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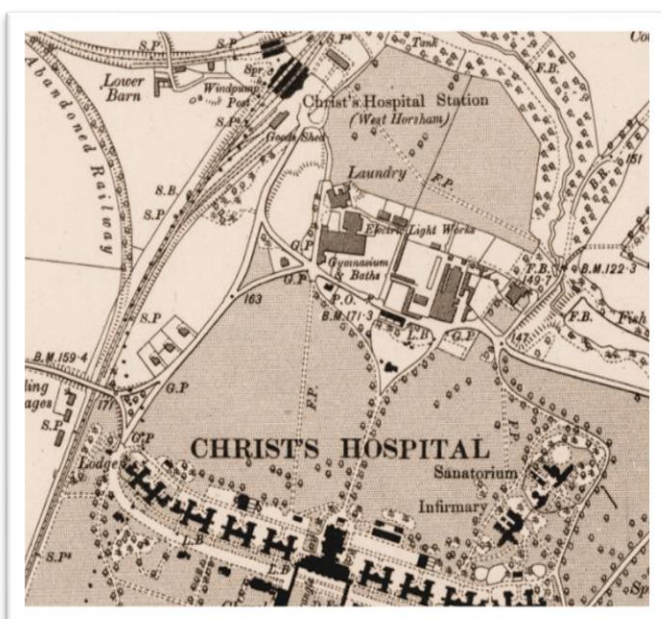
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THE SOUTH EASTERN ELECTRICITY BOARD AREA

Regional and Local Electricity Systems in Britain

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CHRIST'S HOSPITAL SCHOOL

Moved from the City of London to a Sussex estate in 1902. The service area north of the main buildings included an "Electric Light Works". A mains supply became available in the early 1930s when the Horsham Urban District Council extended its service area.

Ordnance Survey Six Inch Map, Sussex XIII. SE, 1909 (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 organizations to connect small towns, villages and eventually farms.

In the process of electrification, hundreds of municipal and company organizations developed local and sometimes regional systems. Before nationalization 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 enterprise, often in places which no longer have much meaning except to local residents. Since there are few contemporary maps, listing and grouping the electricity organizations geographically is difficult and often time-consuming.

These notes are offered as an outline guide to the pre-1948 local authorities and companies which developed electricity supplies in South Eastern England.

The South Eastern 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, avoid cutting across distribution networks. The South Eastern Area covered parts of Kent, Sussex and Surrey. As in other regions the detailed boundaries were shaped by the territories of the earlier electricity undertakings. This was evident in Middlesex where the London and Home Counties Joint Electricity Authority included Twickenham and Teddington and the Woking Electric Supply Co. crossed the Thames to cover part of Sunbury-on-Thames. The boundary lines shown in 1947 continue to be entrenched in the distribution area franchises of the present day.

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

Constituents of the South Eastern Electricity Board Area

When the South Eastern Electricity Board began operation on 1 April 1948 it incorporated the services and systems of 23 local authorities, two boards and 25 companies.² There were enormous variations in the size of constituent areas. The Weald Electric Supply Co. covered about 400 square miles while Kingston–upon-Thames Corporation occupied an area just over two square miles. Hastings Corporation’s electricity development served an area of 159 square miles, considerably larger than the 11.4 square miles of Hastings County Borough.

With an area of about 3,095 square miles and an estimated population of about three million, the South Eastern Electricity Board Area had one of the highest population densities of the 14 area boards established in 1948. At 928 persons per square mile, this was well above the national average of 740 psm. The distinctive economic geography of the South East resulted in a low proportion of industrial sales (25.6 percent) and a correspondingly high proportion of domestic sales (54.7 percent).

After a search for headquarters in Maidstone, Tunbridge Wells and Brighton, the Board decided to acquire the Prince’s Hotel on the seafront at Queens Gardens, Hove. The building was one of the grandest occupied by any of the area boards.³

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 controls from an early stage. The Electric Lighting Act, 1882 required “undertakings” to apply for a licence or provisional order from the Board of Trade.⁴ This requirement followed 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 private companies, and 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.

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

² Sydney Robinson, *Seeboard: the first twenty-five years* (Hove: South Eastern Electricity Board, 1974) pp.109-110. There was also one non-statutory company, Strode Park Engineering at Herne Bay which supplied 284 consumers.

³ Brighton Polytechnic School of Architecture and Interior Design, *A Guide to the Buildings of Brighton* (Macclesfield: McMillan Martin for the South East Region of the Royal Institute of British Architects, 1987).

⁴ Basic details of this Act and subsequent legislation are outlined in *Electricity Supply in Great Britain: A chronology* (London: Electricity Council, 1977).

scrutiny by the Board 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 the early technology.

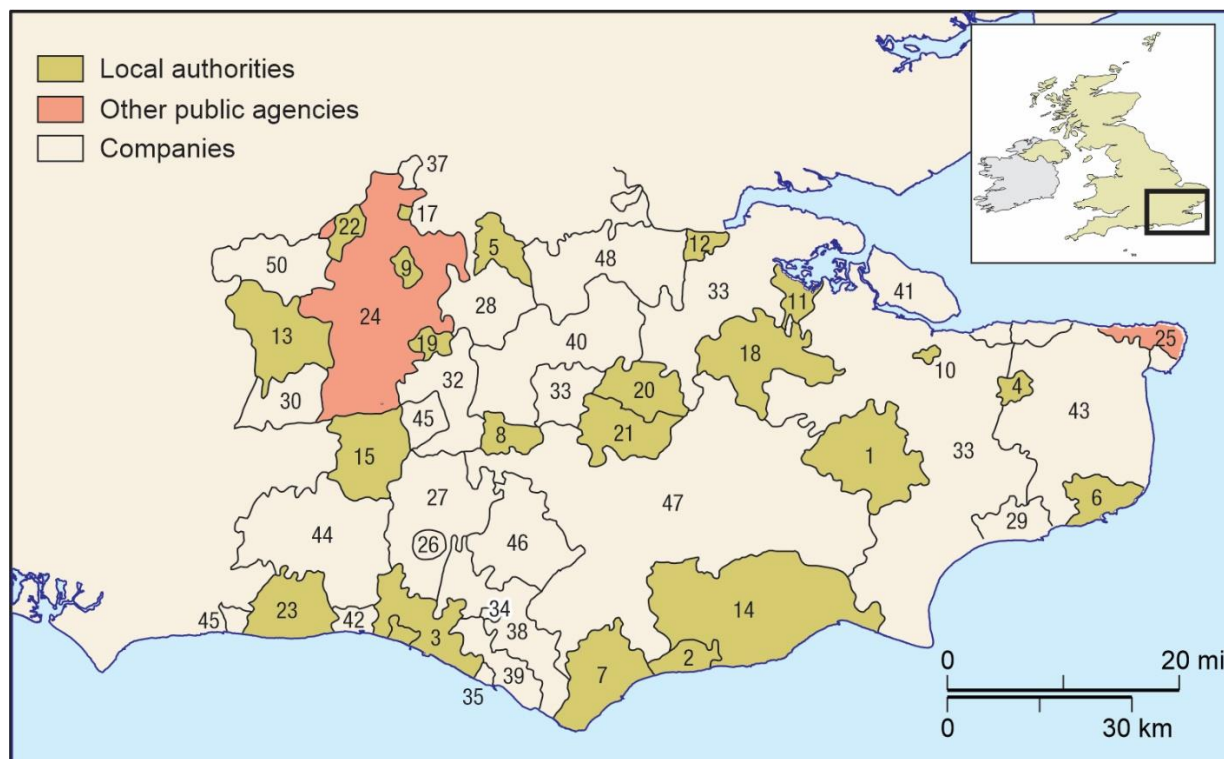


Figure 1 CONSTITUENT AREAS OF THE SOUTH EASTERN BOARD, 1948.

