

DR. G.T. BLOOMFIELD

Professor Emeritus,
University of Guelph

SOUTH EAST SCOTLAND ELECTRICITY BOARD AREA

Regional and Local Electricity Systems in Britain

Contents

Introduction	2
The South East Scotland Electricity Board	2
Constituents of the South East Scotland Electricity Board	2
Development of Electricity Supply Areas.....	3
I Local Initiatives.....	6
II State Intervention	10
III Nationalisation.....	18
Summary	22
Note on Sources.....	23



ALLOA

The Alloa Town Council bought the electricity works from the British Electric Plant Co. in 1910. Capacity was increased to 3,129kW in a burst of postwar optimism. Sales, however, failed to expand and the municipal system was sold to the Scottish Central Electric Power Co. in 1927/28.

Ordnance Survey Six Inch Map series, Perth & Clackmannan CXXXIX, 1920 (National Library of Scotland)

Introduction

Public electricity supplies began in Britain during the 1880s. By 1900 most urban places with over 50,000 population had some form of service, at least in the town centre. Gradually the isolated points on the national map began to coalesce, especially when the national grid helped local organisations to connect small towns, villages and eventually farms.

In the process of electrification, hundreds of municipal and company organisations developed local and sometimes regional systems. Before nationalisation in 1948, however, there was little consolidation of areas.

The study of British electricity systems is a remarkably daunting task. While there is a rich legacy of detailed annual surveys, these publications have to be tracked down. The user is then faced with immense alphabetical listings of all sorts of enterprises, often in places which no longer have much meaning except to local residents. Since there are few contemporary maps, listing and grouping the electricity organisations geographically is difficult and often time-consuming.

These notes are offered as an outline guide to the pre-1948 local authorities and companies that developed electricity supplies in South East Scotland.

The South East Scotland Electricity Board Area

The area was first defined by the Ministry of Fuel and Power in a White Paper published in January 1947, a month before debate began on the Electricity Bill.¹ Fourteen area boards were to be established for electricity distribution or retailing. Generation and transmission were to be the responsibility of the British Electricity Authority.

Each area board was defined to provide a diversity of load between urban and rural areas and, where possible, avoided cutting across distribution networks. The South East Scotland Area, as defined at this time, had been part of the Central and South Scotland Electricity Scheme Area. Other parts of this large area were transferred to the South West Scotland Electricity Board or the North of Scotland Hydro-Electric Board.

In detail the South East Scotland Area included the whole counties of Berwickshire, Clackmannanshire, Fife, Lothians, Peebles, Selkirkshire, and parts of Dunbartonshire, Roxburghshire and Stirlingshire. Part of northern Northumberland, operated by the Scottish Southern company to 1948, continued to be administered by the South East Scotland after nationalisation.

Constituents of the South East Scotland Electricity Board

When the Board began operations on 1 April 1948 it incorporated the distribution services and areas of eight local authorities and eight companies. The constituent areas varied enormously in size. The Scottish Southern Co. covered 1,160 square miles while the Police Burgh of Denny and Dunipace occupied a area of just over one square mile.

¹ Ministry of Fuel and Power, *Electricity Supply Areas*, Cmd 7007. (London: HMSO, 1947).

With a total area of about 3,174 square miles and an estimated population of about 1.3 million, the Board included every kind of district from the unpopulated uplands of Selkirk to the densely settled central parts of Edinburgh. In area and population, the Board was the smallest of the 14 Area Boards created by the Electricity Act 1947.

The head office at 53 Melville Street, Edinburgh was previously occupied by the Lothians Electric Power Co. With office accommodation very limited at the time, the existing administrative staff were moved out to High Street, Musselburgh.²

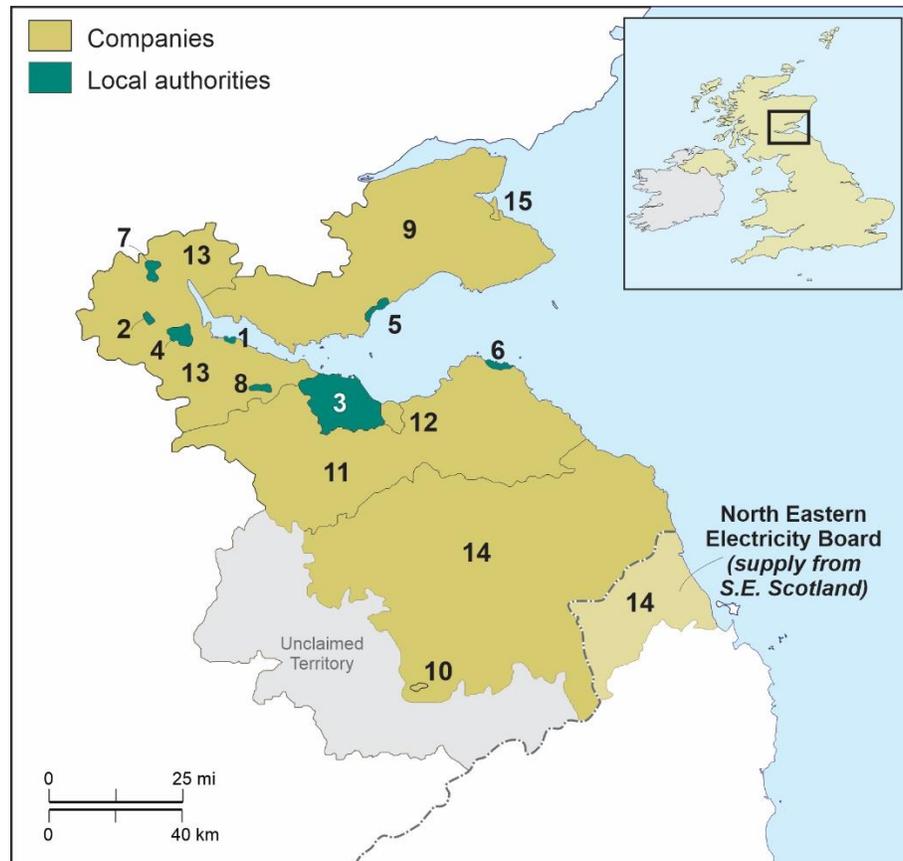


Figure 1 SOUTH EAST SCOTLAND ELECTRICITY BOARD CONSTITUENT UNDERTAKINGS 1948.

Development of Electricity Supply Areas

The 1948 pattern illustrated in **Figure 1** represented the climax of over 50 years of development. Unusually for a new innovation, electricity for public supply was subject to tight national regulations from an early stage. The Electric Lighting Act 1882 required “undertakings” to apply for a licence or

² South East Scotland Electricity Board, *First Annual Report and Accounts*, HC349 (London: HMSO, 1949), p.4.

provisional order from the Board of Trade.³ This requirement followed the precedents for earlier public utilities which had to “break up the streets” to lay mains or tracks. Electric Lighting Orders provided the basic conditions of a franchise to operate within a defined area, limiting the maximum prices that could be charged to consumers and, for private companies, a time limit of 21 years after which the local authority could purchase the system. An amendment in 1888 extended the time period to 42 years. All the Electric Lighting Orders were subject to Parliamentary approval. Major changes such as amalgamation of companies and extension of area required special acts.

Table 1 SOUTH EAST SCOTLAND ELECTRICITY BOARD CONSTITUENT UNDERTAKINGS 1948

MAP #	LOCAL AUTHORITIES
1	Borrowstouness Corporation
2	Denny & Dunipace Corporation
3	Edinburgh Corporation
4	Falkirk Corporation
5	Kirkcaldy Corporation
6	North Berwick Corporation
7	Stirling Corporation
8	Uphall (West Lothian County Council)
	COMPANIES
9	Fife EP Co
10	Hawick (Urban ES Co)
11	Lothians EP Co
12	Musselburgh & District EL&T
13	Scottish Central EP Co/Scottish Midlands ES Co
14	Scottish Southern ES Co
15	St Andrews (Electric Supply Corporation)

Key to Abbreviations

EL&T: Electric Light and Traction

EP Co: Electric Power Company

ES Co: Electricity Supply Company

Only a few public electricity systems were established under the 1882 Act. By 21 December 1882 the Board of Trade had received 109 applications for Electric Lighting Orders. After scrutiny by the office and Parliament, 69 ELOs were granted to local authorities and companies. Eight of these came to fruition over the next decade, while the others were abandoned as the early optimism waned given the uncertainties of the market for electricity and the limitations of early technology.

