife on, probably, 27th February, 1894 Aberdeen proposed to supply 27,000 lamps rather than the 18,000 originally intended and in July 1894 it was revealed that the central station had cost £25,000.¹⁷ Edinburgh was, initially, slower to react than either Aberdeen or Dundee. In February 1893 the town council was still seeking further advice before making a decision on whether it should operate the order itself or hand it over to a company. Indeed, it

15. Garcke, op. cit. Vol. I.

16. Electrical Review, Vol. XXX, 19th February, 1892 and Vol. XXXII, 17th March, 1893.

17. Ibid., Vol. XXXI, 9th September, 1892; Vol. XXXII, 5th May, 1893; Vol. XXXIII, 21st July, 1893; Vol. XXXIV, 2nd March, 1894; Vol. XXXV, 6th July, 1894.

was only after a number of great debates that the town council decided in April 1893 to carry out the lighting itself. In March 1894 it was revealed that the capital cost of the adopted scheme was estimated at £130,000 and it was expected that the city would be fully lit in five years. The foundation stone of the Dewar Place central station was laid by the provost on 25th June, 1894 and the current turned on by Mrs. McDonald, wife of the provost, on 11th April, 1895. At the opening ceremony the provost provided an analysis of the cost of the station, though unfortunately not of the actual contractor; this analysis is given in Table 2.¹⁸

TABLE 2

Cost of Dewar Place Central Station,
Edinburgh. 1894

Cost of land	£9,000	
Cost of machinery	15,000	
Cost of boilers	6,500	
Cost of switchboards	1,700	
Cost of batteries	14,000	
Cost of cables and copper	24,000	
Cost of casting	9,500	
Cost of roadworks	<u>17,000</u>	<u>£96,700</u>

Source: Electrical Review, Vol. XXXVI, 19th April, 1895.

Edinburgh was, therefore, the last of these four major cities to provide a public supply. However, by 1896, when comparable statistics are available, Edinburgh had overtaken both Aberdeen and Dundee, and, indeed, throughout the entire period under review remained second only to Glasgow

18. Ibid., Vol. XXXII, 10th February, 1893 and 24th April, 1893; Vol. XXXIV, 9th March, 1894 and 29th June, 1894; Vol. XXXVI, 19th April, 1895.

in financial expenditure and in electricity supplied. This was undoubtedly due not only to the size and extent of Edinburgh and its status as the capital city but also to the fact that it was a highly developed industrial and commercial centre as well as being a centre of learning and finance and the centre of the judiciary and administration. At 1896 with a loan capital of only £90,000, Edinburgh had expended £143,979.37p., which was slightly more than Glasgow and more than double both Aberdeen and Dundee taken together (see Appendices 8 and 9). Moreover, in 1896 Edinburgh, with 3035KW, had a greater installed capacity than Glasgow, although Glasgow was generating more electricity. (see Appendices 6 and 7). The rapid acceleration of Edinburgh, apart from any greater technical efficiency, may be partially explained by its pricing policy. In 1896 the price per unit was reduced from 6d. to 5d. for private lighting and from £20 to £18 per arc lamp for public lighting; this reduction took place to absorb £4,000 of the estimated £7,000 surplus. Such a reduction may also be reflected in the number of customers and in the number of lamps supplied. At the date of opening on 11th April, 1895 there were only 48 customers whereas in December 1896 there were 732, and the number of lamps joined had risen from 2,200, 8c.p., to 82,830, 8c.p. In June 1897 the cost was further reduced to 4d. per unit for private lighting, or "with discount off practically 3½d. per unit," and to £16 per arc lamp for public lighting. In 1897 it was claimed that these rates were the lowest charged for electric lighting in the United

Kingdom.¹⁹ This claim may, however, be slightly exaggerated since earlier in March 1896 Aberdeen, at that time with 17,000 incandescent lamps and 80 arc lamps connected to its central station, which was charging consumers 4d. per unit, made a similar statement.²⁰ Furthermore, the spirit of inquiry was, perhaps, more advanced in Aberdeen. In March 1897 it was reported that, as an experiment, Aberdeen had agreed to supply free electricity to motor cars belonging to John T. Clark, a coachbuilder, for the purposes of conveying passengers to the bathing stations. If the experiment was successful, Clark agreed to supply a char-a-banc at a cost not exceeding 300 guineas; the outcome of the experiment is not known.²¹

A study of Scotland's four major cities namely, Glasgow Edinburgh, Aberdeen and Dundee, indicates that, once a public supply had been established and found acceptable, there was almost an inevitability of expansion. Appendix 11 which provides a basic analysis of electricity actually sold, as against the total generated, in these four cities in many ways reflects this inevitability of expansion. Public lighting witnessed great expansion during the period under consideration. This was an important facet of local government service and undoubtedly helped to improve the

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19. Ibid., Vol. XXXVIII, 1st May, 1896; Vol. XXXIX, 4th December, 1896; Vol XL, 4th June, 1897.
 20. Ibid., Vol. XXXVIII, 6th March, 1896.
 21. Ibid., Vol. XL, 5th March, 1897.

social environment of major areas of these cities. However, the importance of public lighting should not be unduly exaggerated since, despite its tremendous expansion, it normally only represented a small proportion of total sales. The logic of such a situation appears self-evident. As the public supply was extended from the important inner and commercial centres of these cities, it encouraged owners of adjacent property to take up supply whether this property was of a private, commercial or industrial nature. Moreover, there was, in a sense, a limit to the extension of public lighting as presumably major and then minor streets were provided with public lighting.

From Appendix 11 it can be noted that although the expansion of public lighting took place in all four cities, it did not proceed at a uniform rate. Aberdeen and Glasgow, disparate cities, experienced their greatest percentage increase in sales for public lighting between 1900/1901 and 1905, while Edinburgh had its greatest percentage increase between 1896 and 1900/1901, and Dundee, much later than either of the other three, between 1910 and 1915/1916. No fully substantiated reasons can be given to explain such differences. On the other hand, a consideration of the relative importance of sales for public lighting against total sales does appear to indicate a fairly general pattern: although there was a continuous expansion of such sales, their relative importance declined sharply after an initial phase. Edinburgh was exceptional, and in 1915/1916 public lighting still accounted for over ten per cent of

total sales. As indicated above, this was probably due to Edinburgh's unique position as the capital city.

As has already been stated and as can be seen from Appendix 11, sales to customers increased markedly throughout the period under consideration. Again, apart from the process of continuous expansion of such sales, no common pattern is discernible among the four cities. Dundee experienced an ever upward percentage spiral of such sales whereas the other three cities experienced a much more cyclical, though at all times positive, movement in such sales. Moreover, because of a lack of historical evidence, the situation remains vague and general. No information is available to provide a further analysis of the figures for customer sales. Thus, the proportion of such sales for private, commercial or industrial use cannot be determined. This situation is further complicated when figures become available for sales for power and heat, since again individual consumers or customers cannot be identified. These figures, therefore, suggest the growing popularity in the use of electricity but do not identify the individual sources of such popularity. Although individual users cannot be identified, global figures are generally available for the total number of customers which each of the four cities had, and these have been given, where known, in Table 3.

TABLE 3Total Number of Customers of the Four Major Cities

	<u>1896</u>	<u>1900/1901</u>	<u>1905</u>	<u>1910</u>	<u>1915/1916</u>
Aberdeen	-	405	1,342	2,181	3,190
Dundee	249	400	926	1,533	3,047
Edinburgh	732 ¹	-	7,129	12,252	16,156
Glasgow	855	2,852	10,777	18,158	30,098

Source: Garcke, op. cit. Vols. I, V, IX, XIV and XIX;
¹ Electrical Review, Vol. XXXIX, 4th December, 1896.

Probably the most striking feature of Table 3 which can be noted immediately is the small number of customers which each city or local authority had at any one time. This is all the more striking when it is remembered that at 1911 the population of Aberdeen was 164,000, that of Dundee 176,000, that of Edinburgh (including Leith) 424,000 while that of Glasgow (including environs) was approximately one million.²² Thus, bearing in mind that the number of customers noted in Table 3 included both commercial and industrial as well as private users, the total number of private individual customers in each of the four cities would be relatively small. A crude analysis of Table 3 and Appendix 11 reveals that average sales per customer increased sharply between 1896 and 1915/1916, with the notable exception of Edinburgh where average sales actually fell, and this is indicated in Table 4. In Table 4 the figure for Aberdeen has been taken at 1900/1901 instead of 1896 since no figure for customers is available for 1896.

22. B.R. Mitchell and P. Deane, Abstract of British Historical Statistics, (Cambridge, 1971), p. 25.

TABLE 4

Average Sales per Customer in B.T.U.
at the Four Major Cities.

	<u>1896</u>	<u>1915/1916</u>
Aberdeen	573.26	3029.17
Dundee	813.00	3958.72
Edinburgh	1213.57	1172.38
Glasgow	1275.97	2559.00

Source: Table 3; Appendix 11.

As already emphasised, these are only crude figures since they do not take into account the type of customer involved. Nevertheless, they do indicate, generally, the expansion of sales and a greater intensification in the use of electricity and, bearing in mind what has been said above regarding the small number of private users, undoubtedly reflect a growing commercial and industrial awareness. Despite the crude nature of the figures provided in Table 4, such figures invite pertinent questions. Why, for example, did Dundee with the smallest number of customers at 1915/1916 achieve the highest average sales per customer? It seems logical to assume that Dundee must have concentrated on industrial outlets rather than the smaller private and commercial units. By the same token Glasgow had the longest history of any of the four cities and had undoubtedly the greatest potential outlet for energy supply in Scotland and yet was a poor third behind both Aberdeen and Dundee in average sales per customer in 1915/1916. There is no immediate explanation for the position of Glasgow. As late as 1923 the Boiler Insurance Company estimated that there were 750,000 h.p. of

industrial plant in Glasgow and that, by that year, Glasgow was supplying only 150,000 h.p.²³ This would infer, even at this later date, a major criticism of Glasgow in failing to exploit such a vast potential. It may also, of course, reflect an innate conservatism by industrialists, and especially those smaller industrialists outside the major sectors of industry who may have regarded the installation and use of electricity as being financially non-viable. The other very significant feature of Table 4 is the situation of Edinburgh which as explained earlier was second only to Glasgow in both financial expenditure and in electricity supplied throughout this entire period. Moreover, after Glasgow, Edinburgh had the largest number of customers and yet had the lowest average sales per customer and, indeed, in Edinburgh's case average sales per customer had fallen slightly between the dates concerned. It seems likely that this pattern of consumption resulted from Edinburgh's unique social structure and the residential nature of the city. In other words, it is presumed that the low figure for average sales per customer in Edinburgh is indicative of a high number of individual householders connected.

Perhaps the most notable aspect of Appendix 11 is the figures given for 'power and heat.' In the case of Dundee a separate analysis for such sales is not given,

23. S.R.A. Records of Strain and Robertson, T.D.
83/6/9.

but the dramatic increase in customer sales of 269.76 per cent between 1910 and 1915/1916 may disguise in Dundee a trend which was evident in ^{the} other three cities. Edinburgh, as can be noted, was the first city to provide a separate analysis for sales for power and heat in 1905 when such sales represented 21.61 per cent of total sales. The figures for Aberdeen and Glasgow begin at 1910 with sales figures of 21.26 and 51.52 per cent respectively. By 1915/1916 the importance of such sales had become ^{even more} apparent. At that time Glasgow, with unit sales for power and heat of just over 54 million units, representing 70.17 per cent of its total sales, was, for fairly obvious reasons, the leading local authority supplier to industry in Scotland. Edinburgh, in absolute terms, came second, although in the case of Edinburgh such sales amounted to only 32.98 per cent of total sales whereas in Aberdeen, although unit sales were lower, they represented 48.56 per cent of total sales. The importance of sales for power and heat as a major outlet reflects the ever-rising use of electric power for factories and the feature which was to under-pin such electrification was the development of alternating current power.

The alternating current system (AC) had a number of advantages over the direct current system (DC) which became increasingly obvious as central station development became larger and the area of distribution much more widespread. Alternators (AC generators) generate power at a high voltage which is much more suitable for long-range transmission. Near the point of use it can be by means of

transformers be stepped down for local distribution. It is much more difficult to design dynamos (DC generators) to generate power at equally high voltages and the process of transforming this power for domestic use can only be carried out mechanically. DC was advantageous in that power could be stored in batteries and used for peak-hour demand allowing a generating station to close-down for several hours effecting a saving in costs and allowing for maintenance. However, capital charges and the rate of depreciation of batteries was high and there was a twenty per cent loss in the delivery of power to the mains. Moreover, storage in batteries was only efficient while electricity was being used for lighting. In the context of increasing industrial and commercial use AC had overwhelming advantages. It was a much more flexible system, capable of a wide variety of industrial application.^{23a}

In the 1870's and 1880's factory motors used direct current but since such motors were not totally reliable and were costly they were not widely used. However, between 1887 and 1900 the alternating current polyphase system and the induction motor were developed in America

23a. For a more detailed analysis of the merits of both systems see R.H. Parsons, The Early Days of the Power Station Industry, (Cambridge, 1939) Chapter 7.

and the Continent by Tesla and Dobrowolsky. Moreover, as the domestic market for small generating plant began to decline, British electrical manufacturers began to switch their existing capacity to the manufacture of industrial motors. Thus, from the turn of the century the significance of this trend, allied with imports from Germany and America, was reflected in a decline in motor prices. Equally important was the fact that such events were occurring at a time when the advantages of electrical power over steam power were becoming more clearly recognised. In general terms, electric power was potentially cheaper, much more adaptable and provided an economy of space over steam power and this, linked with the cheapening of motors (for example, it has been estimated that the price of a 10 h.p. motor fell from £65 in 1901 to £30 in 1905) meant that there was a widespread adoption of electric power in industry.²⁴

Appendix 11 emphasises the importance of such industrial sales. Moreover, it is probably true to say that the figures provided are incomplete, since separate figures for power sales would not be given until such sales were substantial. Thus, the figures for sales for power and heat in Appendix 11 undoubtedly disguise their relative importance prior to the year when they are first stated. This is particularly evident in the case of Glasgow where

24. For a more detailed analysis of the introduction of electric power to industry see Byatt, op. cit. Chapter 5.

such figures, first provided in 1910, indicate that industrial sales accounted for 51.52 per cent of total sales. Nevertheless, by 1915/1916 the importance of sales for power and heat is very evident.

From Appendix 11 it is also evident that traction was an important aspect of consumption but that its relative importance in the overall sales pattern tended to decline with the evolution of time. The figures for Aberdeen begin at 1905 at which time they formed the major area of sales but by 1915/1916, although in absolute terms unit sales indicated an increase of 38.21 per cent, their relative importance had declined markedly; a similar trend is also evident in the case of Dundee. At Aberdeen the starting point of 1905 obscures the fact that the tramways were acquired by the Corporation in August 1898 and converted to electric traction and opened for traffic on 23rd December, 1899. Moreover, power was also supplied to the Aberdeen Suburban Tramways Company which formed an extension to the corporation tramways.²⁵ It should be noted that no figures are provided for Glasgow which maintained a separate generating station for transport, of some 20,000KW, which could, if necessary, be worked in conjunction with its other stations.²⁶ In addition, and

25. Garck, op. cit. Vol. IX.

26. S.R.A. Records of Strain and Robertson, T.D.
83/6/9.

other than the information provided in Appendix 11, no information is available concerning the situation at Edinburgh.

Despite the inadequacy of the figures for traction, there is, from the example of Aberdeen and Dundee, a discernible pattern. Traction provided a basic market for sales but one which could not be readily expanded. After the initial transition from horse-drawn to electric traction a basic market was established together with an optimum mileage network which maximised potential consumer demand. Such demand was normally from within a nucleated area and once that demand had been met, further expansion of mileage was impractical from the point of view of adequate return on investment made; this is reflected in unit sales. Only in the case of Glasgow are figures made available for contract sales, and no information has been found to explain these figures.

(2) The Lesser Local Authorities.

The establishment of permanent public supply undertakings by Scotland's four major local authorities, namely, Aberdeen, Dundee, Edinburgh and Glasgow, did not have the effect of stimulating similar undertakings in Scotland's other major burghs immediately. Indeed, the future pattern of development in the local authority sector was affected, in many cases, by indecision, delay and conservatism on the part of the ruling corporations and their failure either to realise the potential of the new form of energy or to awaken to the

needs of modern industry; these aspects were to be emphasised by the establishment and growth of, for example, the Clyde Valley Electric Power Company after 1901 (see Chapter 8).

As already noted, Edinburgh was the last of the major cities to establish a public supply of electricity on 11th April, 1895 and it is, in many ways, surprising to note that Edinburgh was followed not by an urban industrialised burgh but by the more rural and seaside burgh of Ayr. Ayr had obtained its Electric Lighting Order in 1890,²⁷ and, after several years of indecision, decided in 1894 to proceed with electric lighting and in the same year obtained borrowing powers from the Secretary for Scotland to the amount of £15,000.²⁸ The town hall, council chambers and adjacent room were lit on 4th December, 1895 but the system in its entirety was not officially inaugurated until 8th January, 1896 when Lord Kelvin performed the opening ceremony.²⁹ By May 1896 the total authorised borrowing powers of Ayr amounted to £25,000 and at the 31st August, 1896 the total expenditure on the undertaking amounted to £22,112.69p.³⁰ However, the return on such investment was not great. In May 1896, apart from the main generating

27. Garcke, *op. cit.* Vol. VI.

28. *Electrical Review*, Vol. XXXIII, 25th August, 1893; Vol. XXXIV, 23rd March, 1894, 13th April, 1894, 18th May, 1894; Vol. XXXV, 14th September, 1894.

29. *Ibid.*, Vol. XXXVII, 13th December, 1895; Vol. XXXVIII, 17th January, 1896.

30. *Ibid.*, Vol. XXXVIII, 15th May, 1896; Vol. XXXIX, 16th October, 1896.

plant, Ayr had four sub-stations and a capacity of 7,000, 8c.p. lamps, and yet as late as October 1896 the total revenue for the month amounted to only £315.91p, and from this total works costs of £94.66p. had to be deducted.³¹ Moreover, despite the apparent progressive nature of Ayr, in January 1897 Ernest G. Pink, the electrical engineer resigned, since allegedly "he had had anything but a smooth time with the council."³² Such implied, if unsubstantiated, criticism of Ayr must be muted by the fact that it was a relatively small burgh, and hardly highly industrialised, and yet it had provided a public supply of electricity earlier than many of the larger more urban and much more industrialised burghs.

In October 1890 Paisley Town Council applied for a provisional order to provide a public supply of electricity.³³ The lighting order was granted in 1891, but a public supply did not begin until September 1899.³⁴ It is difficult to determine fully the reasons for the delay in implementing the order. In December 1892 the town council was forced to request an extension of time in carrying out its powers and in January 1893 all decisions were postponed for a further six months.³⁵ Such a postponement lasted much longer, since in November 1895 the Caledonian Electric

31. Ibid., Vol. XXXVIII, 1st May, 1896; Vol. XXXIX, 20th November, 1896.

32. Ibid., Vol. XL, 15th January, 1897.

33. Telegraphic Journal, Vol. XXVII, 17th October, 1890.

34. Garcke, op. cit. Vol. VI.

35. Electrical Review, Vol. XXXI, 23rd December, 1892; Vol. XXXII, 6th January, 1893.

Supply Company notified the town council of its intention of applying for a provisional order.³⁶ In a fairly obvious response to this situation the town council, in March 1896, decided to acquire the necessary plant for providing electric light and in the following month tenders were, in fact, submitted, but yet again the town council decided to take no action at the time.³⁷ However, in June of the same year it was decided to appoint a resident engineer at a salary of £200 per annum and in November it was agreed to acquire a site for a generating station and that Francis Teague, who had been appointed engineer, should submit plans for a generating station capable of supplying 10,000 lights.³⁸ In January 1897 the town council considered Teague's scheme which was estimated at a cost of £33,750 and decided to make application to the Secretary for Scotland for powers to borrow £35,000.³⁹ Site operations began in November 1897 and, as noted earlier, a public supply was inaugurated in September 1899.⁴⁰

In July 1901 at the House of Lords Inquiry into the C.V.E.P. Bill, Paisley disputed the right of the C.V.E.P. Company to lay mains through the town to gain access to Johnstone on the grounds that this would mean disturbance

36. Ibid., Vol. XXXVII, 15th November, 1895.

37. Ibid., Vol. XXXVIII, 27th March, 1896, and 24th April, 1896.

38. Ibid., Vol. XXXVIII, 19th June, 1896; Vol. XXXIX, 13th November, 1896.

39. Ibid., Vol. XL, 22nd January, 1897.

40. Ibid., Vol. XLI, 5th November, 1897.

to roads and pavements already congested with gas and water pipes and also because it was against a private company coming into Paisley. In many ways more important than the actual dispute was the information revealed in evidence concerning the Paisley undertaking and local industrial and political re-action to it. In the several years prior to 1901 it was alleged that the town council had expended between £80,000 and £100,000 on the undertaking and that it was working at a loss of £10,000 per annum. It was further alleged that, although there were 98 works in Paisley, the undertaking did not supply energy for power purposes but only for lighting. It was also claimed by William Bow, Managing Director of Bow McLachlan Limited, shipbuilders on the River Cart at Paisley, that not only were the rates charged by Paisley prohibitive but that his firm could generate electricity cheaper; it is also interesting to note that Bow was one of the promoters of the C.V.E.P. Scheme. Thus, local industrial interests were clearly not in sympathy with the local authority. Moreover, the political will of Paisley was also divided on this occasion. James Clarke, Provost of Paisley between 1883 and 1885 and in 1901 still a member of the town council, spoke on behalf of the C.V.E.P. Company. From the neighbouring town of Johnstone the politico-industrial interest speaking in favour of the C.V.E.P. Scheme was William Shanks, an ex-Provost of Johnstone and a Justice of the Peace for Renfrew County. Shanks, who was speaking on behalf of all the major employers in Johnstone, was also the senior partner of James Shanks, Engineers and Tool

Makers, Union Works, Johnstone which employed over 3,000 people.⁴¹

Thus, from the very outset in 1890, the pattern of development in Paisley was adversely affected by delay and indecision on the part of the town council which cannot easily be ignored. In this highly urbanised and industrialised community there was a failure to provide, on the part of the local authority, adequate leadership and also there was a decided lack of vision. Moreover, if the later allegations made at the House of Lords Inquiry in 1901 are valid, then the ineptness displayed by the local authority at an earlier stage was compounded by business, technical and administrative inexperience after the undertaking had opened. However, in fairness to the town council, local industrial leaders, if not openly hostile, do appear to have been critical of local government involvement and intervention in the business and industrial sector. Furthermore, local government itself was divided. James Clarke was, after all, obviously not entirely in sympathy with the aspirations and ideas of his town council. If this Paisley pattern of inept local government beset by indecision, delay and divided loyalties and compounded by a muted hostility on the part of local interests was repeated nationally, it might partially explain the tardiness of local authorities generally to provide an adequate public supply.

Unfortunately, the experience of the Burgh of Motherwell fully re-inforces the interpretation of the situation

41. S.R.A. Records of Strain and Robertson, T.D. 83/7.

at Paisley. Motherwell was an urban and highly industrialised burgh with a rapidly expanding population. Indeed, between 1891 and 1901 Motherwell experienced the largest percentage population increase, some 62.5 per cent, of any burgh in Scotland.⁴² In October 1894 the Motherwell Police Commissioners adopted a report by H.A. Mavor of Glasgow which indicated that the cost of lighting the streets, together with the actual cost of the provisional order, would be £12,500. Moreover, it was calculated that with the saving affected, presumably over gas, and the income from private lighting there would be no increase in the rates. In consequence, the burgh's application was deposited with the Board of Trade in December 1894 and granted in 1895.⁴³ No progress in implementing the actual order was made in 1895, and in April 1896 when the burgh lighting committee recommended to the Police Commissioners that they should proceed with the lighting of the streets it was decided, by seven votes to four, to adopt a policy of delay.⁴⁴ Moreover, in June 1896 the Police Commissioners decided not to proceed with the provisional order.⁴⁵ As a result of this decision the Board of Trade brought pressure to bear on the burgh to begin operations and expressed its willingness to delay any revocation of the

42. Ibid.

43. Electrical Review, Vol. XXXV, 12th October, 1894;
Vol. XXXVI, 4th January, 1895. Garcke, op. cit.
Vol. V.

44. Electrical Review, Vol. XXXVIII, 7th April, 1896.

45. Ibid., 12th June, 1896.

provisional order on the understanding that the construction operations would begin within twelve months.⁴⁶ In September 1897 the Electric Lighting Committee was still recommending that an installation should be set up but the town council, despite having received earlier advice, decided to visit various towns before deciding on the type of installation. For example, in February 1898 it sent a deputation to inspect the electric lighting plant at Whitehaven.⁴⁷ A public supply eventually began in February 1901.⁴⁸

The lack of vision and the conservative nature of Scottish local authorities and the re-action of local interests is, once again, further highlighted during the early operations of the Motherwell undertaking. In July 1901 the Burgh of Motherwell was unsuccessful in its attempt to petition against its inclusion within the area of supply of the C.V.E.P. Company. At the House of Lords Inquiry in July 1901 into the C.V.E.P. Bill, evidence of a somewhat less than complimentary nature was revealed concerning the operation of the Motherwell undertaking. The Motherwell generating station, which was of 200KW size and cost £30,000, began operating on 1st February, 1901. In July 1901 the station was not operating at full capacity. Lamps were not

46. S.R.A. Records of Strain and Robertson, T.D. 83/7.
Electrical Review, Vol. XLI, 16th July, 1897.

47. Electrical Review, Vol. XLI, 3rd September, 1897 and 17th September, 1897; Vol. XLII, 25th February, 1897.

48. Garcke, op. cit. Vol. V.

lit at night and there were, in fact, only two main consumers of electricity for power purposes namely, George Russell and Son (trade unknown) which took 50 h.p. and the office of the Motherwell Times which took 4/5 h.p. The town council, by its own admission, adopted a policy of proceeding with caution, refusing to lay down plant in excess of demand and refusing to lay down plant to supply works until the works had actually applied for power. This lack of vigour towards a more positive marketing policy is all the more surprising when it is known that there were 26 large works with a total estimated demand of 60,000 h.p. within the burgh; a large work being defined as one which required over 100 h.p. Furthermore, six owners of works were members of the town council viz., Dunlop (Engineer), Brown (Joiner), Purdie (Manager of Co-operative Stores), Laing (Brass Finisher), Park (trade unknown) and Alexander Findlay of Alexander Findlay and Company, Bridge and Roof Builders. However, the negative attitude of the town council in its approach to marketing can, perhaps, be partially explained by the fact that 20 out of the 26 large works within the burgh welcomed the C.V.E.P. Bill, while Alexander Findlay was an actual promoter of the C.V.E.P. Scheme. Conversely, of course, the enthusiasm of these larger works for the C.V.E.P. Company may have resulted from the earlier ineptitude of Motherwell, but this interpretation does not adequately explain¹ the attitude of Alexander Findlay who was also a member of the town council, although he may, personally, have been opposed to civic involvement in industry. Many

of these large works such as The Lanarkshire Iron and Steel Works, David Colville and Son Limited, The Motherwell Bridge Building Company and Morton, Speedie and Company had their own installations and yet were active in their support of the C.V.E.P. Bill. Although it might be argued that heavy industry utilising its own steam power capacity and using local coal may have found such installations competitive, the support of these large works would appear to indicate that their owners not only welcomed an external supplier but also realised that such an external supply, by achieving economies of scale, would be cheaper than their own individual installations, be much more flexible and provide a significant saving in capital expenditure. The reaction of local industrial interests to a possible burgh supply is also indicated by the fact that at an earlier House of Commons Inquiry, the town council were unable to call upon one owner of a large work to speak in its favour, and yet six owners of works were represented on the town council itself.⁴⁹

Thus, the situation in the two large urban and industrialised burghs of Paisley and Motherwell, which can, probably in all fairness, be regarded as representative of the mainstream of urban burghs, was not fully conducive to the promotion of a public electricity supply. Both burghs were beset by an inherent conservatism which was exemplified

49. S.R.A. Records of Strain and Robertson, T.D. 83/7.

by a policy of extreme caution, not aided by the twin evils of indecision and delay. However, in fairness to those local authorities, it must also be stated that they were operating in a climate which was not entirely favourable to the growth of public enterprise and that they had in their midst able spokesmen for and from opposing interests.

The situation at Leith was, in some ways marginally better in the sense that in February 1893 a positive decision was taken not to supply electricity because of the town council's connection and agreement with the town's Gas Commissioners.⁵⁰ Matters appear to have lain in abeyance until 1896 when it was decided to apply for a provisional order. However, as late as March 1897 it was still being suggested that Leith should simply take a supply from Edinburgh.⁵¹ Despite this suggestion a lighting order was obtained in 1897, and a public supply began in January 1899.⁵²

However, Stirling displayed a trend and pattern similar to that found at both Paisley and Motherwell. In December 1893 the town council sought advice from Glasgow concerning the installation of a public supply.⁵³

————— In March 1894 it was reported that Stirling town council had refused in the previous

50. Electrical Review, Vol. XXXII, 24th February, 1893.

51. Ibid., Vol. XXXIX, 11th September, 1896 and 25th December, 1896; Vol. XL, 5th March, 1897.

52. Garcke, op. cit. Vol. V.

53. Electrical Review, Vol. XXXIII, 9th December, 1893.

year to give its consent to the Caledonian Electric Supply Company obtaining a provisional order for the town.

Nevertheless, despite this and the fact that the Board of Trade insisted that either the town council itself apply for a provisional order or allow a company to do so, the town council, by a majority of two members, decided not to apply for such an order.⁵⁴ In consequence the Caledonian Electric Supply Company's application was granted.⁵⁵

Shortly afterwards the town council decided to contest the granting of the provisional order to this company on the grounds that the company refused to provide the town council with the terms that they had previously offered.⁵⁶ In this, the town council was apparently successful and it, the town council, was granted the provisional order in 1895.⁵⁷ However, further delay took place in implementing the provisional order, amid rising anger from local ratepayers.⁵⁸ In January 1897 a scheme was adopted but no date was fixed for its commencement.⁵⁹

However, despite this decision having been taken, in April 1897 the town council considered the idea of using the water supply at Touch Reservoir to

54. Ibid., Vol. XXXIV, 16th March, 1894.

55. Ibid., 30th March, 1894.

56. Ibid., 6th April, 1894.

57. S.R.A. Records of Strain and Robertson, T.D. 83/7.
Garcke, op. cit. Vol. V. Electrical Review,
Vol. XXXVI, 4th January, 1895.

58. Electrical Review, Vol. XXXIX, 18th September, 1896.

59. Ibid., Vol. XL, 29th January, 1897.

drive dynamos but on the advice of its consultant engineer decided to drop the idea.⁶⁰ The matter did not end at that point, and in December 1897 the consultant engineer was asked to provide a further report on the same issue.⁶¹ In March 1898 the consultant engineer reported back, for the second time, that such a scheme was not practical, but this was not accepted by the town council and a second consultant was appointed.⁶²

A public supply eventually began on 21st March, 1900. The plant, which cost £25,000 and had a total installed capacity of 225KW, served, at that date, 70 customers.⁶³

As stated earlier, inherent conservatism in the promotion of a public supply of electricity, as indicated by delay, indecision and extreme caution was widespread among the Scottish local authorities. Moreover, this situation had a wide geographic base and was not confined to one particular area of the country. By the same token, it affected burghs both large and small. It would be tedious and almost impossible, to list each and every local authority but the following evidence from burghs large and small, urban and rural, is believed to be representative of Scottish local authorities in the pre-1914 period.

Dunoon experimented relatively early in utilising

60. Ibid., 23rd April, 1897.

61. Ibid., Vol. XLI, 24th December, 1897.

62. Ibid., Vol. XLII, 4th March, 1898 and 25th March, 1898.

63. Garcke, op. cit. Vol. V.

electricity but had to wait quite some time before a public supply was available. As early as May 1894 the Burgh Commissioners discussed the possibility of introducing the electric light to the Castle gardens during the summer at a cost of between £400 and £500.

In August 1897 the pier was lit for the first time with electric light and thus became only the second pier, after Tichnabruaich on the island of Bute, to be electrically lit on the River Clyde.⁶⁴ However, an electric lighting order as such was not obtained by the town council until 1906,

but by 1910 a total capital of £20,000 had been expended on the scheme.⁶⁵

The industrialised town of Falkirk had been aware of the possibility of lighting the town with electricity as early as 1893 when the Caledonian Electric Supply Company unsuccessfully requested permission to apply for a provisional order. However, the town itself did not obtain a lighting order until 1901 and, although a public supply began relatively quickly on 3rd March, 1903, this was rather late and some ten years after the initial approach had been made.⁶⁶

If anything the situation in Govan was even more serious. Govan, a highly industrialised burgh, and at the time independent of Glasgow, was granted an electric lighting order in 1892 authorising an expenditure of £50,000 to

64. Electrical Review, Vol. XXXIV, 18th May, 1894; Vol. XLI, 7th August, 1897.

65. Garcke, op. cit. Vol. XIV

66. Electrical Review, Vol. XXXIII, 21st July, 1893 and 29th September, 1893. Garcke, op. cit. Vol. IX.

provide a supply within the burgh. For reasons unknown, a public supply did not begin until some eight years later on 20th January, 1900.⁶⁷ However, by July 1901, when there were 73 works of a major or minor nature within its boundaries, Govan had only expended £30,000 in establishing a small power station of 190KW and had only 35 customers. Despite the smallness of its generating station Govan was offering at that time to supply public works within its area with energy for lighting on the basis of 6d. per unit for maximum demand for the average of 365 hours per annum and 2d. per unit for all current over this amount, and for power on the basis of 2d. per unit all over, provided maximum demand was taken for at least five hours per day. These rates were allegedly high and, moreover, it was alleged that, for Govan town council to supply all the 73 works in its area, an expenditure of between £200,000 and £250,000 would be required.⁶⁸

The Burgh of Partick, yet another satellite burgh of Glasgow also incorporated in Glasgow in 1912, had in 1892 the unique distinction of being the only Scottish application out of eighteen provisional order applications deposited with the Board of Trade before 21st December,

67. Electrical Review, Vol. XXX, 26th February, 1892.
Garcke, op. cit. Vol. V.

68. S.R.A. Records of Strain and Robertson, T.D. 83/7.
Garcke, op. cit. Vol. V.

1892. The lighting order was granted in 1893.⁶⁹ It would appear, however, that having obtained the order no attempt was made to implement it, since in November 1897 the burgh opposed an attempt by the Kelvinside Electricity Company Limited to obtain a provisional order for the area. In this it was successful and in February/March 1898 the Board of Trade refused the company's application.⁷⁰

Possibly as a consequence of this Glasgow provided a supply of energy to Partick until such time as its own station was opened on 19th February, 1902.⁷¹ It would appear that Partick, like Govan, was undercapitalised and motivated by caution since there were 47 works in Partick and yet in July 1901 the town council was only in the process of erecting a small generating station in which it proposed to utilise the heat from its refuse destructor and it was thought that almost all of this energy would be required for lighting purposes.⁷² The exact size of the station is not known but by 1902 a capital expenditure of £20,000 had been involved in its construction and there were only 36 customers.⁷³

A number of other disparate local authorities established a public supply of electricity prior to 1914. Greenock town council whose earlier experiment had terminated on 7th May, 1887 (see Chapter 2) began a fresh supply,

69. Electrical Review, Vol. XXXII, 13th January, 1893.

Garcke, op. cit. Vol. V.

70. Ibid., Vol. XLI, 26th November, 1897; Vol. XLII, 5th March, 1898.

71. Garcke, op. cit. Vol. V

72. S.R.A. Records of Strain and Robertson, T.D. 83/7.

73. Garcke, op. cit. Vol. VI.

still under the initial lighting order of 1883, on 30th November, 1899.⁷⁴ Discussions concerning the new scheme began at least as early as 1897, and a final scheme was adopted in March 1898.⁷⁵ This final scheme which was drawn up by Frances Teague, who was also associated with Paisley, envisaged lighting the principal streets by 40, 2000 c.p. arc lamps and also lighting the James Watt Dock at a total cost, including the actual site, of £27,500; a site, belonging to the corporation, at Hunter Place was selected. The small island town of Rothesay began discussing the introduction of electric lighting in 1892 but it was only in 1897 that a decision was taken to apply for a provisional order; the cost of the proposal was estimated at £6,600.⁷⁶ A lighting order was granted in 1898, and a small installation was in operation C 1899.⁷⁷ The provincial town of Perth was aware of the possibilities of electric lighting in 1893 but only obtained a lighting order in 1898 and a public supply began on 1st June, 1901.⁷⁸ The small east coast town of Broughty Ferry was granted a lighting order in 1900, and a public supply began in September 1902;⁷⁹ no background

74. Ibid., Vol. V.

75. Electrical Review, Vol. XLI, 7th August, 1897; Vol. XLII, 18th March, 1898.

76. Ibid., Vol. XXXI, 16th December, 1892; Vol. XLI, 24th December, 1897.

77. Garcke, op. cit. Vol. V.

78. Electrical Review, Vol. XXXIII, 15th September, 1893. Garcke, op. cit. Vols. V and VI.

information is known concerning this order.

At Kirkcaldy discussions regarding the provision of electricity began in January 1893, but even as late as October 1897 the town council decided to delay any decision "until after the elections in November."⁸⁰ However, with pressure from the local Ratepayers Association, a lighting order was applied for and granted in 1899, and a public supply began on 23rd December, 1902.⁸¹ In 1884 Oban rebuffed the overtures of the Edison and Swan United Electric Light Company (see Chapter 2), and it was only in 1901 that the town was granted a lighting order with a supply beginning in January 1903.⁸²

The small district town of Cambuslang in Lanarkshire provides an interesting example of the introduction of electricity to a relatively small community. In April 1896 it was decided that the town's streets should be lit by electric lighting during the ensuing winter and that power should be derived from the River Clyde which was some 500 yards distant from the principal street.⁸³ The outcome of this is not known but in March 1897 Lanarkshire County Council, which administered the town, approved the introduction of electric lighting and gave its consent to application being made to the Board of Trade for a licence

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80. Ibid., Vol. XXXII, 20th January, 1893; Vol. XLI, 22nd October, 1897
 81. Electrical Review, Vol. XLII, 4th February, 1898. Garcke, op. cit. Vol. IX.
 82. Garcke, op. cit. Vol. IX.
 83. Electrical Review, Vol. XXXIII, 10th April, 1896.

or provisional order by a district committee or a person or a company and referred to the weir across the River Clyde which, at a comparatively small cost, could be utilised. In consequence of this, a deputation, presumably of local councillors, visited Fort William to see its water-powered installation (see next chapter). In June 1897, however, it was reported that arrangements had been completed for the introduction of electric lighting, and the system was inaugurated on 27th October, 1897 by Lindsey Miller, chairman of the gas company. The cost of the installation is not known, but plant was put down at the gas works capable of running 20 arc lamps of 2000 c.p. each. The installation was undertaken by Hunter and Jack of Glasgow under the supervision of C. Fulton, the County Council's engineer, and the dynamo, which was supplied by the Electric Construction Company, was driven by a Crossley gas engine.⁸⁴ Later in 1903 Lanarkshire County Council obtained the Lanarkshire Electricity and Refuse Destructor Order whereby a generating station was set up at Cambuslang. Under this order a destructor combined with electrical generating plant was established to utilise the heat produced by the combustion of refuse in order to generate steam to drive steam engines which in turn drove plant for producing electricity which was then distributed for public and private lighting in the Cambuslang area; this was the

84. Ibid., Vol. XL, 5th March, 1897, 9th April, 1897 and 25th June, 1897; Vol. XLI, 5th November, 1897.

only generating station. operated by Inverclyde County Council; ⁸⁵ similar installations were opened at Ayr in 1905 and at Greenock in 1908. ⁸⁶ No details are known concerning the background to operations at Kilmarnock where a lighting order was obtained by the town in 1899 and where a supply began on 5th November, 1904. ⁸⁷ Similarly, in 1913 a lighting order was obtained by the burgh of Lossiemouth and Brandonburgh and a supply began on 14th July, 1914. ⁸⁸ Finally, in the pre-1914 period, the town of Helensburgh first considered introducing electric lighting in 1896 but abandoned the scheme "because of its great cost," and it was only in 1926 that the corporation was authorised to supply within the burgh. ⁸⁹. 89a.

(3) Local Authorities, not providing a public supply.

Between 1888 and 1914 a number of local authorities selected not to provide a public supply, after transferring a Provisional Order to a private company. Generally these were the smaller less industrialised and more rural authorities but there were exceptions such as Coatbridge and Clydebank which were much more urban and industrialised burghs.

85. S.R.A. Records of Strain and Robertson, T.D. 83/6/8.

86. D.G. Tucker, *Refuse Destructor and Their Use for Generating Electricity; A Century of Development*, Industrial Archaeology Review, Vol. II No. 1 1977.

87. Garcke, op. cit. Vol. IX.

88. Ibid., Vol. XXIX.

89. Electrical Review, Vol. XXXVIII, 10th April, 1896; Vol. XXXIX, 10th July, 1896. Garcke, op. cit. Vol. XXIX.

89a. Although detailed evidence cannot be cited, similar delays between the obtaining of a Provisional Order and the establishment of a supply were evident in England. For example, the Corporation of Bradford obtained a Provisional Order in 1883 but supply did not begin until 1889, and the Vestry of Saint Pancras, which also obtained a Provisional Order in 1883, did not begin a supply until 1891. (Parsons, op. cit., p.p. 121/122 and 124). Such occurrences were not uncommon. (Hannah, op. cit., p. 8).

The reasons for this apparent lack of interest and involvement are not clear. Smallness and their rural character may have been a mitigating factor. An unwillingness to risk the necessary capital expenditure may also be an important consideration. Moreover, businessmen and ratepayers may have favoured low rates and non-involvement, and such pressure may have influenced elected representatives to adopt a policy of civic economy with regard to municipal ownership of electrical undertakings, although the reaction of the Stirling ratepayers (see above) suggests that this was not a universal attitude. The composition of town councils may also have been a deciding factor. The profitability, or potential profitability, of electricity supply companies may have encouraged private investment which was attractive to businessmen - councillors. However, for such an interpretation to be accepted, much greater research and analysis is required of the composition of Scottish local government and this is outside the scope of this research. By the same token, sentiment in these local authorities may have been opposed to any extension of municipal socialism. Nevertheless, there was a willingness to co-operate with private enterprise, despite the fact that public initiative was apparently lacking, which suggests that such local authorities were aware of the advantages and benefits of electricity and the amenity improvements brought about by its introduction.

Typical of many such authorities was the case of Arbroath which in September 1897 refused its consent to an unnamed company offering to provide a public supply within the town.⁹⁰ However, in March 1898 some experimentation began, presumably funded by the town council, when the public library, picture galleries and certain other areas were illuminated by arc lamps installed by W. Dixon and Company of Glasgow but after this matters appear to have lain in abeyance.⁹¹ An electric lighting order was granted to the town council in 1899 and a consultant engineer, a Mr. Buchan of Edinburgh was appointed, but this order was apparently not acted upon.⁹² A second such order was obtained in 1907, and a public supply began on 19th August, 1908 but this was provided not by the town council but by the Arbroath Electric Light and Power Company.⁹³ Other local authorities followed a similar procedure, viz., Brechin,⁹⁴

90. Electrical Review, Vol. XLI, 17th September, 1897.

91. Ibid., Vol. XLII, 25th March, 1898.

92. Garcke, op. cit. Vol. VI.

93. Ibid., Vol. XIV.

94. Electrical Review, Vol. XXXIII, 22nd September, 1893; Vol. XXXIV, 1st June, 1894; Vol. XXXVI, 24 May, 1895; Vol. XXXVII, 23rd August, 1895; Vol. XL, 11th June, 1897; Vol. XLI, 20th August, 1897 and 19th November, 1897.
Garcke, op. cit. Vol. IX.