Eleven of the applications in 1882 came from the South East.⁵ ELOs were granted to local authorities in Brighton and Richmond-on-Thames. The competing company applications for these towns were rejected as the Board of Trade gave preference to municipal proposals. The seven applications by the South-Eastern (Brush) Electric Light & Power Co. for Canterbury, Croydon, Folkestone, Gravesend, Maidstone, Margate, Rochester/Chatham were all approved by the Board of Trade and Parliament.⁶ All these company ELOs were, however, revoked in 1884/5 when South Eastern (Brush) was unable to fulfill its obligations to develop an electricity supply.

⁵ "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. HC 237.

⁶ This company was a subsidiary of the Anglo-American Brush Company which was very active in the 1882 applications for ELOs. Some 47 applications were submitted for places between Aberdeen and Folkestone including 25 in London and Suburbs. All the ELOs granted were revoked by 1885 since the companies were unable to raise capital. Emil Garcke joined the company as Secretary in 1883 and later became Managing Director of the successor company Brush Electrical Engineering Co.

Table 1 SOUTH EASTERN ELECTRICITY BOARD CONSTITUENT UNDERTAKINGS 1948

Local Authorities	
1	Ashford UD
2	Bexhill MB
3	Brighton CB
4	Canterbury CB
5	Croydon CB
6	Dover CB
7	Eastbourne CB
8	East Grinstead UD
9	Epsom & Ewell MB
10	Faversham MB
11	Gillingham MBs
12	Gravesend MB
13	Guildford MB
14	Hastings CB
15	Horsham UD
16	Hove MB
17	Kingston-upon-Thames MB
18	Maidstone MB
19	Reigate MB
20	Tonbridge UD
21	Tunbridge Wells MB
22	Walton & Weybridge UD
23	Worthing MB
Local Authorities	
16	Hove MB
17	Kingston-upon-Thames MB
18	Maidstone MB
19	Reigate MB
20	Tonbridge UD
21	Tunbridge Wells MB
22	Walton & Weybridge UD
23	Worthing MB
Joint Boards	
24	London & Home Counties Joint Electricity Authority (part)
25	Margate, Broadstairs & District Electricity Board
Companies	
26	Burgess Hill E Ltd
27	Central Sussex E Ltd
28	County of London ES CO (part)
29	Folkestone ES Co Ltd
30	Guildford Gas Light & Coke Co.
31	Herne Bay ES Co. Ltd
32	Horley & District ES Co Ltd
33	Kent Electric Power Co
34	Lewes & District ES Co Ltd
35	Peacehaven EL&P Co Ltd
36	Ramsgate & District ES Co Ltd
37	Richmond (Surrey) EL&P Co Ltd

38	Ringmer & District E Co Ltd
39	Seaford & Newhaven E Ltd
40	Sevenoaks & District E Co Ltd
41	Sheerness & District ES Co Ltd
42	Shoreham & District EL&P Co Ltd
43	South East Kent EP Co Ltd
44	Steyning E Ltd
45	Sussex ES Co Ltd
46	Uckfield G & E Co
47	Weald ES Co Ltd
48	West Kent E Co Ltd
49	Whitstable E Co Ltd
50	Woking ES Co Ltd

Key to Abbreviations

CB: County Borough
 EL Co: Electric Light Company
 EL&P Co: Electric Light & Power Company
 EP Co: Electric Power Company
 ES Co: Electricity Supply Company
 ES&P Co: Electricity Supply & Power Company
 MB: Municipal Borough
 RD: Rural District
 UD: Urban District

Source: Sydney Robinson, *Seeboard: the first twenty-five years* (Hove: South Eastern Electricity Board, 1974).

Despite the failure of these projects, some lasting public electricity supply systems were developed outside the confines of the legislation. In Brighton, Robert Hammond (1850-1915) converted a temporary exhibition of arc lighting with a regular service inaugurated on 27 February 1882.⁷ This early non-statutory company continued until 1894 when it was sold to the Corporation. Hammond was also responsible for similar ventures in Eastbourne and Hastings which opened later in the year and later designed the electric light works in Canterbury and Tonbridge.⁸ By the mid-1890s electricity in Brighton was a successful municipal operation with sales larger than Bradford a city more than double in size.⁹

As well as the electric lighting ventures in the coastal towns there were other early experimental activities in the region. Many of these reflected the strong metropolitan influences across the South East. Magnus Volk (1851-1937) was a local pioneer of telephone

⁷ There is a comprehensive account of the Brighton system in R.H. Parsons, *The Early Days of the Power Station Industry* (Cambridge: Cambridge University Press, 1939) pp.12-20. See also Roger Hennessey, "Brighton 'Electric City,'" *Histelec* Supplement 69, August 2018. www.wpehs.org.uk

⁸ Hammond obituary, *The Engineer*, vol. 129, 1915, p.156.

⁹ Garcke's *Manual* in 1896 gave the following details:

	Brighton	Bradford
Sales (kWh)	867,494	673,699
Capital expenditure £	151,000	71,000
Customers	1,066	378

service, electric lighting in the Brighton Pavilion, and the seaside electric railway (1882 to present). This narrow-gauge line was the earliest electric railway in Britain. The Glynde aerial tramway (1885-1890) was an aerial ropeway (or telpher) with small carriers powered by electric motors. The line ran from a clay pit to a railway siding and was about a mile in length.¹⁰

Sir David Lionel Salomons (1851-1925) inherited a large estate at Broomhill near Tunbridge Wells and built a very early electric lighting system, workshops and laboratories from the mid-1870s. He was an enthusiast for electricity with a range of published work and served as the first chairman of the City of London Electric Lighting Co. As Mayor of Tunbridge Wells he inaugurated the Borough's public electricity system in 1895. Salomons is best known as a pioneer motorist, organizing the first national Horseless Carriage Exhibition.¹¹

Public electricity schemes began to take off in 1889-1890 when applications for Electric Lighting Orders resumed. There were 17 applications nationally in 1889 and 161 in 1890.¹² Eighteen applications were related to places to the South East. Only eight ELOs were granted – three of the orders "legitimised" the Eastbourne and Hastings companies already in operation as well as a recently formed company in Chatham/Rochester. The other five allowed for development in Dover, Hastings (the Corporation for public purposes only), Hove, Sevenoaks and Woking. The Sevenoaks ELO was revoked in 1892 when the promoters, The Electric Trust Ltd, failed to carry out the initial requirements of the order. Among the rejected applications were the four from the South of England House-to-House Electricity Company, a company associated with Robert Hammond.¹³ The places in these four applications were Croydon, Kingston & Surbiton; Richmond, Mortlake & Barnes; and Tunbridge Wells. All were good potential markets for electricity but without the support of the local authorities such company applications were unlikely to be approved by the Board of Trade.

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. 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 1, state intervention to the 1940s and nationalisation from 1948.