A single application was made by the Brush Electric Light & Power Co. of Scotland for an ELO covering Edinburgh. There were many objections to the application and the Board of Trade held a local inquiry on 8 May 1883. Reporting on the inquiry Major F.A. Marindin concluded:

In the absence of any evidence whatsoever as to the capital and position of the promoters and as to their ability to carry out the obligations imposed by the order,

³ Basic details of this Act and subsequent legislation are outlined in *Electricity Supply in Great Britain: A chronology* (London: Electricity Council, 1977).

*and having regard to the strong opposition of the local authority, I have to recommend that the application for the Order be refused, and I consider that the cost of the inquiry should be borne by the promoters.*⁴

By 1887 there were several examples of private electric lighting in the region. In Edinburgh, Waverley station had electric lighting by 1884⁵ and the Esk paper mills at Penicuik were "...lighted up by the electric light which is also useful for matching colours."⁶ Construction of the Forth Bridge was also facilitated by arc lighting. The Isle of May lighthouse in the Firth of Forth had a steam-powered generator from December 1886.

Scotland's first venture in international exhibitions opened in Edinburgh during May 1886. Located in the West Meadow Pleasure Park, off Melville Drive, the International Exhibition of Industry, Science and Arts had two million visitors during the six months it was open. As at other contemporary exhibitions, electric lighting was featured in the buildings and gardens. A large powerhouse included 13 engines and 30 dynamos. One third of the dynamos were built by King, Brown & Co., Rosebank Works, Edinburgh.⁷

A second exhibition was held in Edinburgh in 1890, partly to celebrate the opening of the Forth Bridge. An electric railway was also featured. Unlike its predecessor this venture failed to attract the big crowds and lost money.⁸

Although general urban electrification failed to take off in the region, private systems began to develop. Private generation provided a market for electrical equipment, helped the training of workers and gave opportunities to refine the details of the new technology.

Public electricity supply systems began to take off in 1889-90 when applications for Electric Lighting Orders resumed. Nationally there were 17 applications in 1889 and 161 in 1890. Three applications for the region were made in 1890. The Scottish House-to-House Electricity Co. presented applications for Edinburgh and Leith and for Hawick while the Scottish Electric Supply Co. applied only for the City of Edinburgh. All three were rejected:

*The Promoters failed to produce the consent of the local authorities or to satisfy the Board of Trade that it should be dispensed with and that the Board of Trade refused to grant the Order.*⁹

In the following year the City of Edinburgh was granted an ELO and began supply in 1895. Leith Town Council began a public supply in 1899 and Stirling in 1900.

While the Board of Trade developed regulations for safety, inspected and approved new systems as well as collecting annual returns, the Board provided no guidance on general policy or technical matters.

⁴ Report by the Board of Trade respecting the applications to and the proceedings of the Board of Trade under the Electric Lighting Act 1882," *Parliamentary Papers* 1883, HC2237, Appendix 5, p.19.90. HC 273.

⁵ Noted in a paper by William Geipel, Institution of Mechanical Engineers, *Proceedings* 1888, p.100. Waverley Station had 34 arc lamps in 1884. The Caledonian Railway had electric light for the Grangemouth Docks by 1884, John Butt, *Industrial Archaeology of Scotland* (Newton Abbot: David & Charles, 1967), p.188

⁶ I.Mech.E., *Proceedings*, 1887, p.463.

⁷ *The Engineer*, Vol.61, 1886, pp.467-469.

⁸ *The Engineer*, Vol.69, 1890, pp .347-352.

⁹ "Report by the Board of Trade respecting the applications to and the proceedings of the Board of Trade under the Electric Lighting Acts 1882 and 1888 during the past year", *Parliamentary Papers* 1890. HC 273.

These were left to the operator and consulting engineer to decide. Consequently after 1888 large numbers of fragmented operators developed DC and AC systems with little attempt at co-ordination. AC systems with frequencies varying from 25 cycles (Hz) to 100 cycles were established. The lack of standardisation would become a major problem when interconnection between areas became advantageous.

An outline of development is presented in three phases: local initiatives from the 1880s to World War I, state intervention to the 1940s, and nationalisation from 1948.

I Local Initiatives

Figure 2 and **Table 2**, derived from a rare map of electricity undertakings in the British Isles, provide a snapshot of the development of public supply areas over the previous three decades.



Figure 2 SOUTH EAST SCOTLAND ELECTRICITY UNDERTAKINGS, 1912.

Table 2 SOUTH EAST SCOTLAND AREA: ELECTRICITY UNDERTAKINGS c.1912

UNDERTAKING	COUNTY	SUPPLY BEGAN
LOCAL AUTHORITIES		
Alloa	Clackmannan	1901
Denny & Dunipace	Stirling	1908
Edinburgh	Midlothian	1895
Falkirk	Stirling	1903
Kirkcaldy	Fife	1902
Leith	Midlothian	1899
Stirling	Stirling	1900
Uphall ¹	West Lothian	1906?
Companies		
Berwick-On-Tweed	Northumberland	1903
Bo'ness ²	West Lothian	1905
Dalkeith	Midlothian	1904
Dollar	Clackmannan	1904
Fife Electric Power Co	Fife	1905
Fife Tramway, Light & Power Co	Fife	1909
Hawick	Roxburgh	1902
Jedburgh	Roxburgh	1904
Melrose	Roxburgh	1904
Musselburgh	Midlothian	1904
St Andrews	Fife	1905
Scottish Central Electric Power Co	Stirling	1905
Wormit & Woodhaven	Fife	1903

Notes:

¹ Linlithgow County Council (later renamed West Lothian).

² Owned by Corporation; leased to National Electric Construction Co.

Source: "Map showing Electric Lighting, Power and Traction Undertakings in Operation." Supplement to *Garcke's Manual of Electrical Undertakings*. Undated but c 1912. [Copy from National Library of Scotland]

The eight local authorities were clear examples of local initiative in developing electric light and power. Edinburgh Corporation (population 320,318 in 1911) was the largest of the local authorities. Denny and Dunipace (population 5,164) was the smallest. Unlike Edinburgh that had two power stations, Denny and Dunipace purchased a bulk supply from the local power company.

The 13 companies in South East Scotland were very varied in scale and location, some on the fringes of the region, others at the core. Apart from the Wormit and Woodhaven undertaking owned by the Tayside Electric & Gas Light Co., a local enterprise, the other companies were associated with national firms. The Electric Supply Corporation (associated with Crompton & Co.) owned the operations in Dalkeith, Dollar, Jedburgh, Melrose and St Andrews. Edmundson's/Urban Electric Supply Co. controlled Berwick and Hawick while the National Electric Construction Co. leased and worked the Bo'ness undertaking on behalf of the Town Council. Musselburgh & District Electric Light & Traction was also related to the National Electric Construction Co.

The two power companies—Fife and Scottish Central—were established by private Acts in 1903. Unlike the other companies they were not subject to the 42-year franchise limit and were allowed to provide bulk supply and power to large industrial concerns.

Electrification in the region around 1912 was still incomplete with only a small part of the area covered by Electric Lighting Orders. Buckhaven and Methil (population 15,149 in 1911), Galashiels (14,919), Bathgate (8,226) and Selkirk (7,406) all lacked a public system.

Lighting was still the dominant use for electricity until the late 1890s. The most profitable demand was in shops, offices, hotels, theatres (and later cinemas) and public buildings. Residential sales were more limited—by the expense of installation and the high retail prices. With lighting, much of the load on generating equipment was confined to the evening hours, a feature that also contributed to the high prices. Diversification of the load to other uses, especially in the daytime, was essential if electricity was to become a viable alternative to gas. Such diversification began with the electrification of tramways and the substitution of electric motors for small steam engines and manual power.

The limitations of DC supply became apparent to many larger undertakings after 1900 and in the search for economies of scale the introduction of more efficient prime movers became a priority. Edinburgh had AC and DC from the beginning in 1895 and changed the original frequency of 52.5Hz to 50Hz by 1903. The power companies adopted AC at 50Hz from the beginning. By 1914 Edinburgh, Falkirk and Leith had turbines in service. Kirkcaldy at this time was still wholly DC but added AC and a turbine during the war.

The 1912 data do not cover private generation which was very important at the time, not only in isolated establishments but also in urban centres where there was already a public supply. Some examples are outlined here to give a sense of the scale and scope of private generation otherwise absent in many accounts of electrification.