Montrose,⁹⁵ Inverness,⁹⁶ Hamilton,⁹⁷ Airdrie,⁹⁸ Coatbridge,⁹⁹
 Clydebank,¹⁰⁰ Dumfries,¹⁰¹ Dunfermline,¹⁰² Galashiels,¹⁰³
 Hawick¹⁰⁴ and Dumbarton,¹⁰⁵

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95. Electrical Review, Vol. XXXIII, 15th September, 1893; Vol. XXXIV, 30th April, 1894; Vol. XXXV, 25th January, 1895; Vol. XL, 23rd April, 1897; Vol. XLI, 24th September, 1897. Garcke, op. cit., Vol. IX.
96. Electrical Review, Vol. XXIX, 18th September, 1891; Vol. XXX, 15th January, 1892 and 12th February, 1892; Vol. XXXVII, 11th October, 1895; Vol. XXXIX, 18th December, 1896; Vol. XL, 5th March, 1897. Garcke, op. cit., Vols. IX and XIV.
97. Electrical Review, Vol. XXXIII, 27th October, 1893; Vol. XLI, 5th November, 1897. Garcke, op. cit., Vol. IX. S.R.A. Records of Strain and Robertson, T.D. 83/7. I.C.R. Byatt, The British Electrical Industry, Unpublished D. Phil. thesis, University of Oxford, 1962, p. 481.
98. Electrical Review, Vol. XLI, 15th October, 1897. Garcke, op. cit., Vols. VI and IX.
99. S.R.A. Records of Strain and Robertson, T.D. 83/7.
100. Ibid., T.D. 83/6/3.
101. Garcke, op. cit., Vols. IX, XIV and XXIV.
102. Ibid., Vol. XIV.
103. Electrical Review, Vol. XLI, 23rd July, 1897. Garcke op. cit., Vol. XIX.
104. Electrical Review, Vol. XXX, 12th February, 1892. Garcke op. cit., Vol. IX.
105. S.R.A. Records of Strain and Robertson, T.D. 83/6/2, T.D. 83/6/6C and T.D. 83/7

In addition to those local authorities which handed over responsibility for the provision of a public supply to private enterprise, others, having established a small generating station or merely a distribution system, took a bulk supply from a larger neighbour. Thus, they were able to meet expanding demand without being involved in additional capital investment of a serious nature. The burgh of Alloa, for example, was granted a lighting order in 1899 and a public supply began on 31st December, 1901. However, by agreement with the British Electric Plant Company electricity was supplied in bulk by that company. Thus, at 1905 the total capital expenditure of Alloa was £9,530 and this was on the distribution system only.¹⁰⁶ The town council of Denny and Dunipace received its lighting order in 1905, and a public supply began in 1908. Current was supplied to the council in bulk by the Scottish Central Electric Power Company Limited. In 1909 the total capital expenditure of the council on electricity supply amounted to only £1,200.¹⁰⁷ The burgh of Wishaw was in a similar position. Wishaw received its lighting order in 1904 and a public supply began on 3rd November, 1905.¹⁰⁸ This supply was provided in bulk by the C. V. E. P. Company under an agreement signed on 17th December, 1903; further agreements were signed in 1905, 1910, 1924 and 1927.¹⁰⁹ On the other hand Linlithgow,

106. Garcke, op. cit., Vols. VI and IX.

107. Ibid., Vol. XIV.

108. Ibid., Vols. IX and XIV.

109. S.R.O. Records of South of Scotland Electricity Board, S.S.E.5. I/1, I/2, I/3 and I/4.

which was granted a lighting order in 1905, decided to discontinue generating electricity itself (the date is unknown) and instead purchase it from the Scottish Central Electric Power Company.^{II0} The C. V. E. P. Company apart from supplying in bulk to Wishaw also supplemented the supply of Motherwell, Hamilton and Dumbarton.^{III}

(4) The General Pattern of Growth, as exemplified by Selected Authorities.

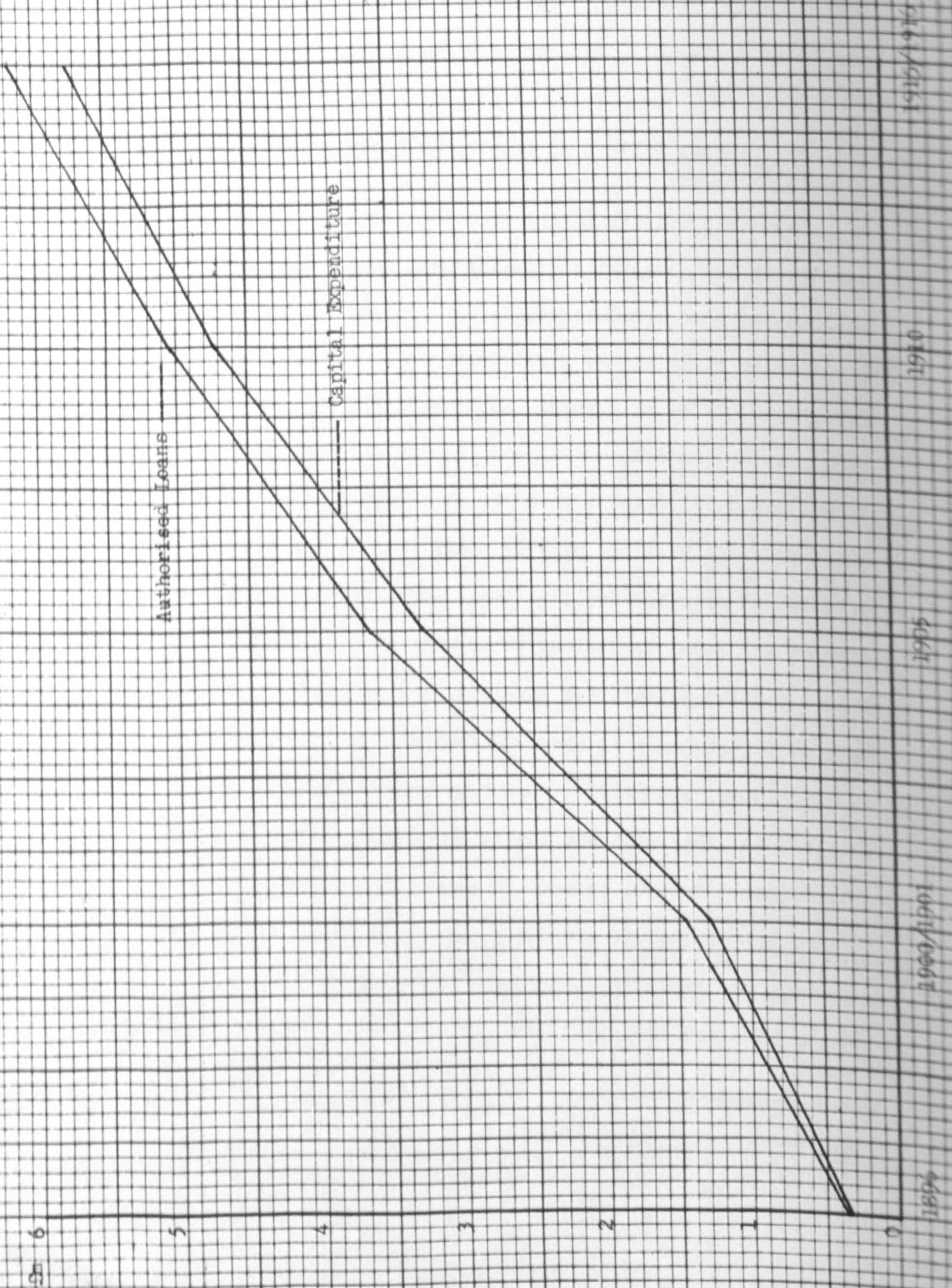
Despite criticism of the Scottish local authority sector given earlier in this chapter it remains true to say that once the undertakings had been established, fairly remarkable progress was made in this period prior to the First World War. The progress of Scotland's four major cities of Glasgow, Edinburgh, Aberdeen and Dundee has already been examined in some detail and the dominance of Glasgow noted. Appendices 6, 7, 8 and 9 examine, on a quinquennial basis, the basic progress made not only by these four cities but also the development of other Scottish local authorities. Appendices 8 and 9 examine the loans authorised to be made by local authorities and the actual capital expenditure involved, and as might be expected both sets of figures move in broad conformity. The loans authorised by Scottish local authorities rose from the relatively low base figure of £362,000 in 1896, when admittedly there were only four local authorities involved, to over £6 million in 1915/1916; this represents an increase of 1607.59 per cent. As can be seen, and as could be expected, the greatest quinquennial increase took place between 1896 and 1900/1901 by which time the _____

II0. Garcke, op. cit., Vol. XXIX.

III. S.R.O. Records of South of Scotland Electricity Board, S.S.E.5. I/2, I/4. S.R.A. Records of Strain and Robertson, T.D. 83/6/6C.

GRAPH I

Total Authorised Loans and Capital Expenditure of Scottish Local Authorities 1895 - 1915/1916



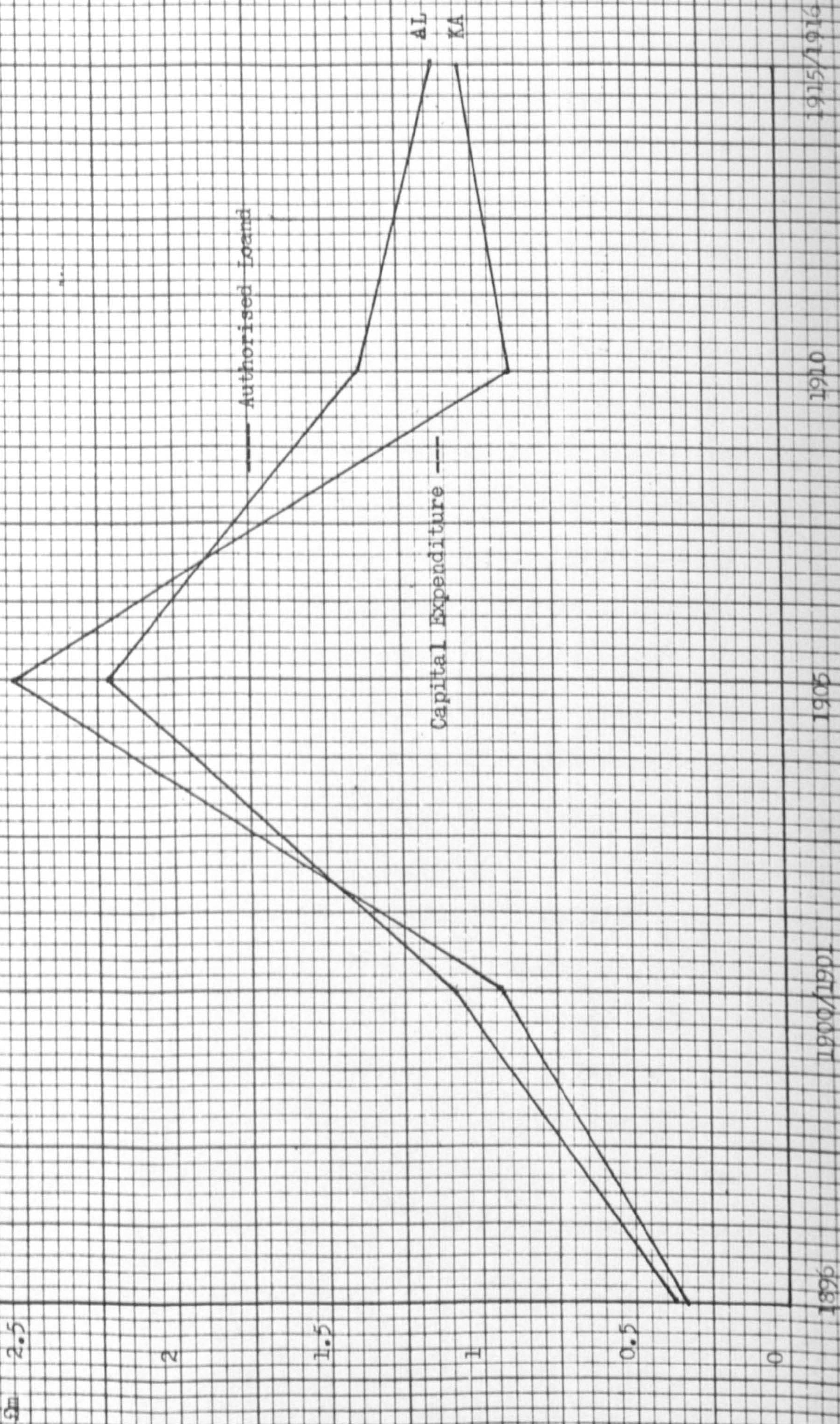
major undertakings had been established or were in the process of construction. After 1900/1901 there was a gradual percentage downturn in authorised loans, although at all times the figure remained positive.

However, if these figures are presented graphically (see Graphs 1 and 2) it can be noted that, although the period from 1896 to 1900/1901 provided the greatest percentage increase, it was in the period from 1900/1901 to 1905 when the greatest amount was actually borrowed. After 1905 the fairly dramatic downswing in the amount borrowed by local authorities undoubtedly reflects that demand, at that particular period, was satiated and that no further expansion was intended. The overall figures, of course, distort the situation with individual authorities. Rural areas such as Ayr, Stirling and Perth reached a, more or less, optimum size and scale relatively quickly which involved no major immediate expansion. Other towns of a more urban and industrialised nature faced competition from the growth of power companies, such as the C.V.E.P. Company, and avoided additional heavy capital outlay by obtaining a bulk supply from these companies. This was true of, for example, Motherwell and later Paisley, which both obtained a bulk supply from the C.V.E.P. Company.

As stated in the previous paragraph, the figures for capital expenditure, given in Appendix 9, move in accord with authorised loans and this is probably better illustrated in Graphs 1 and 2. Over the period examined, there

GRAPH 2

Authorised Loans and Capital Expenditure of Scottish Local Authorities on a Quinquennial Basis between 1896 and 1915/1916

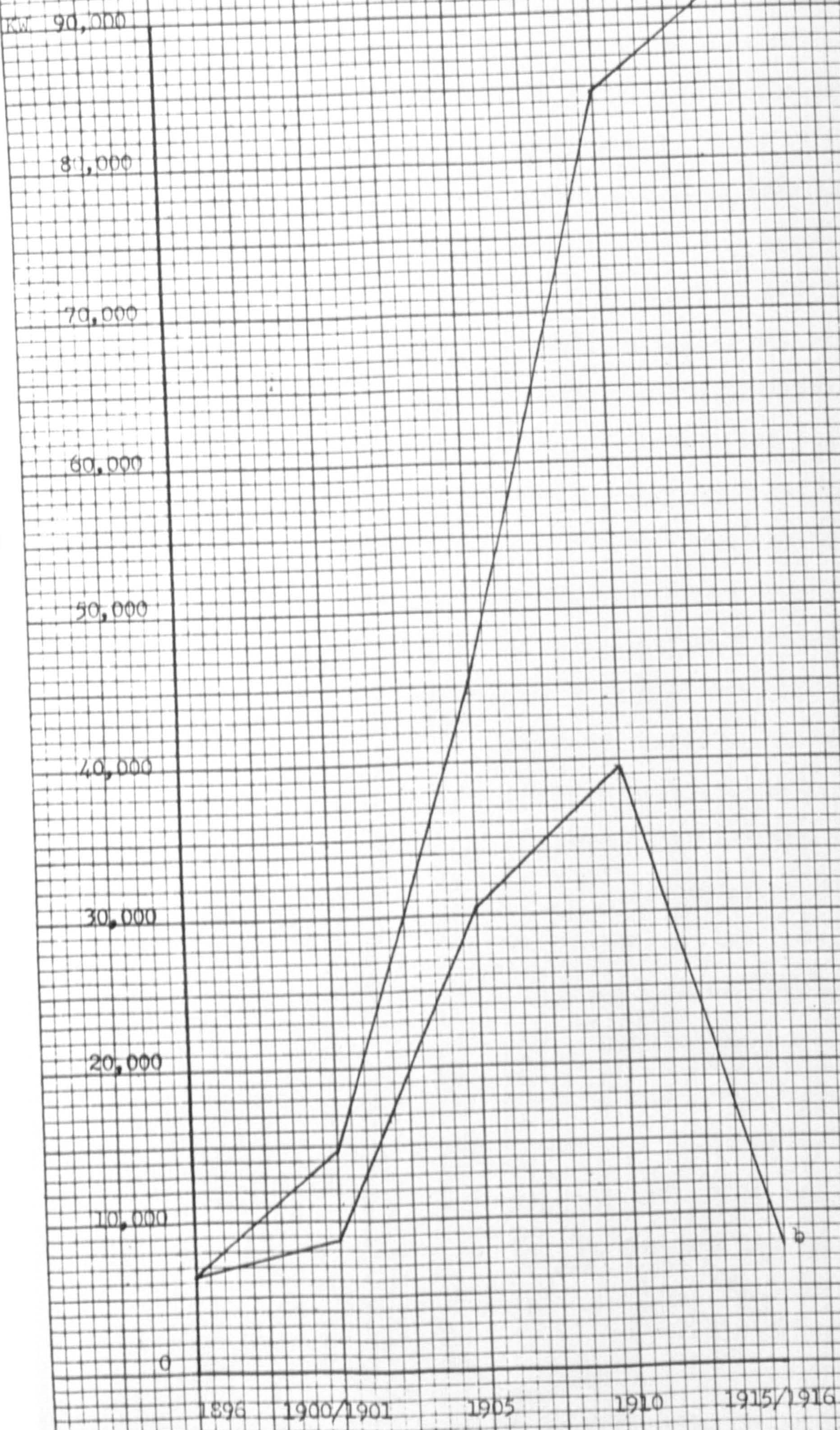


was a percentage increase in capital expenditure of 1587.43 per cent with the period between 1896 and 1900/1901 providing the greatest quinquennial percentage increase, but between 1900/1901 and 1905 came the greatest actual expenditure. It seems apparent that the interpretation given concerning such movements either globally or individually for authorised loans is also valid for capital expenditure. It should also be noted that a greater number of local authorities are quoted in Appendix 9 than in Appendix 8 as having authorised loans. Apart from the fact that these figures have been faithfully abstracted from Garcke's Manual of Electrical Undertakings (as stated earlier), it should also be noted that, as explained earlier in this Chapter, some local authorities such as Alloa and Denny and Dunipace had only to provide a distribution system and presumably this was paid from common good funds without it being necessary to obtain borrowing powers, since no capital expenditure was necessary to erect a generating station.

In relation to the 'technical' Appendices 6 and 7 dealing with installed capacity and electricity generated the position of the four major cities had already been examined in some detail, and again the dominance of Glasgow was noted. Indeed the dominance of Glasgow followed by Edinburgh and Dundee tends to distort the global perspective. Nevertheless, it can be seen from Appendix 6 that during this period there was a 1367.13 per cent increase in installed capacity and, following upon what has already been said in the 'financial' Appendices 8 and 9, that the

GRAPH 2.

- a) Total Installed Capacity of Scottish Local Authorities 1896 - 1915/1916.
- b) Installed Capacity of Scottish Local Authorities on a Quinquennial Basis between 1896 and 1915/1916.



greatest percentage increase took place between 1900/1901 and 1905 and that the period when the greatest capacity was installed was between 1905 and 1910, with a lesser capacity installed thereafter; this can also be noted in Graph 3. The situation at Ayr and Paisley should also be noted in that at Ayr installed capacity declined after 1905 and that a similar situation occurred at Paisley after 1910; yet in both instances, from Appendix 7, electricity generated continued to increase. This undoubtedly reflects greater technical efficiency and greater utilisation of existing resources. However, Appendix 6 does emphasise the comparatively small unit size of most undertakings. Appendix 7 is, in many ways, the most noteworthy of all in that electricity generated, during the period examined, rose by a dramatic 6359.69 per cent and also from the fact that, although the quinquennial percentage increases varied, the actual units generated in each of the quinquennial periods continued to indicate positive expansion; this can be better observed in Graph 4.

A comparison of Appendices 6 and 7 indicates that there was a decided improvement, as stated earlier, in both technical efficiency and in the utilisation of resources. The following table, Table 5, attempts to measure this improvement from a number of selected towns by measuring the number of Board of Trade units produced by 1KW in the years stated. This is admittedly a very crude measure since it ignores both costing and rates charged as

B.T.U. (000s)

180

160

140

120

100

80

60

40

20

0

1896

1900/1901

1905

1910

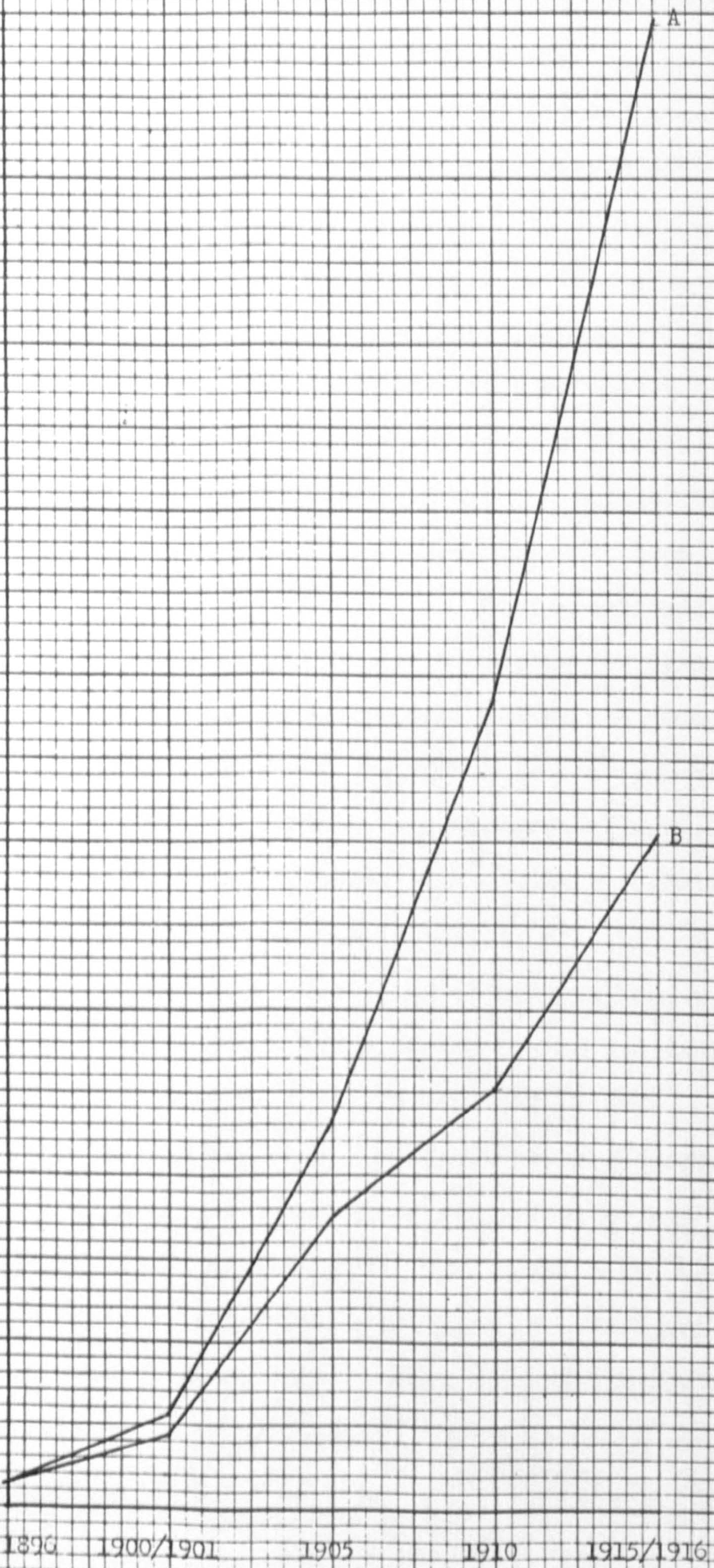
1915/1916

A

B

GRAPH 4

A) Total Electricity Generated by Scottish Local Authorities 1896 - 1915/1916.
B) Electricity Generated by Scottish Local Authorities on a quinquennial Basis between 1896 and 1915/1916.



well as, in any one year, the stage of development or growth of the undertaking. Nevertheless, the table does provide this crude indicator of efficiency within, solely, the local authority sector.

TABLE 5

	<u>Number of B.T.U. Produced by 1KW at Selected Undertakings.</u>				
	<u>1896</u>	<u>1900/1901</u>	<u>1905</u>	<u>1910</u>	<u>1915/1916</u>
Glasgow	699.97	816.44	1299.58	1095.32	2390.11
Edinburgh	352.68	983.07	1039.72	1258.21	1264.93
Ayr		1438.37	795.09	1272.40	1463.71
Motherwell			860.20	1379.13	1186.91
Paisley			379.70	767.24	984.58
Stirling			1016.84	626.88	741.54
Perth			903.32	863.27	1007.86

Source: Appendices 6 and 7.

The reason for the selection of these cities and towns is probably self-evident, especially Glasgow and Edinburgh, whose special features have been examined in some detail earlier. Ayr, a seaside town on the west coast of Scotland, was selected as being a town of fairly static characteristics and one not subject to a great deal of change. Motherwell and Paisley were both of an urban and industrialised nature whereas Stirling and Perth, both inland, were much more rural market towns and less industrialised.

From Table 5 it can be seen that, although the efficiency of the undertakings named were at variance with one another, the overall indication of progress, as measured by this method, was one of improvement. Glasgow, the longest established undertaker, in many ways dominates the table and, with the exception of the year 1910, Glasgow's

figures were consistently above the Scottish local authority average. The figures for 1915/1916 may be slightly distorted since by that time Glasgow had absorbed the market previously supplied by Govan and Partick. Nevertheless, Glasgow did achieve a relatively high degree not only of efficiency but an ability to meet an ever-expanding market. Moreover, that such a market was expanding is confirmed by Table 6 which reveals that the number of customers supplied by Glasgow between 1896 and 1915/1916 rose by 3420.23 per cent; it is unfortunate in Table 6 that the type of customer, either industrial, commercial or private, cannot be identified. A comparison of Appendix 6 and Tables 5 and 6 indicates that installed capacity, at least, kept pace with demand and that the efficiency of the undertaking was continually improving. This interpretation appears all the more valid when it is noted that, while the number of customers in absolute terms continued to expand, after 1905 there was a relative decline in growth. For example, the number of customers at Glasgow achieved a peak growth rate of 277.88 per cent between 1900/1901 and 1905, but between 1905 and 1910, and between 1910 and 1915/1916 the growth rates were 68.49 and 65.76 per cent respectively.

TABLE 6

Number of Customers Supplied by
Selected Undertakings between
1896 and 1915/1916.

	<u>1896</u>	<u>1900/1901</u>	<u>1905</u>	<u>1910</u>	<u>1915/1916</u>
Glasgow	855	2852	10,777	18,158	30,098
Edinburgh			7,129	12,252	16,156
Ayr			689	1,204	1,576
Motherwell			282	580	916
Paisley			460	915	1,691
Stirling		70	213	290	290
Perth				346	488

Source: Garcke, op. cit. Vols. I, V, IX, XIV, XIX.

The low number of B.T.U. produced by 1KW at Edinburgh in 1896 is self-explanatory since Edinburgh only began its public supply on 11th April, 1895. After 1900/1901 Edinburgh displayed a modest increase in such figures which appears to be in conformity with the installed capacity and the number of customers. This appears to be particularly true of the period from 1910 to 1915/1916 when the number of customers rose by only 31.84 per cent. Ayr, with its public supply inaugurated on 8th January, 1896 and by the very nature of the town itself, presents, with the exception of the year 1905, a much more static picture. Between 1900/1901 and 1905 the installed capacity rose by a remarkable 488.24 per cent, indicative of the laying down of plant in advance of demand, and this is undoubtedly reflected in the low figure for B.T.U. produced by 1KW in 1905. By 1910 and especially by 1916 a much more satisfactory figure was attained and this is reflected in the number of customers supplied and in the fact that the installed capacity had actually fallen. The industrial

burghs of Motherwell and Paisley provide for interesting comparison. Motherwell's figures for B.T.U. produced by 1KW indicate a downward trend after 1910. This is undoubtedly due to the increase in installed capacity indicated in Appendix 6 laid down in anticipation of increased demand and reflected in the number of customers which rose by 105.67 per cent between 1905 and 1910 but only by 57.93 per cent between 1910 and 1915/1916. On the other hand Paisley, which had established a public supply in September 1899, did apparently have a slow growth rate until 1905 when only 379.70 B.T.U. were produced by 1KW. This may indicate that plant was laid down in anticipation of demand which did not materialise and that the 460 customers at 1905 were mostly domestic. After 1905 a growth in efficiency is indicated which is partly explained by a reduction in plant capacity and by a growth of 267.61 per cent in the number of customers. The position of Stirling and Perth, both towns of a rural nature, also bears comparison. Stirling maintained the same installed capacity, 638KW, from 1905 until 1915/1916, while Perth had the same installed capacity, 1195KW, from 1910 until 1915/1916. This would appear to indicate that demand had been saturated in both towns. Indeed, Stirling experienced a reduction in B.T.U. produced by 1KW between 1905 and 1915/1916, while the number of customers remained the same between 1910 and 1915/1916. This would appear to be indicative of, at worst, technical

inefficiency and a lack of vigour towards marketing or, at best, complacency. Perth did show improvement and the drop in the 1910 figure for B.T.U. produced by 1KW can probably be explained by the increase in installed capacity at that time, later taken up by the increase in demand and reflected in the rise in the number of customers.

As stated earlier, it is impossible to identify individual customers of these local authorities. However, it is possible to provide a broad analysis of sales, and this has been given in Appendix 12; such an analysis has already been done for Glasgow and Edinburgh in Appendix 11. Appendix 12 is also important because it indicates the diversity of load factor among the burghs concerned and thus provides additional judgement in any attempt to estimate the efficiency of the several undertakings. For example, the cost effectiveness of the Stirling undertaking, which was basically for lighting purposes only, was affected by the fact that lighting was only required for a minimum period per day and, therefore, the whole oncost of the station was incurred to meet this small demand. Perth, the other rural burgh, was affected by the demands of its electric tramway and the requirements of this, on average about eight hours per day, represented the equivalent of a 30/33 per cent load factor supplementing lighting which alone represented only between 8 and 9 per cent. On the other hand in the more urban burghs, such as Motherwell, with an expanding industrial demand for energy, their load factor was re-inforced

by this demand with consequently, all things being equal, a beneficial effect to cost effectiveness and a large return on fixed oncost charges. A classic example of an industry with a high load factor demand was mining where pumping work at collieries was practically continuous night and day.

In Appendix 12 figures for Motherwell, Paisley, Perth and Stirling are not available prior to 1905 whereas figures are available for Ayr at 1900/1901. The figures for Ayr are in accord with the trend already observed in Appendix 11. In 1900/1901 public sector lighting accounted for 61.72 per cent of all sales but diminished by stages until at 1915/1916 it represented 20.04 per cent which was still a significant proportion of sales. This particular trend can also be observed, with minor variation, in the other rural burghs of Perth and Stirling, and exaggerates a pattern already indicated in Appendix 11 concerning Edinburgh. In other words, and quite logically, in the more residential towns public lighting remained an important, though diminishing, aspect of sales. However, in the more industrialised communities public lighting, although providing an initial foundation and one which expanded, in a relatively short period of time proportionately diminished as an important aspect of sales. This can be observed in Appendix 11 at Glasgow and Dundee and in Appendix 12 at Paisley. Motherwell, for reasons unknown, would appear to be anomalous in that even as late as 1915/1916 sales for public lighting still accounted for 16.27 per cent.

In the rural and more residential towns of Ayr, Perth and Stirling consumer sales for domestic purposes were of obvious importance. However, although such sales continued to expand, there was a fairly marked deceleration in growth as, for that period, a veritable saturation point was reached. A similar interpretation can be argued for the urban burghs but here an expanding demand for energy for industrial purposes created a dominant driving force. In Appendix 12 this is most clearly evident in the case of Motherwell where at 1915/1916 such sales accounted for 65.08 per cent of total sales; this reflects very clearly the situation at Glasgow as indicated in Appendix 11. No separate figures for sales to industry are available for Paisley but the 1915/1916 figure for sales to consumers would clearly encompass such sales; this position has already been noted in Appendix 11 with regard to Dundee. Sales for traction purposes, as already indicated, helped to supplement the load factor and, as already stated when analysing Appendix 11, were not sales which were in continuous expansion; there was, after all, an optimum length of line and a regular demand which could not be readily increased. The unit sales figure for traction at Motherwell in 1905 represented sales to the Lanarkshire Tramways Company, which had, in fact, its own generating station at Motherwell of 750KW,^{II2} and may

II2. S.R.A. Records of Strain and Robertson, T.D.
83/6/2.

represent sales to that company during the temporary closure of the company's own generating station. With regard to Paisley, and since no other information is available, it is assumed that the overall figure for sales to consumers at 1915/1916 contains traction sales.

In many ways the ultimate indicator of the efficiency of any undertaking is its financial viability or, to put it more bluntly, was it a profit making enterprise? However, such a fine measure cannot be solely used in judging the performance of undertakings in the local authority sector, since such undertakings were public utilities and thus the sole criterion of profitability cannot be fully justified. The prevailing policy of the governing body must also be taken into account and, at this time and distance, it is virtually impossible either to analyse accurately or comment upon policy decisions taken at the turn of the twentieth century either with regard to pricing or with regard to the extent to which a loss making undertaking could be judged efficient on the grounds that it was providing a community service. Nevertheless, figures are available which provide a basis for the analysis of the financial performance and growth of undertakings in the local authority sector and these figures for selected undertakings are given in Appendix 13.

As stated earlier these undertakings have been selected since it is believed that they are broadly representative of major undertakings in the local authority sector. This is especially true of Motherwell and Paisley, which were

important industrialised burghs, and Perth and Stirling which were, in their more rural setting, equally important, though obviously less industrialised. Ayr, which, as noted earlier, was fairly progressive in its acceptance of the new form of energy, was a seaside burgh of a residential nature and makes for interesting comparison. Glasgow and Edinburgh have been chosen for their uniqueness and special characteristics which have already been described.

In Appendix 13 the table headings are self-explanatory but, perhaps, require some comment. 'Revenue from Sale of Current' was simply what it states and requires no additional explanation at this stage. 'Other Revenue' was much more miscellaneous and comprised revenue from such areas as rental of meters, rental of property, hire of machinery, hire of motors, municipal wiring, repairs and, in the case of Stirling at 1905, a contribution of £800 from the rates. 'Working Expenses' included the expenses of generation and the expenses of distribution as well as expenditure on rent, rates, taxes, royalties, insurance, management expenses and repairs to public lamps. Repairs and legal expenses were found under this heading but also occasionally under the heading 'Other Expenses.' 'Other Expenses' were normal and included interest on loans, depreciation, sinking fund and expenditure in connection with loans. The final column 'Percentage Total Cost to Revenue from Sale of Current' was taken from Garcke but is

slightly misleading since it is, in fact, working expenses, and not total expenses, expressed as a percentage of revenue from sale of current. Moreover, this is the only column where figures have actually been changed. The true percentage figure is given and Garcke's figures given in brackets.

The figures for revenue from sale of current emphasise yet again the dominance of Glasgow within the Scottish local authority sector and also indicate a trend of continuous expansion which has already been observed. They also, of course, reflect the deceleration which took place as market demand, at that time, was increasingly satisfied. This deceleration in the rate of growth of revenue was most pronounced in the more rural and/or residential areas whereas in the urban more industrialised areas (although deceleration is evident) it is not so marked; industrial demand was obviously a telling factor. For example, the industrial towns of Motherwell and Paisley during the quinquennial period from 1905 to 1910 had remarkably similar growth rates for revenue from sale of current of 48.98 and 47.47 per cent respectively, while between 1910 and 1915/1916 they still achieved fairly respectable growth rates of 18.47 and 15.96 per cent. During the same time periods the more rural burghs of Perth and Stirling experienced much lower growth rates. Between 1905 and 1910 Perth and Stirling witnessed their revenue rise by 27.92 and 35.86 per cent respectively and between 1910 and 1915/1916 by 13.22 and 6.09 per cent. The situation of

Perth and Stirling is also paralleled at Ayr where revenue from sale of current rose by 65.17 per cent between 1900/1901 and 1905 but by only 10.03 per cent between 1910 and 1915/1916. The situation in Scotland's two major cities re-inforces this trend. Between 1896 and 1900/1901 Edinburgh did, in fact, achieve a greater growth in revenue from sale of current than Glasgow; the former experiencing a rate of 66.05 per cent and the latter 58.17 per cent. However, between 1910 and 1915/1916, whereas Glasgow maintained a growth rate of 33.53 per cent, the figure for Edinburgh virtually collapsed to only 8.08 per cent.

However, revenue is not solely affected by the effectiveness of marketing and the demand for the product, but also by the price charged. With regard to Appendix 13 the actual rates charged by these named local authorities is not known, but the average revenue per unit sold or, to put it another way, the average rate charged is known and has been given. This is not entirely satisfactory, since it does not provide information concerning discrimination between and among consumers but it does provide a crude basis for comment. Generally, there was a continuous decrease in the average rate charged with the exception of Ayr where the figure rose from 2.32d. in 1910 to 2.44d. in 1915/1916. It is also evident that, generally, the average rate charged by the industrialised burghs was lower than that charged by their rural counterparts, and that similarly over the time periods given in Appendix 13 the average rate charged fell much more

dramatically in the urban areas than in the rural areas. Admittedly Glasgow had, initially, a higher average rate than Edinburgh but over the period given, that is from 1896 to 1915/1916, Glasgow's average rate fell by 78.87 per cent as against 60.18 per cent for Edinburgh. Between 1905 and 1915/1916 the industrial burghs of Motherwell and Paisley were able to reduce their average rates by 41.00 per cent and 50.17 per cent respectively, whereas Perth and Stirling reduced their rates by only 26.45 and 26.52 per cent respectively. This trend is even more marked at Ayr where the average rate charged fell by only 20.78 per cent between 1900/1901 and 1915/1916. There seems little doubt that an undertaking's ability to reduce rates charged was dependent on rising sales and greater utilisation of plant capacity; that this was easier to achieve in the urban setting appears self-evident.

During the periods under consideration in Appendix 13 it can be observed that working expenses rose at a considerable rate. However, it can also be observed that, generally, working expenses per unit sold fell, but that there were, for reasons not immediately apparent, exceptions to this downward trend. For example, in the periods under consideration Glasgow experienced a reduction in working expenses per unit sold of 84.77 per cent, Edinburgh 53.09 per cent, and the industrial towns of Motherwell and Paisley 40.00 per cent and 50.87 per cent

respectively. However, the rural burgh of Perth experienced a reduction of only 24.84 per cent while Stirling for the shorter period, a reduction of only 12.39 per cent. Thus, a greater cost effectiveness was obtainable in the first place from the larger undertakings and secondly from those undertakings meeting a demand from the urban industrial consumer. It is noted that the exceptions to the general downward revision of working expenses per unit sold occurred in the more residential and/or rural areas of Edinburgh, Ayr and Perth. Admittedly, such rises in working expenses per unit sold were not inordinately large, but they did occur. For example, at Edinburgh between 1905 and 1910 there was a rise of 0.04 per cent, at Ayr between 1910 and 1915/1916 the rise was 10.53 per cent and at Perth during the same period the rise was 5.76 per cent. Nevertheless, over the entire period the general reduction indicated by all the undertakings would appear to exemplify a greater efficiency and utilisation of plant capacity which was undoubtedly reflected in the load factor.

A finer measure of working expenses per unit sold can be obtained by analysing the global figure for per unit sold into its various aspects. This has been done in Table 7. The year 1905 has been selected not entirely at random but as a year at which all of the selected undertakings had been established for a number of years and thus could be regarded as mature. In 1905 all of these undertakings were in the process of growth but this would

be equally true of 1910 and 1915/1916. Thus 1905 was chosen. Table 7 has been provided more for informative rather than comparative purposes. No accurate comparison can be made among the undertakings, because each of the individual aspects named requires additional detailed analysis, data for which is not available. For example, the make-up of the costing of the elements comprising generation are not known and thus it is difficult to determine if like is being compared with like. However, the table does indicate the difficulty of making generalised assumptions regarding working expenses. It is possible to say that generation was the predominant element within such costing but it is noted that there was a fairly wide margin of difference in the proportion of working expenses attributed to generation; this is particularly evident in the less industrialised burghs. The proportion of working expenses attributed to distribution by these undertakings is so wide as to render comparison ineffectual. Management expenses are more closely ranged, though at Stirling they do seem extraordinarily large. Rent, Rates and Taxes are again unevenly distributed and, even allowing for the difference in locale between Paisley and Perth, the difference in their figures defies understanding without additional information. Insurance and legal expenses appear to be closer related, but differences are evident among the authorities.

TABLE 7

Analysis of Working Expenses per Unit Sold at Selected Undertakings in 1905

	GLASGOW		EDINBURGH		AYR		MOTHERWELL		PAISLEY		PERTH		STIRLING	
	d	%	d	%	d	%	d	%	d	%	d	%	d	%
Generation	0.51	52.04	0.52	54.17	0.93	72.09	0.64	64	1.14	65.89	0.93	57.77	1.51	66.82
Distribution	0.20	20.41	0.18	18.75	0.10	7.75	0.12	12	0.33	19.07	0.07	4.35	0.27	11.95
Management	0.12	12.24	0.11	11.46	0.13	10.08	0.14	14	0.22	12.72	0.29	18.01	0.34	15.04
Rent, Rates, Taxes	0.15	15.31	0.13	13.54	0.08	6.20	0.10	10	0.02	1.16	0.29	18.01	0.08	3.54
Insurance			0.02	2.08	0.05	3.88			0.02	1.16			0.06	2.65
Legal Expenses											0.03 ¹	1.86		
	0.98	100	0.96	100	1.29	100	1.00	100	1.73	100	1.61	100	2.26	100

1. Includes insurance.

Source: Garcke, op. cit. Vol. IX.

As stated earlier, the final column of Appendix 13 is also related to working expenses since it expresses working expenses as a percentage of revenue from sale of current. In crude terms it states the percentage of working capital which was absorbed by working expenses and thus provides another indicator of the efficiency with which the undertakings were managed; the lower the percentage the more efficient the undertaking. It does, of course, ignore the importance of 'other expenses' in influencing the final profitability of the undertakings. However, bearing this in mind, the figures in the final column do not indicate a general trend towards greater efficiency but rather a cyclical movement which was dependent on sales and effective cost management of the undertaking and both these factors were obviously affected by extraneous influences such as the state of the market and any variance in input costs. Nevertheless, making a judgement solely on the basis of the final column, it is possible to indicate, when the figures are averaged out for the time periods given, the cost efficiency of the undertakings. Edinburgh, with 46.48 per cent, was more efficient than Glasgow which only managed to attain 52.78 per cent. This could possibly be explained by a much closer relationship between the pattern of demand and the undertaking's ability to meet such a demand. However, it is also dependent on the rate charged to the consumer and it has already been indicated earlier that Glasgow reduced its average rate much more than Edinburgh during the period under consideration. The

situation at the urban burgh of Motherwell, where the average for the three years stated was 50.99 per cent, was much better than that of Paisley where a figure of 58.08 per cent was achieved. Indeed, Paisley's figure has a marked similarity with Perth which attained 58.07 per cent. The figure for Stirling of 54.76 per cent is relatively low but could, in fact, be distorted since it is only for two years. Thus, there is a slightly anomalous situation where Paisley appears to be more in agreement with Perth and also Ayr, where the figure was 56.15 per cent, than its industrial counterpart of Motherwell. Therefore, it would appear that such figures provide a crude measurement, but that there are so many contingent factors which are unknown and which make any general interpretation a virtual impossibility.