¹⁰ For details see: M.J. Pope, "Mineral transport by the Telpher System: the pioneering work of Prof. H.C.F. Fleming-Jenkin", *Sussex Industrial History* No. 17, 1987, pp.13-20; A. Lusted, "The Electric Telpher Railway", *The Glynde Archivist* 2, 1985, pp.16-28.

¹¹ See R. Davenport-Hines entry in the *Oxford Dictionary of National Biography*. Good details of the Salomons Museum website c.2009 are preserved on the Internet Archive.

¹² Board of Trade, Proceedings under the Electric Lighting Acts. *Parliamentary Papers* 1890. HC 273.

¹³ The House-to-House companies submitted 51 applications including 6 in Scotland and 2 in Ireland. Only the companies in Coatbridge, Leeds and London (Brompton and Kensington) developed a public supply system.

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 over the previous three decades.

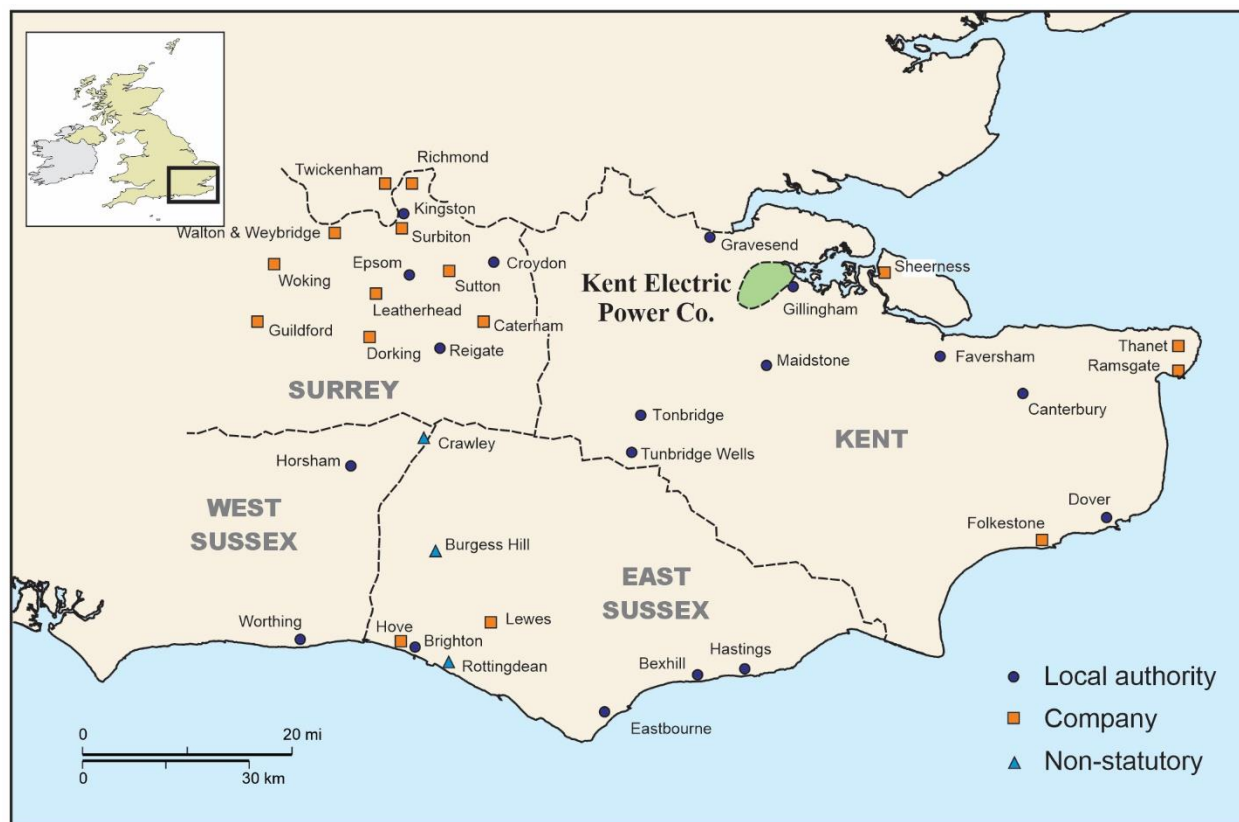


Figure 2 ELECTRICITY UNDERTAKINGS IN SOUTH EASTERN ENGLAND c.1912

The 18 local authorities were clear examples of local initiative in developing electric light and power. Croydon County Borough (population 170,165 in 1911) was the largest of the local authorities and Faversham Borough (10,619) was the smallest. Brighton Corporation was the first municipality to begin a public supply in 1891 and others followed--Kingston-on-Thames (1893), Tunbridge Wells (1895) and Croydon (1896). Earlier company systems had been taken over by the local authorities in Dover, Eastbourne, Gillingham and Hastings.

Half the undertakings in 1912 were companies generally operating under an Electric Lighting Order which had the approval of the local authority. In three cases the operators were non-statutory companies with arrangements for overhead wire service outside the constraints of the Electric Lighting Acts. Non-statutory companies were significant in rural areas from the 1880s to the 1920s when larger undertakings began expansion beyond town boundaries.

Table 2 SOUTHERN ENGLAND: ELECTRICITY SUPPLY UNDERTAKINGS c. 1912

UNDERTAKING	COUNTY	SUPPLY BEGAN
Local Authorities		
Bexhill	Sussex E	1900
Brighton	Sussex E	1882 ¹
Canterbury	Kent	1899
Croydon	Surrey	1896
Dover	Kent	1895
Eastbourne	Sussex E	1882 ²
Epsom	Surrey	1902
Faversham	Kent	1904
Gillingham	Kent	1898
Gravesend	Kent	1902
Hastings	Sussex E	1882 ³
Horsham	Sussex W	1902
Kingston-upon-Thames	Surrey	1893
Maidstone	Kent	1901
Reigate	Surrey	1901
Tonbridge	Kent	1902
Tunbridge Wells	Kent	1895
Worthing	Sussex W	1901
Companies		
Burgess Hill N/S	Sussex E	1906
Caterham	Surrey	1903
Crawley N/S	Sussex W	1908
Dorking	Surrey	1904
Folkestone	Kent	1898
Guildford	Surrey	1896
Hove	Sussex E	1892
Isle of Thanet	Kent	1902
Kent Electric Power	Kent	1906
Leatherhead	Surrey	1902
Lewes	Sussex E	1901
Ramsgate	Kent	1905
Richmond	Surrey	1893
Rottingdean N/S	Sussex E	1895 ⁴
Sheerness	Kent	1903
South Metropolitan (Sutton)	Surrey	1902
Surbiton	Surrey	1902
Twickenham & Teddington	Middx	1902
Walton & Weybridge	Surrey	1902
Woking	Surrey	1890

Notes: N/S non statutory undertaking (outside 1882/1888 Acts).

¹ By a company. The Corporation began service in 1891 and bought out the company in 1894.

² By a company. Taken over by a Corporation 1900.

³ By a company. Taken over by a Corporation 1898.

⁴ Taken over by Brighton Corporation in 1898?