The Oakbank Oil Company, Niddry Castle works, Winchburg, opened in 1902-3, was an all-electric operation from the beginning. A narrow-gauge (2'6") electric railway linked the refinery with the shale mines to the north.¹⁰ Other mining operations, particularly coal, were early users of electricity and were building new power stations in the 1920s when public supplies were becoming available. The Lothian Coal Co. opened a new power station in 1924 equipped with two 1,000kW turbines at the Newtongrange Colliery.¹¹ The Fife Coal Company at Kelty had an even larger central power station to serve its mines in the district. By 1922 this plant at Aitken Pit had a capacity of 7,500kW.¹² Coal ports at Grangemouth (Caledonian Railway) and Methil (North British Railway) had power stations to light the docks. The North British also had a very small power plant at the isolated Riccarton Junction in Roxburgh.¹³

¹⁰ P.M. Cadell ed., *The County of West Lothian, Third Statistical Account of Scotland*, Vol.21 (Edinburgh: Scottish Academic Press, 1992), p.11; Guthrie Hutton, *Shale Oil: A history of the industry in the Lothians* (Catrine: Stenlake Publishing, 2010), pp.45-47.

¹¹ Institution of Mechanical Engineers, *Proceedings* 1933, p.88.

¹² "The Fife Coal Company Ltd, Jubilee Year 1922." See Scottish Mining website www.scottishmining.co.uk

¹³ The Methil and Riccarton Junction power stations were still operating in 1928. See: Electricity Commissioners, *Generation of Electricity in Great Britain 1927-1928* (London: HMSO, 1928), p.14.

Electric Tramway Systems in South East Scotland¹

	<i>YEARS OPERATING</i>	<i>ROUTE MILES</i>	<i>MAX NO. OF CARS</i>
<i>Dunfermline & District</i>	1909-1937	18.36	47
<i>Edinburgh Corporation</i>	1922-1956	47.25	597
<i>Falkirk & District</i>	1905-1936	7.80	37
<i>Kirkcaldy Corporation</i>	1903-1931	6.11	26
<i>Leith Corporation</i>	1904-1920 ²	9.09	37
<i>Musselburgh & District</i>	1904-1928 ³	6.53	22
<i>Wemyss & District</i>	1906-1932	7.45	29

Seven electric tramway systems were developed in the region between 1903 and 1922, three by local authorities and four by companies.

Edinburgh, which had taken over the horse tramway in 1890, made the decision to convert the system to cable traction in 1895. At the time several electric tramways were operating elsewhere in Britain but the decisionmakers selected what seemed a sensible mechanical system. Built by Dick Kerr & Co., the cable system was leased to Edinburgh & District Tramways when completed in 1899. The defects of cable traction were apparent by 1914 and Edinburgh Corporation was again faced with decisions in a period of technical transition. In central London all surface transport was by motor bus and some small electric companies were abandoning trams (such as Sheerness in 1917). When the cable company's lease expired in June 1919, the Corporation took control and began conversion of the cable system to electric traction. The building of the Portobello power station also began at this time, partly to supply the extra demand of the tramways system. The first electric tramcar services began in June 1922 and all conversion work was completed by the following year.⁴

Tramway power supply, as a proportion of total sales, was very important in the early years and ensured the viability of many public supply systems. In Kirkcaldy, tramway power accounted for 42.4 percent of all electricity sales in 1911/12. Even as late as 1925/26 tramway power supply represented 60.5 percent of the Musselburgh Company which also provided public supply in the town. Tramway power sales in Edinburgh at this time amounted to 17.3 percent of the Corporation's total electricity sales.

Wemyss & District was the only tramway operator with a specialised generating station. This was located at Aberhill (part of Buckhaven-Methil) and had a capacity of 400kW in 1914. By the mid-1920s the company was taking its supply from the Fife Electric Power Company.

Electric tramways provided fast, efficient and cheap urban transport and were very profitable before 1914. Motor bus competition after the war quickly eroded the viability of the smaller systems.

¹ Compiled from Keith Turner, *Directory of British Tramways*, Vol.3 (Stroud: The History Press, 2010).

² To Edinburgh Corporation when Leith was amalgamated with the city.

³ Transferred to Edinburgh Corporation.

⁴ D.L.G. Hunter, *Edinburgh Transport Vol.2. The Corporation years 1919-1975* (Edinburgh: Mercat Press, 1992), p.18.

Paper mills at Markinch, Fife and Valleyfield Mills, Penicuik were also generating their own power requirements. The Royal Navy dockyard at Rosyth, under construction in 1912, included several power stations for the docks, workshops and new village.¹⁴ Kilncraigs woollen mills, in the centre of Alloa, was generating its own power and continued working as late as the 1970s.¹⁵

Hotels were early in adopting electric lighting as one of the amenities of high-class hospitality. The Queen's Bay Hotel at Joppa was advertising electric light in 1900.¹⁶ At this time the power would have been generated on the premises, a feature of hotels in North Berwick (where there was no public supply until 1912) and the Peebles Hydro rebuilt after a fire in 1907.

Other institutions of a different type were also introducing electric lighting. The Bangour Village Hospital at Dechmont, West Lothian, opened in 1904 as the Edinburgh District Asylum had its own powerhouse, served for coal supplies by a long branch railway.¹⁷

Throughout the region country houses, estates and larger farms added electricity. Manderston House near Duns added an "electric house" for generating in 1896-97 when the whole estate was being rebuilt and modernised.¹⁸

II State Intervention

Difficulties of interconnection, differences in AC frequencies, and the need for coal conservation by the use of larger scale plant became major issues in World War I when electricity consumption nearly doubled. The Electricity (Supply) Act 1919 created a new organisation, the Electricity Commissioners, to replace the role of the Board of Trade.

A key mandate of the Commissioners was the restructuring of generation and transmission, by voluntary means since the earlier compulsory powers had been deleted from the legislation. The first stage of the procedure for establishing Joint Electricity Authorities was the definition of a series of Electricity Districts covering parts of the country where reorganisation was most needed. All the electricity undertakings in the defined area were then invited to submit proposals for reorganisation schemes emphasising the technical, administrative and financial aspects of a JEA.

An East of Scotland Electricity District was defined by December 1921 and a date for submission of proposals was set for the end of July 1922. Edinburgh Corporation submitted a scheme for a Joint Electricity Authority and a local inquiry was held in December. While there was no agreement on forming a JEA, the general proposals for Edinburgh to provide a bulk supply for distribution throughout Midlothian and East Lothian were accepted. The Lothians Power Company which had never operated under its Act of 1904 was now activated as the primary distributor for the two counties. A draft order for constituting the Edinburgh and Lothians Electricity District was prepared in 1923, approved by a local inquiry in 1924 and passed both Houses of Parliament in December (**Figure 3**). This scheme was one of

¹⁴ T.B. Hunter and A.L. Bell, "HM Dockyard, Rosyth", *Proceedings of the Institution of Civil Engineers*, Vol.223, 1927, pp.37-96.

¹⁵ C.A. Oakley, *Scottish industry today* (Edinburgh: Moray Press, 1957), p.91. The Paton & Baldwin's mill also had a two-mile underground cable to the Clackmannan Mill (noted in the I.Mech.E. works visits, Edinburgh, 1961).

¹⁶ *Edinburgh and South of Scotland Trades Directory 1900* advertisement.