The significance of 'other expenses' in the profitability of the undertakings is very evident in Appendix 13 and, indeed, with one exception, that of Glasgow at 1896, at no time did other expenses fall below 40.00 per cent of total expenses. Moreover, at times they exceeded 50.00 per cent of total expenses. For example, Glasgow at 1905 and 1910 where they accounted for 61.87 and 57.91 per cent respectively; at Edinburgh in 1905 when they were 54.02 per cent; at Motherwell in 1905 and 1915/1916 when they were 53.84 and 53.94 per cent respectively and at Stirling in 1905 when they accounted for 55.82 per cent of total expenses. As already explained, the items involved, interest on loans, depreciation and so on, were part of the normal financial overhead

expenses of any undertaking, but in these undertakings they do appear to be inordinately large, and 1905 appears to have been a year when they were of prime importance. The two major items of overhead costs common to all authorities were interest on loans and amounts set aside in a sinking fund although individual authorities could have items of particularly heavy expenditure in any one year. Table 8 provides information on these two major items and expresses them as a percentage of total overhead cost at 1905.

TABLE 8

Interest on Loans and Sinking Fund, as a percentage of Total Overhead Costs at Selected Undertakings in 1905.

	Interest on Loans	%	Sinking Fund	%
Glasgow	£36,023.38	36.00	£15,205.53	15.19
Edinburgh	20,637.95	41.44	28,022.65	56.27
Ayr	2,905.52	55.06	1,916.70	36.32
Motherwell	1,738.50	49.13	1,800.00	50.87
Paisley	3,795.74	63.95	1,956.71	32.97
Perth	1,495.74	59.35	744.00	29.52
Stirling	998.48	40.80	-	-

Source: Garcke, op. cit. Vol. IX.

The figures given for interest payments on loans made do, of course, emphasise the reliance of local authorities on borrowed capital to finance the growth and development of their undertakings. By 1905 Glasgow had borrowed £1,038,618.20p and with respect to electrical undertakings was the largest debtor local authority in Scotland. Of this sum only £66,381.80p had been repaid by 1905 and this

is reflected in Table 8 where the interest payment for that year amounted to £36,023.38p, representing 36.00 per cent of total overhead costs. In 1905 also Glasgow had set aside £15,205.53p in its Sinking Fund while depreciation amounted to £32,180.65p. However, Glasgow's overhead costs in 1905 were inflated by a transfer payment to the Gas Account of £13,895.30p which had been the loss incurred for the year ending 31st May, 1903 and which apparently at that time had been borne by that account. By contrast with Glasgow, Edinburgh had repaid £142,208.21p of the total amount, £842,782, borrowed by the city and this is reflected in Table 8 where interest on loans amounted to £20,637.95p. . Apart from that sum, the only other significant overhead cost was the amount set aside for the Sinking Fund of £28,022.65p, or 56.27 per cent of the total overhead costs, and this very high percentage figure perhaps indicates the greater prudence of those administering the undertaking. It also, of course, emphasises their ability to do so. The difference in the interest payments of the industrial burghs of Motherwell and Paisley is obviously related to the amounts borrowed by those authorities. By 1905 Motherwell had borrowed £55,454 and Paisley £134,777.35. However, although Paisley had repaid £2030 of this borrowed capital, Motherwell, at 1905, had repaid nothing. In a similar manner, the difference in the interest payments of Ayr, Perth and Stirling is accounted for by the amount of borrowed capital outstanding at 1905. Ayr, Perth and

Stirling had borrowed £82,912.38p, £51,422.77p and £37,000 respectively. However, whereas Ayr and Perth had only repaid £2,000 and £1,820 respectively, Stirling had repaid £4,325.57p and at 1905 was the only local authority of the seven named making a repayment on its borrowed capital; this repayment amounted to £1,079.29p. It is also noted that Stirling made no contribution to a sinking fund in that year. Overall, the amount set aside by the individual undertaking as its contribution to a sinking fund would appear to be dependent on the ability of the undertaking to do so and also on the judgement of its administrators.

Finally, Appendix 13 reveals the profitability of the named undertakings at the stated quinquennial years. An examination of profit and loss indicates that, with the exception of Edinburgh at 1905, the margin of profit or loss was not exceptional. However, and as indicated above, it was possible for so many other factors to influence the eventual profitability of an undertaking that these figures are only of nominal value. Generally, it would appear that these undertakings, as public utilities, were motivated by a policy of breaking even and were content to do so. It is interesting to note that this was achieved by Glasgow in 1915/1916, Paisley in 1910 and Stirling in 1910.

Chapter 5.Relations between Local Authorities and Electricity Supply Companies, including hydro-electric development 1890-1930.

It has already been demonstrated in the previous chapter that the Electric Lighting Act of 1888 made some concession towards private enterprise by extending the period of reversionary purchase by a local authority from twenty-one years to forty-two years. However, by law the growth of private sector undertakings was still restricted, since permission from a local authority was essential before any company could apply for a provisional order. In the decade following 1888 Scottish local authorities, with few exceptions, were positive in exercising this right despite the fact that their own efforts in establishing a public supply of electricity were beset by delay and indecision.¹ The attitude of local authorities in Scotland to this more liberal legislation was indicated in 1890 when a number of their representatives met officials from the Board of Trade to seek amendments to the Electric Lighting Acts which would give town councils responsibility for local authority electric lighting.²

Moreover, this attitude was expressed in a more forthright manner by many Scottish local authorities who refused to give their consent to private

1 Vide infra, p.p. 106-123

2 Telegraphic Journal; Vol. XXVI, 14th March, 1890.

companies that wished to apply for a provisional order. In 1889 Leith refused to give its consent to a private company obtaining a provisional order for the town and in the same year Edinburgh refused its consent for six companies.³ In 1893 overtures by the Caledonian Electric Supply Company were declined by the town councils of Oban, Falkirk, Stirling, Perth, Dunoon and Hamilton, and in 1894 Perth also refused the Municipal Electric Light and Power Corporation.⁴ In 1895 Inverness opposed applications from three companies, while the Caledonian Electric Supply Company experienced a further rebuff at Paisley.⁵ In 1897 unnamed companies were refused consent to apply for provisional orders by the town councils of Galashiels, Rothesay and Arbroath.⁶ A final example can be shown in 1898 when the North British Electricity Company experienced a similar fate at Courock, Greenock and Port Glasgow.⁷ Admittedly some of these local authorities had plans of their own to provide a public supply of electricity, but

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3. Ibid., Vol. XXV, 9th August, 1889 and 13th September, 1889.
4. Ibid., Vol. XXXIII, 1st July, 1893, 1st September, 1893, 5th September, 1893, 22nd September, 1893, 29th September, 1893, 27th October, 1893 and Vol. XXXIV, 24th August, 1894.
5. Ibid., Vol. XXXVII, 11th October, 1895 and 15th November, 1895.
6. Ibid., Vol. XLI, 23rd July, 1897 and 17th September, 1897.
7. Ibid., Vol. XLII, 21st January, 1898 and 19th April, 1898.

as was noted in the previous chapter, such plans could be long in reaching fruition. However, not all local authorities were hostile to private enterprise and the town council of Dingwall were prepared to consider proposals from persons or companies willing to undertake the free electric lighting of the town.⁸ On the more serious side there were casualties. The Edinburgh Electric Supply Corporation, set up to implement the provisional order for Edinburgh in the belief that the city council would not carry out the work itself and possessing in 1892 a privately supplied capital of £32,775, was eventually wound up in 1893.⁹ In a similar manner the North British Electricity Supply Company, formed on 29th June, 1897 to provide an electricity supply in Gourock, Port Glasgow and Greenock, was formally dissolved on 18th September, 1900.¹⁰

(1) The Gradual Demise of Private Installations.

This hostility, latent or otherwise, between

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8. Ibid., Vol.XL, 7th May, 1897.
 9. Ibid., Vol.XXXI, 30th December, 1892 and Vol. XXXIII, 21st July, 1893.
 10. Garcke, op.cit. Vol.V.

local government and the private sector in Scotland meant that in the 1890s only three companies began to provide a public supply of electricity viz., The Kelvininside Electricity Company (supply began August 1893), The Scottish House-to-House Electricity Company (supply began March 1894) and The Fort William Electric Lighting Company (supply began August 1896). These companies will be examined in detail later. However, despite this lack of impact by private companies and the tardiness of local authorities, the advance in the use of electrical power, particularly for lighting, continued unabated and is evident in the number of private installations which were established. Such installations were to be found on a widespread basis nationally and in a domestic, commercial and industrial framework as well as for other uses. It would be tedious to list every known private installation but sufficient examples will be given to exemplify the fact that by the 1890s the awareness of the benefits of electric power was established, and that its popularity was ever increasing. Moreover, it is true to say that these private installations provided a vanguard which was to underpin central station development by both local authority and private enterprise.

In January 1889 at Dumbarton, A. Denny, a member

of the local shipbuilding family, had his residence lit entirely by electricity and one year later this installation had virtually taken on the appearance of a private central electric light station when he induced a number of his neighbours to have their homes lit. Perhaps more interesting than this is the fact that the work was carried out by the electrical department of the Leven Shipyard which had obviously gained its expertise in such matters from the installation of lighting in ships.¹¹ In 1889 also the Glasgow firm of Anderson and Munro were busy providing lighting installations at a number of mansions and large mills in Hawick and at the Royal Lunatic Asylum of Gartnavel, near Glasgow. In addition, under the supervision of C.H. Yeaman, an electrical engineer of London, they wired Strathearn House, a hydropathic establishment at Crieff, for electric lighting.¹² In that year, even further travelled was the newly formed firm of Anderson, Campbell and Munro of the Hyde Park Electric Works, Glasgow which not only rewired the Glasgow Works of Arrol and Company but also

11. Telegraphic Journal, Vol. XXIV, 11th January, 1889 and Vol. XXVII, 18th July, 1890.

12. Ibid., Vol. XXIV, 15th March, 1889 and Vol. XXV 25th October, 1889

installed a unit of eighty lights in a factory near Carlisle.¹³ Much more novel was the curling match played at Edinburgh using electric lighting between the Northern Curling Club of Edinburgh and the Merchiston Club; the Merchiston Club won by 18¹⁴ points.

However, much more interesting was the report in May 1889 concerning a Mr. Monteith of Carstairs House, Lanarkshire who introduced electric lighting to his house and also constructed an electric railway between his house and the Carstairs Station of the Caledonian Railway Company. The 30 inch gauge railway was one and one-quarter miles in length and was intended to supersede carting between the house and the mainline station. The four wheel car for passenger traffic was said to have been specially constructed for speed using an 8 h.p. motor. The electric current was generated by a dynamo driven by the Cleghorn Falls on the River Mouse some three miles distant from Carstairs House. The wires from the dynamo were carried overhead on ordinary telegraph poles to within two hundred yards of the house and then underground to the switchboard which was near the battery in the basement of the house, itself only a few yards

13. Ibid., Vol. XXV, 25th October, 1889.

14. Ibid., Vol. XXIV, 15th March, 1889.

from the terminus of the railway. The battery was used for lighting the house, but the current for working the railway could be taken either from the battery or direct from the dynamo. It was claimed that the car, which was designed by Monteith, had attained a speed of 35 m.p.h. It is also interesting to note that the electrical and mechanical work on the railway, said to be the first permanent electric railway in Scotland, was carried out by Anderson and Munro of Glasgow.¹⁵ In 1889 also, private installations were carried out at places as far apart as Aberdeen and Galashiels. At Galashiels electric lighting was introduced to the Netherdale Mill while at Aberdeen the Belmont Model Laundry was fitted up with incandescent lamps and was, allegedly, the first laundry in Scotland to have such an installation.¹⁶

Throughout the 1890's the establishment of private undertakings of a miscellaneous nature continued. In 1891 the Caledonian Central Station at Glasgow and its adjoining hotel, which had been fitted with Brush lamps some six years previously, was re-fitted by Mavor and Coulson of Glasgow. Thirteen hundred 16 c.p. lamps were placed in the hotel with a further four hundred in the station

15. Ibid., 10th May, 1889.

16. Ibid., Vol. XXIV, 21st June, 1889 and Vol. XXV, 6th December, 1889.

'buildings. The generating plant occupied some of the arches upon which the station was built and steam was also used for laundry and heating purposes. In the same year the Aberdeen Palace Hotel was lit throughout but here the over-widening use of electric power was more evident. A 10½ h.p. electric motor drove a fan for propelling cold air through the meat larder of the kitchen. The passenger and goods lifts were lit by electricity and a system of electric bells was fitted throughout the hotel. 17

In December 1892 a less grand but, perhaps, more propitious event occurred when Lady Kelvin switched on the current at tea-rooms at Charing Cross, Glasgow which had been equipped by Mavor and Coulson. 18

Much less decorous than the use of electric lighting in these service industries was its more functional use in lighting harbours and docks. In 1892 Ardrossan Harbour became, allegedly, the first port in the West of Scotland to be lit by electricity when Mavor and Coulson established seventeen arc lamps of 3000 c.p. each at the harbour. In a similar manner Bo'ness docks were lit up in 1897. On this occasion twenty lamps were set up but the two engines, dynamos and other plant for lighting

17. Telegraphic Journal and Electrical Review, Vol. XXVIII, 12th June, 1891 and Vol. XXI, 11th September, 1891.

18. Electrical Review, Vol. XXXI, 23rd December, 1892.

the docks were purchased from the Public Library at Edinburgh, by this time supplied by the Edinburgh Corporation undertaking.¹⁹ Equally purposeful was the use of electricity in mining. In 1894 the Number 4 Pit at Blantyre belonging to Dixons Limited had one hundred lamps installed by the Faraday Electrical Engineering Company, and in the same year at the Milnwood Colliery, Bellshill, the Newcastle firm of Scott and Mountain installed not only lighting plant for the colliery and miners' cottages but also pumping plant at the colliery.²⁰ Brewers and distillers were also prominent among these early users of electricity as a form of illuminant. At Teaninich in Ross-shire in 1897 Munro and Cameron introduced electric lighting to their distillery, and it was hoped that the Parish Council would be able to arrange for the village itself to be lit from the same plant by arrangement with the firm. Again in 1897, but this time in Perthshire, the Blackford Brewery of W.B. Thomson was lit by over one hundred incandescent lamps and one 2000 c.p. arc lamp. In 1898 the brewery and offices of George Younger and Sons at Candleriggs, Alloa were lit by electricity and this event apparently spurred

19. Ibid., Vol. XXX, 27th May, 1892 and Vol. XLI, 17th December, 1897.

20. Ibid., Vol. XXXIV, 2nd February, 1894 and 15th June, 1894.

on the local authority to decide to light the town's principal streets in the same way during the following winter at a cost of £3000.²¹

The catholicity in the use of electricity, particularly as a form of illuminant, evident in the instances already given, can be re-inforced by many other examples. In 1891 the Gaiety Theatre, Glasgow, which was undergoing re-construction at that time, was lit entirely by electricity and in the same year it was reported that Aberdeen Royal Infirmary would also be electrically lit in the near future.²²

However, in the early 1890's the introduction of the electric light to an establishment and its impact on a workforce could still be regarded as rather sensational.

"The Kirriemuir Linen Works have been lit by electricity for the first time to the great astonishment of the workers, many of whom had only heard of it by name but were altogether ignorant of its power and brilliancy."²³

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21. Ibid., Vol.XLI, 10th September, 1897, 19th November, 1897 and Vol.XLII, 4th March, 1898.
 22. Telegraphic Journal and Electrical Review, Vol.XXVIII, 6th February, 1891 and 1st May, 1891.
 23. Ibid., Vol.XXIX, 16th October, 1891.

Despite any "astonishment" which may have been caused at Kirriermuir, the growing acceptance of electricity both geographically and in differing trades and professions is obvious during this decade of the 1890s. In 1892 Elgin had its first introduction to electric lighting when a private installation was erected on the premises of Gordon R. Shiach L.D.S., North Guildry Street, Elgin.²⁴ In 1893 St. Paul's Free Church, Glasgow and The British Linen Bank, Queen Street, Glasgow were fitted up with the electric light.²⁵ In 1894 Charles Wilson and Sons, Butchers of Castle Street, Edinburgh also introduced the electric light.²⁶ On 5th November, 1896 The Liberal Club at Glasgow was lit for the first time and in March 1897 an installation was put down at the Rossal and Carrol Mansions at Inverness.²⁷ As indicated earlier, distilling, brewing, mining and the textile industry were to the forefront in the use of electricity as an illuminant but industry, generally, also found it acceptable. In 1893 the Cartvale Chemical Company of Paisley set up its own electric lighting plant.²⁸ In 1896 Lovell's Paper

24. Electrical Review, Vol.XXXI, 21st October, 1892.

25. Ibid., Vol.XXXII, 24th March, 1893 and 26th May, 1893.

26. Ibid., Vol.XXXIV, 5th January, 1894.

27. Ibid., Vol.XXXIX, 13th November, 1896 and Vol.XL, 12th March, 1897.

28. Ibid., Vol.XXXIV, 5th January, 1894.

Works at Linlithgow and the West Lothian Steel Rolling Company also introduced electric lighting.²⁹ As late as 1898 it was decided to install a complete system of electric driving and lighting at the new shops belonging to the Motherwell Bridge Company at North Motherwell Farm, while at ^{the} nearby Dalzell Steel and Iron Works of David Colville and Sons Limited the installation of an 1100 h.p. unit was already in progress.³⁰ The delay and indecision of Motherwell town council and its tardiness in establishing a public supply, discussed in the previous chapter, undoubtedly helped to promote the establishment of private undertakings in the Motherwell area. At Ayr, a few years earlier, the cycle track and athletic track of McQuiston and Iarg was lit by electric lighting. This installation was put down by the Glasgow firm of Mavor and Coulson despite the fact that Ayr town council had a provisional order. Indeed Ayr town council, it was said, had been "outstripped by private enterprise" - not only by Mavor and Coulson but also by a number of local businessmen who were having private installations fitted.³¹

29. Ibid., Vol. XXXVIII, 3rd April, 1896 and Vol. XXXIX, 6th November, 1896.

30. Ibid., Vol XLII, 21st January, 1898.

31. Ibid., Vol. XXXI, 18th November, 1892

Before 1890 the growth of private installations reflected the general inactivity of many local authorities. However, in the last decade of the century local authorities became increasingly active in providing generating stations and hence a public supply. Thus, there was less need for private installations.³² The four major cities pioneered the change in attitude, and they were copied by smaller municipal authorities as the technical and economic viability of local authority electricity supplies were proven. However, in the 1890's three private companies began operating with varying degrees of success. These companies were the Kelvinside Electricity Company, the Scottish House-to-House Electricity Company and the Fort William Electric Light Company and only the latter achieved a continuity of success before 1930; this company which was the first in Scotland to use water power will be examined in detail in the ensuing section which deals exclusively with water-powered generating stations.

The Kelvinside Electricity Company registered on 20th June, 1889, was granted a provisional order in 1890 and in August 1893 it became the first publicly subscribed company to provide a public supply.³³

32. Ibid., Vol XXXVIII, 1st May, 1896, 8th May, 1896 and 19th June, 1896.

33. Garcke, op. cit. Vol. I

The company was formed to supply electricity in the Kelvinside district, the principal residential suburb of Glasgow, which was at that time within the, then, independent Burgh of Partick. At no time during its relatively short history was this company profitable, and the underlying reason for this was the fact that the terms of the provisional order restricted the company's area of supply to this one particular district and not the entire burgh. Moreover, allegedly, eighty per cent of the houses were closed entirely during the summer months which further reduced the viability of the concern, and, as late as 1896 there was no public lighting in the district which consequently reduced revenue.³⁴

The records of this company are not available, and the secondary sources present a somewhat confusing picture of the capital structure of the company. The initial capital of the company was £10,000 in £1 shares but this was increased in 1890 to 50,000 shares of £1 each at the request of the local authority in order that the company might more efficiently provide a public supply. In 1890 the unsubscribed capital was offered to the public payable 12.5p on application, 12.5p on allotment and the balance, as required, in calls not

34. Telegraphic Journal, Vol. XXVII, 14th November, 1890; Electrical Review, Vol. XXXVIII, 1st May, 1896.

exceeding .25p at intervals of not less than three months. By February 1894 only 8073 shares had been taken up with 37.5p called on each share, but, taking into account calls outstanding, the total subscribed capital of the company in February 1894 amounted to only £2841.50p.³⁵ However, in 1896 the issued capital of the company which, of course, differs from subscribed capital, was stated to be £16,306.³⁶ In view of the capital outlay figures given below another problem faced by the company was its failure to attract investment and its consequent under-capitalisation. The initial estimate for an installation involving 30,000 lamps was £40,000 but when the generating station at Hughenden Road, Kelvinside eventually opened in August 1893, there were two electric generators, each of 150 h.p.; each was capable of generating current for 3,000, 8 c.p. lamps, and the total cost of the installation amounted to £17,000. As already noted, the total subscribed capital in February 1894 was £2841.50p.³⁷ Moreover, further expansion of the installation evidently took place.

35. Telegraphic Journal, Vol.XXVII, 14th November, 1890;
Electrical Review, Vol.XXXIV, 2nd February, 1894.

36. Garcke, op.cit. Vol.I.

37. Telegraphic Journal, Vol.XXVII, 14th November, 1890;
Electrical Review, Vol.XXXIII, 1st September, 1893.

In 1898 when negotiations were taking place with the Corporation of Glasgow regarding the sale of the undertaking, a sum of £45,000 was necessary to yield the company its outlay from inception, plus five per cent.³⁸

The company was aware of the basic problem of the lack of demand and tried to solve it in a number of ways. In an attempt to attract additional consumers the cost per unit was reduced by 2d to 6d per unit in May 1894 and as late as 1898 an active consumer recruitment campaign met with some success but, at the latter date, the station had treble the capacity it actually required.³⁹ The real solution to the company's problem was the extension of its designated territory to include the more lucrative market contained in the rest of the Burgh of Partick. In July 1897 the company informed the burgh of its intention to apply for a provisional order covering the entire burgh and asking the Board of Trade to revoke the order previously granted to the burgh in 1893 on the grounds that the local authority had failed to carry that order into effect. In December 1897 the company chairman, J.B. Fleming, was still confident of obtaining the provisional order for Partick and did not think that opposition

38. S.R.A. Minutes of The City of Glasgow and Committees, Vol.1898-99, 20th December, 1898.
 39. Electrical Review, Vol.XXXIV, 6th April, 1894 and Vol.XLII, 7th January, 1898.

from the burgh or from Glasgow corporation would count for much. However, in March 1898 the Board of Trade rejected the company's application because of objections from those very sources.⁴⁰ Partick eventually began its own supply in 1902 (See p. 121). Since the Company had lost this application and in view of the adverse circumstances outlined above, failure was fairly certain. The undertaking was, in fact, acquired by the Corporation of Glasgow in 1899⁴¹ for the sum of £37,000.

The Scottish House-to-House Electricity Company was registered on 26th June, 1889 with a nominal capital of £100,000 in £5 shares. The object of the company was to form centres in Scotland at which electric power could be generated, accumulated and distributed. Despite its name, the derivation of the company was not Scottish and all of its first directors came from London viz., R. Hammond, 117 Bishopsgate Street; C. Cornish, 132 Belvidere Road, Lambeth; J. Whitehead, Heycot, Crouch End; T.E. Towersson F.C.S., 1 Portland Road, Finsbury Park; W.A. Bingham, 7 Bedford Place; H. Linklater, 117 Bishopsgate Street and H. Mann, 12 Woburn Place. The company was, in fact, a subsidiary of the House-to-House Electric Supply Company of 117

40. Ibid., Vol.XLI, 23rd July, 1897 and Vol.XLII, 7th January, 1898 and 25th March, 1898.

41. S.R.A. Minutes of The City of Glasgow and Committees, Vol.1898-99, 13th March, 1899.

Bishopsgate Street which was formed on 16th January, 1888 with a nominal capital of £350,000 in £5 shares. The establishment of both the parent company and its Scottish subsidiary could, in some respects, be described as opportunist since they had no real physical base and were merely a means, in the first instance, of 'tapping' potential investors. Moreover, it is interesting to note that, on the same day the Scottish subsidiary was registered, identical companies were formed for Birmingham, Ireland, Lancashire and Cheshire, Liverpool, Manchester, The Midlands, The South of England, Yorkshire, Northern England and, finally, Western England.⁴² Thus, the parent company effectively covered the entire British Isles and could negotiate with regional or local authorities from its standing as a national company at relatively little expense - the first directors held only one £5 share each - while at the same time it had the potential to absorb excess funds within its subsidiaries' areas.

In the Scottish context the subsidiary company is interesting in that not only was it the second publicly subscribed company to commence a public supply, but it was also the first company to receive the consent of a local authority to apply for a

42. Telegraphic Journal, Vol. XXII, 20th January, 1888 and Vol. XXIV, 5th July, 1889.

provisional order covering the entire limits of that local authority. In 1889 the company unsuccessfully sought the assent of the corporations of Perth, Johnstone and Hawick to apply to the Board of Trade for provisional orders. In 1889 the corporation of Airdrie not only refused their consent but applied for a provisional order themselves rather than allow the company to do so.⁴³ However, in 1890 the town council of Coatbridge consented to the company applying for a provisional order for the town.⁴⁴ Moreover, the company also created a precedent, apparently, when it successfully resisted opposition from a local gas company which objected to the provisional order being granted on the grounds of competition.⁴⁵ The provisional order was granted to the company in 1890 and the 375 h.p. generating station was officially opened, amid some ceremony, by Lord Kelvin on 31st March, 1894.⁴⁶

In 1894 when the generating station was opened, it is noticeable that none of the original directors were mentioned and they appear to have been replaced by Messrs. Cairney, Hannay and Flett.⁴⁷ In 1895 there appears to have been a more radical change

43. Ibid., Vol. XXV, 12th July, 1889, 19th July, 1889 and 9th August, 1889.

44. Ibid., Vol. XXVI, 25th April, 1890.

45. Ibid., Vol. XXVII, 25th July, 1890.

46. Garcke, op.cit. Vol. I; Electrical Review, Vol. XXXIV, 6th April, 1894.

47. Electrical Review, Vol. XXXIV, 6th April, 1894.

when the directors were named as T. Bost (Chairman), A. Ayres, W.D. Cairney and F.E. Savery, while the secretary was given as H.B. Renwick of Moorgate Court, Moorgate Place, London.⁴⁸ Renwick's position is of particular relevance since in April 1904 on the application of the County of London Electric Supply Company a Receiver was appointed for the company and in 1905 the provisional orders held by the company were transferred to a new company viz., the Coatbridge and Airdrie Electric Supply Company. Renwick was general manager and secretary of the County of London Electric Supply Company and became⁴⁹ managing director of the new Scottish Company. It would appear, therefore, that the parent company, The House-to-House Electric Supply Company, relinquished its interest in its Scottish subsidiary to be replaced by the County of London Electric Supply Company, probably the major creditor of the Scottish concern which installed Renwick - a company doctor - to run the debtor company. This change in the real ownership of the Coatbridge company is supposition and must remain so, but the weak financial position of the Scottish House-to-House Electricity Company cannot be questioned.

At the 31st December, 1895 the total paid-up

48. Garcke, op.cit. Vol.I.

49. Ibid., Vol.IX.

capital of the company was only £4,258 while the capital expenditure at that date amounted to £18,504.14p. Capital expenditure was, in fact, financed by mortgage and, although there are no background details concerning this mortgage, it seems reasonable to assume that the security was the undertaking itself. In 1895 the company's mortgage stood at £20,149.96p while the interest payment on the mortgage was £552.95p; the total revenue in that year amounted to only £553.20p. There are no figures given for income and expenditure at 1900/1901 but the paid-up capital had only increased to £5,350 while capital expenditure stood at £22,213. The mortgage at that date was £26,955 and if these figures are correct, it may well indicate that the company was financing its day-to-day activities by borrowing. Identical figures are available at 1905 for paid-up capital, capital expenditure and mortgage which does seem unlikely, but overall these figures suggest under-capitalisation of a very serious nature. It is this background that undoubtedly caused the company to be placed in receivership in 1904 and the fact that no dividends had been declared by that date causes no great surprise. The promotion of a new company was by no means foolhardy. Whatever the reason for the failure of the original company the Coatbridge area - the Monklands of

Industrial Revolution fame - was a potentially rich market, while, despite its difficulties, the old company had made some progress. For example, the plant capacity had risen from 150 KW in 1900/1901 to 800 KW in 1905 and the number of consumers from 64 to 242. Moreover, an agreement had been entered into with Airdrie Corporation in 1901 to provide public and private lighting while energy was also supplied to the Airdrie and Coatbridge Tramway Company.⁵⁰ Thus, despite the previous history, the future prospects for the new company appeared more than reasonable and this future growth will be dealt with in the following chapter.

The period of the 1890s was, therefore, an important watershed in a number of ways. It was evident that the era of the private installation was finished and that the future progress of the industry would depend on central station development. This had already occurred with the larger local authorities, but the ever expanding market, revealed by the number of private installations which had taken place, the availability of capital for investment, the potential profitability and the very example of the more forward looking local authorities indicated a potential source of employment for private enterprise. In the period after 1900 the exploitation of such an opportunity was

50. Ibid., Vols. I, V, IX and XIV.

not denied by certain companies and by individual entrepreneurs.

51

(2) Hydro-Electric Development.

The evidence of the numerous private installations which had been established by and during the 1890's indicates that an expertise in electrical engineering had been built up by that time which was geographically widespread throughout Scotland and which affected cities, towns and villages. The installations themselves were, by their very nature, mainly of small unit size and confined to reciprocating steam engines supplying lamps within a small radius. However, experimentation did take place. For example, it was reported in 1887 that a Professor Blyth had

51. The period so far analysed has been confined to an examination of the more conventional generating plant, with the exception of specifically named examples. However, throughout this entire period the importance of water powered generating plant could not be ignored. Scotland, by the very nature of its geo-physical attributes, and especially in its hillier regions, was specifically endowed with a natural ability to exploit such benefit. This section, which is, in many ways, irrelevant to the chronological approach so far adopted, endeavours to examine attempts made to utilise Scotland's abundance of water power and its natural environment. The realisation of such a potential source of energy was awakened, at least, as early as the mid-1880's but in certain instances only reached maturity in the 1920's. For this reason this section, to maintain a continuity of historical perspective, attempts to trace such developments from their inception until maturity was reached. Thus, without excuse, a thematic rather than the simpler chronological approach has been adopted.

erected an electric windmill in the village of Marykirk in Kincardineshire and that, although his methods were rather crude, the results were satisfactory; unfortunately no other information is available.⁵² More numerous were the attempts made to utilise water power to generate electricity. The apparent failure of the experiment at Greenock in 1887 has already been referred to in Chapter 2, and the proposals to utilise water at Cambuslang, Inverness and Stirling were discussed in Chapter 4. The more successful venture by Mr. Monteith of Carstairs House in using the Cleghorn Falls has also been discussed in some detail (see above), but there are a number of other examples which can be usefully discussed at this point, since they affect, mainly the private sector of the economy.

The Falls of Clyde, near Lanark, were a popular choice for a proposed hydro-electric development. As early as 1886 it was proposed to use the Stonebyres Falls which was the furthest down river of the three falls which comprised the falls of Clyde. At this time it was proposed to construct several turbines at Stonebyres to drive dynamos for the generation of electricity which would be conveyed by cables to the town of Lanark where both light and

52. Electrical Review, Vol. XXXIV, 20th April, 1894.

power would be supplied. However, despite the fact that in 1887 the people of Lanark approved of the scheme, the proposal came to nought.⁵³ In 1895 The British Aluminium Company, which by that time had secured the Falls of Foyers (see below), negotiated for the use of the Falls of Clyde. The company proposed to use the Bonnington and Corra Linn Falls but, apparently, could not come to agreement with one of the proprietors on which the falls were situated with the result that the proposal was dropped.⁵⁴ The potential of the Falls of Clyde as a source of hydro-electric power could not be ignored. In 1902 a survey of its generating potential was made by the firm of Ross and Holgate, consulting engineers of Montreal, Canada, for Sir Charles Ross who owned the 1420 acre estate of Bonnington, near Lanark, which had as its boundary the River Clyde, including the Bonnington Falls.⁵⁵ In 1903 Ross and Holgate, at the request of Sir Charles Ross, forwarded a letter to D.A. Starr, the then general manager of the C.V.E.P. Company, in which were enclosed extracts of this report.⁵⁶ However, in 1903 this company decided

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53. Telegraphic Journal, Vol.XIX, 16th July, 1886 and Vol.XX, 4th March, 1887.
 54. Electrical Review, Vol.XXXVII, 25th October, 1895.
 55. S.H.A. Records of Strain and Robertson, T.D. 83/6/6B.
 56. For details of C.V.E.P. Company, see Chapter 8.

that this proposal to utilise the Falls of Clyde could not be entertained since, because the price of coal was so cheap, it was not a commercial proposition and, moreover, the company itself was not sufficiently developed to operate in conjunction with what was considered to be an unregulated river water power plant.⁵⁷ Sir Charles Ross did not lose interest, and in 1912 he had the 1902 survey and report revised. Later in 1918/1919 he placed the revised report and his plans for a hydro-electric scheme at the disposal of the Water Power Resources Committee but he was later to allege that he did not receive a reply from that committee. In 1922/1923 further interviews and correspondence took place between the C.V.E.P. Company and Messrs. Dunn and Company, London accountants, who were acting on behalf of Sir Charles Ross, but no progress was made. Finally, in 1924 Sir Charles Ross had the revised report of 1912 up-dated to 1924 prices, and at that time was considering applying for parliamentary powers to operate the scheme.⁵⁸ However, by 1924 the opportunity for Sir Charles Ross to develop the Falls of Clyde as a hydro-

57. S.R.A. Records of Strain and Robertson, T.D.
83/6/6A.

58. Ibid., TD83/6/6A and TD83/6/6B.

electric scheme was lost.

The more immediate background to this proposed hydro-electric scheme began in 1920 when Arthur George Ingham, a chartered civil engineer and in 1924 Deputy Chief Engineer and Surveyor to the Board of Agriculture for Scotland, presented a report on the potential of the Falls of Clyde to the Water Power Resources Committee and emphasised the proximity of these falls to the main Lanarkshire industrial belt. In March 1921 Ingham drew the scheme to the attention of William Hogarth, a senior member of Buchan and Partners, Consulting Engineers of Westminster and Edinburgh, who had specialised in hydro-electrical construction activities for over twenty years not only in Britain but also in Switzerland and North Italy. Initially Hogarth rejected the idea, but in August 1922 he accidentally met Admiral de Robeck who informed him that Lady de Robeck's trustees and Colonel Cranstoun, proprietors of estates adjoining the River Clyde, were anxious to develop the falls. Hogarth made a new study of the potential of the falls and, satisfied that the scheme was viable, acquired for his firm an option over Cranstoun's water rights, and submitted his proposals for the development of the falls to

59. For a brief account of Sir Charles Ross up to 1924 see Appendix 14.

financial friends. These financial friends were⁶⁰
 the Power and Traction Finance Company Limited,
 which in 1924 promoted a bill in Parliament to
 establish the Lanarkshire Hydro-Electric Power
⁶¹
 Company.

In this hydro-electric scheme the promoters intended to utilise the three Falls of Clyde. The two falls above the town of Lanark, i.e. Bonnington and Corra Linn, were to be combined and used as one, while the third, the Stonebyres Falls, below the town, was to be utilised separately. In each case a weir was to be constructed across the River Clyde for the purpose of deflecting the water into a catchwater or intake at the commencement of a tunnel, in the case of the Bonnington Falls one half mile long, and in the case of the Stonebyres Falls one quarter mile long. In the case of the Bonnington Falls the water would pass through the tunnel until it came to a little open bay from which it would fall through steel pipes down to the power house, which was to be constructed below the Corra Linn Falls, and from which the water would be returned to the river. At the lower

60. Detailed information on the background of the Power and Traction Finance Company Limited is given in Appendix 15.

61. S.R.A. Records of Strain and Robertson,
 TD 83/6/6A.

Stonebyres Falls the water, having again passed through the tunnel, would pass down through the steel pipes to the power house below and be returned to the river. The fall available at the two upper falls was about 189 feet and it was intended to install turbo-generating plant for a maximum output of 9000 KW; at the lower falls the corresponding figures were 89 feet and 4000 KW. From rainfall records it was estimated that for six/seven months of the year there would be sufficient water to run the whole of the plant installed to its full capacity of 13000 KW, but that for the remainder of the year the quantity of water would not be sufficient to give maximum output, and that at times of drought the output might fall as low as 3000 KW or less.⁶² However, because there was no proposal in the scheme for regulating the flow of the river by means of storage reservoirs, and since the great fluctuation between the maximum and the minimum power available ruled out the possibility of a separate undertaking for local distribution, it was obvious that the scheme had to be worked in conjunction with a system operating with steam plant. In other words to make this scheme a commercially viable proposition the C.V.E.P. Company, which was the statutory authority for the burgh and

62, Ibid., TD 83/6/6B and TD 83/6/6C.

parish of Lanark and its environs, had, of necessity, to be involved.

Moreover, during 1923 it was evident that the C.V.E.P. Company was taking an active interest in these proceedings. It was aware that Hogarth had conducted his survey, and in November 1923 its General Manager and Secretary attended meetings in London with representatives of the Power and Traction Finance Company. No information is available in the former company's extant records concerning these meetings, but it is obvious that no agreement was reached since, when the General Manager reported back to his Board of Directors in December 1923, the C.V.E.P. Company's Law Agents were instructed to petition against the granting of powers to the Lanarkshire Hydro-Electric Power Company.⁶³

The Lanarkshire Hydro-Electric Company, which was domiciled in Edinburgh, had a nominal capital of £250,000 which could be increased to £400,000, with powers to borrow in addition one-half of these sums. The number of directors was to be three but not more than seven, and each director had to subscribe £250. The first directors were Percy John Pybus, Sir George May and Sir Hugh Reid, and

63. S.R.O. Records of the South of Scotland Electricity Board, SSE 5, 1/3.

the first two mentioned were also directors of the Power and Traction Finance Company. The overall cost of the works, including the acquisition of land and the construction of fish ladders, was estimated at £248,985 and all work was to be completed in five years.⁶⁴

When the Lanarkshire Hydro-Electric Power Bill came before Parliament in 1924 nine petitions were presented against its proposals. The C.V.E.P. Company petitioned on the grounds that since it had three generating stations at Motherwell, Cambuslang and Yoker, any such proposal was adverse to its interests. Moreover, it was the statutory authority for the burgh and parish of Lanark and therefore, had an immediate interest. The four landowners whose lands were affected by the proposed construction of the scheme also petitioned. Sir Charles Ross petitioned on the basis that he had had a long term interest in the development of a hydro-electric scheme at the Falls of Clyde and on the grounds that from his experience in Canada, he could generate electricity much more efficiently, and cheaper, than the proposed scheme. Edward Bonneau Noble, owner of the Linnville Estate which contained part of the Stonebyres Falls, objected to any compulsory purchase. He was also a

64. S.R.A. Records of Strain and Robertson, TD
83/6/6A.

mechanical engineer and was interested in developing the Falls himself and, moreover, he also considered the scheme as outlined defective. Charles Joseph Edmonstoune Cranstoun, owner of the estate of Corehouse on the left-bank of the river and half the bed of the river, believed that if the scheme went ahead there was a danger of the river drying up and, since he received a "considerable annual sum" for the water used by the New Lanark Mills, he would be adversely affected. Dame Hilda Maud Macdonald Moreton or Lockhart de Robeck, widow of Sir Simon Macdonald Lockhart, Baronet of Lee and Carnwath, and in 1924 wife of Sir John Michael de Robeck, G.C.M.B., G.C.B., Admiral Royal Navy; Allan Thomas Lockhart MacLean of Duart Lodge, 73 Colington Road, Edinburgh; Charles Joseph Edmonstoune Cranstoun of Corehouse and Sir John Michael de Robeck were all owners of the Lee Estate, which bounded the River Clyde for two miles, and were also owners of half the river bed. They were against the proposed scheme because they believed that, if the river was diverted, fish would be killed and game rights affected. Both Lanark County Council and the Royal Burgh of Lanark objected, basically, because they wished to support the C.V.E.P. Company. The Gourrock Rope Work Company, which operated the New Lanark Mills, objected because it believed that the scheme would

interrupt the steady flow of water essential to drive machinery, and also would affect the domestic water supply to the village. Finally, the Burgh of Motherwell and Wishaw objected because it had received statutory power in 1918 to take an additional five million gallons of water per day from the River Clyde for industrial purposes and, therefore, if the supply was regulated by the proposed scheme then this would interfere with its supply.^{65.}

Despite the petition of the C.V.E.P. Company against the proposed scheme, a dialogue between it and the Power and Traction Finance Company continued. On 26th March, 1924 a draft heads of agreement between both companies was discussed by the directors of the C.V.E.P. Company, and a meeting between both sides was arranged for 28th March, 1924 to discuss the proposal that the hydro-electric scheme should be taken over by the C.V.E.P. Company. On 2nd April, 1924 the C.V.E.P. Company expressed its willingness to accept the proposal and on 9th May, 1924 the agreement was formally signed, although bound by certain conditions. The C.V.E.P. Company withdrew its petition against the Parliamentary Bill, became sole shareholders in the new company, agreed to undertake all the

65. Ibid.

financing of the new company and take all of its supply. The Power and Traction Finance Company remained as the promoters of the Bill and agreed to bear all the expenses of promotion, but the new company was bound to enter into contracts with the English Electric Company and Sir William Arrol and Company - companies which were major component parts of the Power and Traction Finance Company (See Appendix 15). For example, a contract valued at £147,000 was signed with Sir William Arrol and Company for the civil engineering works, and a further contract, valued at £72,620, was signed with the English Electric Company for turbines and electricity generators.⁶⁶ Thus, it could be argued that after May 1924 the real promoter of the Bill was the C.V.E.P. Company since the actual promoters were not going to control the proposed new development, although they were receiving the contract benefits and would have a model advertisement.

Since the C.V.E.P. Company, the major opponent of the proposed scheme, was now in accord with the promoters, progress was quickly made, and the Bill

66. S.R.O. Records of the South of Scotland Electricity Board, SSE.5, 1/3.
S.R.A. Records of Strain and Robertson, TD 83/6/6B and TD 83/6/6C.

passed its Second Reading on 9th July, 1924 and received the Royal Assent on 7th August, 1924. The other petitioners either withdrew their opposition, more or less, voluntarily or reached a financial agreement with the promoters. For example, the owners of the Lee Estate were to receive £7,000 in cash within three months of the Royal Assent being given, together with feu duty of one penny (1d) per annum. Moreover, they were to be entitled to a supply of electricity free of charge for lighting the Lee Mansion House and Offices, and to receive an additional supply, not exceeding 500 units per quarter, free for power purposes, and any supply in excess of this was to be given at bulk rates. The cost of the transmission lines and the transformers was to be borne equally by the estate owners and the undertakers. Other current required by the estate or by the tenants of the estate was also to be obtained at bulk rates. However, the tenants were to bear the expense of erecting or laying their own transmission lines. The Corehouse Estate received identical terms, with the exception that the lump sum payment to Charles Cranstoun for the use of his lands and water was £13,500. E.B. Noble, who allegedly had bought the Linnville Estate "within recent years" and had re-sold the bulk of it apart from the lands adjoining the River

Clyde, was apparently, more difficult to deal with, but he finally agreed with the promoters that, in the event of the Bill being passed by Parliament, they would buy the whole of the estate. The settlement with Sir Charles Ross took much longer and it was not until April 1926, by which time he had returned to the U.S.A., that his land claim was settled for the relatively small sum of £1,000.⁶⁷

After the Royal Assent was received on 7th August, 1924, the development of the Lanarkshire Hydro-Electric Scheme at the Falls of Clyde belongs within the confines of the C.V.E.P. Company's history which is examined in detail in Chapter 8. It is sufficient to state at this time that the company took over the plant from the contractors on 1st June, 1928 and that, therefore, presumably⁶⁸ the plant began generating power at that date. Thus, a proposal, which had been put forward at least as early as 1886, reached fruition some 42 years later in 1928. However, intervention from out-with the immediate Scottish scene was required viz., The Power and Traction Finance Company and Sir Charles Ross, who by the 1920s could hardly claim to

67. S.R.O. Records of the South of Scotland Electricity Board, SSE 5, 4/1.
S.R.A. Records of Strain and Robertson, TD 83/6/6A, TD 83/6/6B and TD 83/6/6C.