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]

While most companies were local in management, some were subsidiaries of larger national businesses. In the “electricity boom” from the mid-1890s, several contracting firms had begun to develop and operate complete local systems. The largest was Edmundson’s Electricity Corporation Ltd, which by 1910 was operating 46 systems from Inverness to Guernsey. Seven of these were in the South East at Caterham, Dorking, Folkestone, Ramsgate, Surbiton, Twickenham & Teddington, and Weybridge. The British Electric Traction Co. developed the combined electricity and tramway systems at Sheerness and Sutton (South Metropolitan Electric Traction and Lighting Co.).

The Kent Electric Power Company was the only example of a power company in the region. An Act of 1902 gave the company rights to supply mines, factories, railways etc. throughout Kent except for the Isle of Thanet. The company could also deliver electricity “in bulk” to local authorised distributors. Unlike the other electricity companies, power companies could operate in perpetuity, not being subject to the 42-year franchise. Early plans for a county-wide distribution system with power stations at Rochester, Tonbridge, Sturry (near Canterbury) and the northern outskirts of Dover were abandoned. New power company Acts for West Kent (1909) and South East Kent (1911) reduced the original territory. The company focused its efforts on the Lower Medway area, buying out the Rochester, Chatham & District Electric Light Co. in 1905 and completing a new power station at Frindsbury in 1907.

Electrification in the South East was still incomplete around 1912 and mostly confined to major towns and a few smaller places where local enterprise had developed a system. Significant towns without electricity service included Sittingbourne & Milton (population 17,789 in 1911), Ashford (13,668), and Deal/Walmer (11,295 and 5,347). Two new companies at Sevenoaks and Whitstable began operating in 1914. Steyning also began at this time as a non-statutory company.

Lighting was 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 which 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 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 generations otherwise absent in most accounts of electrification.

Electric Tramway Systems in the South Eastern Region¹

	<i>YEARS OPERATING</i>	<i>ROUTE MILES</i>	<i>MAX. NO. OF CARS</i>
<i>Brighton Corporation</i>	1901-1933	9.5	165
<i>Brighton & Rottingdean Co.</i> ²	1896-1901	2.9	1
<i>Chatham & District Co.</i>	1902-1930	15.0	52
<i>Croydon Corporation</i>	1900-1933 ³	11.9	125
<i>Dover Corporation</i>	1897-1936	4.3	45
<i>Gravesend & Northfleet</i>	1902-1929	6.5	30
<i>Hastings & District Co.</i>	1905-1929	17.8	65
<i>Isle of Thanet Co.</i>	1901-1937	10.8	60
<i>Maidstone Corporation</i>	1904-1930	5.2	18
<i>Sheerness & District Co.</i>	1903-1917	2.5	12
<i>South Metropolitan Co.</i> ⁴	1906-1933	13.3	55

Eleven electric tramway systems were opened between 1891 and 1906. Four were owned by local authorities. The Isle of Thanet, Sheerness and South Metropolitan companies also provided a local public electricity supply. In addition to these tramway operators, the London United Tramways system served the Twickenham-Teddington area and, from 1906-7, Kingston-on-Thames and Surbiton.⁵

The Gravesend & Northfleet company drew its power requirements from the local authority while the other companies built power stations. Hastings & District's power station at Ore was the largest wholly devoted to tramway supply. Output in 1927-28 at 3.33 million kWh was slightly larger than the public supply system of Canterbury Corporation.

Tramway supply as a proportion of electricity sales was still significant in 1925-26. Croydon's trams accounted for 22.1 percent of the Corporation's sales. In Brighton the proportion was 16.5 percent and Dover 15.9 percent.

Electric tramways provided a fast, efficient and cheap urban transport and were very profitable before 1914. Motor bus competition after the war quickly evolved the viability of the smaller systems. The abandonment of the Sheerness system in 1917 was the first in Britain.

In the south western suburbs of London electric railways were being developed at the same time as the tramways. The District line to Richmond was electrified in 1905. Main line electric suburban services began in 1916 when the London & South Western Railway system was opened. Hampton Court, Kingston, Richmond, Surbiton and Twickenham now had cleaner and faster trains to central London. Current was generated at a new railway company owned power station at Durnsford Road, Wimbledon (initial capacity 25,000 KW). Further extensions by the Southern Railway included lines to Dorking, Guildford and Leatherhead (1925), Epsom and Caterham (1928), Gravesend (1930), Sevenoaks (1935), Gillingham and Maidstone (1939). Power for the Sevenoaks and Gillingham/Maidstone lines were taken from the grid substations at Northfleet and Tunbridge Wells.⁶ These Southern electric lines were a significant element in shaping suburban expansion after World War I.

¹ Compiled from Keith Turner, *Directory of British Tramways*, Vol 1 (Stroud: Tempus Publishing, 2007).

² The Brighton and Rottingdean Seashore Electric Tramroad was developed by Magnus Volk. The single car could carry 150 passengers and was equipped with lifebelts and a lifeboat since the track was submerged at high tide.

³ Transferred to the London Passenger Transport Board in 1933.

⁴ The South Metropolitan Electric Tramways & Lighting Co. developed services around Croydon from its base in Sutton. Tramway operations were transferred to the LPTB in 1933, a year after the London and Home Counties Joint Electricity Authority had taken over the electricity supply operations of the company.

⁵ See T.C. Barker & M. Robbins, *A history of London Transport: Passenger travel and the development of the metropolis, Vol. II* (London: Allen & Unwin, 1974). The tramway routes in the area were converted to trolleybus operation in 1931.

⁶ See: G.T. Moody, *Southern Electric* (London: Ian Allan, 1957).

Industrial firms were early adopters of electricity not only for lighting but also power. By 1892 the London, Brighton and South Coast Railway had a generating plant at its Brighton works which also provided arc lighting for the adjacent station and yards.¹⁴ When the carriage and wagon work was transferred to a new plant at Lancing in 1912 an independent electricity system was installed. The Ashford works of the South Eastern and Chatham Railway were being modernised and enlarged in 1911/12 and “...the current for power and lighting will have to be produced on the site, as there are no installations in the district from which a supply can be obtained.”¹⁵ Two diesel-engined generating sets were installed. The lack of any local power supplies also required the new collieries in the Kent coalfield to build their own power stations. In the early development of this energy source it was thought that “electric power may be generated in the coalfield to be transmitted in bulk in London.”¹⁶

Production for the war effort brought new demands for electric power. Dennis Motor Works on the northern boundary of Guildford had its own diesel-powered power plant by 1915.¹⁷ The new aircraft industry with major factories in Brooklands, Kingston-upon-Thames¹⁸ and Rochester created new demands for electricity. State-owned National Aircraft Factories at Waddon, Croydon and Ham, Kingston-upon-Thames raised production capacity and added further demand.

A new port at Richborough was developed in the latter part of World War I to improve the supply lines to the western front. In addition to the train ferry terminals and transportation depot, there were shipyards and workshops on the very extensive site. An independent generating station was an important feature of the complex.¹⁹

Hotels were early in adopting electric lighting as one of the amenities of high-class modern hospitality. This was very evident in the larger coastal resorts and spas like Tunbridge Wells as well as in isolated hotels. The Beacon Hotel at Crowborough included electric light and lift and the Beach Hotel, Littlehampton noted “the only hotel with electric lights” in their 1910 advertisements.²⁰

The South East was a popular location for many types of institutions. Christ’s Hospital School, for example, purchased a large estate near Horsham to replace its crowded facilities in London. When opened in 1902 the campus included a service complex north of the school buildings with

¹⁴ *Proceedings of the Institution of Mechanical Engineers* 1892, pp.401-402. Members at the Portsmouth meeting visited these works.