¹⁷ "Historic Hospitals--an architectural gazetteer" (www.historichospitals.com)

¹⁸ See John Kinross (1855-1931), *Buildings and Designs: Dictionary of Scottish Architects* (www.scottisharchitects.org.uk)

Table 3 SOUTH EAST SCOTLAND AREA: ELECTRICITY SUPPLY UNDERTAKINGS 1925/26

UNDERTAKING	COUNTY	SYSTEM	GENERATING CAPACITY kW	PER CAPITA CONSUMPTION kWh
Local Authorities				
<i>Alloa</i>	Clackmannan	DC	3,129	87.9
<i>Bo'ness</i> ²	West Lothian	DC	500	189.0
<i>Dalkeith</i>	Midlothian	DC	185	33.5
<i>Denny & Dunipace</i>	Stirling	AC	-	14.7
<i>Edinburgh</i>	Midlothian	AC/DC	64,850	180.2
<i>Falkirk</i>	Stirling	AC/DC	5,700	137.7
<i>Kirkcaldy</i>	Fife	AC/DC	7,200	171.9
<i>North Berwick</i>	East Lothian	DC	65	..
<i>Stirling</i>	Stirling	DC	890	47.7
<i>Uphall</i> ¹	West Lothian	DC	142	10.4
Companies				
<i>Berwick-Upon-Tweed</i> ²	Northumberland	DC	470	37.2
<i>Dollar</i> ³	Clackmannan	DC	38	24.2
<i>Fife EP Co</i>	Fife	AC/DC	16,500	..
<i>Fife TL&P Co</i>	Fife	AC	-	16.6
<i>Galashiels & Dist Es Co</i>	Selkirk	AC	3,500	90.9
<i>Hawick</i> ²	Roxburgh	DC	1,680	118.9
<i>Jedburgh</i> ³	Roxburgh	DC	64	32.5
<i>Lothians EP Co</i>	Midlothian	AC	-	12.7
<i>Melrose</i> ³	Roxburgh	DC	64	21.6
<i>Musselburgh & Dist EL&T Co</i>	Midlothian	AC/DC	-	48.6
<i>St Andrews</i> ³	Fife	DC	390	44.8
<i>Scottish Central EP Co</i>	Stirling	AC	15,600	..
<i>Scottish Midlands ES Co</i>	Stirling	AC	-	5.3

Notes:¹ West Lothian County Council.² Urban Electric Supply Co³ Electric Supply Corporation**Source:** Compiled from Electricity Commissioners, *Engineering and Financial Statistics 1925/26*

Statistics on electricity consumption per head of population reveal major contrasts among electricity undertakings. Five places exceeded 100.0kWh per person. Each place had a distinctive market profile reflecting the local economic and social geography. Kirkcaldy's profile in 1925/26 consisted of 18.2 percent of sales in the lighting segment. 1.8 percent in public lighting, 10 percent for the tramways and 70 per cent in power. Two towns, Bo'ness and St Andrews with similar-sized populations (around 10,000) had very different market profiles. Bo'ness was dominated by power sales at 79.5 percent while St Andrews had 56.6 percent in the lighting segment. Annual per capita sales in Bo'ness amounted to 184kWh while sales in St Andrews reached only 44.8.

No new undertakings were created in the region after 1926, but the power companies extended their territory. The Scottish Central Company moved into Clackmannan when it acquired the Alloa and Dollar undertakings in 1928. Fife Electric Power Co. applied for a Special Order for the north east of the county and this was granted in 1926. In the south, the Scottish Southern Company (renamed from Galashiels & District in 1928) took in a large area with a Special Order in 1934. An extensive area of the Southern uplands remained "unclaimed territory" (see **Figure 1**).

Transmission lines supported by tall steel towers became the most visible effect of state intervention as they appeared in the landscape during the early 1930s. Construction of a national transmission grid was a key recommendation of the Weir Report which formed the basis for the Electricity (Supply) Act 1926. The government moved quickly in forming the Central Electricity Board which received the plans for the Central Scotland scheme in April 1927 and accepted these with few modifications. Edward MacColl (1882-1951) was appointed manager and chief engineer for Central Scotland and set up headquarters in Glasgow.

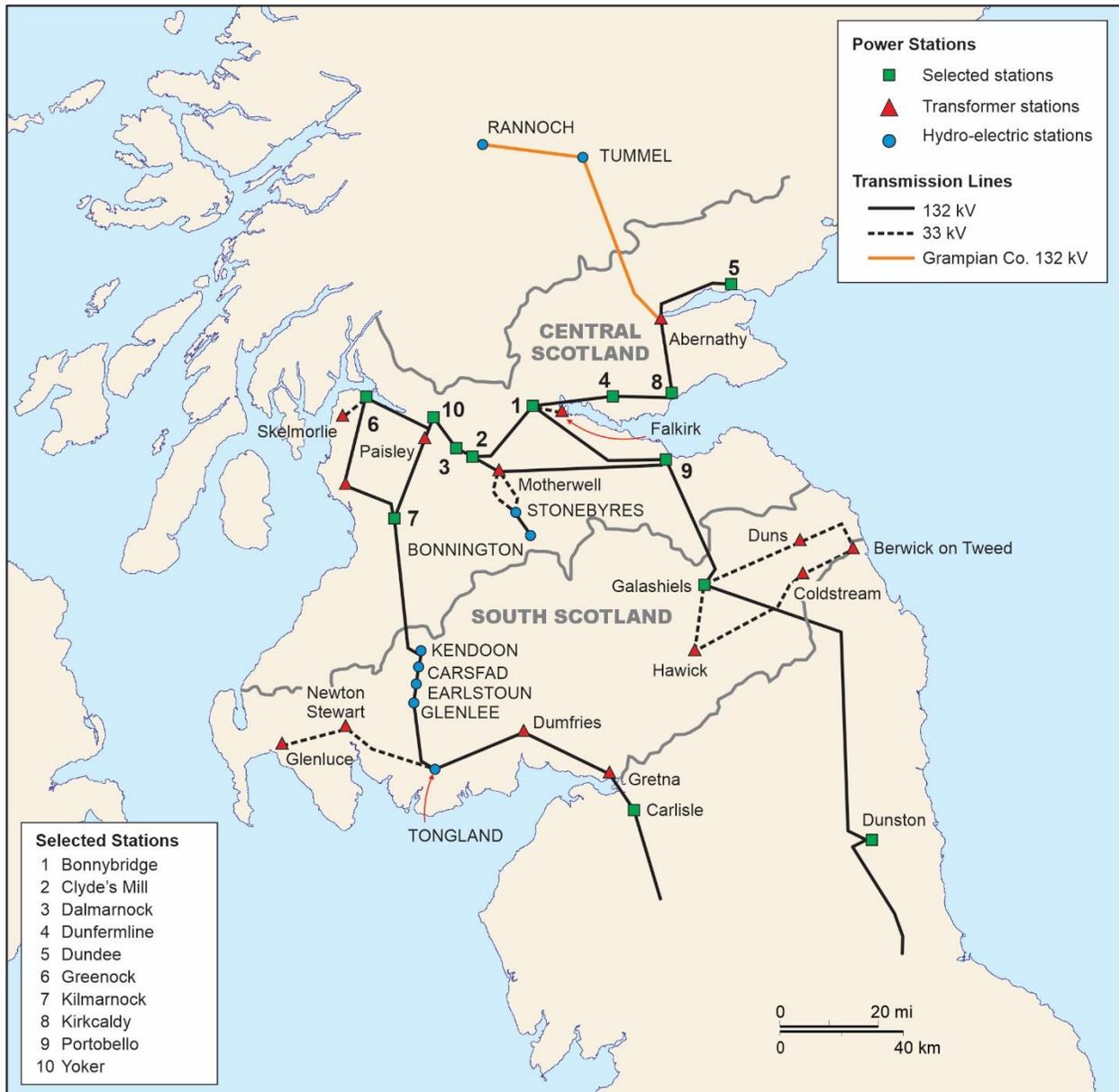


Figure 4 Central and South Scotland Electricity Schemes 1936.

There were three selected stations in the South East Scotland region at Portobello, Bonnybridge and Dunfermline. A main transmission line at 132kv linked these stations together with Dundee and the selected stations in South West Scotland (**Figure 4**). The only major engineering work was the crossing of the Forth at Kincardine. The first tower was erected near Edinburgh on 14 July 1928 and by September the first spans on the 18-mile section from Portobello to Bonnybridge had been completed.

The members of the Central Electricity Board have gone North to inspect the new towers and have invited a number of engineers and representatives of important electricity undertakings to accompany them.²⁰

The Central Scotland scheme was designed and built in three years and in all the details served as the prototype for all the other regional projects of the CEB. A formal opening of the system was performed by Herbert Morrison, Minister of Transport at the Portobello Power Station on 30 April 1930.

When trading began on 1 January 1933, the grid had added a new layer to the complex of undertakings which operated the electricity supply system. The grid control office at Broomhill Drive, Glasgow, now managed the flows of power on the transmission lines and directed the hour-to-hour operation of the selected power stations. These stations such as Portobello remained in the ownership and management of Edinburgh Corporation but the daily operation was now directed from Glasgow. Planning for the future became increasingly centralised, particularly from London.