68. S.R.O. Records of the South of Scotland Electricity Board, SSE 5, 4/1.

be a truly native Scot.

The development of the Falls of Clyde may have taken many years to get underway but it did reach a successful conclusion whereas numerous other proposed developments remained merely proposals. No particular reason can be suggested for the failure of such proposals to reach development stage. However, it would appear that lack of essential capital, inability to overcome technical difficulties, failure to reach agreement with riparian proprietors and the gradual extension of supplies from central generating stations and the eventual growth of power companies, such as the C.V.E.P. Company, must be taken into account. Moreover, as already noted, the Lanarkshire Hydro-Electric Development Scheme was only commercially viable when used in conjunction with the conventional stations of the C.V.E.P. Company. Thus, large scale hydro-electric development could only become a reality with the growth of the Central Electricity Board and the "national grid", and an improvement in general technological standards. Hydro-electric developments, with exceptions, were foredoomed prior to that time or were confined to private use and were, therefore, of small unit size.

In the industrial heartland of Lanarkshire the failure of a proposed hydro-electric development at

Cambuslang has already been noted in the previous chapter. A few miles away at Uddingston a similar proposal came to nought. In 1897 it was reported that an electric lighting company was being formed with the intention of utilising the falls or weir at Blantyre Mills.⁶⁹ Neither the size nor scale of this proposed development are known, nor is the extent of the supportive capital with which it was proposed to fund the operation, but there was a sizeable potential market especially in the mining village of Blantyre, where there were extensive colliery operations. It has already been pointed out, however, that collieries were pioneer users of electricity by the use of private installations. For example, the Earnock Collieries of the nearby town of Hamilton as early as 1881 and the Dixon Number Four pit at Blantyre in 1894, and, in all probability, numerous other local installations were not reported. Thus, the popularity of these installations, together with the fact that the cost had already been borne, may have detracted from the possible market and made the possibility of a successful development, at that time, remote.

At Aberdeen, in the early 1890's, two proposals were made to use water power to generate electricity.

69. Electrical Review, Vol.XLI, 10th December, 1897.

In neither case was private enterprise involved and both proposals would appear to have succumbed to the more conventional steam-powered generating unit of the local authority which began to public supply in February 1894. In 1890 a scheme was proposed by the local gas commissioners to utilise the water in the Loch of Skene for the production of electric lighting by means of a dam at the Culter Paper Mills, which were themselves supplied directly from the Loch. It was hoped to convey the water in pipes from the Culter Mills to the Justice Mills at the west-end of Aberdeen where a turbine would be erected to drive a dynamo. In 1891 another proposal was made to use the Rivers Dee and Don to illuminate the city.⁷⁰ Neither proposal, apparently, made any headway.

Other local authorities were aware of the possibility of using water power to generate electricity but found that this could only be done with the co-operation of a local landowner. In 1893 Crieff town council received a report from a Manchester electrician which stated that, by using the nearby waterfall, they could instal six hundred 16 c.p. lamps for an outlay of £3,000 or two

70. Telegraphic Journal, Vol. XXV, 2nd May, 1890.
Telegraphic Journal and Electrical Review,
 Vol. XXIX, 25th September, 1891.

thousand 16 c.p. lamps for £5,000, and Sir P.K. Murray of Ochtertyre House, later in that year, granted the free use of the Barvick water fall for generating electric lighting for the town.⁷¹ The offer was not taken up, possibly because of the relatively heavy capital expenditure involved. In 1897 the scheme was resurrected by a private company which approached Murray for the use of the Barvick falls. The company were prepared to go ahead alone if the local authority could not agree to enter the project. This scheme also failed, possibly because of the cost involved and because Murray demanded a supply to his house, presumably, free.⁷² Further discussions took place in 1898, but it is thought that nothing was achieved until 1922 when the Crieff Electric Supply Company was formed which provided a public supply in May, 1923.⁷³

A similar situation took place at Moffat in 1893 where the commissioners obtained the consent of William Younger of Auchencastle to use the waterfall at Skellywell Mill on the River Evan to generate electricity. Exclusive of buildings the

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71. Electrical Review, Vol. XXXII, 21st April, 1893 and Vol. XXXIII, 24th November, 1893.
 72. Ibid., Vol. XL, 30th April, 1897.
 73. Electrical Review, Vol. XLII, 21st January, 1898 and 11th February, 1898; . . Carcke, op.cit. Vol. XXIX.

cost of the scheme was said to be £3,879. Although this scheme was apparently accepted no further evidence has been found to suggest the size and scale of the operation.⁷⁴

In 1891 a scheme was devised for lighting the town of Pitlochry with motive power derived from the Falls of Tummel. At that time no progress could be made because the proprietor of Faskally was under age and could give no title to the water. In 1895 A.E. Butter of Faskally agreed to proposals, and a scheme was submitted by Pitlochry Gaslight Company at an estimated cost of £4,000. A final decision was, however, deferred until the terms for the use of the water power were ascertained. This problem, similar, in many respects to the situation at Crieff, since no further evidence of any operation at Pitlochry has been found prior to 1930, was probably, at least, partly responsible for the ending of events at that time.⁷⁵

At Grantown-on-Spey in 1897 a public meeting was held to consider two schemes for lighting the town using the waters of the River Spey. Stewart and Company¹ of Glasgow proposed tapping the river at a point six hundred yards above Spey Bridge and

74. Electrical Review, Vol. XXXII, 30th June, 1893 and Vol. XXXIII, 21st July, 1893.
 75. Ibid., Vol. XXXVII, 13th December, 1895 and Vol. XXXVIII, 7th February, 1896.

erecting a turbine house a little above the bridge. The scheme also provided for a sub-station with accumulators and using overhead wires on poles; it was estimated that the cost would be £4,500 or using underground wires £5,300. On the other hand, Middleton and Company of Aberdeen proposed to tap the river three hundred yards further up and to erect the turbine house below the bridge. This scheme, which provided for accumulators in the turbine house and for underground mains, was estimated to cost £4,815. The complexity of both schemes, or their cost, was, perhaps, beyond those in attendance since no decision was taken at the meeting, and it is not thought that at any time was either scheme adopted.

Private installations were popular during this period. Of course, the cost involved ensured that only the relatively wealthy could enjoy the benefits of electricity. Nevertheless, not only was an expertise being built up, but also a small thriving, and from the example of Grantown-on-Spey, competitive industry. For example, in 1892 the Duke of Montrose lit Buchanan Castle by means of water power. The water was taken in pipes from a point

76. Ibid., Vol.XL, 8th January, 1897.

about 1,400 yards from the Castle, the turbine and dynamo were placed midway and the accumulators were placed in the Castle itself. In the same year The Mackintosh of Mackintosh decided to introduce the electric light to Mey Hall, near Inverness. The dynamo was driven by a water-turbine which was activated by a fifty foot fall that was about one-half mile from the house. The current was conveyed through bare overhead conductors almost up to the house, where underground cables were used for the remainder of the distance. At Mey Hall 160 incandescent lamps were lit.⁷⁷ In January 1896 Middleton and Company of Aberdeen won the electrical contract for lighting and heating Mar Lodge. The electricity was generated by water power on the estate and the cost was estimated at between £2,000 and £3,000.⁷⁸ In 1897 an unnamed Stirling newspaper reported that as a result of the successful electric lighting of Murthly Castle, Mr. Stewart of Fotheringham House, Forfar and Mr. Whitelaw of Strathallan Castle, near Crieff, in Perthshire, were also about to do the same. Later that year the Strathallan Castle

77. Ibid., Vol. XXX, 25th March, 1892 and 1st. April, 1892.

78. Ibid., Vol. XXXVIII, 10th January, 1896.

installation was confirmed - the motive power for generating the electric current was taken from the River Machany.⁷⁹ Perhaps the ultimate acceptance for such installations came in 1898 when Queen Victoria decided to light Balmoral Castle by electricity using water power from the Gelder which was a stream running into the Dee at a point about one and one-half miles⁸⁰ from Balmoral.

: One of the more interesting developments was that at Fort Augustus where at the Benedictine Abbey and school in April 1889 "the incandescent electric light with the most recent improvements for regulating both engine and accumulators" was installed. A preliminary run took place on the 11th April, 1889, which was the Right Reverend, the Lord Abbot's feast day, when Sir Henry Macandrew, the Provost of Inverness, and various other notables were present. The size of the installation is not known, but there were in the study hall of the school twenty-four lights which represented an aggregate 400 c.p., and the work was conducted under the supervision of

79. Ibid., Vol. XLI, 6th August, 1897 and 17th December, 1897.

80. Ibid., Vol. XLII, 15th April, 1898.

a Mr. Neville of Wellingore, near Crantham.

Nothing is known about the efficiency of this installation but, perhaps, because of running costs the steam-powered unit was replaced in 1894 by one using water power derived from the River Tariff.

A dam was constructed about three-quarters of a mile distant from the Monastery and a lade was taken down the hillside at Borlum Bank, at the foot of which a 15 h.p. turbine was placed; the water escaped to Loch Ness. The current from this installation supplied not only the Monastery but also, by means of an overhead wire, Cullachy which was about one and one-half miles distant. The installation was still operating in 1931.

All of the undertakings so far examined, with the exception of the Lanarkshire Hydro-Electric Company, were situated in the hillier regions of Scotland where there was an abundance of water supply and were, mainly, private undertakings. Thus, their impact was highly localised and had relatively little influence on either the economic or social life of the region within which they supplied. However, in the pre-1914 period three

81. Telegraphic Journal, Vol. XXIV, 19th April, 1889.

82. Electrical Review, Vol. XXXV, 21st September, 1894.
Garcke, op.cit. Vol. XXXIV.

companies were to have a fairly dramatic effect on their immediate economic and social environs. These companies were The British Aluminium Company, its wholly owned subsidiary, The Lochleven Electric Supply Company, and The Fort William Electric Lighting Company which was the first Scottish, publicly subscribed, company to establish a central station based entirely on water-powered generated electricity.

The British Aluminium Company, registered on 7th May, 1894, was formed to manufacture carbide of calcium, aluminium and its alloy by means of electricity and among its directors was Lord Kelvin who was technical advisor to the company from its inception until his death in 1907.⁸³ As early as June 1895 construction operations on the new aluminium works began at the Falls of Foyers, which adjoined Loch Ness.

By June 1896 the scheme was completed.

83. Garcke, op.cit. Vol.V. L.V. Chilton, The Aluminium Industry in Scotland, Scottish Geographical Magazine, Vol.66, December 1950. C.A. Oakley, Scottish Industry Today, (Edinburgh, 1937), p.p.54-55.

Moreover, in addition to supplying the works, the turbines drove dynamos which supplied power for the electric lighting of the Foyers Hotel, and were also due to supply power to a model village which was to be created for over three hundred people for whom the works would give regular employment. By January 1897, by which time the works were producing two hundred tons of aluminium per year, representing one-tenth of the total ^{world} production of 2,000 tons, there was a plant capacity at Foyers of 3,500 h.p. and an additional 1,400 h.p. was being put down under the supervision of William Murray Morrison who in 1895, at the age of twenty-one years, became the company's first engineer, a director between 1900/1901 and 1905 and, who for almost fifty years, guided the expansion and development of the company.⁸⁴

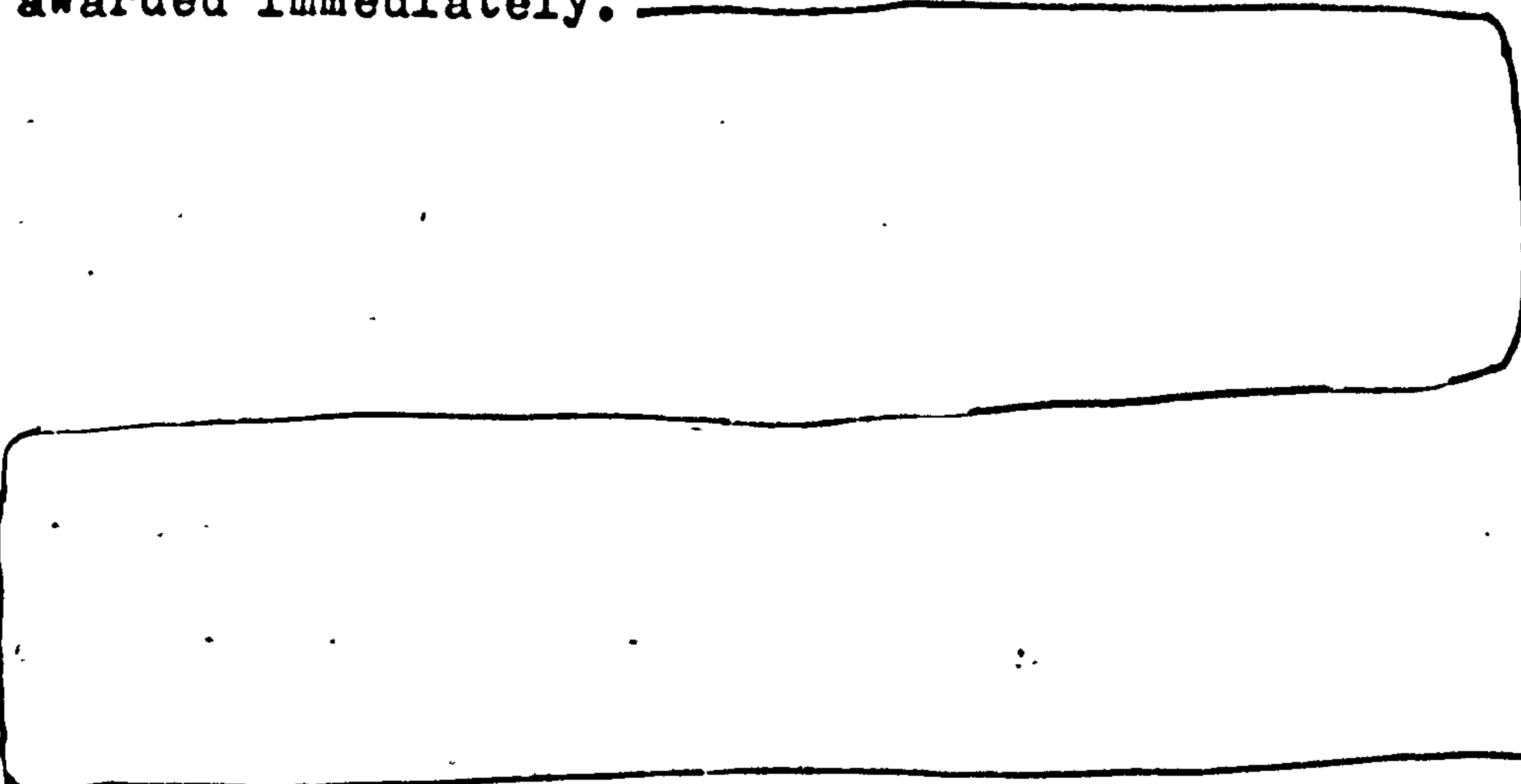
Construction operations at Foyers raised _____

84. Electrical Review, Vol. XXXVI, 14th June, 1895; Vol. XXXVIII, 19th June, 1896 and Vol. XL, 1st January, 1897.
L.V. Chilton, The Aluminium Industry in Scotland, Scottish Geographical Magazine, Vol. 66, December, 1950.

considerable controversy. It has been stated that at the outset of construction operations a local public meeting welcomed the siting of the hydro-electric scheme at Foyers "two ladies alone dissenting" despite the fact that the proposed development disrupted the scenic value of an area which included the water fall which had inspired a poem by Robert Burns.⁸⁵ However, the development at Foyers became a national issue when the Duke of Westminster, President of The National Trust for Places of Historic Interest and Natural Beauty, drew attention to "the destruction of the well-known Falls of Foyers on Loch Ness", and described it as an "act of desecration". In reply Doctor Andrew Common F.R.S. stated that no damage was being done to the scenery at Foyers.⁸⁶ It is interesting to note that, although no definite relationship has been established, the Board of Directors of The British Aluminium Company in 1900/1901 included an A. A. Common.⁸⁷

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85. K.J. Lea, Hydro-Electric Power Developments and The Landscape in The Highlands of Scotland, Scottish Geographical Magazine, Vol.84, December, 1968. R. Burns, Written with a Pencil standing by the Fall of Foyers near Loch Ness.
86. Electrical Review, Vol. XXXVII, 2nd August, 1895 and 9th August, 1895.
87. Garcke, op.cit. Vol.V.

The British Aluminium Company also promoted the Loch Leven Water Power Act 1901 which was updated in 1904. The contracts for the building of the Blackwater Dam, at the western end of a chain of lochs stretching from Rannoch Moor to the neighbourhood of Kinlochleven in Argyllshire, were awarded immediately.



The power-house of the Blackwater Reservoir generated 35,000 h.p. and full production began in 1909.⁸⁸ The Loch Leven scheme catered for the needs of the parent company. However, on 25th July, 1910 the Loch Leven Electric Supply Company was registered as a private company to take over so much of the undertaking of the Loch Leven Water and Electric Power Company relating to the supply of electricity, other than the supply to the British Aluminium Company itself, and acquire bulk supplies

88. L.V. Chilton, The Aluminium Industry in Scotland, Scottish Geographical Magazine, Vol. 66, December, 1950.

from that company for distribution.

_____ A wholly owned subsidiary of the British Aluminium Company, it had an identical directorship. Prior to 1930 it had a nominal capital of £10,000, of which £5,000 was issued, and its total capital expenditure of £6,565 remained static between 1925 and 1930. Moreover, since it took a bulk supply from the British Aluminium Company, there are no figures for plant capacity.⁸⁹

The Lochaber Water Power Act 1921 incorporated the Lochaber Power Company, with an authorised capital of £3,000,000. However, since this company was a wholly owned subsidiary of the British Aluminium Company, which owned its entire share capital, the antecedents of the Lochaber Power Company can be argued to have lain in the pre-1914 period and thus, for the sake of continuity, can be examined at this point.

The 1921 Act empowered the Lochaber Power Company to establish hydro-electric works within the County of Inverness, to supply water and electricity

89. Garcke, op.cit. Vols. XIX, XXIV, XXIX, XXXIV.

to parts of Kilmallie and Kilmanivaig and to supply electricity in bulk to authorised distributors, to lighting authorities and for power purposes outside that area. By December 1929 only the first stage was completed, and was mainly for the purpose of affording direct current supplied to the aluminium company. The installation comprised 36,400 KW in five water turbine direct current sets, each coupled to two generators which had ratings of 3,000-3,400 KW, and two water turbine alternator sets, each of 1,200 KW. The actual capital expenditure of the company is not known, but by 1931, when the authorised capital was still £3,000,000, the issued capital was £2,043,505.⁹⁰ Thus, by 1930 this company was operating but, since its supply was principally taken up by the parent concern, at that time the Lochaber Power Company can be considered to have been a private rather than a public under-taking.

A contemporaneous development with Lochaber Power Scheme, and one which chronologically falls outwith this particular chapter, but, which has been included within it, because it is so similar was the Grampian Hydro-Electric Scheme. The Grampian Electricity Supply Act 1922 incorporated the Grampian Electricity Supply Company, and conferred powers on that company to construct works for the purpose of generating electricity by means of water power available in the neighbourhood of the Grampian Hills. The Company was authorised to supply electricity in the counties of Perth, Kinross and Forfar, the

90. L.V. Chilton, The Aluminium Industry in Scotland, Scottish Geographical Magazine, Vol. 66, December, 1950.
Garcke, op. cit. Vols. XXIX and XXXIV.

parishes of Kingussie, Insh and Laggan in the County of Inverness, the parish of Lismore and Appin in the County of Argyll and the parishes of Buchanan, Drymen, Killearn, Balfroun, Kippen, Fintry and Gargunnoch in the County of Stirling. Thirty-five works were to be constructed which included about fifty miles of catchment aqueducts, the enlargement of six lochs to serve as reservoirs, and the formation of two new reservoirs which, taken together, were intended to collect and impound the waters of ten lochs and forty-two rivers and streams. Under this scheme it was proposed to erect four generating stations viz., on the River Tummel at Tummel Bridge, on Loch Rannoch near bridge of Ericht, on Bruar Water near Bruar Bridge and on the River Garry between Blair Atholl and Struan. The period for the completion of the works was ten years from the commencement of the 1922 Act, but in 1931 this period was extended by five years. However, it was only in November 1930 that a supply became available from the hydro-electric generating station on the shores of Loch Rannoch, near Bridge of Ericht, where there was an initial installed capacity of 42,000 h.p. In December 1930 the capital expenditure of the company was £1,848,720 and at that date

the authorised capital was £1,750,000 of which
 £1,600,000 was issued.⁹¹ The whole of the issued
 share capital was held by the Scottish Power Company
 Limited.⁹² Thus, although the conception of the
 Crampian Electricity Supply Company took place by
 the 1922 Act, its active life began too late to
 affect materially electricity supply within the time
 scale considered by this thesis.

; However, despite the almost exclusive nature of
 the undertakings which have so far been examined, in
 1895 a public supply company utilising water power
 came into existence which was to remain as an indep-
 endent viable concern down to 1930. This was The
 Fort William Electric Light Company and, when the
 public supply began in August 1896, the town became
 the first in Scotland to be lit by means of water
 power and the company itself became only the third
 company in Scotland to provide a public supply.

Fort William, in the County of Inverness, had
 in the 1890s a resident population of between 2,000
 and 3,000 inhabitants. During the summer months
 the resident population was augmented by tourists,

91. Garcke, op.cit. Vols. XXIX and XXXIV. Oakley,
op.cit. p.53.

92. The relationship of the Crampian Company to the
 Scottish Power Company is examined in detail in
 Chapter 7.

who made it a centre for visiting the West Highlands, and by those who wished to climb the nearby Ben Nevis, the highest mountain in the United Kingdom. The ease with which tourists could reach Fort William was greatly facilitated in 1895 by the West Highland Railway. This company had made the town its terminus, and transformed it "from an old world village into a more modern town". Until that time the local privately owned gas works had provided a supply for both public and private lighting. However, during the winter of, probably, 1894 a crisis was reached when the gas supply, which had apparently always been unsatisfactory, failed altogether. One result of this was that the town commissioners were obliged to resort to oil lamps, which were hung upon the existing gas standards, while the churches, shops and private houses were forced to use paraffin lamps. Subsequently, in June 1895, discussions began into the possibility of using water power to generate electricity. The question of using water power to generate electricity had already been discussed, at an earlier date, with H.F. Yorke A.I.E.E. of Glasgow, who had already been responsible for lighting up several large houses in the West Highlands with the electric light by means of water power, but the scheme was abandoned because

of difficulties over water rights. However, on this occasion agreement was reached with those proprietors and, in September 1895, a meeting of the promoters of the Fort William Electric Light Company resolved to register the company. The company was registered on 17th December, 1895 with a capital of £7000 (later increased to £9000, in £5 shares) to introduce and supply electric current to the town for light, heat and motive power.

An interesting feature of this company, and one which contrasts fairly sharply with the formation of later Scottish companies, is the fact that the initial subscribers of the company, with the exception of R.F. Yorke who designed the undertaking and became its managing director, were all of local origin. For example the original subscribers were:-

A. McIntyre of Fort William (occupation unknown); John McDonald of Fort William, a distiller; M. McKenzie of Fort William, a writer; D. McTeish of Fort William, a bank agent; D. McNiven of Fort William, a bank agent, who registered the company; D. Cameron of Kilmoniwag, Inverness-shire, a minister, and Yorke himself. The pre-dominance of local men was undoubtedly due to the fact that Fort William was relatively remote from the central industrial belt, and required local knowledge of

presented to the town by an unknown donor, were fitted at their base with drinking troughs for horses, while the third had a fountain at its base.

In the private sector the rate and method of charge for a supply attempted to encourage potential consumers and promote the efficiency of the undertaking. The meters which were used were supplied by Laurence Scott and Company of Norwich and the system by which consumers were charged was known as the Norwich system. Under this system the price per unit charged was 9d from one hour before sundown to nine o'clock at night, and from that hour until an hour before sundown the following day the charge was 4½d per unit. In this manner, it was hoped to encourage the use of current during the period of light load. It is also reported that for the ordinary workman's house a fixed rate of £0.50p per 16 c.p. lamp per annum was charged. In March 1897, by which time the Board of Trade had passed the installation, the number of lamps connected amounted to the equivalent of 3,000 8 c.p. lamps. The company began its supply on 1st August, 1896 and the current was rapidly taken up, "consumers coming on as fast as they could be wired and connected". By March, 1897, apart from all the principal shops and dwelling houses, six hotels, three churches, the

Belfort Hospital, the Court House and the town prison had all been connected. The vigour with which the market was attacked may be judged from the fact that in January 1898 the proprietor of the gas works intimated that he would close the works at the end of that month.

After the initial construction operations and the provision of the supply, the undertaking does not appear to have been particularly labour intensive, but this was what was intended and ensured relatively low labour costs. Apart from R.F. Yorke, himself, who was managing director, and Duncan McNiven, Junior, a local solicitor, who acted as secretary of the company, a crofter, who had received only a week's tuition, was in charge of the electric and water plant in the turbine house. The crofter was in communication with an engineer at Fort William who instructed him when to start and stop running the machinery. Thus, the working arrangements were simple and automatic, and the running of the plant only required an occasional inspection to see that all was in working order.

93. Electrical Review, Vol. XXXVI, 28th June, 1895; vol. XXXVII, 13th September, 1895 and 27th December, 1895; Vol. XXXIX, 4th September, 1896; Vol. XL, 5th March, 1897 and 19th March, 1897; Vol. XLII, 14th January, 1898 and 28th January, 1898. Garcke, op.cit. Vol. XXXIV.

The majority of water powered generating stations were of small unit size, catering for private, almost individual, use. Nevertheless, by the 1920's larger commercial undertakings, such as the Inverclyde Hydro-Electric Scheme in Lowland Scotland and the Grampian Scheme in the Highlands were coming into use, as technology advanced, and as both public and industrial demand grew. Thus, it was becoming increasingly obvious that the physical and natural attributes of the Highland region would lead to further, more widespread, developments.⁹⁴

94. For a study of such developments after 1930, see inter alia:
 S.R.O. Records of the Scottish Development Department, D.D. II/120;
 M.A. Hutchison, A Study of Hydro-Electric and Forestry Developments
 in the Highlands, with reference to The Doonally Basin, Tummel
 Basin and Mid-Argyll, with a view towards assessing any consequent
 economic and demographic changes, (Unpublished Ph.D thesis,
 University of Edinburgh, 1963); G.D. Banks, Hydro-Electric
 Development in the Highlands, Scottish Geographical Magazine,
 Vol. 66, September, 1950.

Chapter 6

Private Sector Development to 1930.

(1) Review of Existing Legislation.

In the mid-1890's it was increasingly evident that existing legislation would have to be modified. During this period it could be reasonably argued that the ideal administrative area for electrical supply was the confines of a town or city with its own generating station and distribution network, and this argument was valid whether the authorised undertaker was the local authority as in the case of Glasgow, Aberdeen, Ayr and so on or in the case of Coatbridge where the authorised undertaker was a private company. Of course, the validity of such an argument was dependent on the extent of technical knowledge and ability. However, by the 1890's technical improvements in large scale transmission and generation, together with the wider industrial uses of electricity by combining lighting and power supply, thereby reducing capital costs per unit, indicated that a much larger area of supply was appropriate for future development. Thus, the optimum area of supply, as expressed in the franchises then given to both municipal and company undertakings, was being weakened by developments which stressed the economies, both financial and technical, which could be achieved by extending the recognised optimum geographic base. The 'ideal administrative area' could also be questioned from a purely social point of view. In the more rural areas, small towns and villages which could

not, technically or financially, justify a public supply were denied the only power medium which could be effectively transmitted over large distances since existing undertakers were unwilling to bear additional distribution costs where the financial return would be low. There was in this situation an inherent inequality since only those with sufficient wealth could provide their own private installation. The solution, therefore, was the creation of larger areas of supply which could exploit the technical advances made to provide benefits, both economic and social.

It was against this background that in 1898 a Joint Select Committee of the House of Commons and the House of Lords was set up under Viscount Cross¹ to examine

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1. Richard Assheton Cross, first Viscount Cross (1823-1914) was educated at Rugby and Trinity College, Cambridge. He was called to the bar, the Inner Temple, in 1849 and joined the Northern circuit. Between 1857 and 1862 he was Conservative Member of Parliament for Preston and during this period he became a partner in Parr's bank at Warrington, becoming chairman in 1870. In 1860 he re-entered politics, becoming Member of Parliament for South-West Lancashire, and between 1874 and 1880 was Home Secretary. During his period in office he introduced a number of important Acts among which were the Licensing Act (1874), the Artisans' Dwellings Act, the Factory Act, the Employers and Workmen Act and the Conspiracy and Protection of Property Act (1875) and the Factories and Workshops Act (1878). From 1880 until 1885 he was in Opposition but again became Home Secretary in 1885/1886. He became a viscount in 1886 and from that year until 1892 he was Secretary for India. He was Privy Seal from 1895 until 1900 and retired from public life in 1902. The Concise Dictionary of National Biography, Part II 1901-1950, (1961).
Who was Who 1897-1915, Vol. I (1920).

developments in the electrical industry. The Committee reported in favour of the compulsory acquisition of land for generating stations, even where the proposed site was outside the area of supply. The report also favoured the granting of powers for the breaking up of streets between the generating station and the boundary of the area of supply in the case where the generating station was not situated within the area of supply. Moreover, the Committee recognised that changes had taken place in the industry, in particular the bulk supply of electricity for industrial purposes, which made the earlier legislation antiquated. In consequence, the Committee reported that,

"where sufficient public advantage is shown, powers may be given for the supply of electrical energy over an area including districts of numerous local authorities and involving plant of exceptional dimensions and high voltage."

The Committee also thought that the provisions of the Electric Lighting Act 1888 enabling a local authority to purchase an undertaking after forty-two years was inapplicable, as a general rule, to the case of an undertaker supplying in bulk.

The recommendations of the Cross Committee were not acted upon immediately and, indeed, it was not until 1909 that, in a truncated form, they were implemented in legislation. More immediately, the Cross Committee influenced parliamentary thought and opinion on the question

of power companies, and it was agreed that such companies could be created under Private Act of Parliament to supply power in bulk to small undeveloped towns and direct to factories or to large consumers. It was further agreed, that permanent concessions could be bestowed on power companies where no rights had already been given in the area, unless local authorities gave cause to show why powers of reversionary purchase should be inserted. In addition, power companies could obtain provisional orders for distribution in areas not already covered by other undertakings.

The power company Acts became subject to the 'Kitson Clause' - so-called because it originated from the report of a Parliamentary Committee which was examining power bills under the chairmanship of Sir James Kitson.² This clause authorised power companies to supply without restriction in those areas where no authorised undertaker existed, but

2. James Kitson (1835-1911) was originally an ironmaster who, in 1854, took charge of his father's Monkbridge Ironworks which became a limited liability company in 1886, the year in which he was knighted. Between 1889 and 1891 he was president of the Iron and Steel Institute. Kitson was also the first Lord Mayor of Leeds in 1896/1897 and was renowned in that city as a public benefactor. From 1883 until 1890 he was president of the National Liberal Federation and represented Colne Valley in Parliament between 1892 and 1902. He became the first Baron Airedale in 1907. The Concise Dictionary of National Biography, Part II 1901-1950, (1961).

in districts where local authorities or companies had obtained provisional orders, their privileges were to be safeguarded and their consent was required before a power company could commence a local supply. However, if this consent was refused and the local undertaking was not prepared to provide a supply itself within a reasonable time, the Board of Trade was entitled to set aside such a refusal and authorise the power company to supply competitively at a cheaper rate to consumers.

The importance of these developments for Scotland can be seen in the establishment of the Clyde Valley Electric Power Company, the Scottish Central Electric Power Company, the Fife Electric Power Company and the Lothians Electric Power Company. The progress of these large companies will be examined in more detail later, and a complete case study of the Clyde Valley Electric Power Company is provided in Chapter 8.

The only national legislation enacted prior to the First World War was the Electric Lighting Amendment Act 1909. This Act, although taking cognisance of the Cross Committee recommendations, provided only a marginal advance on the 1888 Act and did little to strengthen the industry. The Act gave equality of power as regards bulk supply to companies and local authorities and authorised the supply to premises just outside the area of an authority, whether company or municipality, if necessary without the consent of the neighbouring undertaking by what was termed 'fringe' order procedure. Further compulsory powers were

also introduced with regard to acquiring sites for generating stations and for breaking up streets. Thus, although no attempt was made to re-structure the industry, the Act, generally, facilitated electric supply.³

(2) Private Companies and the structure of the industry.

It was against this legislative background, and the earlier legislation of 1882 and 1888 which has already been examined, that public supply developments in the electrical industry took place in Scotland. The growth of local authority undertakings prior to 1914 has already been analysed in detail in Chapter 4. This chapter proposes to discuss developments in the private company sector to 1930. The decision to adopt a different time scale was not taken arbitrarily, but chosen in an attempt to achieve greater historical continuity and perspective. For example, many of these companies were associated concerns interconnected either by individuals or by parent companies, and such linkages overlapped the First World War period; this particular aspect will be examined in the next chapter. Thus, to divide company developments into two distinct time periods would have distorted the overall pattern of development. The growth of the supply industry in Scotland was also influenced by the Electricity Supply

3. For a more detailed examination of the above legislation, see Ballin, op. cit. Chapters 2 and 3; Henderson, op. cit. p.p. 30-88.

Acts of 1919 and 1926 but, since such legislation did not materially inhibit company developments, their effect will be examined later.

In February 1919 extant records of the Secretary of State for Scotland listed nineteen electricity companies operating in Scotland (see Appendix 16, p. 698). Notable omissions from this list of companies and ones which were operating at that time were the Fort William Electric Light Company, North Berwick Electricity Supply Company, Coatbridge and Airdrie Electric Supply Company and the Loch Leven Electric Supply Company and several smaller concerns. Indeed, between 1889 and 1920 some twenty-nine companies were incorporated, either by Act of Parliament or under the Companies Acts, to provide a public supply of electricity in Scotland, and by 1930 this figure had reached forty-eight (see Appendix 17, p. 701). The forty-eight companies listed reveal the miscellany of public supply within the private sector in Scotland throughout this period. The type of company which operated ranged from the large power company, such as the C.V.E.P. Company and the Scottish Central Electric Power Company, to the small non-statutory concerns at Fochabers, operated by the Duke of Richmond, and the Symington Electric Supply Company of The Tinto Hotel in Lanarkshire. Hydro-electric developments displayed a similar disparity ranging from the Fort William Electric Light Company to the vast schemes proposed in the 1920's. Other concerns such as the Loch Leven Electric Supply Company and the Strathclyde Electric Supply Company

obtained a bulk supply from other companies and acted merely as distributors. Moreover, within individual classifications the size and scale of the undertaking varied widely, and the entire structure was further complicated by the fact that certain undertakings were wholly owned subsidiaries of parent companies within and without Scotland, so that the possibility or question of a financial subsidy at a crucial period in the development of the individual company cannot be entirely ignored. Finally, the overall situation is further obscured in two important ways: by the fact that many company records have been destroyed or lost; furthermore, many companies had a penchant for secrecy and those companies established by Private Act of Parliament were not required to register or reveal all their financial dealings. The consequences from all of this are that exact comparative studies between individual companies are virtually impossible. Moreover, any attempted assessment of the overall development of private company growth, during this period prior to 1930, from the financial or technical standpoint is bound to have weaknesses.

The simple statement, made earlier, that there were forty-eight electricity supply companies operating in Scotland between 1889 and 1930 is in itself rather misleading. The date of inception of any company and the date at which it began a public supply differed. Some companies were able to begin a public supply almost immediately, while others for obvious reasons did not begin a public supply until after several years had elapsed; where the date at

which the public supply began is known it has been given in Appendix 17. Moreover, not all companies had a continuous history throughout the stated period. Certain companies were taken over by other undertakings, although where this occurred a continuity of supply was maintained. For example, as already noted in Chapter Four, the Kelvinside Electricity Company was taken over by Glasgow Corporation in 1899, while the C.V.E.P. Company took over the Kilmacolm Electric Lighting Company on 23rd December, 1925.⁴ In 1904 the Scottish House-to-House Electricity Company went into liquidation and was replaced by the Coatbridge and Airdrie Electric Supply Company, and in a similar manner in 1926 the Strathpeffer and Dingwall Electric Company was replaced, at a purchase price of £30,000, by the Ross-shire Electric Supply Company, and in both instances a continuity of supply was again maintained.⁵

In several cases undertakings which were previously privately owned were transferred to their immediate local authority. For example, Dumfries Electric Supply Company was transferred to the Burgh of Dumfries on 9th January, 1923, North Berwick Electric Light and Power Company to North Berwick Burgh in April 1926 while on the 15th August, 1926 the Inverness undertaking which belonged to the North of Scotland Electric Light and Power Company was taken over

4. Garcke, op. cit. Vol. V. S.R.O., Records of the South of Scotland Electricity Board, SSE5,1/3.

5. Garcke, op. cit. Vols. IX and XXIX.

by Inverness Town Council.⁶ There are also examples of companies being established to take over what had been previously private or non-statutory installations. This occurred on 30th November, 1925 when the Gretna and District Electric Supply Company was formed to take over part of the business of electricity supply which had previously been carried on by H. M. Factory at Gretna, and on 30th October, 1930 the Grantown-on-Spey Electric Supply Company was formed to take over an installation previously privately owned.⁷ Moreover, Appendix 17 (p.701) which deals with specific companies and their known authorised capital ignores the activities of the Electric Supply Corporation and the Urban Electric Supply Company. Both companies have been excluded from Appendix 17, since the extent of their capital involvement in Scotland and the proportion that it represented of their overall investment in Britain is not known; the activities of both companies will be examined in some detail in the next chapter. Nevertheless, the Electric Supply Corporation did operate at Carnoustie, Dollar, Jedburgh, Melrose, Dalkeith, St. Andrews and Dumbarton, and the Urban Electric Supply Company was active at Hamilton and Hawick. For the above reasons, therefore, the stated figure of forty-eight companies operating in Scotland between 1889 and 1930 must be treated with some caution.

6. Ibid., Vol. XXIX.

7. Ibid., Vols. XXIX and XXXIV.

(3) Company Flotations.

Despite any inexactness in the actual number of companies operating in Scotland before 1930, the record of company flotations during this period is interesting; the chronological record of company flotations on both a quinquennial and decennial basis is given in Table 9 (p.226), Table 9, bearing in mind the questions raised in the preceding Section, represents a fairly accurate account of companies established between 1899 and 1930. However, the Table does obscure the annual establishment of companies and this is most obvious during the period of the First World War. The war years, viz., 1914, 1915, 1916, 1917 and 1918, witnessed the inception of only one Scottish company, and by no means, can this company be said to have been formed as a result of the war-time emergency. On 24th June, 1914 Duncan's Electric Supply Company was registered as a private company in Edinburgh to acquire from James Duncan the rights of supply to Ballater and Ellon, and, Aboyne and Kintore in the County of Aberdeen. A public supply began at Ballater on 23rd December, 1914 and at Ellon in October 1915.⁸

The First World War was, therefore, apparently, inimical to the foundation of electricity companies. It is difficult to analyse, fully, the effect of the First World War on the industry because of the lack of contemporary information, but the war undoubtedly led to a scarcity of capital goods and raw materials and the absorption of

8. Ibid., Vols XIX and XXIX.

labour into the armed forces: all of these were detrimental to the industry generally. Moreover, interest rates were higher than in the pre-war period and consequently capital raising was costly. For example, the Bank Rate, after the initial panic when it rose to 10 per cent on 1st August, 1914, was continuously throughout the war years at between 5 and 6 per cent, that is between 1 and 2 per cent higher than it had been immediately pre-war.⁹ Thus, the First World War was rather a period of consolidation and expansion of existing undertakings. For example, during the war years the munitions industry was greatly reliant on the electricity supply industry and, indeed, in factories making munitions, 95 per cent of machinery was driven by electricity;¹⁰ details concerning the overall financial expansion of company enterprises is examined in some detail later. The expansion and consolidation of existing undertakings is partially explained since, because of depleted staffs, the maintenance of private power plant installations was difficult, and this emphasised not only the need for the expansion of existing central station generating plants but also for the inter-connection of supply systems, so much so that in 1916 the Board of Trade issued a circular suggesting that the supply industry should voluntarily

9. B.R. Mitchell and P. Deane, Abstract of British Historical Statistics, (Cambridge, 1971), p. 459.
10. Ballin, op. cit. p. 96.

undertake an examination of this question of inter-connection.¹¹ However, since the demand for electricity was continually rising, the government was forced to intervene in the industry. A special Electric Power Supply Department of the Ministry of Munitions was established to approve extensions and grant priority certificates.¹² Thus, the government preferred existing, and presumably proven, enterprises in areas of need. The recognition of the value of the electricity supply industry to the war effort, and its vital role in the post-war period, by the government is revealed by the fact that for the first time, through the agency of the Ministry of Munitions, financial aid was offered to electrical undertakings in connection with specific projects directly geared to the war effort.¹³ For example, in 1919 the Ministry of Munitions made a loan to the C.V.E.P. Company to assist with the construction of the Clyde's Mill Power Station (see Chapter 8, Section 3). The importance of the electricity supply industry was shown earlier when the manager of the Kilmacolm Electric Lighting Company reported in February 1917, that he had appealed and gained exemption from military service for Henry White, one of the company's employees: until 23rd April, 1917, on the

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11. S.R.O. Records of The Scottish Development Department, DD 11/4.
 12. Ballin, op. cit. p. 96.
 13. Henderson, op. cit. p. 94.

grounds that he was indispensable to the undertaking.¹⁴

TABLE 9

Record of Company Flotation Prior
to 1930

<u>Period of Years.</u>	<u>Number of Companies.</u>	<u>Quinquennial Percentage.</u>	<u>Decennial Percentage.</u>
Pre-1890	2	4.17	4.17
1891-1895	1	2.08	
1896-1900	3	6.25	8.33
1901-1905	8	16.67	
1906-1910	7	14.58	31.25
1911-1915	6	12.50	
1916-1920	2	4.17	16.67
1921-1925	12	25.00	
1926-1930	7	14.58	39.58
<u>Total</u>	<u>48</u>	<u>100.00</u>	<u>100.00</u>

Source: Appendix 17, p. 701.