¹⁵ “Extension of the Locomotive Department at Ashford”, *The Engineer*, Vol.113, 1912, p.146.

¹⁶ H.S. Jevons, *The British Coal Trade* (1915; Reprint Newton Abbot: David & Charles, 1969), p.174.

¹⁷ Pat Kennett, *Dennis*. World Trucks No.6 (Cambridge: Patrick Stephens, 1979), p.24.

¹⁸ Sopwith Aircraft built 3,379 aircraft in Kingston-upon-Thames and Ham between 1914 and 1918. Another 10,527 Sopwith planes were built by British subcontractors. See: Bruce Robertson, *Sopwith—The Man and His Aircraft* (Letchworth: Air Review, 1970), p.164.

¹⁹ *The Engineer*, Vol.129, 1919, p.104.

²⁰ *Bradshaw’s April 1910 Railway Guide* (reprinted Newton Abbot: David & Charles, 1968), pp.1007-1189 included hotel advertisements from Aberdeen to York.

a laundry, gymnasium, baths and an electric light works.²¹ Other contemporary institutions of a different type were also building private power stations. The London County Council's 1,000-acre asylum complex in Epsom had a central power house for heating and electricity supply.²² Hellingley Hospital, near Hailsham, opened by the East Sussex County Council in 1903, also included a small electric railway for transporting coal and passengers to the asylum complex.²³

Country houses, estates and some larger farms also added electricity. Rudyard Kipling, for example, moved to Bateman's near Burwash, East Sussex in 1902 and soon added a water turbine at a nearby mill as part of modernising the property. Most generation at such locations generally used the small diesel- and petrol-engined generating sets which had become available from manufactures such as Petters Ltd of Yeovil and R.A. Lister & Co. of Dursley, Gloucs.

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 usage nearly doubled. The Electricity (Supply) Act 1919 created a new organization, the Electricity Commissioners, to replace the role of the Board of Trade. While the initial plans for national restructuring were thwarted, the Electricity Commissioners managed to develop plans for more efficient and lower-cost generation and to encourage the expansion of service areas to supply small towns and rural areas.

Table 3 lists the statutory undertakings in 1925/26. The non-statutory undertakings noted in Table 2 generally continued in existence until acquired by larger neighbours or as in the case of the Burgess Hill and Crawley companies were "legitimised" by Special Order in 1924. Meanwhile new non-statutory companies were springing up to serve growing communities such as Peacehaven (1922), a plot-lands settlement begun in 1916.²⁴

Three new local authorities appear in the table for the first time. East Grinstead UD which had been granted an Electric Lighting Order in 1915 opened its system in 1923. Hove (1913) and Guildford (1920) were municipal takeovers of older companies.

New company formations since the war included Crowborough Gas & Electric Co. which was authorised by a private Act of 1913 to provide electricity but delayed action until 1922/23 when the Electricity Commissioners gave consent for a 225kW power station. This was one of the last small power stations to be approved in the region. Most new undertakings from this time drew their power supplies from neighbouring operations. Haywards Heath and the Weald companies

²¹ The Ordnance Survey Six Inch map, Sussex XIII, SE (1909), shows the school campus in full detail. The same map also shows the electricity works in Horsham. The National Library of Scotland has this map on its excellent website: maps.nls.uk

²² See: "Lost Hospitals of London: Horton Hospital" at ezitis.myzen.co

²³ "The Asylum List" – Hellingley Hospital website: countyasylums.co.uk

²⁴ Dennis Hardy & Colin Ward, *Arcadia for all: the legacy of a makeshift landscape* (London: Mansell, 1984). The electricity company was granted a Special Order in 1929.

were granted Special Orders in 1922 and 1924. The Steyning company which had begun as a non-statutory was granted a Special Order in 1921.

Table 3 SOUTH EASTERN AREA: ELECTRICITY SUPPLY UNDERTAKINGS 1925/26

UNDERTAKING	COUNTY	SYSTEM	GENERATING CAPACITY kW	PER CAPITA CONSUMPTION kWh
Local authorities				
<i>Bexhill MB</i>	Sussex E	DC	700	87.6
<i>Brighton CB</i>	Sussex E	AC/DC	19,300	104.0
<i>Canterbury CB</i>	Kent	AC/DC	3,250	75.6
<i>Croydon CB</i>	Surrey	AC/DC	23,000	115.4
<i>Dover MB</i>	Kent	AC/DC	3,550	69.0
<i>Eastbourne CB</i>	Sussex E	AC	6,000	107.0
<i>East Grinstead UD</i>	Sussex E	DC	306	19.1
<i>Epsom UD</i>	Surrey	DC	850	54.1
<i>Faversham MB</i>	Kent	DC	750	59.0
<i>Gillingham MB</i>	Kent	AC	1,940	30.0
<i>Gravesend MB</i>	Kent	AC/DC	13,400	243.7
<i>Guildford MB</i>	Surrey	AC/DC	1,560	54.5
<i>Hastings CB</i>	Sussex E	AC	9,500	64.6
<i>Horsham UD</i>	Sussex W	DC	700	65.4
<i>Hove MB</i>	Sussex E	AC/DC	1,024	70.2
<i>Kingston-upon-Thames MB</i>	Surrey	AC	8,000	84.6
<i>Maidstone MB</i>	Kent	AC/DC	10,500	443.9
<i>Reigate MB</i>	Surrey	AC	1,780	44.7
<i>Tonbridge UD</i>	Kent	DC	940	52.7
<i>Tunbridge Wells MB</i>	Kent	AC	3,6440	77.2
<i>Worthing MB</i>	Sussex W	AC/DC	2,245	63.7
Companies				
<i>Burgess Hill & Dist ES Co</i>	Sussex E	DC	224	17.7
<i>Caterham (Urban ES Co)</i>	Surrey	AC	- ¹	19.8
<i>Crawley (Sussex ES Co)</i>	Sussex W	DC	364	19.9
<i>Crowborough Dist G&E Co</i>	Sussex E	AC	125	..
<i>Dorking (Edmundson's Electr Co)</i>	Surrey	DC	80	41.2
<i>Folkestone ES Co.</i>	Kent	AC/DC	4,820	67.1
<i>Haywards Heath & Dist ES Co</i>	Sussex E	DC	134	4.1
<i>Isle of Thanet ES Co</i>	Kent	DC	3,800	34.8
<i>Kent EP Co</i>	Kent	AC	5,000	..
<i>Leatherhead & Dist E Co</i>	Surrey	AC/DC	710	34.7
<i>Lewes & Dist ES Co.</i>	Sussex E	DC	615	51.3
<i>Ramsgate & Dist ES Co</i>	Kent	DC	1,540	29.0
<i>Richmond EL&P Co</i>	Surrey	DC	- ²	70.8
<i>Sevenoaks & Dist ES Co</i>	Kent	AC	588	224.3
<i>Sheerness & Dist EP&T Co</i>	Kent	AC/DC	2,520	107.1
<i>South Metropolitan ET&L Co</i>	Surrey	AC/DC	- ³	63.8
<i>Steyning EL Co</i>	Sussex W	DC	69	15.7
<i>Surbiton (Callenders Cable Co)</i>	Surrey	DC	580	42.8
<i>Twickenham & Teddington ES Co</i>	Middx/Surrey	AC/DC	4,000	30.2
<i>Walton & Weybridge (Urban ES Co)</i>	Surrey	AC/DC	- ⁴	59.6

UNDERTAKING	COUNTY	SYSTEM	GENERATING CAPACITY kW	PER CAPITA CONSUMPTION kWh
<i>Weald ES Co</i>	Sussex E/Kent	A	- ⁵	..
<i>West Kent ES Co (pt)</i>	Kent	AC	- ⁶	..
<i>Whitstable E Co.</i>	Kent	DC	500	39.9
<i>Woking ES Co</i>	Surrey	AC	2,800	58.9

Notes:

¹Bulk supply from County of London ED Co.