The South Scotland Electricity Scheme was prepared by the Electricity Commissioners by December 1930 and adopted by the CEB in July 1931. In South East Scotland the grid was a basic 132kv line from Edinburgh to Galashiels and then across the Border to Dunston power station near Newcastle. A lower-voltage line from Galashiels served the small towns to the east. This section was all completed by 1933. When the Galloway hydro-electric power stations were completed, trading began on 1 January 1937.

Table 4 shows the situation in 1935/36 when 17 undertakings were in operation. Over the previous decade several changes had taken place in the type of systems. Wholly DC systems had been reduced from 12 to six as smaller undertakings had been merged. Hawick and Stirling, however, remained dedicated to DC.

Generating technology emphasised economies of scale with larger units that brought major reductions in coal consumption. The Portobello station that had opened with 12,500kW alternators added two 31,250kW machines in 1929-30.²¹ Coal consumption in the three Edinburgh power stations, of 2.20lbs for each kilowatt hour generated in 1925/26 was reduced to 1.49lbs in Portobello a decade later. In contrast, coal consumption at the Berwick station rose slightly from 5.66lbs per kWh in 1925/26 to 5.81lbs a decade later.

Rationalisation of generation and interconnection of undertakings all contributed to reducing the cost of electricity. Other factors such as the growth of radio broadcasting and lower prices for small appliances helped to boost electricity consumption. By 1935/36 there were eight places in the region with per capita consumption levels above 100kWh.

²⁰ *The Times*, 14 September 1928, p.9.

²¹ "Extensions at Portobello power station", *The Engineer* Vol.149, 1930, pp.525-526. Some of the waste heat from the condensers was later used for warming the nearby swimming pool completed in 1936. *The Engineer* Vol.162, 1936, pp.133-134.

Table 4 SOUTH EAST SCOTLAND: ELECTRICITY SUPPLY UNDERTAKINGS 1935/36

UNDERTAKINGS	SYSTEM	GENERATING CAPACITY kW	PER CAPITA CONSUMPTION kWh
Local Authorities			
<i>Bo'ness Corporation</i>	DC	-	186.3
<i>Denny & Dunipace</i>	AC	-	45.9
<i>Edinburgh</i>	AC/DC	116,500	406.3
<i>Falkirk</i>	AC	5,700	308.6
<i>Kirkcaldy</i>	AC/DC	7,200	213.7
<i>North Berwick</i>	AC	-	121.5
<i>Stirling</i>	DC	890	168.4
<i>Uphall¹</i>	DC	-	121.5
Companies			
<i>Berwick-Upon-Tweed²</i>	DC	470	54.6
<i>Fife EP Co</i>	AC/DC	16,550	..
<i>Hawick²</i>	DC	1,680	112.4
<i>Lothians EP Co</i>	AC	-	84.3
<i>Musselburgh & Dist EL&T Co</i>	AC/DC	-	53.1
<i>St Andrews³</i>	DC	580	79.8
<i>Scottish Central EP Co</i>	AC/DC	28,100	..
<i>Scottish Midlands ES Co</i>	AC	-	30.0
<i>Scottish Southern ES Co</i>	AC/DC	7,549	170.3

Notes:¹ West Lothian County Council.² Urban Electric Supply Co³ Electric Supply Corporation**Source:** Compiled from Electricity Commissioners, *Engineering and Financial Statistics 1935/36*

The growth of electricity sales, especially in the lighting segment, may be illustrated by the case of Falkirk. Total electricity sales grew from 3.65million kWh in 1925/26 to 6.64m kWh a decade later. The lighting segment that included domestic uses expanded from 0.84m kWh to 4.5m kWh. With continued growth in power demand over the same period, per capita consumption in Falkirk rose from 137.7kWh to 308.6kWh.

Economic depression affected electricity sales as in the case of Hawick where sales in 1935/36 were slightly less than a decade earlier. The lighting segment grew from 0.34m kWh to 0.64m kWh but power sales declined and per capita consumption fell from 118.9kWh to 112.4kWh.

All nine of the electricity companies operating in the region in the mid-1930s were owned by holding companies (**Table 5**). The largest was Scottish Power with four subsidiaries and combined sales of 88.92million kWh and 35,225 consumers in 1935. Incorporated in December 1909 to acquire the shares of the Scottish Central Electric Power Co., the company had a share capital of £500,000 in July 1927. With the beginning of construction on the Grampian hydro-electric scheme and the takeover of more companies such as the Fife Electric Power Co., the authorised capital was raised to £1.5million in March 1928, £4.2million in September 1930 and £6million in December 1933.²²

²² Garcke's *Manual of Electrical Undertakings* 1940/41, p.803.

Table 5 SOUTH EAST SCOTLAND: CORPORATE STRUCTURE OF ELECTRICITY HOLDING COMPANIES 1934/35

1. British Electric Traction	1.1 Lothians Electric Power Co 1.2 Musselburgh & District
2. Edmundson's/Urban Electric Supply Co	2.1 Berwick-upon Tweed 2.2 Hawick
3. Electric Supply Corporation	3.1 St Andrews
4. Scottish Power	4.1 Fife Electric Power Co 4.2 Scottish Central Electric Power Co 4.3 Scottish Midlands 4.4 Scottish Southern

Source: Political and Economic Planning, *Report on the Supply of Electricity in Great Britain* (London: PEP, 1936), pp.140-141.

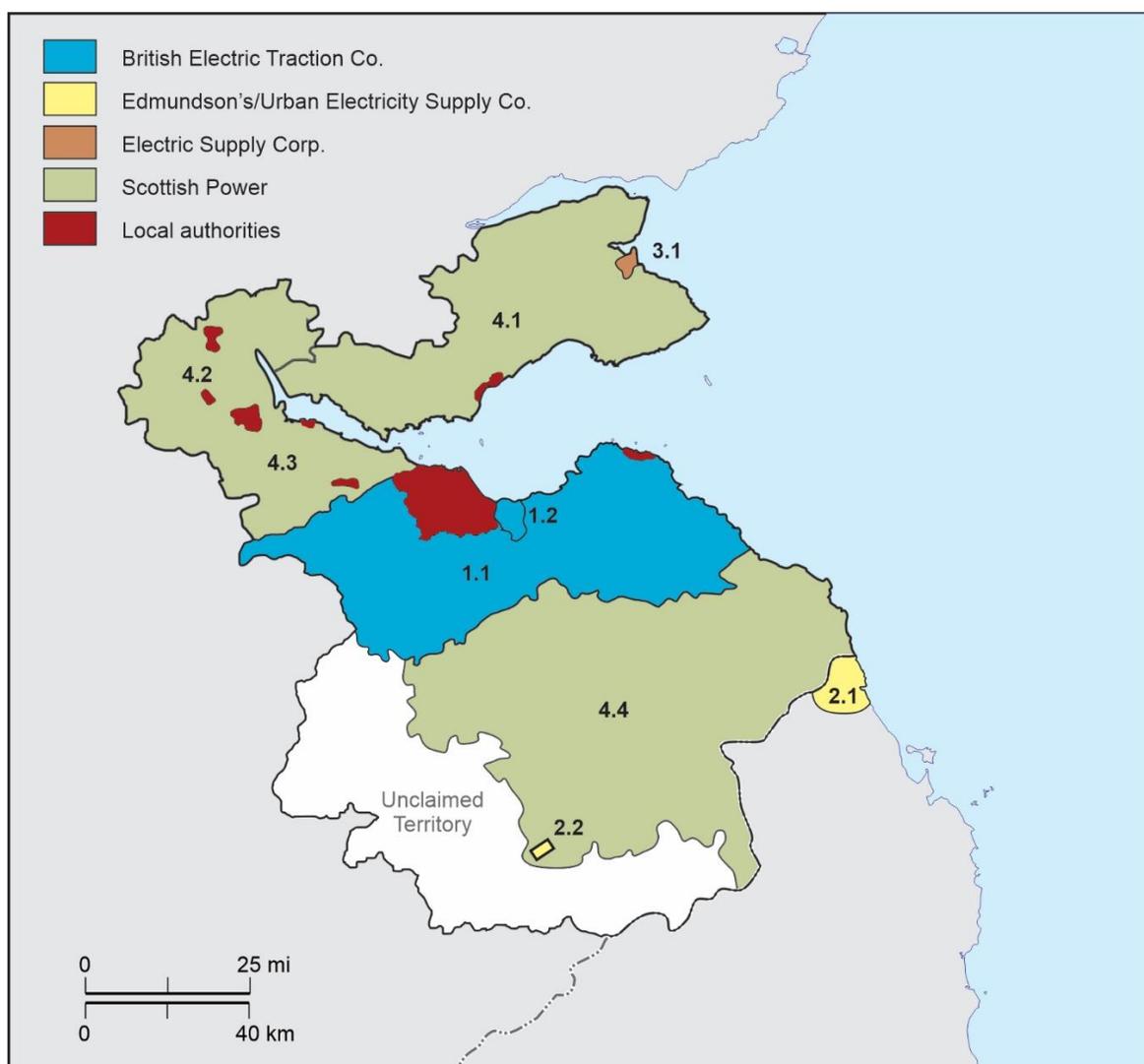


Figure 5 SOUTH EAST SCOTLAND HOLDING COMPANIES 1934/35.