An examination of Table 9 indicates that the period prior to 1900 was not one of fulfilment for company development. This was a period, however, when hostility by municipalities towards company development was probably at its greatest. Moreover, during that period, developments tended to take place in the more, obviously, profitable urban and populated areas, jealously guarded by their own immediate local authorities which were favourably protected by earlier legislation. Consequently, only six companies were founded during this period, and of the six the North British Electricity Supply Company did not manage to grow beyond the embryonic stage while, as analysed in the previous chapter, the Kelvinside company suffered

14. S.R.O. Records of the South of Scotland Electricity Board, SSE5,3/3.

severe market problems and was eventually taken over by Glasgow Corporation in 1899. The Scottish House-to-House Electricity Company at Coatbridge remained in existence until c 1905 when, in financial difficulties, it was supplanted by the Coatbridge and Airdrie Electricity Supply Company which was an associate of the County of London Electric Supply Company which held a mortgage on it.¹⁵ Not a great deal is known concerning the Tayside Electric and Gas Light Company but, with a nominal capital of £25,000 and an issued capital of £2,713 at 1920/1921, it can hardly have made a major contribution to electricity supply developments in Scotland (see Appendices 17 and 18, p.p. 701 and 702). The Fort William undertaking has already been examined in detail in the previous chapter, and it was clearly not typical of other contemporary concerns. The North of Scotland Electric Light and Power Company was formed in March 1899 as the Angus Electric Light and Power Company - the name was changed on 14th October, 1904. This company owed its existence to Edmundsons' Electricity Corporation which was by far the major shareholder; this relationship will be examined in detail in Chapter 7. Thus, it would appear that these initial six companies, with the possible exception of the Fort William Electric Light Company, did not enjoy the wholehearted support of their local communities.

After the turn of the century the number of Companies formed displayed a marked increase, but this was due in no

15. Hennessy, op.cit. p.p. 173-174

small part to the acceptance of the regional power company by Parliament since four of the eight companies formed between 1901 and 1905 were power companies, viz., C.V.E.P. Company, Fife Electric Power Company, Scottish Central Electric Power Company and Lothians Electric Power Company while the Strathclyde Electric Supply Company was a wholly owned subsidiary of the C.V.E.P. Company. Nevertheless, during the first decade of the century fifteen companies were formed, representing 31.25 per cent of Scottish Companies, and many of these were situated within the environs of towns, Arbroath and Dumfries for example, which suggests that local authority hostility was being somewhat muted. The growth of these companies was also a reflection of rising demand. It may also indicate the fact that these local authorities lacked an entrepreneurial outlook, or the fact that they were unwilling to risk capital in such ventures; the attitude of ratepayers is not known but, undoubtedly, the foundation of municipal companies involved an increase in local rates. On the other hand, within the much larger geographical areas of the power companies, although there was an initial opposition from individual local authorities, the benefits of large scale generation and distribution were realised, and local authorities within such areas usually worked amicable with the power company. The small unit size of many local authorities, of course, emphasised the attraction of obtaining a supply from a power company rather than an involvement in onerous capital outlays. The relationship between the C.V.E.P. Company and the numerous local

authorities within its designated area of supply is examined in some detail in Chapter 8.

The decade from 1911 to 1920 was interrupted by the First World War when, as noted above, there was a very definite slowing down in company formation. Nevertheless, the number of companies continued to expand with the period from 1911 to 1915 being the most prolific when six companies were formed. In the formation of these companies the question of the growing public demand for an electricity supply cannot be ignored, since the economic viability of any company depended upon this important element. However, the growth of such a demand had to be recognised and encouraged and it was at this point in time, prior to the First World War, that the entrepreneurial initiative of George Balfour of Balfour, Beatty and Company began to become prominent in the Scottish electricity supply industry. The importance and influence of Balfour will be analysed fully in the next chapter, but already in 1908 he had been the motivating factor behind the Arbroath Electric Light and Power Company and, between 1911 and 1915 he was undoubtedly responsible for the establishment of two, and probably three, of the six companies formed. In 1910 he obtained the electric lighting order for Ardrossan and Saltcoats; this he transferred to the Ardrossan and Saltcoats Electric Light and Power Company which was incorporated on 11th August, 1911 and of which he remained a principal director. In a similar manner, in 1912 he obtained the electric lighting order

for Linlithgow and District which was transferred to the Scottish Midlands Electric Supply Company later to become part of the Balfour empire. The Galashiels and District lighting order was not obtained by Balfour, but he was a major director of that company - and most influential. In March 1928 the Galashiels and District Electric Supply Company changed its name to the Scottish Southern Electric Supply Company.¹⁶ Thus, although the raison d'etre for these four companies cannot be said to be the responsibility of one individual, there is little doubt that Balfour was influential in their establishment.

The other companies formed in the decade ending 1920 were noticeably small. Of the three remaining companies established between 1911 and 1915 Duncan's Electric Supply Company was discussed earlier while the Beaully Electric Supply Company, which was registered on 17th July, 1912 and began generating current in December 1912, was particularly small having a nominal capital of only £1,000, of which only £921 was issued at 1920/1921.¹⁷ The other company formed pre-1915 was the North Berwick Electric Light and Power Company registered on 15th December, 1912 with a nominal capital of £7,500. Between 1916 and 1920 only two companies were formed, and the establishment of both took place in 1920. The Symington Electrical

16. Garcke, op. cit. Vols. XIV, XIX, XXIV and XXIX.

17. Ibid., Vols. XIX and XXIV.

Supply Company was formed on 5th February, 1920 to provide an electricity supply to the Tinto Hotel in Lanarkshire. It may have supplied one or two other customers in its immediate vicinity but it could not in the ordinary sense be described as a public supply company. The Dunblane and District Electric Supply Company which was formed on 5th May, 1920 was in some senses more interesting. This was initially a small private company, with an authorised capital of only £500, which intended to utilise the water power of the River Allan at Lower Keir Mill near Dunblane to generate electricity. However, when a supply eventually began in March 1925, bulk power was provided by the Scottish Central Electric Power Company.¹⁸

The decade from 1921 to 1930 presents probably the most surprising statistics within Table 9 since almost 40 per cent of companies were formed during that decade, while the five year period from 1921 to 1925, co-inciding with the beginning of the inter-war depression, witnessed the most prolific period of company flotation with twelve companies, representing 25 per cent of the overall total, being founded. However, with the exception of the hydro-electric schemes which were discussed in the previous chapter, most of the companies formed were relatively small, and several were to be found in the more remote parts of Scotland. For example, in Berwickshire, the Greenlaw Electric Supply Company was formed on 7th April,

18. Ibid., Vols. XIV and XXIX.

1921 to supply the town, of the same name, which had a total population of only six hundred people and 176 houses. The generating plant at Greenlaw which had a capacity of a mere 5.95KW was driven by water power from a mill lade at the River Blackadder.¹⁹ This company could probably be best described as a parochial undertaking, and a similar description would probably befit the Strichen Electric Supply Company which supplied the village of Strichen in Aberdeenshire, the Newcastleton Electric Supply Company in Roxburghshire where there was a 24KW installed capacity, the Dalry Electric Supply Company where by 1931 the total capital expenditure amounted to only £1,515. Other companies of a similar nature were the Langholm Gas and Electricity Supply Company of Dumfries-shire and the Lairg Electric Supply Company in Sutherland which supplied within the parish of the same name from a 52KW generating set. On the other hand, the West Kilbride Electricity and Light Company which supplied the parish of West Kilbride, including Seamill, took a bulk supply from the Ayrshire Electricity Board and is not known to have had any generating plant of its own.²⁰

Table 9, as was pointed out earlier, may be slightly misleading since certain companies were formed to take over undertakings which previously were private

19. Ibid., Vol. XXXIV.

20. Ibid., Vols. XXIX and XXXIV.

or non-statutory, and this is also true of the 1920's. For example, the Dalbeattie Electric Light and Power Company took over a private undertaking which had operated at the Barrhill Works, Dalbeattie and, presumably, continued to operate that plant since the directorship remained virtually unchanged; by 1931 this company had an installed capacity of only 110KW which again placed it among the smaller category of undertaking. Similarly, the Grantown-on-Spey Electric Supply Company took over a previously privately operated plant and retained the identical directors; by 1931 it had an installed capacity of 100KW. The position at Gretna was explained earlier. In 1906 the Burgh of Dunoon was granted a lighting order, but this was not acted upon, since in 1929 the Dunoon and District Electric Supply Company was formed to operate a special order of that year which authorised the company to supply within the burgh; a supply began on 15th September, 1930.²¹ At Fochabers, from as early as 1906, the Duke of Richmond, Gordon and Lennox operated the Fochabers (Elgin) Electric Lighting Order and at 1925/1926 this private installation had an installed capacity of 162KW. This undertaking initially supplied part of the parish of Bellie, including the village of Fochabers, but in 1930 a further portion of the parish was supplied. The generating station was situated at the west side of Fochabers and supplies were

21. Ibid., Vols, XIV, XXIX and XXXIV.

produced by dynamos driven by water turbines, supplemented by the installation of a diesel set; motive power to drive the turbines was obtained from the River Spey. Meanwhile, in August 1922 the Elgin Electric Supply Company was formed to provide an electricity supply within the City and Royal Burgh of Elgin, and this began in December 1922, and in 1925/1926 the company had an installed capacity of 102KW and in 1931, 237KW.²²

The two remaining companies, the Crieff Electric Supply Company and the Peterhead Electricity Company, were in some ways quite different from others formed in the 1920's. The Crieff Electric Supply Company was formed in October 1922 to generate and supply electric current for light, power and any other purpose in the burgh of Crieff, and supply began in May 1923. At this stage the company was totally independent, but C 1925 it became part of the Balfour group of companies; this aspect of consolidation will be discussed in detail in the next chapter. The electricity special order for Peterhead was originally granted to the Electric Supply Corporation of London and then transferred to the Peterhead Electricity Company which was formed in June 1927. However, the influence of the Electric Supply Corporation remained, since K.A. Scott Moncrieff, managing director of that

22. The Third Statistical Account of Scotland, The Counties of Moray and Nairn, (Glasgow, 1965), p.p. 90-91. Garcke, op. cit. Vols. XXIX and XXXIV.

Company, was also chairman of the Peterhead company;²³ the influence of the Electric Supply Corporation on the Scottish electricity supply industry will also be discussed in detail in the next chapter.

The evidence for larger areas of supply and the recognition that this received by the Cross Committee has already been examined in the opening paragraphs of this chapter. Consequently, there is the paradox that there was a multiplicity of company undertakings scattered widely throughout Scotland. However, it must be remembered that such undertakings tended to serve isolated communities where the density of population was low and that the likelihood of inter-connection, because of this remoteness and the difficulties of the terrain, was uncertain. This was evidently true of the Highland and Border counties. The potential of the power company was recognised and accepted in the industrial heartland of Scotland - the C.V.E.P. Company is an obvious testament to this - but in the Borders or in the more northern parts of Scotland there were the obvious difficulties of both an industrial market and domestic demand. Moreover, local authorities, in the more sparsely populated and less industrialised counties, had already captured the major markets. This was particularly true, for instance, at Aberdeen and Perth where major local authority undertakings were established. For example, the city of Aberdeen

23. Garcke, op. cit. Vols. XXVI, XXIX and XXXIV.

accounted for well over 50 per cent of that county's population - in 1931 the population of Aberdeen was approximately 170,000 and the county population 300,000.²⁴ Thus, in the more isolated areas, the provision of a public supply was dependent on local initiative and enterprise, or on the realisation that there was a potential market which could be profitably served by establishing a private company. Amongst others, the formation of companies at Lairg in Sutherland and Strichen in Aberdeenshire substantiates the former supposition while the establishment of companies at Peterhead and Crieff would appear to support the latter hypothesis. Scotland, therefore, by the nature of its topography and by the fact that industrial concentration was emphasised in the Central Lowlands, was covered by a miscellany of electricity supply undertakings of varying size and scale which initially, at least, had been dependent on legislative influence and, in the period prior to 1930, this structure, despite the Electricity Supply Acts of 1919 and 1926, was not radically altered.

(4) The Course of Capital Formation.

Deficiencies in data relating to the private sector of the electricity supply industry in Scotland make it difficult to assess with any precision the growth of

24. S.G.E. Lythe and J. Butt, An Economic History of Scotland 1100-1939, (Glasgow, 1975), p. 245.
Mitchell and Deane, op. cit. p. 23.

companies. Nevertheless, Table 10 (p.238), which has been abstracted from Appendices 17 and 18 (p.p.701 and 702), attempts to measure and analyse the aggregate growth of companies in Scotland between 1896 and 1931 on a quinquennial basis. The Table examines both authorised and issued capital, and determines the percentage increase which took place in these figures during the given five year periods. The final column of Table 10, which analyses, in percentage terms, what proportion of authorised capital was actually issued in these given years, attempts to clarify further the capital formation in this important industry.

The meaning and understanding of 'Authorised Capital' is straightforward and requires no explanation. However, the figures for 'Issued Capital' cannot be accepted in such a simple manner, and qualification must be made. For example, there is no guarantee that all of the issued capital was taken up, that is, issued capital differs markedly from subscribed capital, and, consequently, the figures for issued capital given in Table 10 may exaggerate, marginally, the true value of investment in the private sector of the Scottish electricity supply industry. For example, the extant records of the North of Scotland Electric Light and Power Company reveal that on 2nd July, 1902 £21 remained to be paid on shares issued.²⁵ More dramatic was the situation at the Lothian Electric Power

25. .R.O. Dissolved Company Files, BT2/4189.

Company. On 16th April, 1908 a call of £2 per share was made, but one shareholder only paid his £200 on 4th March, 1909, and this payment was made only after the company had threatened to take legal action.²⁶ It does not seem conceivable that these were isolated examples, and thus the figures given for issued capital in Table 10 may slightly underestimate the true position and should, therefore, be accepted with a degree of caution.

TABLE 10

Authorised and Issued Capital of Scottish
Electricity Supply Companies, on a Quin-
quennial Basis from 1896 to 1931.

<u>Year</u>	<u>Authorised Capital</u>	<u>Issued Capital</u>	<u>Issued Capital as a Percentage of Authorised</u>
1896 £	150,000	20,564	13.71
1900/1901 £	160,000	31,016	19.39
Increase %	6.67	50.83	
1905 £	2,951,000	705,528	23.91
Increase %	1744.38	2174.72	
1910 £	3,052,100	982,391	32.19
Increase %	3.43	39.24	
1915/1916 £	3,225,600	1,507,717	46.74
Increase %	5.68	53.47	
1920/1921 £	4,263,100	2,000,147	46.92
Increase %	32.16	32.66	
1925/1926 £	10,600,600	4,070,607	38.40
Increase %	148.66	103.52	
1931 £	11,942,000	9,551,497	79.98
Increase %	12.65	134.65	

Source: Appendices 17 and 18.

In 1896 the authorised capital of the two companies then in existence stood at £150,000 which bearing in mind

26. S.R.O. Records of the South of Scotland Electricity Board, SSE5, 5/1.

the two companies involved, the Kelvinside Electricity Company and the Scottish House-to-House Electricity Company at Coatbridge, would appear to have been unrealistic and, perhaps, over-optimistic about the possible future expansion of both concerns and their attraction to potential shareholders. This is borne out by the issued capital of these undertakings. In 1896 the issued capital of the Kelvinside company stood at £16,306 from a total authorised capital of £50,000, and the former figure remained static until the undertaking was taken over by Glasgow Corporation in 1899. The situation at Coatbridge was less favourable. The authorised capital of this company was £100,000 and yet the maximum issued prior to its dissolution in 1904 was only £5,350. Indeed, both companies were dependent on loan capital. In 1898 the Kelvinside company received loans amounting to £13,717,²⁷ while at 1904 the Coatbridge undertaking was mortgaged to the extent of £26,955.²⁸ Both companies were, thus, singularly unattractive to the investing public.

By 1900/1901 authorised capital had increased by only 6.67 per cent to £160,000 as a consequence of the formation of two new companies, viz., the Fort William Electric Light Company and the, short-lived, North

27. Garcke, op. cit. Vol. V.

28. Ibid., Vol. IX.

British Electricity Supply Company. However, the issued capital figures indicated an increase of 50.83 per cent over the 1896 figure. The basic reason for this was that the total authorised capital of the company at Fort William was issued.

The period ending in 1905 witnessed the highest percentage increases for both authorised and issued capital in any of the given quinquennial periods. By 1905 authorised capital had increased to £2,951,000, representing a 1,744.38 per cent rise over the previous figure. This, of course, was the period when the major power companies were formed, and their grandiose schemes, together with the immense land area that they covered, required an abundance of capital; the territory designated to the C.V.E.P. Company alone was over 700 square miles. Indeed, of the £2,951,000 of authorised capital at 1905, the four power companies accounted for £2,700,000 i.e., 9149 per cent of the total authorised capital. The remaining £251,000 of authorised capital was divided among six other companies, the most important of which was the North of Scotland Electric Light and Power Company; this in 1905 had an authorised capital of £100,000. The issued capital also grew at an unprecedented rate between 1900/1901 and 1905. In monetary terms, issued capital rose from £31,016 to £705,528 which represented a quinquennial increase of 2174.72 per cent by 1905, and this figure may

underestimate the true position since no statistics are given for the Lothian, and Scottish Central Electric Power Companies.

The explanation for the rapid percentage growth of issued capital is, on the surface, fairly straightforward, viz., the C.V.E.P. Company had issued two-thirds of its issued capital amounting to £600,000 while the North of Scotland company had issued £50,000 of its authorised capital. However, such a straightforward explanation ignores certain salient points. For example, on 23rd September, 1902 a contract was signed between the C.V.E.P. Company and the British Westinghouse Electric and Manufacturing Company. Under the terms of the agreement the contract price to be paid by the C.V.E.P. Company to British Westinghouse for the two central generating stations at Yoker and Motherwell was £310,000 and, in addition, a further £170,000 was to be paid for all cable work, sub-stations and so on i.e., a total cash payment of £480,000. However, by the agreement the British Westinghouse company applied for 48,000 shares of £10 each in the C.V.E.P. Company, and, subsequently, the C.V.E.P. Company was then entitled to retain and apply the cash due on the contract as payments to the account of capital represented by the 48,000 shares.²⁹ In addition, 4,688 shares of £10

29. For a more detailed examination of the financial structure of the C.V.E.P. Company, see Chapter 8, Section 3.

each were taken by the Traction and Power Securities Company of London which acted as underwriters to the C.V.E.P. Company, while only 7,312 shares were held by private shareholders.³⁰ A greater clarification of the C.V.E.P. Company shareholding is possible from a tabular presentation of the above noted figures which were initially given in 1902, but which are presumed to have remained static until 1905.

TABLE 11

Analysis of Shareholders of C.V.E.P.
Company at 22nd December, 1902.

Shareholders	Number of Shares Held	Percentage of Total Shares Held
British Westinghouse and Manufacturing Co.	48,000	80.00
Traction and Power Securities Co,	4,688	7.81
Private Shareholders	7,312	12.19
TOTAL	60,000	100.00

Source: S.R.O. Records of the South of Scotland Electricity Board, SSE5,1/1.

Table 11, therefore, indicates that of the 60,000 shares of £10 each issued by the C.V.E.P. Company, 80 per cent were held by the major contractor in lieu of any cash payment for the work undertaken. A further 7.81 per cent were taken up by the company's underwriters while only

30. S.R.O. Records of the South of Scotland Electricity Board, SSE5,1/1.

12.19 per cent were held by private investors. No complete analysis is available of the private/individual shareholders of the C.V.E.P. Company since the company, by law, was not required to provide this information and, moreover, the extant records of the company are not helpful. However, since the promoters of this company included the major shipbuilders, industrialists, coal-masters and landowners in the West of Scotland, there seems little doubt that this company, a power company, was not at all like the normal private company. Nevertheless, despite the lack of adequate information, the shareholding of the other power companies probably showed a marked similarity. The C.V.E.P. Company was an example of the professionalism of the larger power companies in assessing market demand, and attempting to satisfy that demand (see Chapter 8) and this aspect, together with the immensity of their designated territory and the character of contractual agreements, ensured that issued capital was quickly subscribed. The North of Scotland Electric Light and Power Company was in a similar position to the C.V.E.P. Company. In 1905 the authorised capital of this company was £100,000, of which £50,000 was issued. In March 1905, Edmundsons' Electricity Corporation held 9,772 shares of £5 each, out of a total 10,000 shares issued. The value of the Edmundsons' shares was £48,860, representing 97.72 per cent of the issued capital. Thus, it can be argued that these Scottish companies became

were subsidiaries of their major contractors.³¹ However, the overall situation, as exemplified by the C.V.E.P. Company and the North of Scotland Electric Light and Power Company, explains why there was this rapid acceleration of issued capital in the quinquennial period ending 1905.

Between 1906 and 1910 there was a rapid deceleration in capital formation in terms of both authorised and issued share capital. This fall reflected the general depression which affected the Scottish economy in these years. Moreover, with regard to authorised capital, those companies which had been accounted for at 1905 experienced no increase in their nominal capital in the intervening period, whereas those companies which had come into existence since 1905 were relatively small, with the obvious exception of the Musselburgh and District Electric Light and Traction Company with its authorised capital of £120,000. Thus, the increase in authorised capital in the quinquennial period ending in 1910 was only 3.43 per cent, or £101,000. On the other hand, issued capital rose by £276,863, representing a growth rate of 39.24 per cent in the same period. The explanation for this is again fairly straightforward. For example, the Fife Electric Power Company had more than doubled its issue of

31. For C.V.E.P. Company, see Chapter 8, Section 3. For the North of Scotland Electric Light and Power Company, see Chapter 7, Section 2.

capital since 1906, from £30,000 to £62,830, while for the first time a figure for issued capital was available for the Scottish Central Electric Power Company, although its accuracy is open to question (see Appendix 18, p.702). Moreover, the Musselburgh company had issued £87,207 of its capital (72.67 per cent of its authorised capital) and the Arbroath company had a capital issue of £22,270 which represented 74.23 per cent of its authorised capital. In these four cases, therefore, the onset of construction had induced an issue of capital. It is obvious, from even a perusal of Appendix 18, that the overall amount stated for issued capital at 1910 has been underestimated since figures for issued capital are not available for three companies. This is particularly evident in the case of the Dumfries Electric Supply Company where a public supply began on 21st December, 1906 which must have resulted in an issue of capital by 1910. Moreover, the overall amount stated for capital issued of £982,391 does not take into account known loan capital and thus does not present a true reflection of the total sum invested in the Scottish electricity supply industry. For example, the Coatbridge and Airdrie Electric Supply Company, which had in 1910 an authorised and issued capital of only £1,000, was mortgaged to the extent of £143,159. By the same token the Fort William Electric Light Company had a debenture issue of £1,750 while the Musselburgh company and the North of Scotland company had a debenture issue of £64,700 and £14,186

respectively, and the Scottish Central Electric Power Company £20,000.³² Therefore, apart from any omissions, known loan capital amounting in total to £243,795 must also be taken into consideration.

Capital formation in terms of authorised and issued share capital in the quinquennial period ending 1915/1916 has a marked similarity to the preceding period. The increase in authorised capital reflects the formation of a number of new companies, the authorised capital of the older companies remaining static, while the Strathclyde Electric Supply Company, which had been established in 1905, is included for the first time. The authorised capital rose by £173,500, or 5.68 per cent, from 1910 and, since this was spread over an additional eight companies, it represents only moderate development. Issued capital rose much faster by £525,326, or 53.47 per cent, since 1910, indicating, perhaps, shareholders being asked to indicate their loyalty to individual firms in a period of stringent emergency created by the First World War. Nevertheless, apart from the companies established since 1910, and again figures are lacking, this increase represents the continued expansion and development of existing undertakings. In particular, the C.V.E.P. Company and the Fife Electric Power Company are most noteworthy. By 1915/1916 the former company had issued its entire authorised capital amounting to £900,000, while the latter company had issued an additional £119,500 bringing its

32.. Garcke, op. cit. Vol. XIV.

total issued capital to £182,330; the increase in the issued capital of other companies was much more modest. Consideration must, yet again, be given to loan capital, which at 1915/1916 amounted to £296,151. For example, by this time Coatbridge and Airdrie Electric Supply Company's mortgage had risen to £157,441, and the debenture issues of the Musselburgh and North of Scotland companies had risen to £89,800 and £27,160 respectively. The debenture issue of the Fort William Electric Light Company and the Scottish Central Electric Power Company remained the same as at 1910 viz., £1,750 and £20,000 respectively.

During the five years ending 1920/1921 authorised capital rose by a remarkable 32.16 per cent, which in monetary terms was equivalent to £1,037,500, and yet only two companies, the Dunblane and District Electricity Supply Company and the Symington Electrical Supply Company, with a combined authorised capital of £2,500, were formed. This increase in authorised capital illustrates the continued dominance of the C.V.E.P. Company which in this period increased its authorised capital by £1,000,000, undoubtedly an indication of increased provision being made for the construction of the Clyde's Mill generating station (see Chapter 8). Apart from that company, only two others increased their authorised capital, viz., the companies at Dumfries and Galashiels where authorised capital was increased by £15,000 and £20,000 respectively. Thus, this substantiates the point made earlier that the

war years and their more immediate aftermath were ones of consolidation and also reflect the extent of government control. From Table 10 (p. 238) it is obvious that there was a marked similarity in the percentage increases of both authorised and issued capital in the period ending 1920/1921, viz., 32.16 and 32.66 per cent respectively. However, in the case of the issued capital this was equivalent to only £492,430, as against £1,037,500 for authorised capital. Furthermore, a complete acceptance of the percentage rise in issued capital by 1920/1921 ignores the fact that issued capital figures, amounting to £58,237, are included for the undertakings at Strathpeffer and Dingwall, Lochleven, Beauly, Galashiels and North Berwick for the first time. The Fife Electric Power Company with an increase in issued capital of £252,670, or 138.59 per cent, and the Scottish Central Electric Power Company with an increase of £151,420, or 127.76 per cent, experienced the greatest growth in issued capital during this period, and it is surely significant that both were power companies and were located in the more industrialised areas where demands for power were likely to be heaviest during the war period. As stated above, the authorised capital of the C.V.E.P. Company was increased by £1,000,000 in 1918, but it was only in October 1921 that £500,000 of this additional capital was issued.³³ Indeed, during this period the

33. S.R.O. Records of the South of Scotland Electricity Board, SSE5, 1/3

C.V.E.P. Company preferred to rely on overdraft facilities and a government loan to finance its operations rather than an increase in capital issue (see Chapter 8, Section 3). Apart from the amounts given for issued capital, in 1920/1921 debentures to the value of £130,460 had been issued by the Musselburgh and District Electric Light and Traction Company (£83,300), the North of Scotland Electric Light and Power Company (£27,160) and the Scottish Central Electric Power Company (£20,000).³⁴ Thus, the overall impression of this period, which included the major portion of the war years, was one of stability and consolidation. The period did not witness the formation of any major companies and with the stated exceptions given above and taking into account the indeterminate rate of inflation of this period, there does not appear to have been a substantial growth of capital formation.

The penultimate period, from 1920/1921 to 1925/1926, which is examined conveys an entirely different image. This was a period of great activity and expansion, including the growth of major hydro-electric developments (see Chapter 5, Section 2). In this quinquennial period authorised capital rose by 148.66 per cent, representing a monetary increase of £6,337,500, which was the greatest monetary rise in authorised capital in any of the time periods given in Table 10. In addition, issued capital

34. Garcke, op. cit. Vol. XXIX.

rose by £2,070,460, or 103.52 per cent, which represented the greatest monetary increase in issued capital up to that time; this rise, in both monetary and percentage terms, was overtaken in the following period.

During the period of years ending in 1925/1926 there is little doubt that the most significant development was the growth of the hydro-electric schemes. From Appendix 17 (p.701) it can be noted that authorised capital rose by £6,337,500 in the period between 1920/1921 and 1925/1926, and of this increase large scale hydro-electric schemes, such as those of the Grampian Electric Supply Company, the Lanarkshire Hydro-Electric Power Company and the Lochaber Power Company, accounted for £5,000,000, or 78.90 per cent of the increase in authorised capital in this period. Furthermore, the largest power company, in Scotland, the C.V.E.P. Company, experienced a rise in authorised capital of £1,000,000, which represented an increase of 15.78 per cent of the total increase for the period. However, many of the small undertakings also experienced growth in their authorised capital which would appear to reflect the increased market expectations of their directors, and also the fact that not only was there a pent-up demand from the war years, as indicated earlier, but also that, despite the depressed nature of the period after 1920/1921, there was a demand from those in relatively secure employment. For example, undertakings such as those at Arbroath, Galashiels, Dunblane and even

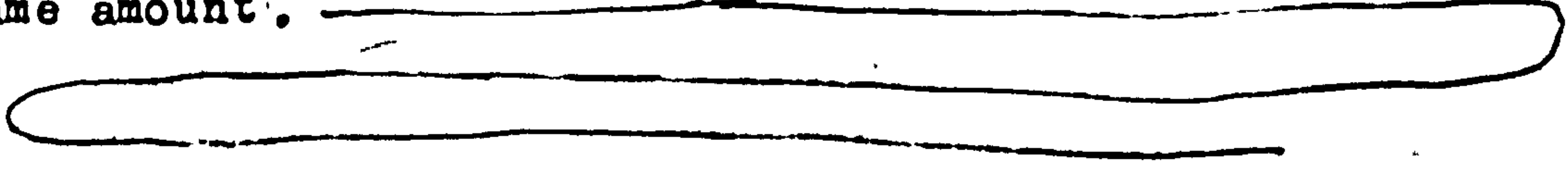
Beaully experienced a major growth of their authorised capital. Moreover, the fact that there was a 100 per cent increase in the authorised capital of the Strathclyde company, which acted merely as a distributor for energy supplied by the C.V.E.P. Company, appears to substantiate these hypotheses. It must be noted, however, that the increase in the authorised capital of the undertaking supplying Coatbridge and Airdrie from £1,000 to £200,000 during this period obscures the fact that no longer was this company mortgaged.³⁵

The amount quoted for issued capital in Table 10 is again misleading and may well underestimate the true position, since there are obvious gaps in the statistical information. (see Appendix 18, p.702) and, moreover, by 1925/1926 a total of £103,300 was issued in the form of debentures by three undertakings, notably the Musselburgh company, the North of Scotland company and the Scottish Central Electric Power Company.³⁶ Nevertheless, the acceleration of developments within the Scottish electricity supply industry is revealed by the fact that not only did overall issued capital rise by £2,070,460, or 103.52 per cent, but also it was established companies which were undergoing expansion rather than those more recently formed. For example, the Lochaber Power Company, which had an authorised capital of £3million, had not yet exercised

35. Ibid., Vol. XXIX.

36. Ibid.

any powers under its Act while the Grampian company had only issued capital to the extent of £67,000.³⁷ On the other hand, established companies experienced a marked increase in issued capital. The C.V.E.P. Company, the largest power company in Scotland and the one whose designated territory included the greatest concentration of both industry and population, increased its issued capital by £1,000,000, i.e. 53.73 per cent of the total increase of issued capital during this period. However, undertakings of lesser size also made a significant contribution. Among the power companies, the Fife Electric Power Company and the Scottish Central Electric Power Company increased their issued capital by £165,000 and £280,000 respectively, while, for the first time, the issued capital of the Lothians Electric Power Company was stated at £94,830. Moreover, the North of Scotland company, one of the oldest established companies, increased its capital by £25,000 while the geographically disparate undertakings of Arbroath, on the east coast, and Galashiels, in the Borders, increased their issued capital by £39,085 and £53,524 respectively. The Strathclyde company, which, as already noted, increased its authorised capital by £50,000, also raised its issued capital by the same amount.



37. Ibid.

In the quinquennial period ending 1931 a major difference took place in the increase of authorised and of issued capital. Authorised capital rose by £1,341,400 whereas issued capital rose by £5,480,890. In percentage terms this represents an increase of only 12.65 per cent in authorised capital but a staggering 134.65 per cent in issued capital, indicating, perhaps, that rising interest rates in 1929 led to greater reliance on calls to finance development.³⁸ It is interesting to note that the new undertakings formed during this period, viz., the undertakings at Dunoon, Galloway, Grantown-on-Spey, Greenlaw, Lairg, Newcastleton, Peterhead and Ross-shire, only accounted for £384,000 of the increase in authorised capital i.e., 28.63 per cent of additional capital formation. That does indicate, of course, that demand for an electricity supply was widening but that, nevertheless, the intensity of demand was concentrated in established areas which had already experienced the industrial, commercial and environmental advantages of such a supply. In anticipation of an extension of supply following upon an expansion of markets, established companies increased their authorised capital. For example, the Fife Electric Power Company and the Scottish Central Electric Power Company, both increased their authorised capital by £400,000. Apart from the power companies, major companies

38. Mitchell and Deane, op. cit. p. 459.

such as the Galashiels company and the Scottish Midlands company (which supplied Linlithgow and Falkirk) increased their authorised capital by £100,000 and £80,000 respectively. Moreover, even the lesser undertakings such as those at Crieff, Dalbeattie and Elgin raised their authorised capital by £8,000, £5,000 and £10,000 respectively. Therefore, the overall growth of authorised capital during this period indicates that not only was demand intensifying but also it was becoming more geographically widespread, reflecting the growth of private sector enterprise.

The hypothesis that authorised capital was increased, at least in part, as a means of financing and satisfying the growth in demand is substantiated by an examination of issued capital which rose by £5,480,890 or 134.45 per cent during this period. However, after the depression began in 1929, the increase in issued capital may reflect higher bank rate,³⁹ and an unwillingness to rely on debentures or overdraft facilities. Thus, this response has little to do with demand for electricity and may have happened in earlier depressions. During this period, the Fife Electric Power Company and the Scottish Central Electric Power Company, which had, each, increased its authorised capital by £400,000, also increased their issued capital

39. Ibid.

by £300,000 and £200,000 respectively. The Galashiels undertaking increased its issued capital by an amount equal to the increase in its authorised capital, i.e., £100,000, while the Scottish Midlands company was virtually in the same position. The Scottish Midlands company increased its authorised capital by £80,000 and its issued capital by £78,500. Moreover, even those companies which had not increased their authorised capital during this period found it essential to increase their issued capital. For example, the C.V.E.P. Company increased its issued capital by 45 per cent, or £900,000, while the Lothians Electric Power Company increased its issued capital by 279.63 per cent, or £265,170, during the quinquennial period ending in 1931. The example set by those major companies was followed by lesser undertakings at Dunblane, Crieff and Elgin which increased their issued capital by £6,234, £3,973 and £13,573 respectively. However, there is little doubt that the major growth points responsible for the great increase in issued capital during this period were the Grampian Electric Supply Company and the Lochaber Power Company which together accounted for £3,576,505 or 62.25 per cent of the actual increase in issued capital during this period. The Grampian Electric Supply Company, which was formed by the 1922 Act, had by 1925/1926 issued capital to the value of £67,000, but by 1931 the immensity of the scheme ensured that capital issued amounted to £1,600,000, that is an increase of £1,533,000. The Lochaber power scheme was

established by the Act of 1921 and, although by 1925/1926 no capital was apparently issued, the complexity and cost of construction operations by 1931 necessitated a capital issue of £2,043,505. During this period an additional eight new companies were incorporated, but their contribution to capital formation and investment in the Scottish electricity supply industry was relatively small. Unfortunately, capital issued figures are only available for five of these eight companies (see Appendix 18, p.702), but this does not detract from an assessment of their contribution prior to 1930. For example, of the three for which figures are not available, the Galloway Water Power Company was incorporated by its 1929 Act and did not begin construction operations until post-1930, while the Newcastleton and Grantown-on-Spey undertakings, by their geographical locations, were relatively small. The five known companies, therefore, had a total issued capital of £88,500 which represented only 1.61 per cent of the total increase in issued capital during this period. Yet again any consideration of investment in the industry must take account of all sources of loan capital and at 1931 debentures valued at £166,400 had been issued by four companies viz., Dunoon (£45,000), Musselburgh (£81,400), Ross-shire (£20,000) and Scottish Central (£20,000) but again, by comparison with total issued capital at this time, such amounts were not inordinately large.

40. Garcke, op.cit. Vol. XXXIV.

The final column of Table 10 indicates what percentage issued capital represents of authorised capital in each of the stated quinquennial periods and in many ways the percentage figures given are predictable. In general terms this column establishes that authorised capital was created in anticipation of rising demand and hence additional capital expenditure which was financed, setting aside any other loans made, by issued capital. However, from Table 10 it is evident that investment in the Scottish electricity supply industry, as represented by issued capital, displayed a fairly gradual and then rapid growth rate. For example, issued capital only represented 13.71 per cent of authorised capital in 1896 and then gradually grew until 1920/1921 when it represented 46.92 per cent of authorised capital. Between 1920/1921 and 1925/1926 there was a setback when issued capital fell to only 38.40 per cent of authorised capital, a factor which is largely explained by the inception of the huge hydro-electric schemes; these were set up during this period but still had to commence large scale construction operations requiring costly financing. However, by 1931 issued capital had risen to 79.98 per cent of authorised capital and this tremendous acceleration largely represented a requirement to finance the construction of hydro-electric developments, legislatively conceived in the previous quinquennial period. It also seems possible to suggest that the closer relationship between authorised and issued

capital which evolved, by the end of the period under examination, was the result of a more realistic assessment of capital requirements being made by company promoters and entrepreneurs rather than the highly optimistic forecasts made of potential demand by earlier companies and which is implicit in their authorised capital figures. For example, the apparent optimism of the Scottish House-to-House company and the Kelvinside company in this respect has already been noted. Of course, this closer relationship is also a witness to the growing popularity of electricity that was reflected in rising demand and expanding markets which required additional financing.

A final examination of Table 10 reveals that between 1896 and 1931 the authorised capital of those companies involved in the Scottish electricity supply industry rose by £11,792,000 or by 7,861.33 per cent. However, issued capital in the same period rose by £9,530,933 or a massive 46,347.66 per cent. The greater part of the increase in both sets of figures took place in the decade of the 1920's, although in differing quinquennial periods, and thus coincided with the beginning of the inter-war depression. Nevertheless, overall these growth rates suggest a buoyant and vibrant industry and one which had, increasingly, every confidence in its ability to succeed.

(5) Capital Expenditure and Finance.

National statistics for capital expenditure by all Scottish companies during the period from 1896 to 1931 are

not known and this deficiency of statistical information is again made clear in Appendix 19 (p.703), which lists the known capital expenditure of individual companies. Appendix 19 evinces the impossibility, with some exception, of either making an assessment of the growth of individual companies based on capital expenditure or of making a comparative analysis of growth between companies from which could be drawn a common, but valid, indicator.

However, certain general conclusions can be reached which substantiate points made earlier in this chapter. The growth in demand, the intensification of markets and the widening geographical distribution of a public supply of electricity are self-evident from even a cursory study of this appendix. The former aspects are indicated by the data given for companies such as Arbroath, Galashiels and the undertaking at Fochabers while the latter aspect is shown by the increase in the number of companies. Moreover, the dominance of the power company is exemplified by the statistics for the C.V.E.P. Company, and latterly, the immensity of construction operations in the hydro-electric development is proven by the Grampian Electric Supply Company. However, despite the shallow nature of such observations, Appendix 19 is invaluable since, by comparing it with Appendix 18 which examined issued capital, it proves almost conclusively that private enterprise in Scotland did not depend on issued capital alone to finance the establishment and the expansion of undertakings and that external sources of finance were essential for

development.

A comparative study of Appendices 18 and 19 reveals that the capital expenditure of the Fort William Electric Light Company continually exceeded its issued capital. The capital expenditure of the C.V.E.P. Company in the years 1920/1921, 1925/1926 and 1931 was greatly in excess of its issued capital. Only one figure for the capital expenditure of the Fife Electric Power Company is known but again this figure exceeded issued capital. Indeed, a complete comparative examination of both appendices reveals that similar statements can be made for the Kilmacolm undertaking in 1915/1916 and 1920/1921; the North of Scotland company from 1905; the Arbroath undertaking at 1915/1916, 1920/1921 and 1925/1926; the small Beaully undertaking at 1920/1921, 1925/1926 and 1931; the Grampian hydro-electric scheme at 1925/1926; the Loch Leven and the Galashiels undertakings at 1925/1926 and 1931 and the undertakings at Dumfries, Skelmorlie, Coatbridge and Airdrie, Crieff, Peterhead and Ross-shire at 1931. Even the two earliest companies viz., the Kelvinside company and the Scottish House-to-House company adopted this practice. This must inevitably raise the question of development being financed from revenue but, without greater sufficiency of financial data, this question cannot be answered.

The use of debentures as a means of possible finance for capital expenditure development has already been noted with individual companies. Table 12 collates this

information for the years stated and expresses debenture interest as a percentage of issued capital. Debentures were popular only with a small number of companies which tended to persist with this form of loan capital throughout the period under review. For example, apart from the two earliest companies, the Kelvinside and the Scottish House-to-House companies, the major exponents of this form of capital funding were the Fort William Electric Light Company, the North of Scotland Electric Light and Power Company, the Musselburgh Electric Light and Traction Company, the Scottish Central Electric Power Company and the Ross-shire Electric Supply Company.

TABLE 12.

<u>Total Known Debenture Issue of Scottish Companies 1896-1931.</u>		
<u>Year</u>	<u>Value £</u>	<u>As a Percentage of Issued Capital.</u>
1896	9,817	47.74
1900/1901	13,717	44.23
1905	-	-
1910	100,636	10.24
1915/1916	138,710	9.20
1920/1921	130,460	6.52
1925/1926	103,300	2.54
1931	166,400	1.74

Source: Garcke, op. cit. Vols. I, V, IX, XIV, XIX, XXIV, XXIX, XXXIV.

The market for debentures stocks varied considerably. Since they normally carried a fixed interest, when capital markets expected bank rate to rise, they were not very popular, and prices normally fluctuated downwards to adjust to higher interest rates. Table 12 indicates that the use

of debentures made a declining contribution to capital investment in the electricity supply industry. The figures for both 1896 and 1900/1901 are abnormal since only one company was involved, the Kelvinside concern, and this company was never strong. After 1910 the use of debenture capital became less and less important. Debentures went through a bad time in the 1920's when bank rate was, in historical terms, high; the return to the Gold Standard depended upon maintaining a high domestic rate of interest. Small local companies could probably sell their debentures locally; as relatively small fry, they probably preferred debentures to bank overdrafts and might, indeed, find bank credit more difficult to obtain than larger companies. Yet bank advances were relatively easy to obtain in the early 1920's,⁴¹ and certainly from the extant evidence the larger Scottish companies readily availed themselves of this credit.⁴² The sale of debentures ran into special difficulty in Scotland, and the willingness of local capital markets to absorb them was severely tested by the fiasco of Beardmores⁴³ and by the many issues from established firms in the late 1920's when industries such as steel, shipbuilding, coal and textiles

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41. M. Gaskin, The Scottish Banks, A Modern Survey, (1965), p. 131.
42. This was particularly true of the C.V.E.P. Company, see p.p. 263-264.
43. J.R. Hume and M.S. Moss, Beardmore, The History of a Scottish Industrial Giant, (1979), Chapter 6.

were subject to rationalisation, often engineered by company doctors such as Duncan and Weir.⁴⁴

The question of lack of liquidity, on a short-term basis, could, of course, be overcome by means of obtaining a bank overdraft on a temporary basis, a popular and cheap method of overcoming temporary financial crises. However, certain firms made such temporary financial facilities semi-permanent, and since the amount of the overdraft grew in size it seems certain that capital projects were being funded rather than short-term debts.