²Bulk supply from Twickenham and Teddington ES Co.

³Bulk supply from County of London ED Co.

⁴Bulk supply from Twickenham and Teddington ES Co.

⁵Bulk supply from Tunbridge Wells Corporation.

⁶Bulk supply from South Metropolitan ET&L Co.

Source: Electricity Commissioners, *Engineering and Financial Statistics 1925/26*

The 45 undertakings in 1925/26 operated a variety of systems. DC, with 16 systems, had been superseded in many places by AC. With an operating radius of 1-1 ½ miles from the generating plant, DC was only suitable for city centres or small towns and villages. The other undertakings with AC systems were further subdivided by different frequencies. All but three worked at 50 cycles (Hz), a frequency that had become a national standard after 1903. The exceptions were part of Kingston-upon-Thames at 77 Hz, part of Dover at 100 Hz and all Woking at 100 Hz. Hastings had converted from 100 Hz to 50 Hz after 1920 when a new power station was being developed.

The data on generating capacity show that all but six of the 45 undertakings generated their own power. Richmond had closed its power station a decade earlier, purchasing all requirements from the neighboring Twickenham & Teddington Company. Most of the stations were small with capacities of less than 2,000kW. Steam turbines are dominant in all the larger stations and varied in size from a 10,000kW unit in Croydon to one of 250kW in Hove. Older reciprocating steam engines were still common in many of the DC sections of power stations. Diesel engines were common in the smaller power stations.

Statistics on electricity consumption per head of population reveal major contrasts between electricity undertakings. Only six places--Brighton, Croydon, Eastbourne, Gravesend, Maidstone and Sheerness--exceeded 100.0kWh per person. Each place had a distinctive market profile reflecting the local economic and social geography. Croydon had a well-balanced profile in 1925/26, consisting of 46.4 percent of sales in the lighting segment, 3.8 percent in public lighting, 22.1 percent for the tramway and 27.7 percent in power. Two towns, Maidstone and Kingston-upon-Thames with a similar-sized population (around 38,000) had very different market profiles. The power segment accounted for 83.8 percent of total sales in Maidstone but only 38.0 percent in Kingston. Total annual per capita sales in Maidstone reached 443.9kWh while total sales in Kingston amounted to only 84.6kWh. Local industrial demand was a very important factor in electricity sales.

Electrification and extensions of supply areas were given new impetus following the Weir Report (1925)²⁵, the Electricity (Supply) Act 1926 and the formation of the Central Electricity Board in 1927. Even before the detailed plans for the National Grid were announced, there was a quickening of interest in the formation of more companies and applications for Special Orders. Over the next decade all the empty areas of the map were covered by new or extended supply areas. Brighton Corporation extended its supply area to cover the Portslade and Southwick Urban Districts in 1925 and a large annexation of territory by the County Borough in 1928 brought in places such as Patcham and Rottingdean. Eastbourne and Hastings were also active in widening their distribution areas for electricity.

New local authority areas after 1925/26 were limited to Ashford Urban District (service began 1 November 1926) and Walton UD which bought out the company system in 1927. When Walton UD was merged with Weybridge in 1933, the former company system in Weybridge had become part of the London & Home Counties Joint Electricity Authority distribution system.

The eleven companies listed below represent the final surge of efforts to fill in the remaining empty spaces on the map. Details below of population (in thousands) and sales (in million kWh) in 1935/36 show a wide range in the scale of operations. Map locations of the companies refer to Figure 1.

- Central Sussex Electricity (map #27) began with Haywards Heath, ESO 1922 (population 22.0, sales 1.79); extended to Hassocks and Hurstpierpoint, ESO 1927 (population 6.9, sales 0.55) Renamed Central Sussex in 1929.
- Guildford Gas Light & Coke Co. (Map #30) acquired in 1931 the Cranleigh Gas & Coke Co. ESO 1927, added area Ewhurst ESO 1928. (population 8.0, sales 0.48)
- Herne Bay & District Electric Supply Co. (Map #31) had started as a non-statutory company of Hunt & Sons. An ESO was granted in 1926. Bulk supply came from Canterbury Corporation (population 17.0, sales 1.50)
- Horley & District Electric Supply Co. (Map #32) granted ESO in 1925 and 1926. Associated with the County of London Electric Supply Co. (population 18.0, sales 2.26).
- Peacehaven Electric Light & Power Co. (Map #35) established as a non-statutory company in 1922. ESO 1929. (population 4.0, sales: 0.19).
- Ringmer & District Electric Supply Co. (Map #38) was the last new company to be established in the region. ESO 1931. Financed from the outset by Johnson & Phillips Ltd, electrical manufacturers, Charlton, London. (population 7.5, sales 8.04).
- Seaford & Newhaven Electricity (Map #39) ESO 1926, surprisingly late for an active port and resort area. Promoted by Crompton & Co. (population 16.3, sales 2.37).
- Shoreham & District Electric Light & Power Co (Map #42) ESO 1922 for Shoreham UD and Lancing parish but public supply did not begin until June 1926. Bulk supply from Brighton Corporation.

²⁵ Ministry of Transport, *Report of the Committee appointed to review the National Problem of the Supply of Electrical Energy* (London: HMSO, 1927), 39pp.

- South East Kent Electric Power Co. (Map #43) authorised by private Act 1911 which separated area from Kent Electric Power Co. Supply began in October 1911 from Tilmanstone Colliery but growth was very limited. New management and a new supply from Betteshanger Colliery from Dec. 1927 helped to revitalise the company and increase sales especially in Deal and Walmer (population 64.0). Sales rose from 0.23 million kWh in 1929 to 2.81m kWh plus another 3.74 m kWh in bulk sales to other undertakings in 1935/36. The number of consumers increased over the same period from 435 to 4,075.
- Sussex Electric Supply Co. began as a non-statutory operation in Littlehampton in 1922. An ESO was applied for in May 1924 and granted in 1926; (population 12.7, sales: 2.05). The company also bought the Crawley undertaking (ESO 1924)) which became a very profitable operation (population 8.0, sales 21.25). Sales in Crawley were dominated by sales of 20.0m kWh to the Southern Railway.
- Uckfield Gas & Electricity Co. Authorised by a private Act 1925. Bulk supply came from the neighbouring Central Sussex Co.

Most of the details were compiled from the Annual Reports of the Electricity Commissioners, with supplementary material, in the case of South East Kent Electric Power, from Garcke's *Manual*.