George Balfour (1872-1941) had directed this company from the beginning and by the 1930s controlled an empire of electrical enterprises from the North of Scotland to metropolitan London. Although born in Portsmouth, much of his technical education and early practical work in electrical engineering took place in Dundee and Edinburgh. Based mostly in London from 1903, he was instrumental in the formation of Fife Tramways Light & Power Co. in 1909 and Galashiels & District Electric Supply Co. in 1913. With Andrew Beatty he formed Balfour Beatty in 1909 which developed into a major construction company. In 1922, he formed Power Securities Ltd which became the holding company for many subsidiaries such as Scottish Power. Balfour owned an estate at Foss, Perthshire near the Tummel hydro-electric station. From 1918 until his death, Balfour represented the Hampstead constituency as a Unionist MP. He was active in the House of Commons, particularly in the lengthy electricity debates in 1919 and 1926 when he opposed the government measures.²³

The other holding companies with assets in South East Scotland were much smaller. Musselburgh & District and the Lothians Power Co. owned by British Electric Traction together had sales of 12.10 million kWh and 11,400 consumers. St Andrews, Hawick and Berwick-on-Tweed undertakings were all relics from an earlier phase of expansion by London companies now retreating from the region. In 1936 Edmundson's sold the Berwick undertaking to the Scottish Southern Company.

Although state intervention had begun to rationalise electricity generation, the efforts of the Electricity Commissioners to reduce the very large numbers of distributors were unsuccessful. The McGowan Report published in May 1936²⁴ and the subsequent government proposals were strongly opposed by many sections of the electricity supply industry. A recommendation in the McGowan Report, that all undertakings with annual sales of less than 10 million kWh should be amalgamated, was particularly controversial. In South East Scotland six of the eight local authorities fell below this limit. Kirkcaldy and Stirling would have resisted any plan for amalgamation with the power companies. The government's Outline of Proposals published in April 1937²⁵ was met with strong opposition and more pressing issues of the time meant that reorganisation of distribution was set aside.

Table 6 lists the undertakings consolidated between 1920 and 1948. Most of the changes were takeovers by the power companies or other subsidiaries of Scottish Power. The Leith Corporation Electricity Department, the second largest municipal undertaking in the region, became part of the Edinburgh system when the town was amalgamated with the city in 1920. Tayside Electric Light & Power which had supplied Wormit and Woodhaven for 20 years had its Electric Lighting Order revoked in June 1923 after complaints to the Electricity Commissioners about the service. The Wormit Electric Light Company was registered in October 1923 to take over the earlier operation and worked as a non-statutory company until about 1930 when Fife Electric Power Co. extended its distribution lines to Tayport.²⁶

²³ Leslie Hannah, "Balfour, George, 1872-1941, utility engineering consultant", *Dictionary of Business Biography*, Vol.1 (1982), pp.125-128; "Obituary, George Balfour", *The Engineer* Vol.172, 1941, p.219.

²⁴ Ministry of Transport, *Report of the Committee on Electricity Distribution*, May 1936 (London: HMSO, 1936). The report noted that there were no fewer than 635 separate authorised undertakings in Great Britain in 1934, comprising the Central Electricity Board, 3 Joint Electricity Authorities, 5 Joint Boards, 373 Local Authorities and 253 Companies and persons.

²⁵ Ministry of Transport, *Electricity Distribution: Outline of Proposals* (London: HMSO, 1937).

²⁶ The Newport, Wormit and Forgan Archive (www.newportarchive.co.uk) has various details including a list of shareholders of the Wormit company 1923-1929.

Table 6 SOUTH EAST SCOTLAND AREA CONSOLIDATIONS TO 1947.

UNDERTAKING	YEARS IN OPERATION	NEW OWNER
<i>Leith Corporation</i>	1899-1920	Edinburgh Corporation
<i>Tayside EL&P Co</i>	1903-1923	ELO Revoked ¹
<i>Melrose</i> ³	1904-1927	Galashiels & District ²
<i>Alloa Corporation</i>	1901-1928	Scottish Central ES Co
<i>Dollar</i> ³	1904-1928	Scottish Central EP Co
<i>Dalkeith Corporation</i> ⁴	1904-1929	Lothians EP Co
<i>Fife Tramways L&P Co</i>	1909-1929	Fife EP Co
<i>Jedburgh</i> ³	1904-1929	Scottish Southern
<i>Berwick-On-Tweed</i> ⁵	1903-1936	Scottish Southern

Notes:

¹ The company, serving the Wormit/Woodhaven district, continued to operate as a non-statutory company until taken over by the Fife Electric Power Co c1930.

² Renamed Scottish Southern Electric Supply Co.

³ Electric Supply Corporation.

⁴ Taken over from the Electric Supply Corporation, 1 April 1926.

⁵ Urban Electric Supply Co.

Bonnybridge was the only power station in the region to be extended during 1939-1945 war. Two 20,000kW turbines were installed and two reinforced concrete cooling towers were built to avoid overheating the River Carron. Elsewhere several of the smaller stations were closed--St Andrews in 1937, Stirling 1943, Kirkcaldy 1944, and Berwick and Hawick c1945.

III Nationalisation

After three decades of discussion, the whole organisation of electricity supply was restructured following the Electricity Act 1947. From 1 April 1948, the South East Scotland Electricity Board took over the assets of 16 local authorities, boards and companies (**Figure 1**). The generating stations and transmission lines of the Central Electricity Board were transferred to the British Electricity Authority.

The arrangements of 1948 lasted only seven years. In the elections of 1950 and 1951, the Conservatives had stressed their intention to give more independence to the Scottish and Welsh parts of nationalised industries. By June 1952 the Minister of Fuel and Power was ready to act on the Conservative manifesto by hiving off the southern Scottish Boards from the BEA. This was implemented by the Electricity Reorganisation (Scotland) Act 1954 which came into operation on 1 April 1955. The South of Scotland Electricity Board combined the South East and South West Scotland Boards together with the power stations and transmission lines of the BEA. Supervision of the new board was transferred from the Minister of Fuel and Power in London to the Secretary of State for Scotland in Edinburgh.

Electricity Distribution

The South East Scotland Board was responsible for integrating all the undertakings. Systems had to be standardised and the multiplicity of tariffs reduced. For administrative purposes, the Board area was subdivided into five sub-areas.



Figure 6 SOUTH OF SCOTLAND ELECTRICITY BOARD AREA, 1957.

Figure 6 shows the geographical organisation in 1957, two years after the formation of the South of Scotland Board, when there were three sub-areas and ten districts covering the South East. One notable feature is the network of 29 service centres where consumers could pay their bills and purchase appliances. These service centres were an important and profitable part of the Board's business.

Between 1948/9 and the end of 1956 the number of consumers in the region increased by 46 percent while consumption rose by 97 percent. Meeting these demands meant considerable investment in new facilities as well as modernisation. One feature of modernisation was the conversion of DC systems to AC; Stirling was wholly converted by the mid-1950s.²⁷ New Towns at Glenrothes (1948) and Cumbernauld (1955) needed a power infrastructure before development could begin. Extending electricity to areas bypassed by earlier phases of electrification was also a priority for the Board. Livingston, West Lothian was connected in 1952 while more isolated places had to wait until the end of the decade. Although the Teviothead parish in Roxburgh had been traversed by a 132kv line from Galashiels to Carlisle built in 1942, there were no local benefits until a lower-voltage connection was completed in 1959.²⁸

²⁷ R.C. Rennie ed., *The County of Stirling, Third Statistical Account of Scotland*, Vol.18 (Glasgow: Collins, 1966) p.172.