From at least as early as 1911 the C.V.E.P. Company arranged a series of temporary overdrafts which initially appear to be normal in the sense that they were taken out to solve problems of liquidity since the sums involved were not inordinately large. For example, between 1912 and 1914 the amounts varied from £5,000 to £15,000. However, from 1918 onwards the amounts became much more significant and of a semi-permanent nature. In April, 1918 an overdraft was arranged for £30,000 and by 1919 this amount had been raised to £50,000. Of much greater consequence is the fact that in June 1920 the company decided that, rather than issue debentures for £442,000, it would obtain an overdraft for that amount, at an interest rate of 7 per cent, for twelve months. In June 1923 that

44. R.H. Campbell, The Rise and Fall of Scottish Industry 1707-1939, (Edinburgh, 1980), p.p. 170-179.
P.L. Payne, Colvilles And The Scottish Steel Industry, (Oxford, 1979), p.p. 155-189.

overdraft was still in existence and the company decided to continue it for one year. In June 1926 the company's overdraft stood at £600,000, by July 1927 - £750,000 and by June 1928 it reached £800,000. In January 1929 a peak was reached when the overdraft then stood at £900,000 which represented 45 per cent of the company's total issued capital at that time (see Chapter 8, Section 3). In 1930, probably at the request of the bank at this time of severe depression, the overdraft was reduced to £100,000 and this reduction coincided with the issue in 1929 of 900,000 Ordinary Shares of £1 each, paid for by means of four equal installments before the end of that year (see Chapter 8, Section 3). It must be emphasised that these overdraft facilities were supposedly of a short-term nature, ranging from one month to one year, but that they became a continuing process which undoubtedly enabled the company to circumvent normal channels for capital fund raising. It should be noted that until 27th June, 1923, all the overdraft facilities were obtained from the Commercial Bank of Scotland in Glasgow, but that after that date the London branch of that bank provided the facility.⁴⁵

45. S.R.O. Records of the South of Scotland Electricity Board, SSE5,1/2, 27th December, 1911, 13th March, 1912, 15th June, 1912, 28th August, 1912, 20th November, 1912, 18th December, 1912, 17th December, 1913; SSE5,1/3, 6th March, 1918, 26th November, 1919, 16th June, 1920, 13th July, 1921, 27th June, 1923, 9th June, 1926; SSE5,1/4, 27th July, 1927, 20th June, 1928, 9th January, 1929 and SSE5,1/5 2nd April, 1930.

Not only the large powerful company, such as the C.V.E.P. Company, sought overdraft facilities but smaller and weaker companies also enjoyed this benefit. For example, in August 1904 the directors of the Kilmacolm Electric Lighting Company agreed to obtain an overdraft of up to £1,000 on the personal guarantee of the directors and, presumably, this was obtained. In March 1905 it was again agreed to obtain an overdraft to meet a balance due to Callenders Cables and Construction Company for work carried out, and again it is presumed that this was obtained. In May 1909 the Royal Bank of Scotland at St. Vincent Street, Glasgow sanctioned a further £1,000 advance to the company and, possibly as a consequence of this, the company's overdraft with the British Linen Bank was transferred to the Royal Bank of Scotland.⁴⁶ The example of the Kilmacolm company is interesting in that it indicates that banks were willing to lend to relatively small companies on a medium rather than a short-term basis. This example also confirms that companies were able to fund capital projects by means of overdraft facilities.

The Skelmorlie Electric Supply Company was yet another company which benefited from the use of the overdraft. In March 1912, the chairman of this company arranged an overdraft of £5,000 at 5 per cent with the Clydesdale Bank and

46. S.R.O. Records of the South of Scotland Electricity Board, SSE5,3/1, 8th August, 1904, 13th March, 1905, 5th May, 1909; SSE5,3/2 6th July, 1909.

in doing so opened, apparently, the company's account with the bank. In May 1913 this overdraft was raised to £6,000 to meet the cost of the laying of cables by Callenders Cables and Construction Company. In September 1926 a payment of £1,000 was made to the Clydesdale Bank to reduce the company overdraft to £5,000 and, since there is no other mention in the extant records of the 1913 overdraft having been cleared, it is presumed that this 1926 payment was towards payment of the overdraft which had been negotiated in 1913.⁴⁷ Thus, yet again, the semi-permanency of the customary short-term loan was confirmed, as was the use of such facilities to extend the capital size of the undertaking.

There were, of course, a variety of other measures taken to ensure that, where there was a problem of liquidity or a problem of a more long-term financial difficulty, adequate finance was available. For example, in June 1910 one of the directors of the C.V.E.P. Company, the politician Bonar Law, agreed to be responsible for any loans, up to £2,000, arranged by the C.V.E.P. Company with William Jacks and Company of Glasgow.⁴⁸ Furthermore, the underwriters of the capital of the C.V.E.P. Company, the Traction and Power Securities Company, provided that

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47. S.R.O. Records of the South of Scotland Electricity Board, SSE5,8/1, 23rd March, 1912, 26th May, 1913 and 21st September, 1926.
48. S.R.O. Records of the South of Scotland Electricity Board, SSE51/2, 3rd June, 1910.

company with a loan of £90,000 at an interest rate of 5.5 per cent per annum in August 1916; this loan was eventually repaid on 31st March, 1925.⁴⁹ In addition to this, and as already noted, the C.V.E.P. Company received a loan from the Ministry of Munitions of an amount eventually totalling £266,499.01p in 1921; this was eventually repaid in May 1929.⁵⁰ Moreover, the C.V.E.P. Company had other sources of possible capital. For example, the company's financial position was discussed on numerous occasions with the British Westinghouse Electric and Manufacturing Company, the company's major contractor, and the Traction and Power Securities Company, and on 23rd March, 1921 the company directors decided that John W. Cloud, one of the company's directors and also president of the Westinghouse Brake Company of America, should discuss the position of the C.V.E.P. Company with Mr. Herman Westinghouse, who was expected in London, to see if additional capital loans could be obtained from one of the company's American shareholders;⁵¹ the outcome of these negotiations is not known. Moreover, subsidiary companies obviously benefited from their connection with parent companies. For example, in December 1925 the Lanarkshire Hydro-Electric Power Company decided that its future financing should be obtained

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49. S.R.O. Records of the South of Scotland Electricity Board, SSE5,1/2, 23rd August, 1916 and SSE5,1/3, 31st March, 1925.
50. S.R.A. Records of Strain and Robertson, TD86/6/4. S.R.O. Records of the South of Scotland Electricity Board, SSE5,1/3 11th May, 1921 and SSE5,1/4, 22nd May, 1929.
51. S.R.O. Records of the South of Scotland Electricity Board, SSE5,1/3, 23rd March, 1921.

from its parent company, the C.V.E.P. Company, in the form of temporary loans.⁵²

Among the smaller undertakings there seems little doubt that personal loans by individuals, and in particular the companies' directors, were used as a means of providing essential additional capital during times of acute crisis. For example, the directors of the Skelmorlie company were told in December 1914 that the company had not the funds to meet the interest due on its overdraft with the Clydesdale Bank, an overdraft obtained to finance additional capital expenditure. Consequently, two of the company's directors provided the company with a loan of £110 each to meet this contingency. Interest was charged on the loan at the same rate being charged by the bank.⁵³ In 1913 the Kilmacolm company also experienced a financial crisis when it was found necessary to extend the plant and, since it was thought that the outside public would not subscribe for share capital, the directors decided to finance the expenditure in March 1913.⁵⁴ The amount of this loan was finally confirmed in January 1914 when two of the directors, Dr. Parker and T.H. Barr, made personal loans to the company of £400 each, at the rate of 4 per cent per annum.

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52. S.R.O. Records of the South of Scotland Electricity Board, SSE5,4/1, 16th December, 1925.
53. S.R.O. Records of the South of Scotland Electricity Board, SSE5,8/1, 23rd December, 1914 and 30th December, 1914.
54. S.R.O. Records of the South of Scotland Electricity Board, SSE5,3/2, 12th February, 1913 and 14th March, 1913.

This, however, left a balance of £1,200 which the company secretary stated he could not obtain from the bank, on overdraft, at 4 per cent per annum. As a result T.H. Barr offered to take the place of the bank and provide the company with a loan for this balance at the rate of 4 per cent per annum; this was accepted.⁵⁵ It could be argued that these loans were merely business transactions by the directors, as private individuals, and the company, but it must be remembered that if the company could not attract public funds in the form of share capital to finance its expansion, then this lack of confidence by the investing public undoubtedly pointed to a weakness in the company. Therefore, these loans were at risk and were not receiving interest comensurate with that risk. Moreover, directors did make sacrifices for the financial betterment of their companies. For example, in May 1919, in order to wipe off a loss of revenue, two of the directors of the Skelmorlie company surrendered a proportion of their shares. Colonel R.C. Mackenzie and R.V. Farnham surrendered forty and fifty shares of £10 each respectively to reduce the company's liability to shareholders and to enable the company to make a new issue of shares without exceeding its authorised capital; no mention is made of any financial

55. S.R.O. Records of the South of Scotland Electricity Board, SSE5,3/2, 12th January, 1914.

recompense being offered by the company to these directors.⁵⁶

From the above, therefore, a complete acceptance of issued capital as the sole means of funding the establishment and expansion of electricity supply undertakings in Scotland is misleading, and a number of other relevant factors must be taken into account. The use of short-term credit facilities, from Scottish banking institutions, which became in reality almost long-term loans, was one of these major factors. The importance of this facility was highlighted by the examples given above of the C.V.E.P. Company and the Skelmorlie company. In 1920 when the C.V.E.P. Company had an issued capital of £900,000, it took a conscious decision not to issue further capital but instead to obtain an overdraft of £442,000. Since this overdraft was part of a continuing process, it could be argued that it represented an increase of 49.11 per cent in issued capital at 1920 without, presumably, increasing the company share liability. Similarly, in 1926 when its issued capital was £2,000,000, then the current overdraft represented 30 per cent of issued capital, and in 1929 when issued capital had been raised to £2,900,000 the overdraft at that time of £900,000 still represented 31.03 per cent of issued capital. The Skelmorlie company's

56. S.R.O. Records of the South of Scotland Electricity Board, SSE5,8/1, 9th May, 1919.

financial affairs present an even greater example of the benefits of an overdraft. In 1913 its issued capital was, at most, £8,190. In that year it obtained an overdraft of £6,000, which was still being repaid in 1926, and in 1913 represented 73.26 per cent of its issued capital. As stated earlier, the extant records of all Scottish companies are not available, but if this pattern of extended credit was widely repeated throughout Scotland then the contribution of Scottish banks to the development of the Scottish electricity supply industry was, indeed, great. In particular, and from the above evidence, the contribution of the Commercial Bank of Scotland, the Royal Bank of Scotland, the British Linen Bank and the Clydesdale Bank was important. The importance of loans either public or private, large or small, national or parochial, must also be recognised, since at times such loans were almost the life-blood of the individual undertaking. Moreover, these loans, from the examples given above, affected companies of varying size and scale, and, since it is presumed that this was a feature of the financial policy of companies throughout Scotland, the true value of investment in Scotland in this industry may be very much underestimated, although by how much is impossible to determine.

The reliance of individual companies, and thus the industry itself, on the provision of either loans or overdraft facilities, or both, indicates the fact that such companies were under-capitalised. It was assumed that, prior to the inception of any undertaking, a careful

assessment was made of market demand, capital requirements and the viability of the future undertaking in terms of potential shareholders, but from the evidence this was patently not true. It can be argued that in the case of the C.V.E.P. Company that, initially, careful preparation was carried out - the 'Inventory of Works' (Appendix 22 p.709) is evidence of this - but because of its unique position in the industrial heartland of Scotland demand, industrial, commercial and domestic, outstripped supply quicker than was anticipated, thus forcing the company to rely on external sources of finance. However, with other companies such an hypothesis cannot be accepted since, by their own admission, there was a failure to attract shareholders and also a failure to provide an adequate supply within their designated area. For example, at Skelmorlie in 1919 the company received numerous letters requesting a supply but did not have sufficient cash to finance such connections and, by its admission, could not attract possible subscribers from within its own area to provide additional finance.⁵⁷ Similarly, the secretary of the Kilmacolm company, in 1907, received numerous letters from people in the area who wished a supply. The secretary was told to reply to these letters to the effect that a supply would be given, but only if those involved took up shares equivalent to the capital

57. Ibid., 17th April, 1919 and 27th August, 1919.

outlay.⁵⁸ Such companies were undoubtedly undersubscribed but from a comparative assessment of Appendices 18 and 19, which indicates that on so many occasions capital expenditure exceeded issued capital, it can also be concluded that many companies were under-capitalised.

(6) Capacity.

Any attempt made to assess the comparative growth of individual companies or the overall growth of the Scottish electricity supply industry during this period, based on technical statistics, yet again meets with difficulty because of a lack of reliable evidence. This is amply shown by a study of Appendix 20 (p.704), which lists the installed capacity and units generated, where known, of individual Scottish companies. The reasons for the deficiency of statistical information are not known, although the thoroughness with which the information was collated would lead one to believe that the collators were not culpable. Thus, it is believed that, for whatever reason, the evidence was not provided by the individual companies. However, Appendix 20 is further confused by the fact that rather than units generated being listed at source, the figure provided was for unit sales. Thus, in the appendix this difference is noted by 'G' for units

58. S.R.O. Records of the South of Scotland Electricity Board, SSE5, 3/1, 30th April, 1907.

generated and 'S' for units sold against the figures provided.

Despite the weaknesses of this appendix, attention can be drawn to certain aspects and certain questions can be raised. For example, even as late as 1931 there were a number of small generating stations where the installed capacity was less than 100KW. This is true at Melrose, Dollar, Jedburgh, Portpatrick, Tayside, Dalbeattie (at 1925/1926), North Berwick, Grantown-on-Spey and Newcastleton. Such undertakings provided a supply mostly for lighting rather than power and this tends to be borne out by their geographical locations in the more remote and less industrialised areas. However, this supposition cannot be completely substantiated since only composite figures are given for units either generated or sold.

As could be expected, it is the power companies which dominated the statistics for installed capacity. Greater evidence is available during the 1920's, and from the figures it can be seen that the C.V.E.P. Company with an installed capacity of 106,250KW in 1925/1926 and 112,250KW in 1931 was by far the largest company in Scotland. In 1925/1926 the two other major power companies, the Fife Electric Power Company and the Scottish Central Electric Power Company, were in positions two and three, although far behind the leading company. In 1925/1926 the former company had an installed capacity of 16,550KW and the latter 13,150KW.

By 1931, although the C.V.E.P. Company retained its

premier position, the influence of the major hydro-electric schemes was becoming apparent. The Grampian Electric Supply Company had taken second place with an installed capacity of 32,000KW. The Scottish Central Electric Power Company retained its third position having increased its installed capacity by 12,100KW to 25,250KW. However, the Fife Electric Power Company had not only slipped into fourth place but also reduced its installed capacity by 300KW to 16,250KW. The growing influence of hydro-electric developments is again obvious with the Lanarkshire Hydro-Electric Power Company (installed capacity of 15,520KW) taking fifth place. The only other company of any real consequence was the Coatbridge and Airdrie Electric Supply Company which had an installed capacity of 11,500KW.

The dominance of the power company in the particular aspect of installed capacity is reflected in units generated and sold, but there are anomalies. The C.V.E.P. Company, as might be expected, sold more units of electricity in 1925/1926 and 1931 than any other company. The Coatbridge and Airdrie Electric Supply Company which, by definition of installed capacity was only the fourth largest company in 1925/1926, was in respect to units sold the second leading company but by 1931 its tabular position had greatly altered; at 1925/1926 (the figure is in actual fact for 1923) over 88 million units were sold, but by 1931 sales had fallen to under 16 million units. The area

supplied by this undertaking was heavily populated and had a concentration of heavy industry. The rapid adoption of electric power by industry and, in particular, by collieries in Scotland is a significant feature of the inter-war period,⁵⁹ and may, in part, explain the high sales figure of 88 million units. Moreover, in 1923 the coal industry "had its most prosperous year of the decade because of the interruption to continental coal supplies following the occupation of the Ruhr,"⁶⁰ and thus these figures may be inflated. The rapid decline in sales revealed at 1931 undoubtedly reflects the depression and the severity with which it affected this area. The Scottish Central Electric Power Company was, in terms of installed capacity, only the third largest company in both 1925/1926 and 1931 and was in respect to units, in this case, generated in third place in 1925/1926 but by 1931 had overtaken the Coatbridge and Airdrie company to become the second leading company. The Fife company held fourth place for units generated/sold in 1925/1926 but by 1931 it, too, had overtaken the Coatbridge and Airdrie undertaking. The Grampian company, having only recently begun operations in 1931, was, despite its great installed capacity, under-utilised. The dominance of the above named companies was

59. Neil K. Buxton, Entrepreneurial Efficiency in the British Coal Industry between the Wars, Economic History Review, 2nd Series, Vol. XXIII (1970), p.p. 476-497.

60. R.H. Campbell, The Rise and Fall of Scottish Industry 1707-1939, (Edinburgh, 1980), p. 155.

to be expected since they were situated in the more densely populated and industrial regions where demand was great and, moreover, this demand was not exclusive to one particular function such as lighting but was greatly augmented by industrial, commercial and domestic use.

The decade of the 1920's, which provides a greater continuity of statistics, is one of considerable interest. For example, an examination of the undertakings at Hawick and Galashiels, less than twenty miles apart in the Borders, reveals an interesting situation. At Hawick, an Edmundsons' undertaking (see Chapter 7, Section 2), installed capacity was increased by 400KW between 1920/1921 and 1925/1926 presumably in anticipation of rising demand but, during that period, demand fell by 14.95 per cent while for the decade ending 1931 demand fell by 27.59 per cent. On the other hand, at Galashiels, a Balfour concern (see Chapter 7, Section 1), installed capacity was continually increased throughout the decade and was accompanied by rising sales. Between 1925/1926 and 1931 installed capacity rose by 122.95 per cent (338.71 per cent for the decade), and this was virtually matched by a corresponding increase in sales of 125.75 per cent for the same period. In the 1930's Hawick, with a population of £ 17,000, was larger than Galashiels where the population amounted to £ 13,000. At Hawick the most important industry was the production of hosiery - more than twenty firms were engaged in the industry, but Galashiels was "the most highly industrialised" of the Border towns and "the chief centre of the Scottish

tweed industry."⁶¹ This heavier concentration of industry at Galashiels accounts in part for the difference in performance of both undertakings, but whereas the Hawick undertaking, apparently, served only its own local community, the undertaking at Galashiels had an expanding area of supply. In 1921 a supply was provided to the nearby town of Selkirk and in 1926 the Galashiels company was authorised to further extend its area of supply to other burghs and parishes in Peebles, Selkirk and Roxburgh. This more regional aspect of the undertaking at Galashiels was emphasised in 1928 when the company changed its name to the Scottish Southern Electric Supply Company.⁶² Thus, the declining demand at Hawick can probably be explained by the onset of the inter-war depression which also affected the industries at Galashiels, but at the latter the expansion of the area of supply more than offset such effect.

From the available statistics other companies experienced a period of decline in the 1920's but, since these companies were not reliant on industrial and commercial demand any explanation concerning the inter-war depression would appear to be not entirely relevant and, furthermore, particular considerations concerning these companies have to be taken into account. The Kilmacolm Electric Lighting Company, which serviced a mainly residential area, experienced a reduction in installed capacity of 80KW. However,

61. C.A. Oakley, Scottish Industry To-Day, (Edinburgh, 1937), *passim*, p.p. 57-65.

62. The Third Statistical Account of Scotland, the Counties of Peebles and Selkirk, (Glasgow, 1964), p. 269. Garcke, op. cit. Vol. XXIV.

this company had been in difficulties over a number of years (see Chapter 8, Section 9), and was formally taken over by the C.V.E.P. Company in December 1925 after which its profitability markedly increased (see Table 49 p. 495). The other undertaking which experienced a decline during this period was that of the Fochabers (Elgin) Electric Lighting. As explained earlier this was a private installation belonging to the Duke of Richmond, Gordon and Lennox; no reason can be given for the decline of this undertaking. The situation surrounding the North of Scotland Electric Light and Power Company is complicated. This company had originally comprised the three undertakings of Inverness, Montrose and Brechin, but in August 1926 the burgh of Inverness took over the undertaking at Inverness. Thus, the statistics given for the company at 1925/1926 and 1931 refer only to the undertakings at Montrose and Brechin. The installed capacity of this company rose from 753KW to 828KW. This was as a result of the installed capacity at Montrose being increased by 75KW, from 507KW to 582KW during this period. The situation with regard to units sold/generated would appear to indicate a dramatic fall in demand by 1931. At 1931, 134,560 units were actually generated by the undertakings at Montrose and Brechin; this figure obscures the fact that an additional 730,474 units were purchased by these undertakings, presumably from the company's previously owned plant at Inverness - although this is not stated - and the total sales of both undertakings amounted to 638,664 units. No similar analysis

is provided for units generated and units purchased for 1925/1926, but it must be assumed that the figure for sales at 1925/1926 of 614,491 units is a composite figure. Thus, a comparison of both sales figures indicates that by 1931 demand rose by 3.93 per cent.

By comparison with the North of Scotland company which increased both installed capacity and sales, two other companies did not expand their installed capacity between 1925/1926 and 1931 but did increase their units generated. There was clearly an increase in demand and in unit sales. The undertaking at Dollar had an installed capacity of 38KW between 1925/1926 and 1931 but increased its units generated by 9,309 units or 19.38 per cent. The figures for the undertaking at Crieff are even more remarkable. At Crieff the installed capacity remained at 162KW, but actual unit sales rose by 61,828 units or 121.24 per cent between 1925/1926 and 1931. Both examples reveal excess plant capacity before 1925/1926, but the increases, particularly of unit sales at Crieff, indicate a pent-up demand which was being satisfied in the latter period; because of the geographical location of Crieff, it seems likely that this demand was domestic rather than industrial.

From the limited amount of statistical information available an attempt has been made to assess the growth of the electricity supply industry in the second half of the 1920's by examining the increase in installed capacity and in units generated/sold of selected companies. The results of this study are presented in Table 13 which presents the

growth of both aspects in percentage terms. Because of the obvious lack of information the companies have not been chosen at random but they do represent a cross section of large and small companies from both rural and urban areas.

TABLE 13.

Percentage Increase of Installed Capacity and
Units Generated/Sold of Selected Companies
between 1925/1926 and 1931.

<u>Company Name.</u>	<u>Installed Capacity</u>	<u>Units Generated/ Sold</u>
Fort William Electric Light Company	63.29	-
St. Andrews	100.00	-
Fife Electric Power Company ..	-1.81	34.19
C.V.E.P. Company	5.65	50.47
Dalbeattie Electric Light and Power Company	57.14	591.73
Elgin Electric Supply Company ..	132.35	541.36
Scottish Central Electric Power Company	92.02	54.40
Duncans' Electric Supply Company	-	53.63

Source: Appendix 20.

The Fort William company, which was one of the earliest to be formed in Scotland, began a public supply in August 1896.⁶³ From, at least, 1910 until 1925/1926 the installed capacity of this undertaking was 158KW and the fact that it remained at that level indicated its ability to satisfy demand without any extension of plant during this fairly lengthy period. However, between 1925/1926 and 1931

63. Garcke, op. cit. Vol. VI.

installed capacity rose by 63.29 per cent, or by 100KW, to 258KW. It is unfortunate that no unit figures are available but, nevertheless, such an increase would appear to indicate that demand was rising fairly rapidly. Moreover, the character of this town emphasises the domestic and commercial nature of this demand. In addition, however, there seems every likelihood that such demand was stimulated by the construction of the nearby Lochaber hydro-electric scheme (see p.203 , which involved on average the employment of 1,000 men and the building of a model village at Fort William to house the permanent workers at the power station and at the aluminium processing factory.⁶⁴ At St. Andrews, where the undertaking had been opened in 1905,⁶⁵ installed capacity grew by 100 per cent between 1925/1926 and 1931. St. Andrews was a university and residential town with no major industries and thus demand was basically domestic and commercial and, although there are no figures prior to 1925/1926, nor figures for units generated/sold, it would appear that demand was intensifying in the latter part of the 1920's. Duncans' Electric Supply Company operated undertakings at Ballater, where a public supply began in 1914, and at Ellon, where a public supply began in 1915.⁶⁶ Both undertakings were, therefore, in rural, relatively isolated areas where there was little

64. Oakley, op. cit. p.p. 54-55.

65. Garcke, op. cit. Vol. IX.

66. Ibid., Vol. XXIX.

or no industrial demand. As indicated, it is not known if installed capacity grew during this period, but units generated rose by 53.63 per cent which again emphasises the growth in domestic demand which took place during the second half of the 1920's. These three concerns had been established for varying but, nevertheless, fairly lengthy periods of time and had had time to become established and yet in the latter part of the 1920's they experienced a renewed surge of growth which was based largely upon domestic and commercial demand.

Table 13 deals with the performance of two of the other smaller concerns which were operating at this time viz., the Elgin Electric Supply Company and the Dalbeattie Electric Light and Power Company. At Elgin a public supply began in 1922 and at Dalbeattie the public supply began c 1924. Consequently, it could be argued that, during the period examined, these concerns were still experiencing the first fervour of growth and had not yet reached maturity. Both concerns may have been much too cautious in their initial establishment and have been forced into expansion to meet rising demand. However, in the latter part of the 1920's both undertakings experienced rapid growth, although it must be admitted that the spectacular growth of units generated/sold may well be explained by the fact that both were operating in, what could be described as, virgin markets. Although installed capacity at Elgin grew by 132.35 per cent in the period, units generated/sold grew by 541.36 per cent, and at Dalbeattie

the corresponding figures were 57.14 per cent and 591.73 per cent respectively. Neither town was renowned as a centre of major industries but at Elgin there were several tweed mills which were introducing new machinery and, generally, re-equipping plant during this period and this may have influenced the pattern of demand, although an upsurge of domestic and commercial usage cannot be ignored.⁶⁷ Similarly, at Dalbeattie there was the possibility of some industrial demand but this cannot be assumed with certainty. It is not known, for example, the extent to which electrification took place in local industries such as the creamery, sawmills or in the production of artificial manures and animal feedstuffs.⁶⁸

The larger power companies also expanded during this period although, as can be noted from Table 13, individual performance varied. These companies, by their very nature, were orientated towards the more urban, highly populated and industrial regions of the country, and their growth illustrates the point that in a truly national sense there was a recognition of and enthusiasm for an electricity supply by not only domestic and commercial consumers but also by industrial users of power. From Table 13, it can be noted that the Fife Electric Power Company reduced its capacity by 1.81 per cent, but in the process expanded units generated/

67. Oakley, *op. cit.* p.p. 35-36

68. The Third Statistical Account of Scotland, The Stewartry of Kirkcudbright and the County of Wigtown, (Glasgow, 1965), p.p. 326-327.

sold by 34.19 per cent, thereby indicating that prior to 1925/1926 the company had suffered from excess capacity. The C.V.E.P. Company, on the other hand, increased its installed capacity by 5.65 per cent, or 6,000KW, but also increased its unit sales by 50.47 per cent equal to 85,931,524 units.⁶⁹

The Scottish Central Electric Power Company also experienced growth during this period, but there are obvious differences between this company and the other two power companies. The installed capacity of this company rose by 12,100KW or 92.02 per cent while units generated by the company rose by 17,700,788 or 54.40 per cent. Both sets of figures undoubtedly reflect the increase in demand which occurred nationally in the latter part of the 1920's. The nature of this demand is not fully known but, since the company was the authorised undertaker for the counties of Linlithgow, Clackmannan and parts of the counties of Dumbarton and Stirling, part of this demand was assuredly industrial. Moreover, the company provided a bulk supply to the Scottish Midlands Electricity Supply Company at Linlithgow and Falkirk and also to the undertakings at Alloa and at Denny and Dunipace. In addition, by 1931 the company supplemented the supply generated by the local authority undertakings of Stirling and Uphall and Broxburn. For example, Stirling purchased 1,387,906 units and Uphall

69. For a detailed analysis of the unit sales of the C.V.E.P. Company at 1923 and 1924, see Chapter 8, Section 5.

and Broxburn 237,465 units.⁷⁰

Table 13, therefore, indicates that, in the second half of the 1920's, demand, whether it was domestic, commercial or industrial, was expanding generally throughout Scotland; and this increase affected companies large and small as well as those undertakings whose primary role was to service areas of either an urban or rural nature. Relatively new undertakings such as those at Dalbeattie and Elgin, which were operating in virgin markets, were able to show very rapid expansion in their formative years, but it is equally evident that mature concerns such as those at Fort William and St. Andrews experienced an acceleration of demand during the latter part of the 1920's. The growing importance of domestic demand has been noted and emphasised. However, the growth of the power companies emphasises the fact that the industrial market for electricity supply was also expanding. In particular, the C.V.E.P. Company and the Scottish Central Electric Power Company, which together supplied West-Central Scotland, benefited from the expansion of industrial markets. Finally, the geographical diversity in the locations of the undertakings named reinforces the view that the growth in demand during this period was not confined to one particular sector or area, but that it was truly national in character.

70. Garcke, op. cit. Vol. XXXIV.

Chapter 7

Holding Companies in The Scottish Electricity Supply Industry before 1931.

Between 1900 and 1931 there were approximately forty companies providing a supply of electricity within the confines of Scotland. Superficially, these companies appeared to be largely independent concerns providing a supply within recognisable geographical areas and, in particular, to municipalities which, for one reason or another, did not wish to provide a supply themselves; the power companies were, of course, exceptions since they provided a regional rather than a localised supply. However, a closer examination of the situation reveals that the oft-quoted words of Sir Walter Scott have more than a degree of veracity viz.,

"O what a tangled web we weave

When first we practice to deceive."

It is not suggested that deceit was practised by Members of Parliament and erst-while respectable persons but it is, nevertheless, true that a 'tangled web' was woven by companies of national and international stature to such an extent that the final fabric was beyond the comprehension of all, with the possible exception of company lawyers and financiers and those directly involved. Thus, of the forty or so companies involved in providing a supply of electricity within Scotland during this period all, but a handful, were linked by a series of interlocking directorships. Indeed, increasingly throughout this

period the Scottish electricity supply industry was dominated by a small number of holding companies to the extent that by 1931 only a few undertakings remained outside their control. Consequently, the importance to the Scottish electricity supply industry of the following companies cannot be denied viz., Balfour, Beatty and Company; Edmundsons' Electricity Corporation; Crompton and Company; British Westinghouse Electric and Manufacturing Company; British Power Company and the National Electric Construction Company. However, in fairness to company enterprise it must be pointed out that the 1888 legislation contained important clauses forbidding company amalgamations, and this stimulated the creation of holding companies. The creation of holding companies was, therefore, not a purely Scottish phenomenon but was widespread throughout the United Kingdom.¹

(1) Balfour, Beatty and Company.

In the Scottish context the foremost holding company was undoubtedly that of Balfour, Beatty and Company. George Balfour (1872-1941) had not only an interesting background but fairly definite links with Scotland. Balfour's father, a Scot by origin, was a skilled worker in the dockyard at Portsmouth, and Balfour received his initial education in that town. In 1888 he was apprenticed as a mechanical engineer in the Blackness Foundry in Dundee

1. Henderson, op. cit. p.p. 27, 55, 69-70.

which had formerly been owned by his great uncle. Balfour also attended the Technical Institute at Dundee and University College, Dundee and after qualifying gained experience in various engineering firms and in Edinburgh Corporation's Electricity Department. In 1899 he became a partner in the engineering firm of Loudon Brothers. In 1901 the Scottish connection was strengthened by his marriage to Margaret Malloch, daughter of David Mathers of Dundee, who provided him with four sons and one daughter. In 1902 he became the commercial manager for an American electric utility company opening in Britain, and it was this experience which gave him the expertise upon which in 1907 he was able to leave this firm and gain his independence. On 12th January, 1909 he formed a partnership with Andrew Beatty and it was this partnership which was eventually to dominate the private sector of the Scottish electricity supply industry. In politics Balfour was a conservative. He unsuccessfully contested the Govan Division of Lanarkshire in 1910/1911 but later became Unionist Member of Parliament for Hampstead, a position he held from 1918 until his death in 1941.²

Balfour's interest in the Scottish electricity supply industry was diverse in the sense that it had at least three strands which were linked by his partnership in the firm of Balfour, Beatty and Company. For example, Balfour the founder member of Balfour, Beatty and Company, operated

2. Who Was Who 1941-1950, (1952). Hannah, op. cit. p.p. 71-72.

apparently outwith the company as a consultant electrical engineer, and became associated with several other companies whose links with the Balfour Beatty concern were rather tenuous and dependent on Balfour, the individual, rather than Balfour as part of the entity, Balfour, Beatty and Company. Secondly, Balfour, Beatty and Company directly established a number of subsidiary concerns and, finally, Balfour, Beatty and Company by establishing the Scottish Power Company formulated, by one means or another, a series of linked companies which were kept distinct and separate from those companies associated with the other two strands. This complicated pattern of development, which is analysed in some detail below and has been presented in Tables 14-18, ended in the latter part of the 1920's when the Balfour holdings were re-organised and consolidated under the Scottish Power Company.

As far as can be determined Balfour's first involvement in the Scottish electricity supply industry began C 1907 when he became a director and later managing director of the Fife Electric Power Company.³ The Fife Electric Power Company, a subsidiary of the British Power Company (see below), was incorporated by Act of Parliament in 1903; by its terms the company was authorised to erect generating stations within the Parishes of Culross, Carnock, Auchertool, Cupar, Markinch and Scoonie, all of which were in the County of Fife, and also to supply electricity within

3. Garcke, op. cit. Vol. XI.

that county.⁴ This company was, in fact, sponsored by the British Power Company and remained within the aegis of that company until 1907 when Balfour, who as far as can be determined had no direct association with that firm, joined the board of directors of the Fife company. On 30th January, 1908 the Arbroath Electric Light and Power Company was formed to carry on the business of an electric light, heat and power company and to undertake the illumination of the streets, buildings and public and private places in the town of Arbroath. The initial capital of this concern was £30,000 of which £5,000 was issued and a public supply began on 19th August, 1908. The first directors of the firm were George Balfour and it is presumed two local men viz., S. Renny and A.V. Anderson.⁵ At 1910, by which time the issued capital was £22,270, the directorship remained the same, and, thus, it would appear that, in the Scottish context, Balfour made his first independent move by establishing this concern. By the end of 1908 Balfour had become managing director of a British Power Company subsidiary, the Fife Electric Power Company, and established an independent supply company at Arbroath.

On 12th January, 1909 Balfour, Beatty and Company was formed, as a private company, to enter into an agreement with the two principals to carry on the business as general

4. Ibid., Vol. VIII.

5. Ibid.

and electrical engineers, contractors and operating managers for tramways, railways and lighting properties and also for the promotion of new companies. The authorised capital of the company was £75,000 of which £50,000 was issued, and at 1910 the two principals, G. Balfour and A.H. Beatty, were the sole directors. On 3rd July, 1909 Balfour, in association with W. Low, J.P., of Blebo, Cupar in Fife⁶ and K. Sanderson, W.S. of Edinburgh who was also a director of the Dumbarton Burgh and County Tramways Company,⁷ was instrumental in forming the Fife Tramway, Light and Power Company to take over the construction, equipment and working of the tramways and other works authorised by the Dunfermline and District Tramways Order 1906.⁸ More important, by 1910 the Fife Tramway, Light and Power Company held £56,500 of the total issued share capital of £62,830 which belonged to the Fife Electric Power Company.⁹ Finally, on 27th December, 1909 the Scottish Power Company was formed to purchase the share capital of the Scottish Central Electric Power Company, with which Balfour had had previous connections (see below) and also other kinds of public and private undertakings in the United Kingdom.¹⁰ Thus, as can be noted

6. Directory of Directors 1910, (1910), p. 589.

7. Directory of Directors 1909, (1909), p. 820 and Directory of Directors 1910, (1910), p. 844.

8. Garcke, op. cit. Vol. XIV.

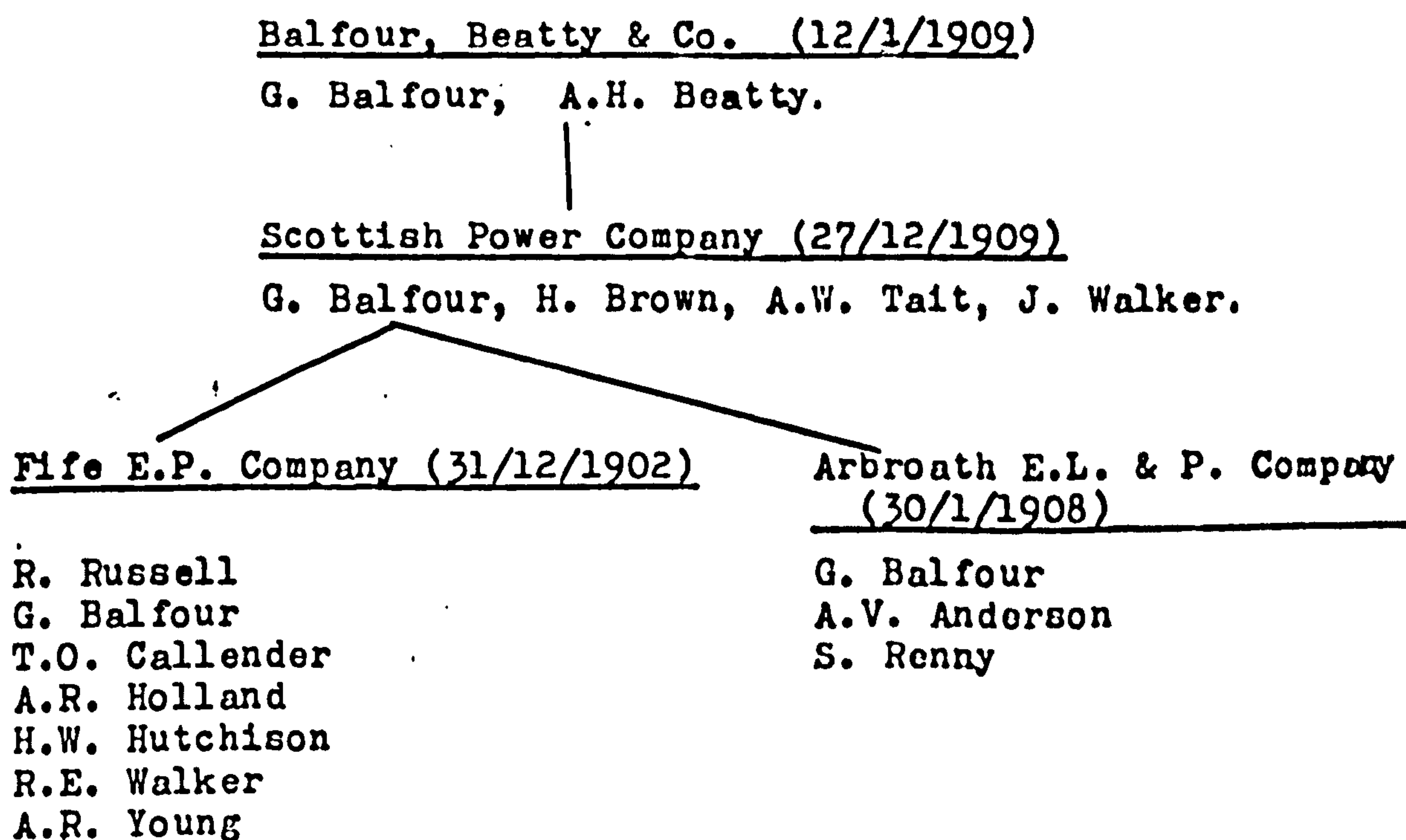
9. Ibid.

10. Ibid.

from Table 14 (see below), by 1910 Balfour had established an independent public supply undertaking at Arbroath, had become closely associated with a major power company in Fife and had the foresight to establish an 'umbrella' holding company, the Balfour Beatty concern, which in turn established an apparently independent holding company, The Scottish Power Company, to oversee the Scottish activities of the parent company, Balfour, Beatty and Company.

TABLE 14

THE INTERESTS OF BALFOUR, BEATTY AND COMPANY AT 1910.



Source: Garcke, op. cit. Vols. VIII, XI and XIV.

By 1910, therefore, Balfour had made important business relationships through his connection with these concerns. No information is available concerning Henry Brown who was a director of the Scottish Power Company

from its foundation in 1909 but by 1911 he was, in fact, chairman of that company. James Walker was a useful acquisition since he had been secretary of the Scottish Central Electric Power Company from its inception in 1903 and, of course, the Scottish Power Company was formed to purchase that company.¹¹ The relationship with A.W. Tait of George A. Touche and Company, Chartered Accountants of London, was also useful. In 1910 Tait was already a director of a number of important companies including Bruce Peebles and Company Limited and the Electrical Securities Trust Limited, and chairman of Durham Collieries Electric Power Company Limited and Ferranti Limited.¹² Moreover, this relationship also gave Balfour access to the British Aluminium Company which, as already noted (see Chapter 5), operated the hydro-electric plant at Foyers. In 1910 Tait was not yet a director of that company but when the British Aluminium Company established its wholly owned subsidiary, the Loch Leven Electric Supply Company, on 25th July, 1910, Tait became its first chairman; by 1915/1916 he was, in fact, chairman of the British Aluminium Company.¹³ Table 14 also provides the names of the directors of the Fife Electric Power Company at 1910. Then this company was still, at least, nominally owned by the British Power Company and in that year A.R. Holland

11. Ibid., Vol. VIII.

12. Directory of Directors 1910, (1910), p. 931.

13. Garcke, op. cit. Vol. XIX.

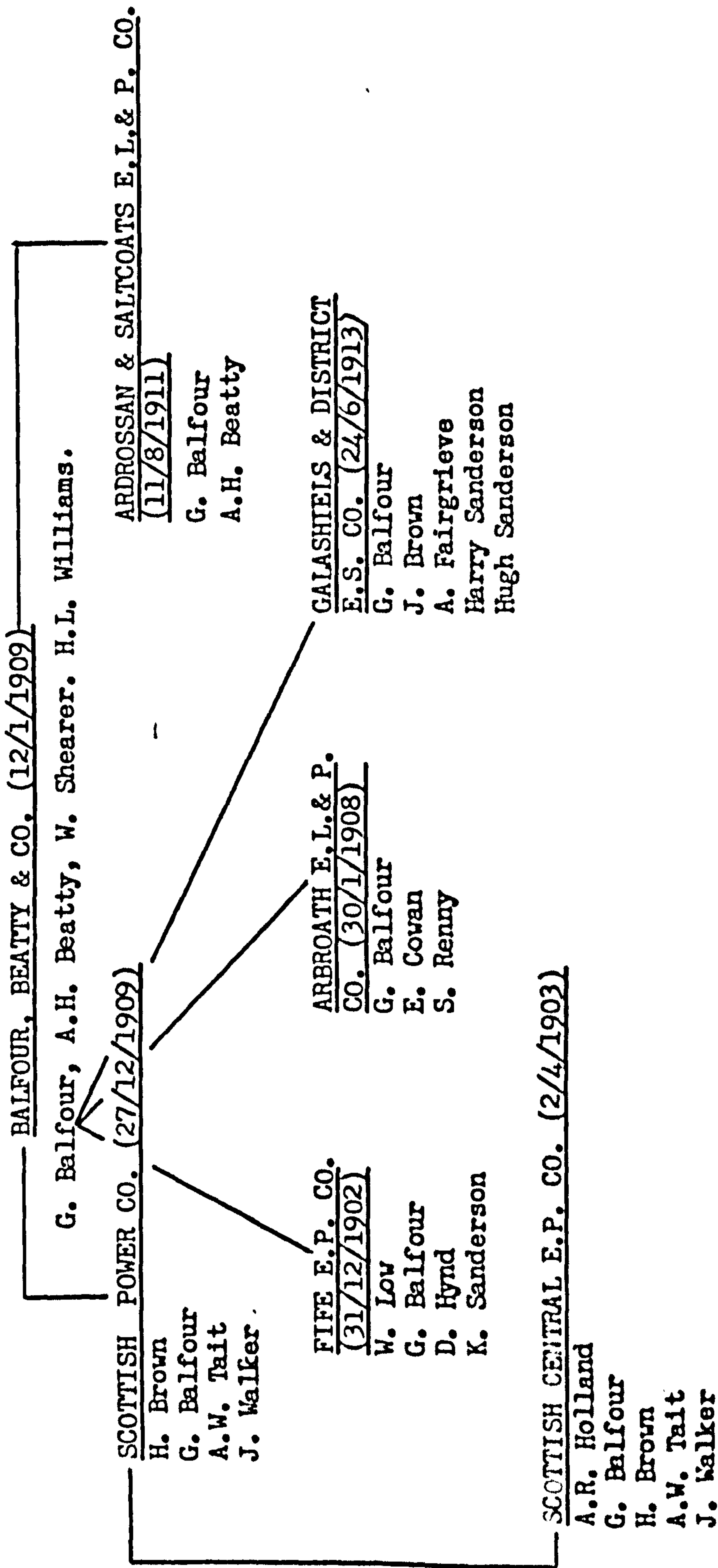
and T.O. Callender were still representing the British Power Company as directors of the Fife company. The British Power Company was originally incorporated on 16th January, 1900 as the South Wales Electrical Power Distribution Company for the purpose of obtaining an Act of Parliament to supply electricity in the County of Glamorgan and part of the County of Monmouth. When those powers were obtained in 1904 the name was changed to the British Power Company which then became a company dealing in electric motors and machinery; the company received £30,000 in shares and debenture stock as remuneration for obtaining Parliamentary sanction and conducting preliminary work at South Wales.¹⁴ T.O. Callender's interest in these companies is obvious since he was the son of W.O. Callender, and at this time managing director of Callenders' Cable and Construction Company.¹⁵ Thus Table 14 does indicate that Balfour was establishing important connections with leading concerns in the United Kingdom.