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 grid was authorised by the Electricity (Supply) Act 1926. The grid was designed to connect "selected" power stations, generally the largest and most efficient generating plants which also had some potential for expansion. Local distributors were expected to draw supplies from the nearest sub-station usually located at or close to a selected power station. Four stations in the region were on the selected list in 1934—Brighton, Croydon, Gravesend and Maidstone. Later most of the remaining power stations were added as "Special Agreement Stations".

Plans were prepared by the Electricity Commissioners and consulting engineers for implementation by the Central Electricity Board.²⁶ The South East England Electricity Scheme was adopted by the CEB in February 1928, tenders were advertised, contracts made, and construction work began.

There were three parts to the grid system in the South East area:

- A section of the 132kv line which encircled London. This was anchored by two large substations—Woking (later West Byfleet) in the west and Northfleet in the east. Croydon power station was an integral part of this section. The river crossing at

²⁶ *Seventh Annual Report of the Electricity Commissioners 1926-1937* (London: HMSO, 1927), pp.37-39. The South East England Electricity Scheme covered an area including London, as far north as Peterborough and westwards to Reading. Merz and McLellan were the consulting engineers for the whole scheme.

Dagenham with its 487-ft towers gave the South East a direct link to the Barking power stations.

- A long 132kv circuit from Northfleet substation via Maidstone, Canterbury and other south coast towns to Brighton, returning via Three Bridges and Tunbridge Wells.
- Localised circuits at lower voltage (33kv) connecting the main grid to smaller centres. A line from Croydon served Epsom, Reigate, Dorking and Leatherhead. At Eastbourne a similar line gave power supplies to local substations at Polegate, Hailsham, Lewes, Ringmer and Newhaven.

Building the transmission lines could be controversial as the CEB found with the South Downs. The original plan had been to build the high-voltage line from Roselands power station, Eastbourne, straight across the Downs to a new transformer station at Fishersgate opposite the Brighton power station on Shoreham Harbour. A lower-voltage line would also cross the chalk uplands from Eastbourne via East Dean to Seaford and Newhaven. Recognising the effect that these proposals would have on the landscape, the Society of Sussex Downsmen worked quickly and effectively. In its annual report for 1928, the Society noted that the line “...has been modified to avoid the Downs entirely east of the River Ouse”.²⁷ Wider opposition to the proposed Lewes-Fishersgate section forced the Ministry of Transport to hold a public inquiry at the Eastbourne Town Hall in February 1929. The proceedings were reported in the national press, incidentally popularising the term “pylon” in place of the official transmission tower. The CEB plans were however upheld by the inquiry, accepted by the Ministry of Transport, and not overturned by the Cabinet despite a major delegation to Downing Street.²⁸

When trading began on 1 January 1935, the grid had added a new layer to the complex of undertakings which operated the electricity supply system. The London grid control office of the CEB 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 the one in Brighton, remained in the ownership and management of the Corporation but the daily operation was now directed from London. Planning for the future became increasingly centralized.

Some examples illustrate the direct effects of the new grid supply in the region. The 33kv lines brought power supplies to Littlehampton and places such as Ringmer in the lower Ouse valley. Seven power stations, with a total capacity of 19,500kW—at Crawley, Dover, Horsham, Leatherhead, Reigate, Sheerness and Twickenham—were closed after 1936. Grid supply also facilitated electrification of the Southern Railway’s services to Brighton and Worthing in 1933 and to Eastbourne and Hastings in 1935.²⁹ A later scheme, completed in 1938, electrified routes

²⁷ Reported in *The Engineer*, Vol. 147, 8 February 1929, p.147.

²⁸ Bill Luckin, *Questions of Power: Electricity and environment in inter-war Britain* (Manchester: Manchester University Press, 1990), pp.95-101.

²⁹ G.T. Moody, *Southern Electric* (London: Ian Allan, 1957).

from Dorking and Three Bridges to Littlehampton and Bognor Regis as well as the Worthing-Havant line.³⁰

Table 4 SOUTH EASTERN AREA: ELECTRICITY SUPPLY UNDERTAKINGS 1935/36

UNDERTAKING	SYSTEM	GENERATING CAPACITY kW	PER CAPITA CONSUMPTION kWh
Local authorities			
Ashford UD	AC	3,500	306.4
Bexhill MB	AC/DC	200	322.9
Brighton CB	AC/DC	68,000	468.7
Canterbury CB	AC/DC	5,125	222.0
Croydon CB	AC/DC	63,000	414.8
Dover MB	AC/DC	1,700	122.9
Eastbourne CB	AC	9,000	670.6
East Grinstead UD	AC/DC	470	154.8
Epsom & Ewell UD	AC/DC	1,550	249.1
Faversham MB	DC	750	133.2
Gillingham MB	AC	890	304.3
Gravesend MB	AC/DC	13,400	534.1
Guildford MB	AC/DC	11,250	333.1
Hastings CB	AC/DC	18,125	357.8
Horsham UD	AC/DC	1,250	173.5
Hove MB	AC/DC	-	332.5
Kingston-upon-Thames MB	AC	11,750	395.6
Maidstone MB	AC/DC	17,325	461.1
Reigate MB	AC	2,562	198.3
Tonbridge UD	AC/DC	270	23.32
Tunbridge Wells MB	AC	11,200	316.8
Walton & Weybridge UD ¹	AC-	-	371.8
Worthing MB	AC/DC	2,920	297.6
Joint Electricity Authority			
London & Home Counties	AC/DC	5,500	231.5
Companies			
Burgess Hill Electricity Ltd	AC	-	74.4
County of London Co (pt)	AC/DC	-	..
Crawley (Sussex ES Co)	AC	162	2,659.9
Folkestone ES Co.	AC/DC	8,130	152.9
Guildford Gaslight Co	AC	-	60.3
Hassocks etc (Central Sussex Co)	AC	-	80.1
Haywards Heath (Central Sussex Co)	AC	-	81.6
Herne Bay Dist ES	AC	-	88.1
Horley & Dist	AC	-	125.8
Isle of Thanet ES Co	AC/DC	6,800	128.9
Kent EP Co	AC	-	..
Lewes & Dist ES Co.	DC	1,215	148.3
Littlehampton (Sussex ES Co)	AC	-	161.6
Peacehaven EL&P Co	AC	-	47.7
Ramsgate & Dist ES Co	AC/DC	3,050	79.0

³⁰ *The Engineer*, Vol.166, 1938, pp.7-9.

UNDERTAKING	SYSTEM	GENERATING CAPACITY kW	PER CAPITA CONSUMPTION kWh
Richmond (Surrey) EL&P Co	AC/DC	-	234.4
Ringmer & Dist E Co	AC	-	1,072.3
Seaford & Newhaven E Ltd	AC/DC	-	145.5
Sevenoaks & Dist	AC	1,003	126.9
Sheerness & Dist EP&T Co	AC/DC	5,300	275.0
Shoreham & Dist ES&P Co	AC	-	103.1
South East Kent EP Co	AC	-	43.6
Steving Electricity Ltd	AC	-	380.9
Uckfield G&E Co	AC	-	75.0
Weald ES Co	AC	-	80.0
West Kent ES Co (pt)	AC	⁶	..
Whitstable E Co.	AC	-	117.5
Woking ES Co	AC	6,000	216.4

Notes:

1. Includes only the Walton part of the united Urban District. The Weybridge part was taken over by the London and Home Counties Joint Electricity Authority in 1951.