²⁸ J. Herdman ed., *The County of Roxburgh, Third Statistical Account of Scotland*, Vol.28 (Edinburgh: Scottish Academic Press, 1992), p.339.

General economic redevelopment in declining parts of the region such as West Lothian also required a modern power infrastructure. The British Motor Corporation's truck and tractor plant, being planned in late 1959, had selected Bathgate partly because it was well connected to the grid. With an expected workforce of 5,000, the factory would be a major electricity consumer.²⁹

Electricity Generation and Transmission

The South East Scotland Division of the British Electricity Authority covered the same area as the distribution board. It was an amalgamation of the 132kv transmission system developed by the Central Electricity Board and the power stations previously owned by the companies and local authorities. The main tasks from 1948 were to integrate the various generating stations and their workforces, to modernise and standardise operations, and to expand capacity to meet the rapidly growing demand.

Table 7 lists the five power stations inherited from the previous owners. One of the first jobs was the extension of the Portobello station, resuming work begun in the late 1930s. Three 60,00kW turbines were commissioned between 1953 and 1956, effectively doubling the generating capacity.

Kincardine was the only station in the region designed by the British Electricity Authority, although constructed by the South of Scotland Board. Statutory consent for the power station was received on 1 April 1955, the same day as the new Board took office.³⁰ Construction work began in June and the first of three 120,000kW turbines was commissioned in 1958. By this time plans for two 200,00kW units were in progress. Development of the Kincardine site was complementary to expansion of the Fife coalfield that still had considerable resources.

Table 7 BRITISH ELECTRICITY AUTHORITY POWER STATIONS IN THE SOUTH EAST SCOTLAND DIVISION 1948/49

POWER STATION	CAPACITY kW	TYPE¹
<i>Portobello</i>	132,500	S
<i>Bonnybridge</i>	65,940	S
<i>Dumfermline</i>	10,000	S
<i>Falkirk</i>	7,500	S
<i>Galashiels</i>	5,625	S
	221,565	

Notes:

¹ S – Steam; H—Hydro-electric.

Source: Compiled from British Electricity Authority, *Annual Report 1948-49*, Appendix 15.

Table 8 shows the capacity of the generating stations in the region at the end of 1959. In addition to the expansion of Portobello and the commissioning of new plant at Kincardine, there was a small expansion at Dunfermline. Although one of the oldest power station sites in Scotland, dating from 1905, it was still considered to be useful when, in 1957, a reconditioned 12,500kW set from Portobello was installed.³¹ Galashiels was closed down in 1959.

²⁹ An early announcement of the Bathgate plans was made in *The Times*, 22 January 1960, p.8.

³⁰ "Kincardine power station", *The Engineer* Vol.210, 1960, p.618.

³¹ South of Scotland Electricity Board, *Second Annual Report and Accounts 1956* (Edinburgh: HMSO, 1957), p.4.

Table 8 SOUTH OF SCOTLAND ELECTRICITY BOARD POWER STATIONS IN THE FORMER SOUTH EAST SCOTLAND DIVISION 1959

POWER STATION	CAPACITY KW	TYPE ¹
Portobello	278,500	S
Kincardine	240,000	S
Bonnybridge	67,000	S
Dumfermline	25,500	S
Falkirk	7,500	S
	618,500	

Notes:

¹S – Steam.

Source: Compiled from South of Scotland Electricity Board *Annual Report 1959*.

The original Scottish grid system (**Figure 4**) continued to serve the original demands with few changes until the late 1940s. A wartime extension from the Galashiels to Carlisle had provided a further route for inter-regional power transfers. A line from the Tummel power station of the North of Scotland Hydro-Electric Board to Bonnybridge was completed in 1950 (**Figure 7**). This connection ensured the viability of the NSHEB and provided a valuable supplement to the central Scotland load centres. Other 132kv lines reinforced the grid supplies in Glasgow, Edinburgh, Fife and Galloway.

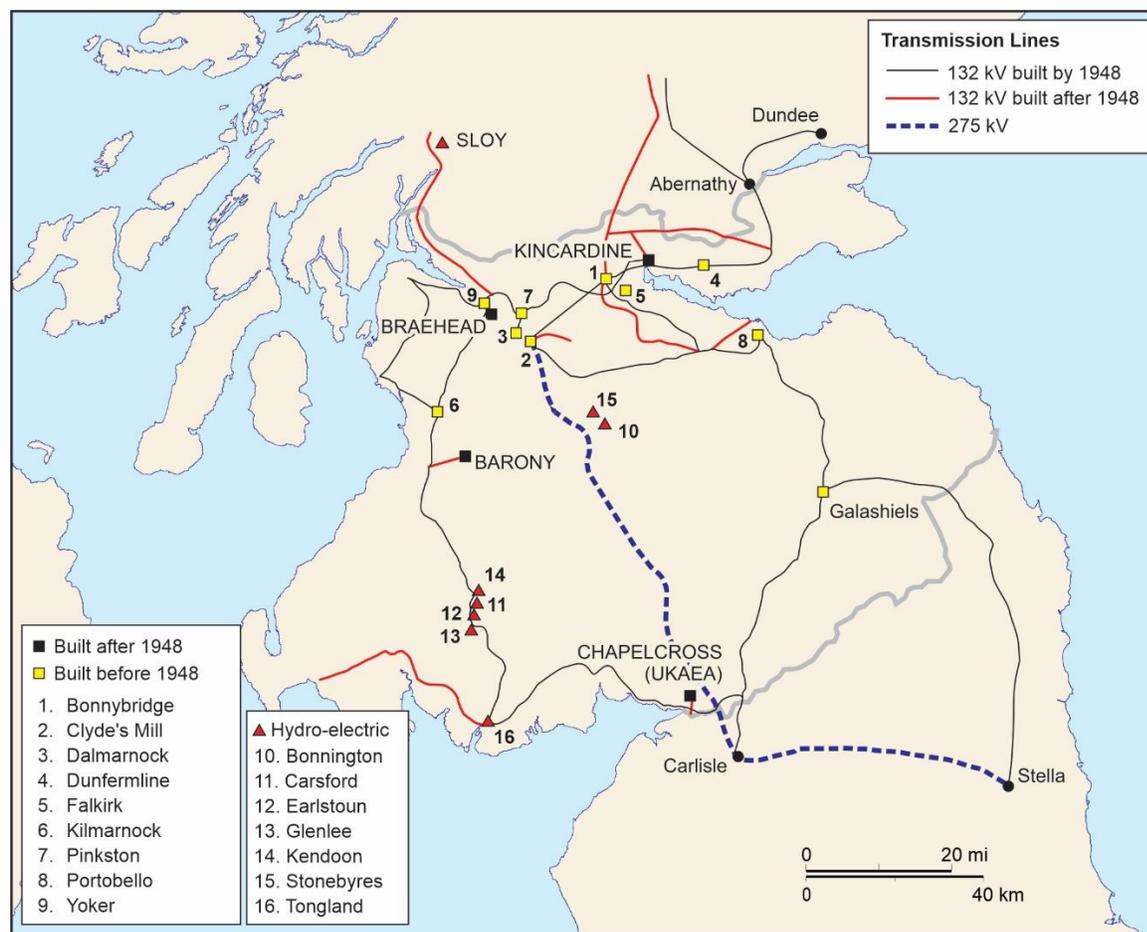


Figure 7 SOUTH OF SCOTLAND ELECTRICITY BOARD TRANSMISSION LINES 1959.

Electricity distribution and generation were combined under the South of Scotland Electricity Board from 1 April 1955. In the decade after nationalisation generating capacity in the region was increased from 946,205kW to 1,702,880kW. Sales of electricity rose from 3,115million kWh to 6,345m kWh and the number of consumers from 956,000 to 1,342,000. Employment in electricity supply in the combined area grew from 8,945 in 1948/49 to 11,377 by 1957.

Summary

Table 9 shows various indicators of the growth of electrification after 1900. One notable feature is the early consolidation of undertakings and power stations. Unlike many other regions there was little proliferation after 1912.

Table 9 SUMMARY OF DEVELOPMENT IN SOUTH EAST SCOTLAND

YEAR	NUMBER OF UNDERTAKINGS	LOCAL AUTHORITY UNDERTAKINGS	NUMBER OF POWER STATIONS	GENERATING CAPACITY (kW)	PER CAPITA CONSUMPTION (kWh)
1900	3	3	4	..	.. (4)
1912	21	8	20	..	.. (36)
1925/6	23	10	20	120,970	115.4 (133)
1935/6	17	8	10	185,219	257.9 (374)
1948/9	..	..	5	221,565	814.1 (821)
1958/9	..	..	5	618,500	1,620.9 (1,765)

Notes:

¹ Excludes all non-statutory undertakings.