14. Ibid., Vol. IX.

15. Ibid., Vol. XIV.

TABLE 15

The Interests of Balfour, Beatty and Company at 1915/1916.



Source: Garcke, op. cit. Vols. XIV - XIX.

Table 15 (page 296) illustrates the Balfour Beatty group of companies at 1915/1916. The parent company remained at the centre of an expanding empire but by this time had acquired two new directors, H.L. Williams and W. Shearer; the latter had been secretary of the company from 1910. In 1910 Balfour was granted the electric lighting order for Ardrossan and Saltcoats which he subsequently transferred to the Ardrossan and Saltcoats Electric Light and Power Company; this, in association with A.H. Beatty, he established on 11th August, 1911 with a nominal capital of £20,000 of which £1,005 was issued.¹⁶ The other major activity of the Balfour Beatty concern remained the Scottish Power Company which was formed with the specific purpose of purchasing the Scottish Central Electric Power Company. This latter company was incorporated by Act of Parliament in 1903 to supply electricity, in bulk, to authorised undertakers and also to persons requiring a supply for power in the whole of the counties of Linlithgow and Clackmannan and a portion of the counties of Dumbarton and Stirling, and also to erect generating stations at Westfield, Bonnybridge and Alva; a public supply began in 1905. This was yet another company set up by the British Power Company which from 1903 until 1910 retained a major interest in it through representation on the board of directors. During that time, T.O. Callender,

16. Ibid., Vol. XIX.

W.S.B. McLaren, H. Ruffer and A.R. Holland were directors of the British Power Company and the Scottish concern.¹⁷ The financial details concerning the purchase of the Scottish Central Electric Power Company by the Scottish Power Company are not known but the actual purchase took place C 1910/1911 when a major change in the directorship of the former company took place. Between 1910 and 1911 the four directors of the Scottish Power Company viz., Brown, Balfour, Tait and Walker took their places as directors of the Scottish Central company. Three of the 'old' directors remained viz., A.R. Holland and H. Ruffer, still representing the British Power Company, and W. Lyon Mackenzie who, it is thought, represented local capital. However, by 1915/1916 the take-over was virtually complete and only Holland remained.¹⁸ By 1921/1922 it was quite definitely stated that the Scottish Power Company owned the whole of the issued share capital and the loan capital of the Scottish Central company, although the date of final acquisition is not stated.¹⁹

Thus, Balfour, as part of the entity Balfour, Beatty and Company, was operating at these two levels. First of all, he was part of an independently administered concern at Ardrossan and Saltcoats, and, secondly, by means of the Scottish Power Company, a holding company, control was

17. Ibid., Vols. VII-XIV.

18. Ibid., Vols. XV and XIX.

19. Ibid., Vol. XXV.

exercised over the Scottish Central company. Meanwhile as an individual, and apparently independent of the founding company, Balfour was developing his third sphere of interest. As indicated earlier Balfour was undoubtedly the major force behind the undertaking at Arbroath and, as Table 15 illustrates, this association continued. The only change that can be detected is that E. Cowan replaced A.V. Anderson as a director.²⁰ It was also noted above that Balfour had had a connection with the Fife Electric Power Company from 1907, and that by 1910 yet another of his enterprises the Fife Tramway, Light and Power Company held the majority of the shares in that firm. However, it was not until 1913/1914 that full control over the Fife Electric Power Company was implemented when Balfour, who already was a director, was joined by W. Low, K. Sanderson and D. Hynd and that the British Power Company abdicated its interest. Low and Sanderson were directors of the Fife Tramway, Light and Power Company, along with Balfour, and at 1915/1916 that company held 18,232 shares of £10 each amounting to £182,320 out of a total issued share capital of £182,330 in the Fife Electric Power Company i.e. only one share remained outside its control.²¹ At 1920, D. Hynd of Summerbank, Broughty Ferry was also a director of the Arbroath Electric Light and Power Company,

20. Ibid., Vol. XIX.

21. Ibid., Vol. XV-XIX.

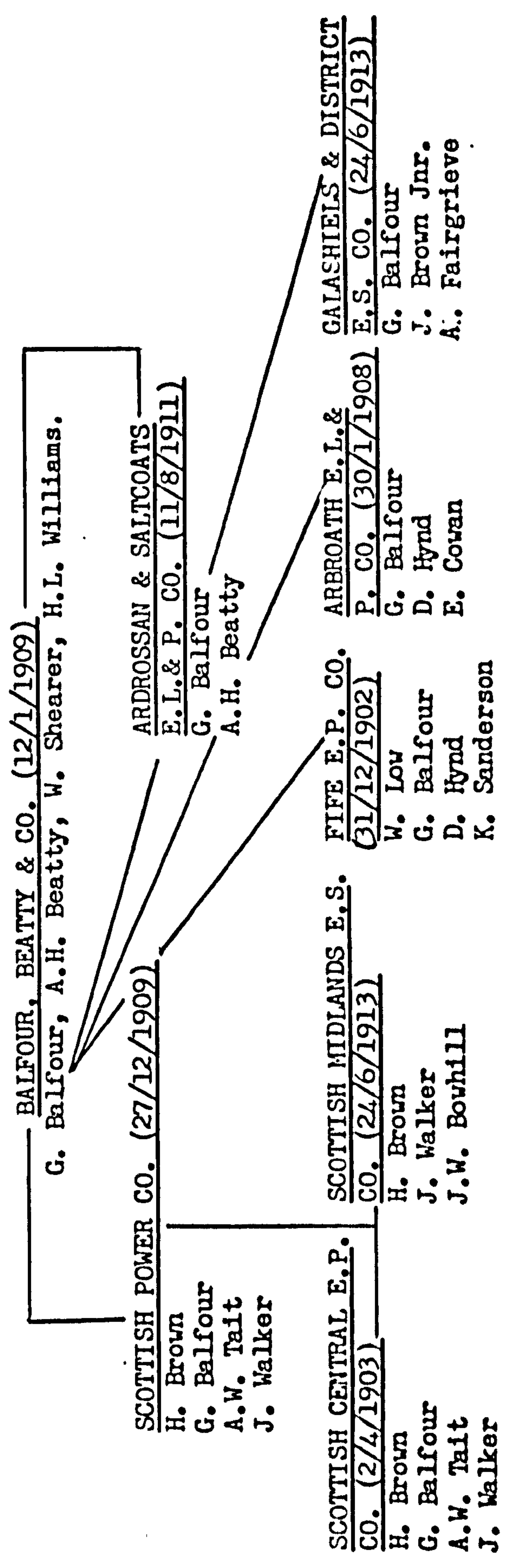
Dunfermline and District Tramways Company, Scottish Central Omnibus Company and chairman of the Victoria Jute Company.²² Meanwhile, Balfour, again it would appear quite independent of any of his other enterprises, formed the Galashiels and District Electric Supply Company in association with A. Fairgrieve, Harry Sanderson and Hugh Sanderson who, it is believed, were local businessmen; J. Brown joined the group the following year. The lighting order for Galashiels was, however, granted to the Electric Supply Corporation, which was a Crompton-associated company (see Section 3), but which, for whatever reason, transferred it to the local company, and a public supply began in October 1914.²³ From Table 15, therefore, it can be seen that at 1915/1916 there was emerging a complicated, but still relatively loose, federation of electricity supply companies which in their administration had one common factor - George Balfour. However, despite the fact that Balfour would appear to have acted independently of the Balfour Beatty company at this time, there is little doubt that the company benefited, in the form of contracts, from his connections. Thus, Balfour received a financial advantage from his membership of the parent company, Balfour, Beatty and Company, and, in addition, received financial gain for the management expertise he was able to offer the other companies.

22. Directory of Directors 1920, (1920).

23. Garcke, op. cit. Vols. XVIII and XIX.

TABLE 16

The Interests of Balfour, Beatty and Company at 1920/1921,...



Source: Garcke, op. cit. Vols. XIX-XXIV.

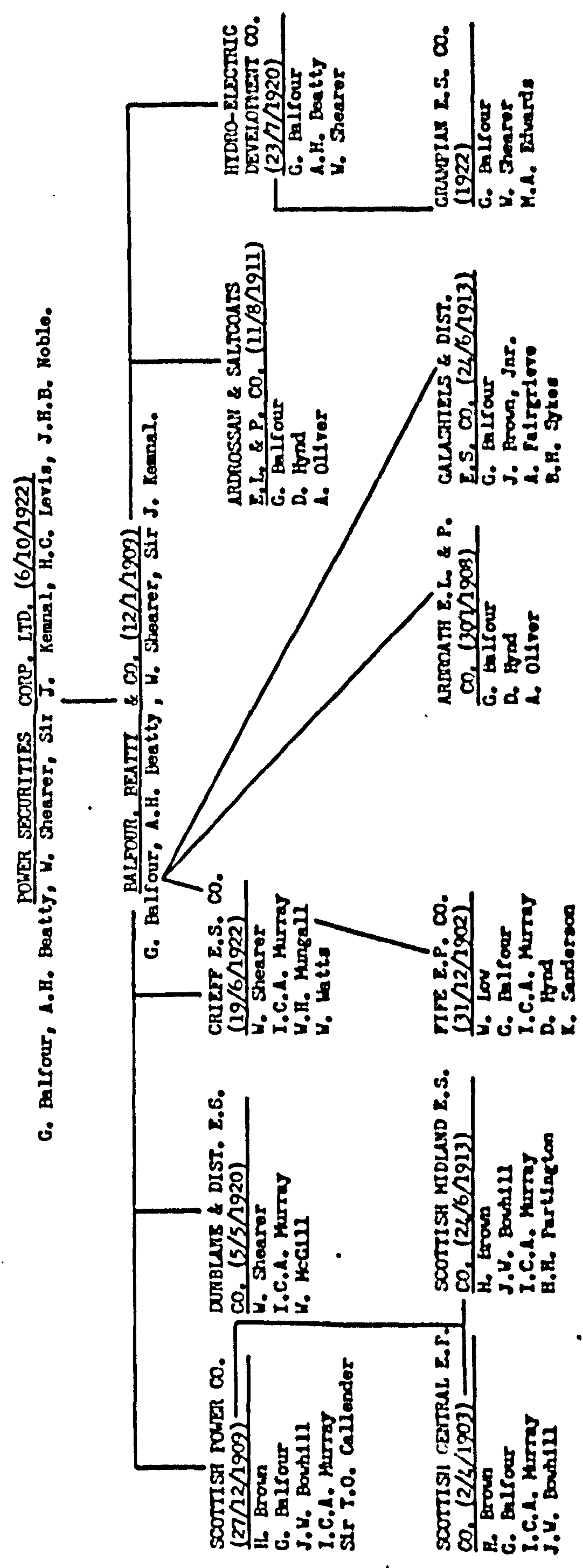
Table 16 (p. 301) outlines the position of the Balfour Beatty group of companies at 1920/1921. From this table it can be seen that there were a few minor changes in the make-up of the directorships of several of the companies. For example, A.R. Holland was no longer a director of the Scottish Central company and D. Hynd had replaced S. Renny on the board of directors of the Arbroath undertaking; Hynd had been a director of the Fife Electric Power Company previously and retained this connection at 1920/1921. Moreover, Harry and Hugh Sanderson, believed to have been 'local' directors, were no longer directors at Galashiels. However, the major change, indicated by Table 16, was the acquisition of the Scottish Midland Electric Supply Company which provided a public supply of electricity to Linlithgow and District. It is interesting to note that the electric lighting order for this area had originally been granted to George Balfour in 1912, but was transferred by him to this company when it was formed on 24th June, 1913. At this stage there was no apparent connection with any of the other Balfour companies since the directors viz., J.R. Little, C. Don and R.F. Shepherd do not have any obvious connection with any of the other companies. However, the secretary of the Scottish Midlands company at 1914/1915 was I.C.A. Murray who was also secretary of the Scottish Power Company, and both concerns shared a common registered office at 63 Castle Street, Edinburgh. This may have been simply a matter

of administrative convenience, and the Scottish Midlands company may have operated as an independent unit outside the Balfour sphere of influence during this earlier period. However, by 1920/1921 the Balfour connection was evident, since two of its directors, Brown and Walker, were also directors of the Scottish Power Company and the Scottish Central Electric Power Company, and, moreover, it is known that its entire share and loan capital was held by the Scottish Power Company from at least 1921/1922.²⁴ The inclusion of J.W. Bowhill among the directors of the Scottish Midlands is of some interest. Both Bowhill and A.W. Tait were directors of the Electrical Securities Trust Limited which had been formed on 3rd July, 1907 to conduct the business of an investment trust company, chiefly in connection with the purchase of shares and debentures in electrical undertakings. At 1910, from a nominal capital of £200,000, it had issued £115,507. Full details of this company are not known, but by 1920/1921 it had apparently sold off all its assets, although the company itself had not been wound up.²⁵

24. Ibid., Vols. XVIII, XIX, XXIV and XXV.
25. Ibid., Vols. XIV and XXIV.

TABLE 17

The Interests of The Power Securities Corporation Limited at 1925/1926.



Source: Carke, *op. cit.*, Vols. XXIV - XL.

Table 17 illustrates the expansion and transition which the Balfour Beatty group had undergone by 1925/1926. The most important change indicated by Table 17 is the fact that Balfour, Beatty and Company were no longer the parent concern but had been replaced by a new enterprise in the form of the Power Securities Corporation Limited. On 6th October, 1922 Balfour registered this new company to adopt an agreement relating inter alia to the acquisition of fully paid shares in Balfour, Beatty and Company, with Balfour, Beatty, Shearer and Williams, and to carry on the business of a financial and investment company and, in particular, to aid the development of electrical and other public utility undertakings. A minority of shares were sold publicly, but the controlling interest was held by Balfour and three engineering companies viz., Armstrong Whitworth, Babcock and Wilcox and British Thomson-Houston. This new consortium, therefore, took over all the Balfour Beatty interests, but the Balfour dominance continued, since of the six directors on the board of the new company three originated from the Balfour Beatty company itself; Balfour, who became chairman, and Beatty and Shearer with the three engineering firms being represented by Sir J. Kennal, H.C. Levis and J.H.B. Noble. Balfour Beatty were also appointed as consulting engineers and managers of the group. Thus, Balfour Beatty had organised a reverse take-over in which it lost controlling interest but retained a management position; the new consortium had an authorised

capital of £2,000,000 of which £1,000,000 was issued.²⁶

The Balfour Beatty company continued to expand. As can be noted from Table 17, H.L. Williams was no longer a director and he had been replaced by Sir J. Kennal of the Power Securities Corporation. The basic pattern of development of companies under Balfour Beatty control remained, although there were changes in the directorate. In 1922/1923 Sir T.O. Callender (he had been knighted in 1918) became a director of the Scottish Power Company, thus renewing a Scottish business relationship with Balfour which had began with Balfour's introduction to the Fife Electric Power Company in 1907. It is also interesting to note that A.W. Tait, who gave up his directorship of the Scottish Power Company in 1922/1923, became a director of Callenders' Cable and Construction Company at least as early as 1920/1921, a position he still held in 1925/1926; and at 1925/1926 he was also a director of Callenders' Share and Investment Trust Limited which had been formed on 3rd May, 1912 to hold stocks and shares of companies or governments. This may well indicate that there had been a continuing business relationship between Balfour and Callender from 1907.²⁷ As noted by 1925/1926 A.W. Tait and, also, J. Walker were no longer directors of the Scottish Power Company and had been

26. Garcke, op. cit. Vols. XXVI and XXIX. Hannah, op. cit. p. 81.

27. Ibid., Vols. XXVI, XXIV and XXVIII.

replaced by J.W. Bowhill and I.C.A. Murray who also replaced them on the board of the Scottish Central company. Bowhill, as noted earlier, was also a director of the Scottish Midlands company from 1920/1921, and now Murray, who had previously been secretary of the Scottish Power Company, also became a director of that company. H.H. Partington also became a director of the Scottish Midlands company at this time. The background of Partington is not known, but at 1931 he was director and general manager of the Scottish Midlands company and also general manager of the undertaking at Dunblane.²⁸ The Ardrossan and Saltcoats undertaking continued with Balfour as chairman, but by 1925/1926 Beatty had given up his position with this company and had been replaced by D. Hynd and A. Oliver. Balfour, Hynd and Oliver were also associated at Arbroath where Oliver had replaced E. Cowan; Oliver represented local interest and was of Clark, Oliver, Dewar and Webster, Solicitors, Brothock Bank House, Arbroath.²⁹ Hynd had also been a director of the Fife Electric Power Company since 1915/1916 and the directorship of this company remained the same, although I.C.A. Murray had now become one of its directors. The third of the companies to remain under Balfour's individual control, the undertaking at Galashiels, also expanded its directorate by 1925/1926 with the inclusion

28. Ibid., Vol. XXXIV.

29. Directory of Directors 1925, (1925), p. 1109.

of B.H. Sykes as a director.

Table 17 also indicates that during the quinquennial period ending in 1925/1926 the Scottish holdings of Balfour Beatty continued to expand. On 5th May, 1920 the Dunblane and District Electric Supply Company was registered as a private company, with an authorised capital of £500, to utilise the water power of the River Allan at Lower Keir Mill for the provision of an electricity supply to Dunblane. This company, however, fell by the wayside when it failed to secure the necessary electricity special order from the Electricity Commissioners. In 1921 such an order was granted to A.H. Anderson, D.C. Blair, H. Marshall, Colonel J.A. Stirling and A.B. Wilson, and a new company was registered in March 1922 to supply electricity to the Burgh of Dunblane and part of the Parish of Lecroft in the county of Perth. The authorised capital of the new company was £15,000, and again it was intended to erect a small water power station on the River Allan. Apparently, the company met with some difficulty, since a special meeting of the company was held in Dunblane on 13th December, 1923 at which a resolution was passed for the sale of the undertaking to Balfour Beatty. The purchase price was £1,552, which was the company's expenditure to that time, and also the issued share capital, plus five per cent; the latter figure is not known. Negotiations were successful and at 1923/1924 the directors of the company were W. McGill, I.C.A. Murray, W.J.

Selley, J.W. McInnes and A. Robertson. Murray, as already noted, was by this time a director of several Balfour Beatty subsidiaries, and McGill was secretary of Balfour, Beatty and Company; presumably the other three directors represented local interests. When supply began in March 1925, it was not derived from the River Allan but taken in bulk from the Scottish Central Electric Power Company. At 1925/1926 local interests were excluded from the board of directors and, as can be noted from Table 17, the directors were W. Shearer, one of the major participants in the Balfour Beatty group, and Murray and McGill.³⁰

Not a great deal of background information is known concerning the Crieff Electric Supply Company which was formed on 19th October, 1922 to generate and supply electricity in the Burgh of Crieff. However, this company was undoubtedly initially sponsored by Edmundsons' Electricity Corporation. Among the first directors of the Crieff company were A.N. Rye and E.J. Williams who were Edmundsons' appointees as directors of the North of Scotland Electric Light and Power Company; Rye was also the general manager of Edmundsons'. (The link between Edmundsons' and the Scottish electricity supply industry is examined in detail in Section 2). The other directors at 1922/1923 were Provost W.H. Mungall, T. Brock and W. Watts who represented local interests.

30. Garcke, op. cit. Vols. XXIV-XXIX.

When a supply began in May 1923, the total generating capacity of the undertaking was 45KW. At 1924/1925 Ryo and Williams were still directors of the company together with Mungall, Watts and J. Alexander who had replaced Brock. The authorised capital at this stage was £12,000 of which £11,027 had been issued. At some time in 1925 the company was taken over by Balfour Beatty on behalf of the Power Securities Corporation; the financial details are not known. As can be seen in Table 17, the directors at 1925/1926 were Shearer and Murray, for Balfour Beatty, and Mungall and Watts representing local interests.³¹

The other interesting development during this period was the acquisition by Balfour Beatty of the Hydro-Electric Development Company. This company was originally formed on 23rd July, 1920 as a private company to promote and assist technically and financially propositions for the utilisation of water power to generate electricity in the United Kingdom and other parts of the world. The directors of the company were Sir Henry Babington Smith and Commendatore George Mauzi-Fe and the company had a capital, authorised and issued, of £50,000. No details are known concerning the activities of this company or, indeed, of the take-over, but in 1923 Balfour Beatty acquired the company; the authorised

31. Ibid., Vols. XXVI-XXIX.

capital was raised to £80,000 of which £69,500 was issued, and Balfour, Beatty and Shearer became its directors with W. McGill acting as secretary.³² At 1925/1926, as can be seen from Table 17, the same persons were involved, but by this time the issued capital had increased to £78,000. The importance of the Hydro-Electric Development Company in the purely Scottish context derives from the fact that it promoted the Grampian Electricity Supply Scheme.³³ Balfour and Shearer, together with M.A. Edwards were the directors of the Grampian company, and W. McGill was secretary. At 1925/1926 this company had an authorised capital of £1,750,000 of which £67,000 had been issued.

The quinquennial period ending in 1931 witnessed a flurry of activity which resulted in Balfour Beatty extending, quite, substantially, its hold over the Scottish electricity supply industry. Equally important was the fact that a consolidation process took place which was to end with the Scottish Power Company becoming the major holding company for Balfour Beatty in Scotland. The net result of this rationalisation of undertakings in Scotland can be seen in Table 18 (p. 313). From Table 18 it can be noted that, although the Power Securities Corporation apparently exercised ultimate

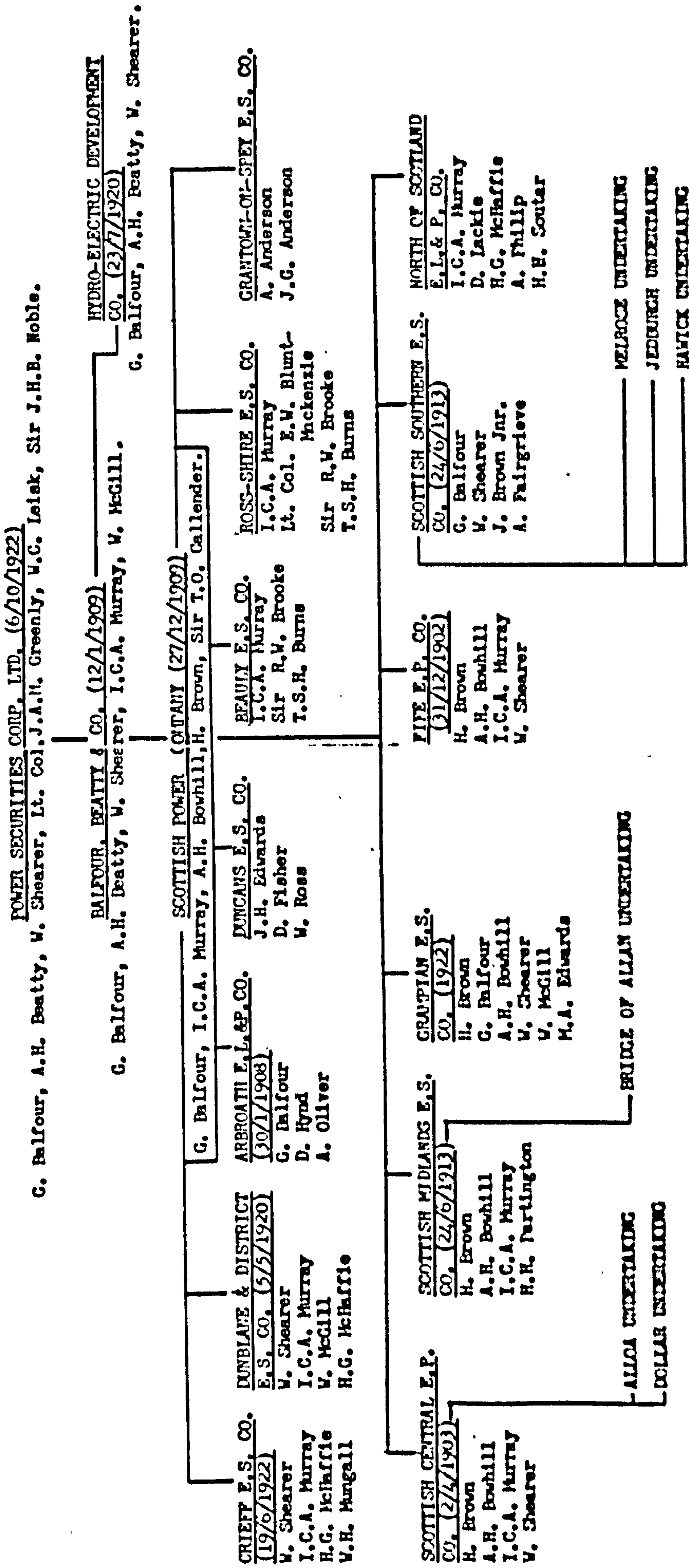
32. Ibid., Vols. XXIV-XXVI.

33. For a detailed examination of the Grampian Electricity Supply Scheme, see Chapter 5, p. 204.

control, the reality of power lay with Balfour Beatty. The latter company controlled three of the six directors on the board of the Power Securities Corporation, and moreover, Balfour himself was chairman with presumably chairman's rights in the event of any internal dispute. By the same token the remaining three seats were held by three disparate engineering companies, and thus concerted action was less likely than that made possible by the presence of the three representatives from Balfour, Beatty and Company.

TABLE 18

The Interests of The Power Securities Corporation Limited at 1931.



Source: Carrie, op. cit., Vols. XIII - XXIV.

By 1931 the board of directors of Balfour, Beatty and Company had also been strengthened. Sir J. Kennal who had been a director in 1925/1926, and who had been a Power Securities Corporation representative, was no longer present and had been replaced by I.C.A. Murray and W. McGill who, it is felt, were much more likely to be loyal to Balfour Beatty and regard their own destinies aligned to that company. McGill had been the secretary of Balfour Beatty as early as 1910 before progressing to become a director.³⁴ Murray had been secretary of the Scottish Central Electric Power Company in 1915/1916 before becoming a director of numerous subsidiary concerns of Balfour Beatty by 1925/1926.³⁵ Balfour Beatty were also in control of the Hydro-Electric Development Company but by 1931, as will be explained below, this company had given up its interest in Scotland.

As stated earlier the Scottish Power Company became the Scottish holding company for Balfour Beatty. The composition of the directors remained basically the same with the exception of A.H. Bowhill who replaced J.W. Bowhill and the fact that, significantly, during this period of transition George Balfour assumed the chairmanship. The continued presence of Sir T.O. Callender during this period which was not only one of transition for the

34. Garcke, op. cit. Vols. XIX and XXXIV.

35. Ibid., Vols. XIX, XXIV and XXIX.

Balfour Beatty group but also a period of general widening in activity within the Scottish electricity supply industry undoubtedly indicates an interest in potentially lucrative contracts for his own concern, Callenders' Cables and Construction Company.

The developments which made the Scottish Power Company a major holding company began in June and July 1927 and continued until 1931. Such developments did, of course, require additional capital and, consequently, between 1927 and 1931 the nominal capital of the company rose, in stages, by £3,700,000. The nominal capital of the company was increased in July 1927 from £500,000 to £1,500,000, in March 1928 to £2,500,000, in July 1929 to £4,000,000 and in September 1930 to £4,200,000. The major portion of this increase in capital was publicly subscribed, and the fact that it was issued and subscribed above par reflects upon the confidence of the company and the public; no details are available concerning individual shareholdings. In 1927 the nominal capital of the company was £500,000, divided equally between ordinary and preference share capital. In July 1927, 500,000 Ordinary Shares of £1 each were issued at £1.20p per share. In December 1927, in terms of a special resolution dated 8th and 29th July, 1927, 83,333 Preference Shares, credited as fully paid out of the company's reserves, were allotted to preference shareholders as consideration for the reduction of the cumulative dividend on the Preference Shares from 8 per cent to 6 per cent as from 1st January, 1928, and a further

16,667 Preference Shares were issued and subscribed at par. In June 1928, 600,000 Ordinary Shares were issued and subscribed at £1.30p per share. In July 1929, 1,000,000 Ordinary Shares were issued and subscribed at £1.40p per share. In April 1930, 650,000 Ordinary Shares were issued and subscribed at £1.35p per share. Finally, in November 1930, 530,000 Preference Shares were issued and subscribed at £1.09p per share. In addition, a further 105,250 Ordinary Shares and 120,000 Preference Shares were issued in exchange for shares in companies which were taken over (see below). Table 19 analyses the overall capital structure of the company at April 1931.

TABLE 19

Authorised and Issued Share Capital
of the Scottish Power Company at
April 1931.

	<u>Capital Authorised,</u>	<u>Issued</u>
1,000,000, 6% Cum Pref. Shares of £1 each.	£1,000,000	£1,000,000
3,105,205 Ordinary Shares of £1 each.	3,105,205	3,105,205
94,795 Shares of £1 each (Undenominated).	<u>94,795</u>	<u>-</u>
	<u>£4,200,000</u>	<u>£4,105,205</u>

Source: Garcke, op. cit. Vol. XXXIV.

As stated earlier, no analysis is available of individual shareholdings and this is in many ways unfortunate since, by comparison with the Scottish Power Company with an authorised and issued capital of over £4,000,000 at 1931, the authorised capital of the Power Securities Corporation

was only £2,000,000 of which £1,000,000 was issued while Balfour, Beatty and Company had an authorised capital of only £300,000 of which £200,000 was issued.³⁶

It has already been indicated that from at least as early as 1921/1922 the Scottish Power Company controlled the Scottish Central Electric Power Company and the Scottish Midlands Electricity Supply Company. By 1931 the Scottish Central company had issued 750,000 shares of £1 each and debentures to the value of £20,000; this entire loan and share capital was held by the Scottish Power Company. In a similar manner, the Scottish Midlands company had issued 95,000 Ordinary Shares of £1 each which again at 1931 were held by the Scottish Power Company. The latent influence of the Scottish Power Company and the fact that such power was much more extensive than was perhaps realised is revealed by the fact that, at dates unknown, the Scottish Central company acquired the undertakings established under the Alloa lighting orders of 1899 and 1911 and the Dollar lighting order of 1901; the latter undertaking was previously owned by the Electric Supply Corporation in association with Crompton and Company (see Section 3). Moreover, by 1931 the Scottish Central was providing a bulk supply to

36. Ibid., Vol. XXXIV.

Bo'ness and to the corporations of Stirling, Denny and Dunipace and the County Council of West Lothian. Its transmission lines, which aggregated 200 miles route length, were interconnected with those of the Fife Electric Power Company. The Scottish Midlands company, which also received a bulk supply from the Scottish Central company, had by 1931 extended its influence by acquiring from the Bridge of Allan Corporation, the undertaking authorised by the electricity special order of 1926.³⁷

The next major acquisition by the Scottish Power Company was the North of Scotland Electric Light and Power Company. This company had initially been sponsored by Edmundsons' Electricity Corporation (see Section 2) and had owned undertakings at Inverness, Brechin and Montrose; the Inverness undertaking was taken over by the local town council on 15th August, 1926. In 1922 Edmundsons' held 49,285 Ordinary Shares of £1 each in this company, equivalent to 95.57 per cent of the total ordinary issue, and 24,535, 10 per cent Cumulative Preference Shares or 98.14 per cent of the total Preference capital.³⁸ On 7th June, 1927 a contract was entered into with Edmundsons' for the purchase of 24,998, 10 per cent Cumulative Preference Shares and 50,000 Ordinary Shares of £1 each of the North of Scotland Company at a price of £89,997.³⁹ Negotiations

37. Ibid.

38. R.C. Dissolved Company Files, B.T.2/4189.

39. Garcke, op. cit. Vol. XXX.

were apparently protracted since it was only on 15th March, 1928 that Edmundsons' transferred its shareholdings, which were identical to those of 1922, to the Scottish Power Company. However, at that date the Scottish Power Company apparently held all of the preference capital amounting to £25,000 and 49,550 ordinary shares of the total issue of 50,000;⁴⁰ by 1931 the Scottish Power Company had acquired the remaining 450 ordinary shares.⁴¹

As was noted earlier, the Crieff Electric Supply was taken over by Balfour Beatty on behalf of the Power Securities Corporation in 1925. However, during the rationalisation process of 1927 the Crieff undertaking now came under the direct jurisdiction of the Scottish Power Company. On the 7th and 8th July, 1927 the Scottish Power Company reached an agreement with the Power Securities Corporation whereby the latter company's 11,027 shares of £1 each in the Crieff concern were obtained for a price of £13,000. At 1931 the issued capital of the Crieff company was £15,000 and it was wholly owned by the Scottish Power Company.⁴²

It will be remembered that in 1923 Balfour Beatty purchased the undertaking at Dunblane for a purchase price equivalent to the then capital outlay of £1,552 and the issued share capital, plus five per cent. The undertaking was then apparently transferred to the Hydro-Electric Development Company, since on 7th and 8th July, 1927 the

40. R.C. Dissolved Company Files, B.T. 2/4189.

41. Garcke, op. cit. Vol. XXXIV.

42. Ibid., Vols. XXX and XXXIV.

Scottish Power Company entered an agreement with that company for the purchase of its 5,066 shares of £1 each in the Dunblane concern for a price of £5,500. At 1931 the Scottish Power Company held the entire issued capital, amounting to £11,300, of this company. The final agreement entered into on those same July days in 1927 was that between the Scottish Power Company and the Hydro-Electric Development Company whereby the former company purchased 84,500 £1 shares at par in the Grampian Electric Supply Company and thus obtained complete control over it. By 1931 the authorised capital of the Grampian company was £1,750,000, of which £1,600,000 was issued and wholly owned by the Scottish Power Company.⁴³

The Arbroath Electric Light and Power Company had been formed in 1908, and Balfour had been a director since that time. Balfour acted as a consultant and, as was emphasised earlier, this was one of three companies which never became fully part of Balfour Beatty. However, at 1926/1927 (the actual date is not known) the Scottish Power Company made an offer of £1.20 per share for the entire ordinary share capital of the Arbroath undertaking which amounted to 60,500 shares of £1 each. This offer was at least partially successful, since by 1928/1929 the Scottish Power Company owned the entire share capital with the exception of 2,570 Ordinary Shares and 8,718 Preference Shares. However, the controlling influence of the Scottish

43. Ibid.

Power Company continued to increase and by 1930 it had obtained a further 2,458 Ordinary Shares, and, moreover, in 1928 the Grampian company purchased the generating station of the Arbroath concern. Thus, by 1931 the authorised capital of this company was £100,000 of which £70,500 was issued, and at that time the Scottish Power Company held the entire share capital with the exception of 112 Ordinary Shares and 8,718 Preference Shares.⁴⁴

The Fife Electric Power Company was the second of the companies with which Balfour had an individual relationship but a company which, again as emphasised earlier, did not come under the full scrutiny of Balfour Beatty. Throughout his association with this company Balfour was managing director and this, perhaps, underpins his consultancy role. As indicated earlier, the Fife Electric Power Company was largely dominated by the Fife Tramway, Light and Power Company, with which Balfour was also associated, and which held the majority of its capital. However, on 1st July, 1929 the Scottish Power Company acquired the whole of the share capital, except for one share, of the Fife Electric Power Company from the Fife Tramway, Light and Power Company for the sum of £1,325,000. By 1931 at which time the authorised capital of the Fife Electric Power Company was £1,000,000 and its issued capital £900,000, the Scottish Power Company was still that one share short of

44. Ibid., Vols. XXX, XXXII, and XXXIV.

complete ownership.⁴⁵

The Galashiels and District Electric Supply Company was the third of the Balfour-related companies. In March 1928 this company changed its name to the Scottish Southern Electric Supply Company and it is with this title that it is presented in Table 18. In September 1930 an agreement was concluded for the sale of this undertaking to the Scottish Power Company on a share exchange basis; the Scottish Power Company issued 120,000 Preference and 80,000 Ordinary Shares in exchange for a like number of Preference and Ordinary Shares of the Scottish Southern company. In 1931, therefore, the total authorised and issued share capital of the Scottish Southern was £200,000. At 1931 the Scottish Southern was in the process of furthering the influence of the Scottish Power Company and was negotiating the purchase of the undertakings at Melrose and Jedburgh which belonged to the Electric Supply Corporation (see Section 3) and the undertaking at Hawick which belonged to Edmundsons' Corporation (see Section 2).⁴⁶

Finally, during the latter part of the 1920's the Scottish Power Company acquired four new companies. By 1928/1929 it had acquired the entire shares of the Beaully Electric Supply Company, with the exception of ten shares. The financial arrangements of the purchase of this company

45. Ibid., Vol. XXXIV.

46. Ibid.

are not known, but by 1931 the Scottish Power Company owned the entire authorised and issued capital of this company amounting to £20,000.⁴⁷ Duncan's Electric Supply Company which was referred to several times in earlier chapters and which provided a public supply to Ballater and Ellon in Aberdeenshire from C 1914/1915 was acquired by the Scottish Power Company in July 1929. The financial details of this acquisition are not known but at 1931, at which time the authorised and issued capital amounted to £25,000, it was a wholly owned subsidiary of the Scottish Power Company.⁴⁸

The penultimate company to be taken over by the Scottish Power Company was the Ross-shire Electric Supply Company which was formed on 1st October, 1926 to take over the existing Strathpeffer and Dingwall Electric Company at a purchase price of £30,000 payable in 12,000 Cumulative Preference Shares and 18,000 Ordinary Shares of £1 each. The company also intended to extend its activities to supply current to those parishes in Mid and Easter Ross lying to the east of a line drawn roughly from Tain to Strathpeffer and the Beaully Firth, excluding the Black Isle. Bulk supplies were to be given to the burghs of Invergordon and Tain, and the existing plants at Alness and Evanton were to be taken over. In 1926 the company intended to proceed immediately to construct a dam at the eastern end

47. Ibid.

48. Ibid.

of Lochluichart which would give a storage capacity of upwards of 150 cubic feet. Moreover, under the then present agreement with the riparian owners, the company had the right to use the water and necessary land for forty years. By 1931 the company was supplying the Burgh of Dingwall and thirteen local parishes and providing bulk supplies to the burghs of Invergordon and Tain. In 1931 its authorised and issued capital amounted to £60,000 but its capital expenditure was £93,099. In 1931 the Scottish Power Company issued 25,250 Ordinary Shares in exchange for 30,000 Preference Shares and 21,000 Ordinary Shares of the Ross-shire company and despite the discrepancy in the share capital figures given, which cannot be explained, the Scottish Power Company owned this company in its entirety.⁴⁹

The final company to be taken over by the Scottish Power Company was the Grantown-on-Spey Electric Supply Company, formed on 31st October, 1930 to take over a small privately owned non-statutory undertaking which had been providing a public supply since 1911. The proprietor and manager of this small undertaking was George Anderson who in 1930 was granted an electricity special order to supply the burgh of Grantown-on-Spey and who was the main person behind the formation of the public company in 1930. The financial arrangements between this company and the Scottish Power Company are not known, but at 1931, with an authorised

49. Ibid., Vols. XXIX. and XXIV.

capital of £20,000, the Grantown-on-Spey undertaking was wholly owned by the Scottish Power Company.^{50,51}

From its formation, therefore, on 27th December, 1909 the Scottish Power Company, under the guidance, principally, of George Balfour, had made remarkable progress in Scotland by 1931. The nominal capital of the company had risen from £160,000 in 1911 to £4,200,000 by 1931, an increase of 2,525 per cent, while its issued capital had risen from £101,874 at 1913/1914 to £4,105,250 by 1931, an increase of 3,929.73 per cent. The Scottish Power Company was established initially to obtain control of the Scottish Central Electric Power Company but by 1931, as a consequence of the expansion of the activities of Balfour Beatty and the rationalisation and consolidation developments of the late 1920's, it controlled thirteen companies with a total issued capital of £3,832,960 and had become a major force in the Scottish electrical supply industry. Moreover, the geographical spread of these companies by 1931 stretching from almost the extreme north-west of Scotland across the Highlands, down the east-coast, entering central Scotland and culminating in the extreme south of Scotland with the

50. Ibid.

51. The only company which appeared previously but which has been omitted from Table 18 is that of Ardrossan and Saltcoats. No information on this company can be found post 1925/1926 but this may indicate that it was taken over by some other undertaking. No details can be found to substantiate this.

Scottish Southern ensured that the potency of the Scottish Power Company and therefore Balfour could not be ignored. Balfour's own position as a Member of Parliament of long standing and a leading parliamentary spokesman on all matters concerning the electricity supply industry⁵² re-emphasised this importance as did his association with other leading electrical entrepreneurs such as Sir T.O. Callender. Thus, Balfour Beatty and ultimately the Scottish Power Company played an increasingly pervasive role in the Scottish electricity supply industry which had important connotations for the economic and social life of large areas of Scotland and the Scottish economy.

(2) Edmundsons' Electricity Corporation.

Edmundsons' Electricity Corporation, through its wholly owned subsidiary the Urban Electric Supply Company, also acted as a holding company in Scotland, and owned and operated a number of undertakings in Scotland, although at no time did it achieve the 'greatness' of Balfour Beatty. The principal Edmundsons' company in Scotland was the Angus Electric Light and Power Company, incorporated on 24th March, 1899, which changed its name on 14th October, 1904 to the North of Scotland Electric Light and Power Company. This company was initially formed to obtain powers for the supply of electricity in Brechin and

52. Hannah, op. cit. passim.

elsewhere. However, by contracts entered into with Edmundsons' the Brechin 1898 and Montrose 1898 lighting orders were transferred from the respective local authorities to this company; the company also obtained the Inverness lighting order 1899. A supply began at Brechin and Montrose in July 1901 while in Inverness the supply began in July 1905.⁵³

When the North of Scotland company was originally incorporated in 1899, its nominal capital was £25,000 divided into 5,000 shares of £5 each and it was, very much, a local enterprise. For example the original subscribers were local men, all of whom took one share in the concern, from the business community viz., George A. Scott, Park House, Brechin, a manufacturer; James Mitchell, 3 Melville Gardens, Montrose, a merchant; Valentine Stone, Holly House, Montrose, a doctor; William McIlroy Valentine, British Linen Bank House, Brechin, a bank agent; J. Leckie Aird, Brechin, a solicitor and Alexander Middleton and D.S. Campbell, 186 High Street, Montrose, both of whom were also solicitors. However, in view of the obvious financial requirements - by 1902 capital expenditure at Montrose was £26,610.45p and at Brechin £20,734.17p - and after reaching agreement with Edmundsons' local interest and influence became more nominal than real, and the company became fully controlled and almost entirely

53. Garcke, op. cit. Vols. IX and XIV.

owned by Edmundsons'.⁵⁴ On the 2nd February, 1901 of the 2,103 shares taken up 1900 shares were held by Edmundsons', while Edmundsons' appointee directors, F.E. Gripper and J.C. Wigham, each held fifty shares, that is only 103 shares were held locally.⁵⁵ As noted previously, Edmundsons' owned this company until 1928 when it was taken over by the Scottish Power Company and throughout this period, although the company was a public one, the Edmundsons' domination was virtually absolute. Table 20 (below) provides an analysis of Edmundsons' shareholding in the company from 1901 until 1928 in terms of shares held, the total value of these shares and the percentage such shares represented of total issued capital.

TABLE 20

Edmundsons' Shareholding in the North of
Scotland Electric Light and Power Company

<u>Year</u>	<u>No. of Shares Held</u>	<u>Total Value (£)</u>	<u>% of Issued Capital</u>	<u>Total Issued Capital (£)</u>
1901	1900	9,500	90.35	10,515
1903	1901	9,505	89.50	10,620
1905	9772	48,660	97.72	50,000
1914	9771	48,855	97.71	50,000
1921	9751	48,755	97.51	50,000
1922) -	(49285 ord.	49,285	98.57	50,000
1928)	(24535 Pref.	24,535	98.14	25,000

Source: R.C. Dissolved Company Files, B.T.2/4189.

From Table 20 it can be seen that at 1901 Edmundsons' held 90.35 per cent of the total issued capital of the company. At 1903, by which time 2,124 shares had been taken

54. Ibid., Vol. IX.

55. R.C. Dissolved Company Files, B.T.2/4189.

up, it owned 89.50 per cent of the issued capital. In August 1904 the capital of the company was increased to £100,000 by the addition of a further 15,000 shares of £5 each and in December 1904, 7,871 Ordinary Shares were allotted to Edmundsons' so that in 1905, as can be seen in Table 20, Edmundsons' now held 9,772 shares representing 97.72 per cent of the total issued capital of the company. Although the extant records do not categorically state that these shares were allotted as fully paid for work completed by Edmundsons' for the company, such an interpretation appears valid. At 1914 Edmundsons' had transferred one share, for reasons not stated in the extant records, to another shareholder but, as can be noted from Table 20, this made little difference to its overall dominance. In May 1921 Edmundsons' shareholding was further reduced when twenty shares were transferred to A.N. Rye to allow him to qualify as a director of the company; Rye was, in fact, an Edmundsons' appointee (see below). On 12th August, 1921 the capital of the company was re-structured when the 10,000 shares of £5 each, which had been issued, were divided into five shares of £1 each. The 10,000 shares of £5 each which at that time were unissued were also divided into five shares of £1 each, but of the 50,000 shares resulting, 25,000 were issued as 10 per cent Cumulative Preference shares of £1 each. Therefore, the nominal capital of the company was now 75,000 Ordinary and 25,000 Preference Shares

of £1 each. Therefore, the nominal capital of the company was now 75,000 Ordinary and 25,000 Preference Shares of £1 each. The 25,000 Preference Shares were allotted payable in cash and, as can be noted in Table 20, Edmundsons' took 24,535 of these shares. In addition, two of the Edmundsons' appointees as directors of the company, F.E. Gripper and A.N. Rye, each took 100 shares, so that in actual fact only 365 of these new shares were allotted to the general public. Thus, as can be noted from Table 20, between 1922 and 1928 Edmundsons' owned 98.57 per cent of the issued ordinary capital and 98.14 per cent of the issued preference capital of the company. Moreover the extant records also reveal that on 10th May, 1922 of the other shareholders in the company the Edmundsons' representatives were the most dominant. For example, at that date F.E. Gripper, who was a director of the company from 1901 until 1927, held 330 Ordinary Shares and 100 Preference Shares; J.C. Wigham, a director from 1903 until 1921, held 250 Ordinary Shares and A.N. Rye, who became a director in 1920, held 100 Ordinary and 100 Preference Shares.⁵⁶

The financial dominance of Edmundsons' over the North of Scotland company was re-emphasised by the character and background of its directors. F.E. Gripper had been a director of the original Edmundsons' Limited which had been registered in Dublin on 5th November, 1888⁵⁷ and became

56. Ibid.

57. Garcke, op. cit. Vol. I.

a director of Edmundsons' Electricity Corporation which was formed on 7th April, 1897 to acquire the latter company and its subsidiary, the Urban Electric Supply Company, formed on 29th June, 1898.⁵⁸ Gripper went on to become chairman of both of these companies by 1905⁵⁹ and remained as, at various times, director and/or general manager/director of subsidiary companies for both companies until at least 1925/1926;⁶⁰ Gripper was also a director of some twenty-two of Edmundsons' subsidiary companies in England in 1919.⁶¹ J.C. Wigham was chairman of the Urban Electric Supply Company in 1900/1901 and as late as 1920/1921 was, with A.N. Rye, joint general manager of Edmundsons' Electricity Corporation;⁶² in 1919 Wigham was a director of at least sixteen of the Edmundsons' group of companies.⁶³ As already noted A.N. Rye, who became a director of the North of Scotland company in 1920, was joint-general manager of Edmundsons' in 1920/1921 and later became the general manager,⁶⁴ and was also in 1919 a director of at least four of Edmundsons' English subsidiary companies.⁶⁵ On 18th May, 1921 Wigham resigned as a director of the North of Scotland company but was not replaced at once. However, in August 1923 E.J. Williams became a director and,

58. Ibid., Vol. V.

59. Ibid., Vol. IX.

60. Ibid., Vols. XIV, XIX, XXIV and XXIX,

61. R.C. Dissolved Company Files, B.T.2/4189.

62. Garcke, op. cit. Vols. V and XXIV.

63. R.C. Dissolved Company Files, B.T.2/4189.

64. Garcke, op. cit. Vols. XXIV and XXIX.

65. R.C. Dissolved Company Files, B.T.2/4189.

although there is no obvious connection between him and Edmundsons', the fact at 1924 he held 105 Ordinary Shares in the North of Scotland company would appear to indicate that he was an Edmundsons' appointee. Finally, F.E. Gripper resigned in 1927 and he was replaced by C.H. Jones who, from at least as early as 1920/1921, was the secretary of Edmundsons' Electricity Corporation.⁶⁶ This then was the 'complexion' of the Edmundsons' representatives on the board of directors of the North of Scotland company.

The local directors, on the other hand, were men of lesser stature who were amateurs by comparison with the multi-directorate professional businessmen and engineers of the Edmundsons' combine. The local directors included men such as the local doctor, Valentine Stone, who lived in the quaintly named Holly House, Montrose and who was a director of the company from the outset until his resignation or demise in 1920 when he was replaced by the local ironmonger, David Lackie, who was also a director of the Montrose Laundry Company. G.A. Scott was also a director of the company from the outset until c 1916. Scott resided at Park House, Brechin and was a local manufacturer, and he was replaced by Alexander Philip who was a director of The Brechin Agricultural and Trading Company and The Glenesk Hotel Company. Such local businessmen may, of course, have been motivated by self-interest, in the form of privileged tariff charges for their own

66. Garcke, op. cit. Vol. XXIV. R.C. Dissolved Company Files, B.T.2/4189

firms, rather than the overall well-being of the local community. There is, however, no evidence to substantiate this view.⁶⁷

The turnover of local directors also weakened the standing of the local community. For example, among the first directors was J. Mitchell, a merchant of 3 Melville Gardens, Montrose who was disqualified, for reasons unknown, in 1903 and replaced by W.J. Sandford-Thomson, an estate agent of Montrose, who resigned before the end of 1903 and was, in his turn, replaced by D.S. Campbell, a local solicitor; Campbell remained a director until 1916. It should also be remembered that it was unlikely that local interests were united. Since the company had, in fact, three undertakings at Brechin, Montrose and Inverness, the possibility of inter-community rivalry cannot be ignored. Moreover, it is interesting to note that only two of these communities, Brechin and Montrose, were represented by local directors, and only one of the towns, Montrose, was officially represented by an ex-officio director. Herbert Hall represented Montrose town council as a director from 1901 until 1920 when he was replaced by William Jolly who was also a local printer and stationer. In 1923, Jolly was replaced by A. Duff Todd who in 1925 was replaced by William Gouk who remained as an ex-officio director representing Montrose town council even after the

67. R.C. Dissolved Company Files, B.T.2/4189.

company had been acquired by the Scottish Power Company. It is interesting to note that Inverness, as far as can be determined, was not represented either officially or unofficially on the board of directors and that the town council of Inverness took over the local undertaking from the company on 15th August, 1926.⁶⁸ Thus, these local directors were rather nebulous and pale by comparison with the national directors, and their position as directors was cosmetic and served as a public relations exercise rather than having any real value to the company or the community.

The North of Scotland company and Edmundsons' Electricity Corporation also exerted a degree of influence over the Beaully Electric Supply Company. This was a small private company formed on 17th July, 1912 to carry on the business of electrical engineers and electricians and to provide a supply of electricity to the small town of Beaully; a supply began in 1912. Among the original directors was E.J. Williams of Edmundsons' and by 1919/1920 he had become chairman, a position he retained until the company became part of the Balfour Beatty group of companies. In addition, the North of Scotland company held, from 31st December, 1916, 225 shares of £1 each in the Beaully undertaking which represented 24.43 per cent of the issued capital of £921. By

68. Ibid.

August 1923 the North of Scotland company held 300 shares of £1 each which at that time represented 25.51 per cent of the issued capital of £1,176. However, by 9th July, 1925 the North of Scotland company had apparently disposed of its shareholding in the Beaully concern since no trace can be found of these shares in the extant records of the former company.⁶⁹

Apart from its interest in the North of Scotland and Beaully enterprises, Edmundsons' was also involved at Hamilton and Hawick. Not a great deal is known of either undertaking. The Burgh of Hamilton obtained its lighting order in 1898, but the entire construction operations were carried out by Edmundsons' which then obtained a lease of the order and worked the undertaking; a supply began in March 1903.⁷⁰ The undertaking was later transferred back to the burgh.⁷¹ At Hawick the situation was different. The electric lighting order for Hawick was granted to the Urban Electric Supply Company, Edmundsons' subsidiary, in 1899. A temporary supply began in November 1901, with a permanent supply beginning in May 1902.⁷² The Hawick undertaking remained under the control of Edmundsons' until 1931 when, as already noted,

69. Garcke, op. cit. Vols. XIX and XXIII-XXXIII. R.C. Dissolved Company Files, B.T.2/4189.

70. Garcke, op. cit. Vol. IX.

71. Hennessey, op. cit. p. 174.

72. Garcke, op. cit. Vol. IX.

Balfour Beatty began negotiations to purchase the enterprise.

Thus, it can be noted that Edmundsons', although not on such an extensive scale as Balfour Beatty, made a contribution to the Scottish electricity supply industry. Edmundsons' commitment was geographically widespread, ranging from Hawick in the south to Montrose, Brechin and Inverness in the north. It is interesting that it did manage to obtain control, for a time, of the Lanarkshire Burgh of Hamilton but it must be remembered that, although this burgh was in the industrial heartland of Scotland, it was a residential burgh with little industry and thus compares favourably with the other Edmundsons' controlled undertakings. This was, perhaps, the basic weakness of the Edmundsons' interest in Scotland in that its commitment was almost entirely to lighting without the attendant benefits associated with a demand for power for industry. This policy may partially explain why Edmundsons' surrendered its Scottish interest largely to Balfour Beatty. Nevertheless, the benefits provided by the Edmundsons' undertakings to the social environment of the areas which it served cannot be denied.

(3) The Electric Supply Corporation.

Contemporaneous with Edmundsons' and the Urban Electric Supply Company and having an almost identical modus operandi were Crompton and Company and the Electric Supply Corporation. Crompton and Company was formed on

30th July, 1888 to take over the earlier business of R.E. Crompton and Company, to act as electrical engineering contractors and to obtain concessions for electric lighting in towns. The Electric Supply Corporation, on the other hand, was incorporated on 8th April, 1897 to obtain lighting orders and also to enter into agreement with Crompton and Company, whereby the latter company transferred any lighting orders it had been granted to the Electric Supply Corporation which then agreed to enter into contracts with Crompton and Company for the construction and the equipping of all generating plant required at cost, plus five per cent; it was also agreed that Crompton and Company would act as consulting engineers.⁷³

By 1905 Crompton and Company had obtained concessions for electric lighting in seventeen towns, but in the purely Scottish context it had obtained the following lighting orders: Dalkeith (Midlothian) 1901, Dollar (Alloa) 1901 and Jedburgh (Roxburgh) 1901. By the terms of the agreement with the Electric Supply Corporation these orders were then transferred to that corporation. Meanwhile, in its own right the Electric Supply Corporation had obtained the following lighting orders: Melrose (Roxburgh) 1901, St. Andrews 1902 and Carnoustie (Forfar) 1902.⁷⁴ Thus, by 1905 the Electric Supply Corporation controlled six undertakings which by terms of the agreement were

73. Ibid.

74. Ibid.

financially beneficial to the Crompton company. In addition, the Electric Supply Corporation, by agreement with the local town council, operated the electricity supply undertaking at Dumbarton under the electric lighting order of 1902.⁷⁵ Moreover, the Electric Supply Corporation was clearly associated with the North Berwick and District Electric Light and Power Company which was formed on 15th December, 1912 to provide an electricity supply to that town, since K.A. Scott-Moncrieff, who was chief engineer and general manager of the Electric Supply Corporation from at least 1905 and one of its directors by 1920/1921, was also a director of the undertaking at North Berwick.⁷⁶ Later in 1926 the Electric Supply Corporation was granted powers to supply the north-eastern burgh of Peterhead. These powers were transferred to the Peterhead Electricity Company which was incorporated on 24th June, 1927 to implement these powers. This Scottish concern became a subsidiary of the Electric Supply Corporation and at 1931 K.A. Scott-Moncrieff was chairman of the Peterhead undertaking. Thus, between 1901 and 1931 the Electric Supply Corporation was variously associated with nine Scottish undertakings.

Information concerning the activities of these undertakings is minimal. However, the provision of a public supply began at Dalkeith, Dollar and Melrose in

75. Ibid., Vol. XXXIV.

76. Ibid., Vols. IX, XIV, XIX and XXIV.

1904 and at St. Andrews in, probably, 1905 while at Peterhead the commencement of supply was 2nd September, 1929.^{77,78} The administration of the two companies at North Berwick and Peterhead would appear to have been by the known formula of a national director viz., Scott-Moncrieff with the assistance of several local directors, but no information is available concerning the administration of the directly owned subsidiaries and it can only be presumed that managers were employed. Similarly, there is little financial information. The North Berwick enterprise had in 1925/1926 an authorised capital of £7,000 of which £5,990 was issued. In 1931 the authorised and issued capital at Peterhead was only £5,000 but capital expenditure amounted to £17,025, and the undertaking had a deficit on the years working of £245. No other financial information is available for these companies and there is no analysis of the shareholding of either company.⁷⁹ The only financial information relating to the directly owned and operated undertakings concerns capital expenditure at 1915/1916 and this has been given in Table 21 below. Table 21 indicates the financial involvement of the Electric Supply Corporation in Scotland at this time but, although such information

77. Ibid., Vols. IX, XIV and XXXIV.

78. The dates for the commencement of supply by the other undertakings are not known.

79. Garcke, op. cit. Vols. XXIX and XXXIV.

obviously relates to the general size and scale of the individual undertakings, any attempt to make a competent interpretation of these figures would be mere conjecture.

TABLE 21.

Capital Involvement by the Electric Supply Corporation in Scotland at 1915/1916.

<u>Undertaking</u>	<u>Capital Expenditure</u>	
Dalkeith	£ 17,113.52	
Dollar	7,496.33	
Jedburgh	13,862.60	
Melrose	11,243.26	
St. Andrews	26,614.75	
Carnoustie	7,000.00	(Estimate for 1910)
Dumbarton	46,979.85	
Total	<u>£130,310.31</u>	

Source: Garcke, op. cit. Vol. XIX.

The Electric Supply Corporation, in its activities in Scotland, shared a similar experience to that of Edmundsons' and thus had to contend, to a large extent, with the same basic weakness. The various undertakings which belonged to the Electric Supply Corporation were, generally speaking, geographically disparate from one another, although this is not true of the Jedburgh and Melrose concerns, catered basically for lighting and served rural communities with little or no industrial demand - Dumbarton may be an exception to this. Thus, their long term viability as individual units must have been in question. For whatever reasons, the Electric Supply Corporation in the later 1920's began to shed some of its interest in Scotland. In April 1926 the undertaking at North Berwick was transferred to the local town council at a purchase price of £10,750; the town council then closed the generating

plant and took a bulk supply from Lothians Electric Power Company. At Dalkeith the generating plant was closed in January 1926, and a bulk supply again obtained from the Lothians Electric Power Company; in April 1926 this undertaking was also transferred to the local town council for £18,000.⁸⁰ In 1931 the undertakings at Jedburgh and Melrose were acquired by the Scottish Southern Electric Supply Company, a subsidiary of Balfour Beatty, which also acquired the Hawick undertaking, previously belonging to Edmundsons' and in this way rationalising supply in southern Scotland. The undertaking at Dollar was acquired by the Scottish Central Electric Power Company.⁸¹ However, at 1931 the Electric Supply Corporation still maintained its interest in the undertakings at St. Andrews, Carnoustie, Dumbarton and Peterhead, and was still making a contribution to the Scottish electricity supply industry.

(4) The National Electric Construction Company.

The Musselburgh and District Electric Light and Traction Company was dominated from its inception by the National Electric Construction Company which obtained both the lighting and traction orders for the burgh and its environs. The National Electric Construction Company

80. Ibid., Vol. XXIX.

81. Ibid., Vol. XXXIV.

(after this the N.E.C. Company) was originally incorporated on 16th July, 1897 as the National Electric Free Wiring Company, changed this name to the National Electric Wiring Company in April 1899 and, finally, became the N.E.C. Company in August 1903. The N.E.C. Company was formed to obtain contracts for the construction and maintenance of electricity works generally, and by 1905 had secured contracts for a number of towns including, in Scotland, Bo'ness and Musselburgh.⁸² No detailed information is available concerning the undertaking at Bo'ness, but, from references made to that undertaking in the extant records of the Musselburgh company, it seems more than probable that the former undertaking was controlled by the N.E.C. Company. For example, the minute books of the Musselburgh company contain a reference to the appointment of a new works manager and it was stated that he had already been interviewed by N.E.C. /Musselburgh directors for a similar position at Bo'ness and that they had been suitably impressed; the man involved, a Mr. Walsh, had lost the Bo'ness appointment because he could not take up his duties immediately.⁸³ Moreover, when Walsh resigned in December 1918, he was replaced by H.C. Babb who came from the Bo'ness undertaking and who, by arrangement

82. Ibid., Vol. IX.

83. S.R.O. Records of the South of Scotland Electricity Board, SSE5,6/3, 11th December, 1916.

with the N.E.C. Company, continued to act as manager at Bo'ness.⁸⁴

The extent of the N.E.C. Company control over the Musselburgh undertaking is revealed by the fact that the first directors of the latter company were also directors of the former concern. For example, in 1905 W.B. Fowler, L.B. Schlesinger, J.T. Jervis and B. Bernheim were directors of both companies while W.B. Cownie, a director at Musselburgh, was general manager and secretary of the N.E.C. Company before becoming its managing director by 1915/1916.⁸⁵ In 1906 J. Carr Saunders became a director of the Musselburgh undertaking and he too became a director of the N.E.C. Company.⁸⁶ During the formative years of the Musselburgh enterprise only one non-N.E.C. Company director was appointed and that occurred when J. Anderson took up his appointment as local director; Anderson was also secretary of the Port Seton Tea House Company.⁸⁷

By 1912 the board of directors had changed somewhat, but the dominance of the N.E.C. Company remained. By

84. Ibid., 8th January, 1919.
85. S.R.O. Records of the South of Scotland Electricity Board, SSE5,6/2, 19th July, 1905. Garcke, op. cit. Vols IX and XIX.
86. S.R.O. Records of the South of Scotland Electricity Board, SSE5,6/2, 28th November, 1906. Garcke, op. cit. Vol. XIV.
87. S.R.O. Records of the South of Scotland Electricity Board, SSE5,6/2 15th January, 1907 and 15th April, 1914.

1912 L.B. Schlesinger had become chairman of both the Musselburgh and the N.E.C. companies, and Bernheim and Cownie were also still representing N.E.C. interests at Musselburgh; J. Anderson remained as the local director. However, two new appointments had also been made. In December 1910 Henry Brown, manager of The Century Insurance Company of Edinburgh, one of the principal debenture holders of the company, was appointed director, and in 1911 Dr. Kurt Lowenfeld also became a director. Lowenfeld's background is not known, though he may have been representing other institutional investors. He was, in fact, a German and, as such, was interned during the First World War with the result that he was asked to resign his directorship of the Musselburgh company. It is also interesting to note that from March 1916 until July 1919, B. Bernheim became B. Burnham and only reverted back to using his original name at the latter date. In 1913 Brown resigned his appointment and was not replaced. On Lowenfeld's resignation, however, R. Watson who had previously been secretary and commercial manager of the company was nominated by the N.E.C. Company as a director. Thus, by April 1915 the N.E.C. Company had assumed once again full control of the company. At that date the directors of the Scottish concern were Schlesinger, Bernheim or Burnham, Cownie, Watson and Anderson, the

local director.⁸⁸

At 1915/1916 the directors of the N.E.C. Company were L.B. Schlesinger, B. Bernheim, J.T. Jervis, J. Taylor, G.H. Nisbett, J. Carr Saunders and W.B. Cownie and it was from this group that the founding directors of a new company, the Electrical Finance and Securities Company, were derived viz., J. Taylor, G.H. Nisbett and W.B. Cownie. The Electrical Finance and Securities Company was formed on 8th June, 1914 to invest in the securities of electrical and associated companies and from then until 1931 the N.E.C. Company controlled at least three of the four directors of this new company. For example, at 1920/1921 and 1925/1926 Taylor, Nisbett and Cownie represented the N.E.C. Company on the board of directors of the Electrical Finance and Securities Company while at 1931 Nisbett, Cownie and H.T. Barnett were directors of both concerns.⁸⁹ Moreover, although it cannot be proven from the available records examined, it may well be the case that the Electrical Finance and Securities Company became the actual holding company and the N.E.C. Company its subsidiary. This interpretation is based on the radical.

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88. S.R.O. Records of the South of Scotland Electricity Board, SSE5 6/1, 15th April, 1912 and 15th April, 1915; SSE5, 6/2, 2nd December, 1910, 9th November, 1911, 30th January, 1912, 13th March, 1913, 22nd July, 1913, 6th November, 1914 and 4th December, 1914; SSE5,6/3, 15th March, 1916 and 2nd July, 1919.
89. Garcke, op. cit. Vols. XIX, XXIV, XXIX and XXXIV.

alteration in the capital structure of both concerns. At 1910 the authorised capital of the N.E.C. Company was £250,000 of which £170,000 was issued. On 20th August, 1914, i.e., shortly after the formation of the Electrical Finance and Securities Company, the authorised and issued capital was reduced by £0.50p per share so that the authorised capital now stood at £125,000 and the issued capital at £85,000, and these figures were to remain static until 1931. On the other hand, the Electrical Finance and Securities Company began life with an authorised capital of £50,000 of which £41,944.50p was issued, but by 1931 its authorised and issued capital amounted to £250,000.⁹⁰ Thus, it may well be the situation that post-1914 the real owner of the Musselburgh undertaking was the Electrical Finance and Securities Company, rather than the N.E.C. Company, with W.B. Cownie, the only director of all three concerns throughout the period representing the Electrical Finance and Securities Company's interest on the board of directors of the Scottish undertaking.

Despite the questioning of the real ownership of the Musselburgh concern, its actual administration remained the responsibility of the N.E.C. Company. When last noted at April 1915 the directors of the Scottish undertaking were Schlesinger, Bernheim, Cownie, Watson and Anderson. Watson resigned in June 1916 and was not replaced.⁹¹ Schlesinger

90. Ibid., Vols. XIV, XIX and XXXIV.

91. S.R.O. Records of the South of Scotland Electricity Board, SSE5,6/3, 19th June, 1916.

died on 2nd September, 1921 and was replaced by J.T. Jervis of the N.E.C. Company; he had previously been a director of the Scottish undertaking in 1907 (see above). Jervis himself died on 13th March, 1923 but was not replaced immediately.⁹² However, on 11th November, 1924 F.E. Stanley, on the motion of Cownie and seconded by Bernheim, became a director of the Scottish company; Stanley was chief engineer of the N.E.C. Company and by 1931 one of its directors.⁹³ Thus, at 1924 the directors were Cownie, who had been elected chairman, and Bernheim, Stanley and Anderson. The directors remained the same until at least 1927 but, by 1931, Bernheim had either resigned or died, since only Cownie, Stanley and Anderson were still noted as directors.⁹⁴ Nevertheless, this analysis of directorships reveals that the Musselburgh undertaking was no more than a subsidiary of the N.E.C. Company and that, after 1914, the possibility of control by the Electrical Finance and Securities Company, as the major holding company, remains a possibility.

The extant records of the Musselburgh company are also interesting since they indicate that this concern almost became part of the Balfour Beatty empire in 1917; at 1915/1916 the main components of the Balfour Beatty group consisted of the Scottish Power Company, a Scottish holding company

92. Ibid., 14th September, 1921 and 29th March, 1923.

93. S.R.O. Records of the South of Scotland Electricity Board, SSE5,6/3, 11th November, 1924. Garcke, op. cit. Vol. XXXIV.

94. S.R.O. Records of the South of Scotland Electricity Board, SSE5,6/3, 25th March, 1927 and 25th March, 1931

in its own right, and its subsidiary the Scottish Central Electric Power Company (see Section 1) In April 1917 Balfour, himself, approached Cownie and suggested that, since he proposed taking over the Lothians Power Company, it might be in the interests of the Musselburgh company to sell its generating station to the Scottish Power Company and obtain a supply in bulk from the Lothians Electric Power Company. Cownie reported to his fellow directors of the Musselburgh undertaking that he had had several meetings with Balfour and had suggested to him a price of £17,000 as the purchase consideration which he would recommend to his fellow directors. In response Balfour had replied that such a price was not unreasonable but that, from the Scottish Power Company's point of view, the only element of real value in this purchase was the generating station, since the rest of the plant, for reasons not stated, was unsuitable to the Scottish Power Company's business. Therefore, Balfour suggested that the Musselburgh directors should accept £10,000 in fully paid Ordinary Shares of the Scottish Power Company and £7,000 in cash by deferred payments. Cownie was not impressed by this suggested agreement, but in reply to Balfour stated that he thought he would recommend to his fellow directors at Musselburgh £7,000 in Ordinary Shares and £10,000 in cash, of which £2,000 should be paid over at the signing of the agreement or at an early date to be fixed. Balfour considered this a feasible proposition but could not agree to pay interest on any outstanding balance. Terms were

also agreed for a bulk supply. After some deliberation the Musselburgh directors agreed that these terms appeared to be the basis for a satisfactory deal, and Cownie was authorised to negotiate with Balfour on these lines.⁹⁵

Subsequently, and following upon a report by inspectors of the Boiler Insurance Company it was found that it was essential to install another boiler at Musselburgh. Meanwhile negotiations continued between Balfour and Cownie. Cownie explained the boiler deficiency to Balfour and stated that the Musselburgh company must either be involved in additional capital expenditure of between £3,000 and £4,000 or obtain a supply in bulk from Edinburgh Corporation since, for reasons not stated, the Lothians Electric Power Company was not in a position to provide a supply. Balfour countered this suggestion by stating that the Lothians Electric Power Company would be willing to advance up to £4,000 to install a new boiler; this advance could be treated as payment on account of the purchase price of the generating station. In his discussion with the Musselburgh directors, Cownie did not foresee any difficulty in arriving at a mutually satisfactory agreement with the Scottish Power Company and, moreover, submitted a letter to them from Balfour stating that an advance would be made directly a suitable boiler could be obtained and that he, Balfour, would have further interviews with Cownie to reach

95. Ibid., 27th April, 1917.

a final agreement for the purchase of the Musselburgh undertaking.⁹⁶

In April 1918 agreement was almost reached for the acquisition of the Musselburgh undertaking by the Scottish Power Company. Indeed, Cownie submitted a Heads of Agreement with regard to arrangements made and contemplated between the Musselburgh company and the Scottish Power Company. In essence the Scottish Power Company agreed to buy, on behalf of the Lothians Electric Power Company, from the Musselburgh company the power station and plant and the land on which it stood for £20,000 - payable £3,000 in cash and £17,000 in 8,500 Preference Shares of £1 each fully paid and 8,500 Ordinary Shares of £1 each fully paid of the Scottish Power Company. The £3,000 in cash was for the purpose of providing an additional boiler to be advanced to the Musselburgh company pending completion of the purchase and would be retained by that company in satisfaction of the cash portion of the purchase price provided the purchase was completed. Terms for the bulk purchase of electricity were also stated in this provisional agreement. Some technical details had still to be settled, but the Musselburgh directors unanimously agreed these terms.⁹⁷ However, by July 1918 since Cownie had heard nothing further from Balfour Beatty and had not received their cheque for £3,000 to the account of the purchase price of the generating

96. Ibid., 2nd January, 1918.

97. Ibid., 12th April, 1918.

station nor the draft agreement to carry into effect the terms of the sale and since he had been advised that the undertaking would eventually be taken over by the District Electricity Board on more favourable terms, the Musselburgh directors decided not to complete the agreement with Balfour Beatty.⁹⁸ Thus, after almost fifteen months of protracted negotiations, the proposed acquisition of the Musselburgh undertaking by the Scottish Power Company ended in failure. However, even this failure is, in itself, interesting and does raise unanswered questions. For example, the Balfour Beatty group was, as already noted, in the process of active expansion throughout this period and in negotiation appeared anxious to acquire the Musselburgh undertaking, and yet with agreement seemingly in sight failed to meet declared obligations. Moreover, the discourse between Balfour and Cownie, over this period of months, even in the abbreviated version outlined above, indicates the complexity of any proposed acquisition and, perhaps more important, in the context of the administration of the Musselburgh undertaking highlights the importance of Cownie to its directorate.

The historical association of the British Power Company with the Fife Electric Power Company and the Scottish Central Electric Power Company and the means by which the two latter companies became part of the Balfour Beatty

98. Ibid., 10th July, 1918.

group has already been discussed in some detail. However, the British Power Company sponsored yet another power company in Scotland which was for a short period also to be part of the Balfour Beatty empire but was eventually to be acquired by the N.E.C./Electrical Finance and Securities associated companies. This was the Lothians Electric Power Company which was incorporated by Act of Parliament in 1904 with a nominal capital of £600,000 and authorised to supply electricity to undertakers in bulk and to persons requiring a supply for power purposes in portions of the counties of Midlothian, East Lothian, Peebles and Lanark and to erect generating stations at West Linton, Kingsknowe and Auchengray.⁹⁹

The Lothians Electric Power Company had initially in 1905 an identical directorate to the Scottish Central Power Company viz., W.S.B. McLaren, T.O. Callender, J.A. Hood, D. Russell and J.H. Annandale, with McLaren and Callender being responsible for the British Power Company's interest. However, by the end of 1905 as a consequence of both resignations and new appointments the character of the directorate of the Lothians company had altered. By September 1905 both Callender and Annandale had resigned. In place of Callender, H. Ruffer was appointed director and since he was also a director of the British Power Company, its influence in the Lothians company was not

99. Garcke, op. cit. Vol. IX.

weakened. Annandale was replaced by Norman Doran Macdonald, an Edinburgh advocate,¹⁰⁰ who was a director of several other important companies.¹⁰¹ This situation remained until 1907 when McLaren resigned but was replaced by A.R. Holland, the then chairman of the British Power Company, who also now became chairman of the Lothians company.¹⁰² Thus, by 1909 the directorate of the Lothians company comprised A.R. Holland and H. Ruffer (representing the British Power Company) and J.A. Hood, D. Russell and N.D. Macdonald. This directorate remained unchanged until 1918. Unfortunately, the extant minute book of the company which covers the period until 1918 reveals little of importance and, indeed, when a meeting of directors was held in 1916, it was the first evidence of such a meeting being held since 1909.¹⁰³

The paucity of the extant records during this period ensures that the background to the take-over of the company by Balfour Beatty cannot be examined. No details of discussions or negotiations are available. However, in

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100. S.R.O. Records of the South of Scotland Electricity Board, SSE5,5/1, 11th January, 1905, 6th June, 1905 15th August, 1905 and 26th September, 1905. Garcke op. cit. Vol. IX.
- 101 N.D. Macdonald of 15 Abercromby Place, Edinburgh was on the Edinburgh board of the Car and General Insurance Corporation Limited, a director of Edinburgh and District Motor Omnibus Company Limited, London Power Omnibus Company Limited and Petrolite Limited and was also chairman of Notkin Light and Power Company Limited. Directory of Directors 1907, (1907), p. 574.
102. S.R.O. Records of the South of Scotland Electricity Board, SSE5,5/1, 7th February, 1907 and 23rd February, 1907.
103. Ibid., 26th October, 1909 and 25th October, 1916.

September 1918 both Rusbell and Ruffer resigned their positions as directors of the Lothians company and were replaced by James Walker and Henry Brown; Brown was chairman of the Scottish Power Company and Walker one of its directors (see Tables 15 and 16 p. 296 and p. 301). In November A.R. Holland also resigned and he was replaced by J.W. Bowhill who, as already noted, was a director of the Scottish Midlands company at 1920/1921 and a director of the Scottish Power Company by 1925/1926.¹⁰⁴ It is interesting to note that in his discussions with W.B. Cownie in 1917 concerning the possible acquisition of the Musselburgh undertaking, George Balfour had announced his intention of acquiring the Lothians concern. Moreover, from the 15th February, 1908 until 28th June, 1918 the Scottish Central Electric Power Company, a Balfour Beatty subsidiary, owned 610 shares of £10 each in the Lothians enterprise, and was, allegedly, the largest shareholder in that company.¹⁰⁵ After 1918 the extant records of the Lothians company are again very sparse. Indeed, a series of half-yearly meetings were held but, since no shareholders turned up, were adjourned. At the next meeting held in January 1922, N.D. Macdonald resigned his position as

104. Ibid., 27th September, 1918 and 19th November, 1918.

105. S.R.O. Records of the South of Scotland Electricity Board, SSE5,5/1, 7th August, 1906, 14th February, 1908 and 25th October, 1916. SSE5,5/4.

director and was replaced by W. Shearer who was a director of Balfour, Beatty and Company; at the same meeting I.C.A. Murray, who was the secretary of the Scottish Power Company, became secretary of the Lothians company.¹⁰⁶ The remaining original director, J.A. Hood, resigned in 1922 but was not replaced.¹⁰⁷ With the resignation of Hood the last vestiges of influence of the 'old' company disappeared, and the company now became the property of the Scottish Power Company. James Walker died in July 1922 and was later replaced by I.C.A. Murray, with the result that at the end of 1922 the directors of the Lothians company were Brown, Murray, Bowhill and Shearer.¹⁰⁸

Balfour Beatty's control of the Lothians Electric Power Company lasted only until June 1923 when it was acquired by the N.E.C./Electrical Finance and Securities consortium; again the extant records of the Lothians company do not reveal the reasons for the sale nor details of the purchase price. In June and July 1923, Brown, Murray, Bowhill and Shearer all resigned as directors and were replaced by H.T. Barnett, W.B. Cownie, G.H. Nisbett and J. Taylor;¹⁰⁹ as indicated earlier, all four men were directors of the N.E.C. Company at 1925/1926, and the latter three were directors

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106. S.R.O. Records of the South of Scotland Electricity Board, SSE5,5/1, 11th January, 1922.
 107. Ibid., 7th June, 1922.
 108. Ibid., 17th November, 1922.
 109. Ibid., 13th June, 1923, 14th June, 1923 and 26th July, 1923.

of the Electrical Finance and Securities Company at that date with Barnett becoming a director by 1931. The only other change which took place in the directorate of the Lothians company occurred in 1930 when F.E. Stanley replaced the deceased J. Taylor; Stanley also replaced him as a director of the N.E.C. Company.¹¹⁰

From 1923, therefore, the Electrical Finance and Securities Company exerted administrative control over the Lothians company, and this control was emphasised by its financial dominance of the latter company's affairs. It is not possible to provide a completely accurate analysis of shareholdings in the Lothians company but it is known that at 1931 its authorised capital was £600,000 of which £360,000 was issued.¹¹¹ Of this issued capital it is known that at December 1930 the Electrical Finance and Securities Company held 34,382 shares of £10 each or £343,820, representing 95.51 per cent, of the total issued capital. In addition, nominees of that company, that is shareholders whose dividend payments were paid directly to Electrical Finance and Securities, held a further 536 shares of £10 each.¹¹² In other words, at most, only 1,082 shares of £10 each, or 3.00 per cent of the total issued capital, were independently owned. Thus, both the administrative and financial control of the Lothians concern by the

110. Ibid., 24th April, 1930.

111. Garcke, op. cit. Vol. XXXIV.

112. S.R.O. Records of the South of Scotland Electricity Board, SSE5,5/4.

Electrical Finance and Securities Company was assured.

There is little doubt that the consumers in the Lothians company's area of supply benefited from the injection of additional capital after 1923, but it is equally obvious that the N.E.C. Company, which as indicated above was reduced to a subsidiary of the Electrical Finance and Securities Company, was advantaged by participation in contracts associated with the extension of supply within the designated area of the Lothians concern, contracts which were, in fact, largely financed by the Electrical Finance and Securities Company. For example, in November 1924 the secretary of the Lothians company submitted to his directors a statement between the Electrical Finance and Securities Company and the N.E.C. Company which indicated that the capital expenditure of work completed and work in progress in connection with the expansion of supply amounted to £115,598; particulars of the construction operations are not given.¹¹³ The financing of this contract and subsequent extensions was undertaken by the Electrical Finance and Securities Company which then received fully paid up shares in the Lothians company as payment. Indeed, 13,000 shares of £10 each, fully paid, were received by the former company as part payment on amounts outstanding against contracts completed.¹¹⁴ An

113. S.R.O. Records of the South of Scotland Electricity Board, SSE5,5/1, 27th November, 1924.

114. Ibid., 6th December, 1928, 5th December, 1929 and 4th December, 1930.

additional 3,000 shares were allotted, fully paid, to that company in repayment of a loan of £30,000 given by it to the Lothians company to allow the latter to purchase the Dalkeith undertaking in 1929;¹¹⁵ in other words, 16,000 shares of £10 each were allotted fully paid to the Electrical Finance and Securities Company in payment of debts. However, this does mean that by December 1930 the Electrical Finance and Securities Company had purchased 18,382 shares of £10 each of the Lothians company or, to put it another way, had invested £183,820 directly in the latter company. Moreover, investment did not, in the short-term, yield inordinately high levels of return. For example, the declared dividend of the company in 1925 was 3.50 per cent, in 1926 - 2.50 per cent, in 1927 and 1928 - 4 per cent, in 1929 - 3.50 per cent and in 1930 - 3 per cent.¹¹⁶ Thus, this investment can be regarded as of a long-term nature yielding greater benefit to the Lothians company in the short-term than to the Electrical Finance and Securities Company. For example, the N.E.C. Company agreed to make a loan to the Musselburgh undertaking in 1923 at one-half per cent above the Bank Rate, with a minimum of 6 per cent.¹¹⁷

115. Ibid., 5th December, 1929.

116. Ibid., 15th April, 1926, 25th January, 1927, 27th October, 1927, 31st January, 1929 and 9th April, 1931.

117. S.R.O. Records of the South of Scotland Electricity Board, SSE5,6/3, 5th January, 1923.

(5) Hydro-Electric Development.

The development and use of hydro-electric power did not escape the grasp of the holding company. Hydro-electric development has already been discussed in some detail in Chapter 5 where the linkages between the various companies were also considered, and thus a detailed examination is not required at this point. It is sufficient to state that all of the larger schemes were not independent companies. As noted in Chapter 5, the British Aluminium Company held the entire share capital of both the Loch Leven Electric Supply Company and the Lochaber Power Company.¹¹⁸ The Lanarkshire Hydro-Electric Power Company was set in motion by the Power and Traction Finance Company, and eventually became a subsidiary of the C.V.E.P. Company.¹¹⁹ Finally, as noted both in Chapter 5 and in Section 1 of this chapter the Grampian Electric Supply Company was an integral part of the Balfour Beatty empire.¹²⁰

(6) The Clyde Valley Electric Power Company.

The Clyde Valley Electric Power Company (after this C.V.E.P. Company) was the largest power company in Scotland.

118. See p.p. 202 - 204.

119. See p.p. 180 - 190.

120. See p.p. 204 - 206, 3II.

Almost from its inception in 1901 it was largely administratively and financially controlled by an Anglo-American consortium which comprised the British Westinghouse Electric and Manufacturing Company and the Traction and Power Securities Company. The C.V.E.P. Company is the subject of a fairly detailed case study in Chapter 8 and, therefore, it is not intended, at this time, to provide a detailed examination of its directorate nor an analysis of its finances to exemplify the subsidiary nature of its existence during the greater part of the period covered by this thesis; this will be shown in the following chapter.¹²¹ Moreover, within the Scottish context the C.V.E.P. Company itself acted as a holding company and, again, this will be examined in detail later. However, for the moment it will suffice to say that in 1905 the C.V.E.P. Company promoted the Strathclyde Electricity Supply Company for the purpose of applying for electric lighting orders for districts within its area of supply so that the restrictions imposed by the C.V.E.P. Act 1901 might be overcome. For example, the 1901 Act only allowed the C.V.E.P. Company, as a power company, to supply for lighting 20.00 per cent of what it supplied for power, and did not allow it to supply for domestic lighting; hence the promotion of this company.¹²² The C.V.E.P.

121. See Chapter 8, Sections 2 and 4.

122. See Chapter 8, Section 8.

Company also set up the Scottish Electrical Accessories Limited, as a private company, in 1919 to carry out, basically, the business of general engineers and contractors in connection with the supply of electricity.¹²³ It has already been noted in Chapter 5 that the C.V.E.P. Company also owned the Lanarkshire Hydro-Electric Power Company which was established in 1924 to utilise the Falls, of Clyde, near Lanark, to generate electricity.¹²⁴ Finally, in 1925 the C.V.E.P. Company acquired the Kilmacolm Electric Lighting Company which it then controlled absolutely.¹²⁵ Thus, the C.V.E.P. Company, itself subservient to a major international holding company, became itself one of the principal Scottish holding companies and exerted a tremendous influence over large areas of the industrial belt of Scotland.

It can be noted, therefore, that the electricity supply industry in Scotland within the private sector was dominated by a select number of holding companies of which the Balfour Beatty group, in terms of actual companies controlled, was the largest. Moreover, the degree of control exercised by these holding companies was absolute both in administrative and financial terms and alien to

123. Ibid.
 124. Ibid.
 125. See Chapter 8, Section 9.

Scotland. However, such control from outwith the confines of Scotland may be justified by the fact that the capital investment involved was, as far as can be determined, derived greatly from sources outside Scotland. This cannot be fully substantiated, of course, since a complete analysis of shareholdings is not available, but, as will be noted in the following chapter, the U. V. E. P. Company, the largest company in Scotland, was itself greatly dependant on Anglo-American finance. Foreign investment in the Scottish electricity supply industry was not immediately profitable and did not yield inordinately high returns - the declared dividends of the Musselburgh company is evidence of this - and thus cannot be condemned outright as mere exploitation. If foreign capital had not been so readily available it is, at least, doubtful whether companies would have been created at all, particularly in rural areas. Nevertheless, the holding companies were not motivated entirely by an unlightened benevolence and, despite the fact that their interest may have been long-term, they derived an immediate benefit from the activities of their subsidiary construction undertakings, and, by controlling subsidiary electricity supply concerns, they also excluded rival interests from contractual financial advantage.