² Great Britain 1900-1948/9 from Leslie Hannah, *Electricity Before Nationalisation: a study of the electricity supply industry in Britain to 1948* (London: Macmillan, 1979), pp.427-8.

³ Calculated from data in Electricity Council, *Handbook of Electrical Supply Statistics 1977*, p.63 and census returns.

A sense of the growth of demand from the mid-1920s is illustrated by the two final columns in the table. Generating capacity in the region was always dominated by Edinburgh. The Portobello power station was the largest in the region from its opening in 1923 and accounted for over 40 percent of total capacity until the 1960s.

Per capita consumption in the South East Scotland (with Great Britain in parentheses) shows substantial rates of growth but always less than the national average. Edinburgh, however, was generally above the national average throughout the period.

Electrification was a much slower process than the enthusiastic promoters of the 1880s expected. Much effort and expenditure were needed to create viable electricity undertakings in the larger urban centres. This point of viability was reached about 1900 but extending the benefits of electricity over wider areas took much longer and universal electricity was probably not achieved until the 1950s.

Note on Sources

The records of electrification in Scotland have some distinctive features reflecting the history, legislation and culture of North Britain. After the Electric Lighting (Scotland) Act 1890, the Secretary for Scotland had a role in reviewing applications for Electric Lighting Orders and loans to local authorities for developing electricity supply. The Secretary of State for Scotland gained new powers with the Hydro-Electric Development (Scotland) Act 1943. Full control of Scottish electricity came in 1955 with the Electricity Reorganisation (Scotland) Act 1954 when all the powers were transferred from London to Edinburgh.

Many aspects of regional identity are expressed in the 31 volumes of the ***Third Statistical Account of Scotland*** published between 1951 and 1992. Most of the city and county volumes include details of public utilities such as gas, water and electricity. The slow progress of electrification in parts of the Borders is noted in the account of Cocksburnpath:

There is no public supply of electricity in the parish. Its advent has been eagerly awaited and yearly expected for the past 15 years. Many houses have been wired in preparation for nearly 20 years, but though the scheme is now only three miles distant, its arrival in Cockburnpath seems still to be several years away. [written in 1950-51]

Electricity came to the parish in 1953. Paraffin lamps were consigned to the attic and village chimneys sprouted television aerials within days. Washing machines, electric irons and finally refrigerators have followed quickly and have added greatly to the joys of country life. [a later addition]³²

For the period before state intervention, Garcke's ***Manual of Electricity Undertakings***, first published in 1896, is the indispensable source. This annual volume lists all municipal and company electricity and tramway systems in comprehensive detail. Technical information on the generating and distribution systems is noted for each undertaking, as well as statistics on sales, revenue and expenditure. There are full details of personnel and company directors. Garcke also covers many of the non-statutory companies which were often significant in rural areas.

The contents of the ***Annual Reports*** of the Electricity Commissioners (1st, 1920-21 – 23rd, 1947-48) highlight the role of state intervention during this period and reflect the power of the Electricity (Supply) Act 1919. Under this legislation all power station and transmission line construction required consent of the Commissioners. Loans for local authority electricity undertakings, extensions of areas and transfers of ownership all required approval from London. Even the payment of subscriptions to associations such as the British Electrical Development Association and the Incorporated Municipal Electrical Association had to have the Commissioners' consent. The detailed supervision of expenditure also included the purchase of proceedings of conferences or meetings and the expenses of members and officers attending such meetings.

³² J. Herdman ed., ***The County of Berwick, Third Statistical Account of Scotland***, Vol.23 (Edinburgh: Scottish Academic Press, 1992) pp.83,103.

The ***Engineering and Financial Statistics***, also published by the Electricity Commissioners, were equally detailed. Local authorities and companies are separately listed with detailed tabulations of generating equipment, fuel consumption, output as well as sales (by type). Such data provide effective evidence on the scale and depth of electrification. The financial statistics cover revenue, expenditure and capital investment. All the returns for Scotland were tabulated separately, reflecting the legislative background and perhaps also recognising the differences in the local authorities' financial year.³³

The Electricity Commissioners also published more specialised reports on plans for integrating local systems which formed the basis for the 132kv grid developed from 1927. All the publications of the Electricity Commissioners were issued under the authority of the Minister of Transport.³⁴ They were, however, Non-Parliamentary Publications of HMSO and consequently were not always acquired by libraries at the time.

The Annual Reports of the Central Electricity Board from 1929 to 1947 contain, especially in the earlier years, comprehensive details of the progress of constructing the transmission grid. CEB reports were privately published and are rare items in library collections.

After nationalisation, details of the distribution sector of the electricity supply industry were published in the Annual Reports and Accounts of the South East Scotland Electricity Board 1948/9-1954/5, while data on generation and transmission appear in the British Electricity Authority Annual Reports. The South of Scotland Electricity Board published its Annual Reports on a calendar year basis from 1955. All these reports were published as House of Commons sessional papers until 1971-72. Thereafter they were no longer published by HMSO.

Some publications of the Electricity Council (established in 1958 to provide coordination in England and Wales) include useful Scottish material.

The ***Handbook of Electricity Supply Statistics***, published at intervals between 1966 and 1989, includes helpful summaries. ***Electricity Supply in Great Britain: A Chronology***, also published in various editions, is especially useful for details of legislation and major events, especially technical changes from Michael Faraday's fundamental discoveries of 1831.

In the postwar period the ***Electricity Supply Handbook*** (published annually by the ***Electrical Times*** from 1947) is a very useful compendium of facts, figures and personnel in the industry. The detailed maps of the grid system are especially important. Like many annual reference works of its type, these volumes are quite scarce.

Notable studies of electricity in Scotland include:

John C. Logan, "An economic history of the Scottish electricity supply industry 1878-1930". PhD thesis, University of Strathclyde, 1983, 2 vols.

³³ Generally the Scottish local authority financial year ended on 15 May. There were, however, some variations such as Edinburgh (20 May) and Glasgow (31 May). See: ***Municipal Year Book 1970***, p.1793. In the Electricity Commissioners' ***Engineering and Financial Statistics***, the City of Aberdeen's financial year ended on 31 July.

³⁴ See ***Annual catalogues of British government publications 1920-1970*** (Bishop's Stortford: Chadwyck-Healey. 1974).

David Dick, ed. *A Scottish Electrical Enlightenment: Celebrating 100 years of the Institution of Electrical Engineers in Scotland 1899-1999* (Glasgow: IEE, 2000).

Other works that have references to electricity include: *Scottish Life and Society: A Compendium of Scottish Ethnology* (14 volumes), 2000-

Since there is no specialised museum and archives for electricity in Scotland, the principal centre for any study must be in Edinburgh:

1. The National Library of Scotland has rich resources such as a complete set of Garcke's *Manual of Electrical Undertakings* 1896-1948 and important series such as the *Electrical Review* 1892- and *Electricity Supply Handbook* 1948-2004. The excellent map collection is also available online at www.maps.nls.uk.
2. National Records of Scotland (previously Scottish Record Office, National Archives of Scotland) holds general legislative material on electricity supply (DD11/1-154) and official records such as minutes and annual reports of the North of Scotland Hydro-Electric Board (NSE) and the South of Scotland Hydro-Electric Board (SSE).

The files once held records of pre-nationalisation undertakings but these appear to have been dispersed. Tracing their locations may be possible through the Scottish Archives Network (SCAN), also maintained by National Records of Scotland.

3. Historic Environment Scotland has material on industrial archaeology collected earlier by the former Royal Commission on the Ancient and Historical Monuments of Scotland. Many power station sites are included on the Canmore website at www.canmore.org.uk



EDINBURGH

Portobello was the premier generating station of South East Scotland from the early 1920s, reaching its peak capacity (278,500kW) in 1957. The formal inauguration of the Central Scotland grid system took place here on 30 April 1930. The large open-air swimming pool (1936) on the southern boundary was warmed by waste heat from the power station condensers.

Ordnance Survey 1:25,000 series, Sheet NT27/37, 1955 (National Library of Scotland)