¹Bulk supply from County of London ED Co.

²Bulk supply from Twickenham and Teddington ES Co.

³Bulk supply from County of London ED Co.

⁴Bulk supply from Twickenham and Teddington ES Co.

⁵Bulk supply from Tunbridge Wells Corporation.

⁶Bulk supply from South Metropolitan ET&L Co.

Source: Electricity Commissioners, *Engineering and Financial Statistics 1935/36*.

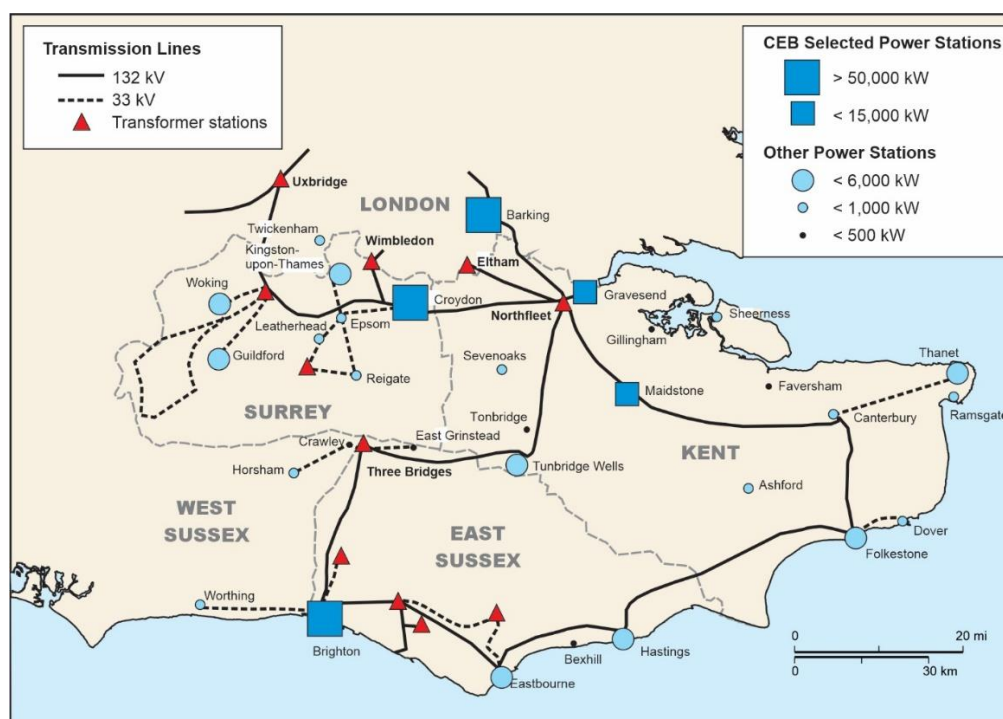


Figure 3 SOUTH EAST ENGLAND NATIONAL GRID 1935-36

Table 4 and Figure 3 show the situation in 1935/36 when 52 undertakings were in operation. Over the previous decade many changes had taken place. One significant shift was the decline in the number of wholly DC systems (from 16 to 2) while the AC-only systems increased from 13 to 28. Frequency standardisation at 50Hz was now complete. Interconnection between undertakings, which had been unusual in the early 1920s, was now normal practice.

The Electricity Commissioners, as part of their mandate for reorganising generation, had encouraged bulk supply agreements between neighbouring undertakings so that small stations could be closed. Such agreements would be a benefit for the later grid system, reducing the number of transformer stations.

Generating technology emphasised economies of scale with larger units. By 1935/36 Brighton had a turbine unit of 30,000kW and Croydon had a 25,000kW machine. Both stations were extended in the later 1930s. As part of a drive to reduce costs, Brighton Corporation also commissioned two 1000-ton colliers.³¹ New equipment and new power stations also brought substantial reductions in coal consumption. Brighton Corporation reduced its coal consumption from 2.44lbs of coal per kWh generated in 1925/26 to 1.20lbs in 1935/36. A new generating station in Guildford (opened in 1927, capacity 11,000kWh) brought major improvements from 5.12lbs in the old station to 1.95lbs in 1935/36.

Rationalisation of generation and interconnections 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 38 places in the region with per capita consumption levels above 100kWh, ranging from 1,072kWh at the Ringmer Company to 103kWh for the Shoreham Company. The Ringmer Company was a remarkably successful example of a new company filling the previously empty territory around Lewes and the northern limits of Brighton. Sales were enhanced by the cement works near Newhaven and other new activities such as the Glyndebourne opera house.³² The effect of the Southern Railway electrification with a demand for at least 70m kWh may be seen in the very high results for Crawley (Three Bridges), Eastbourne, Brighton and Croydon. The Crawley undertaking's 20.1m kWh for traction purposes represented 95 percent of the total sales. Objections by railway companies to the extra charges levied by these intermediaries resulted in a clause in the Electricity (Supply) Act 1935 which allowed the CEB to sell current directly for railway traction purposes.

Two undertakings illustrate the growth of demand from the mid-1920s. The London and Home Counties Joint Electricity Authority bought out six companies in Middlesex and Surrey during

³¹ The "Henry Moon" (1936-1940) commemorated the councillor who was first chairman of the Brighton Corporation Lighting Committee in 1891. "Arthur Wright" (1937-1959) celebrated the first chief engineer of the system. D.R. Chesterton and R.S. Fenton, *Gas and Electricity Colliers* (Kendal: World Ship Society, 1984).

³² "A rural electrification scheme", *The Engineer* Vol.156, 1935, pp.354-355. The scheme was financed by Johnson & Phillips Ltd, electrical manufacturers.

1931-2 at a cost of about £2 million. By 1935/36 the JEA, with sales of 95.4m kWh, had become the third largest supplier in the South East. In the Surbiton area, new investment by the JEA transformed a moribund DC system (sales in 1925/6 836,000kWh) into a modern AC service with sales of nearly 11 million kWh. Per capita consumption in this rapidly expanding suburban market grew from 40.0kWh in 1925/26 to 273.8kWh a decade later.³³

Table 5 SOUTH EASTERN AREA: CORPORATE STRUCTURE OF ELECTRICITY HOLDING COMPANIES 1934/35

<i>1. British Electric Traction Co.</i>	1.1 Lewes & District ES Co. 1.2 Sheerness & District ES Co.
<i>2. County of London Electric Supply Co.</i>	2.1 County of London ES Co. 2.2 Folkestone ES Co. 2.3 Horley & District ES Co. 2.4 Kent EP Co. 2.5 Richmond (Surrey) EL&P Co. 2.6 Sevenoaks & District ES Co. 2.7 South East Kent EP Co. 2.8 Weald ES Co. 2.9 West Kent EP Co.
<i>3. Edmundson's Electricity Corporation Ltd</i>	3.1 Ramsgate & District ES Co.
<i>4. Electric Supply Corporation Ltd</i>	4.1 Burgess Hill E Ltd. 4.2 Central Sussex E Ltd 4.3 Seaford & Newhaven E Ltd 4.4 Steyning E Ltd 4.5 Uckfield G&E Co.
<i>5. General Electric Co. Ltd</i>	5.1 Shoreham & District EL&P Co.
<i>6. Southern Areas Electricity Corporation Ltd</i>	6.1 Sussex ES Co.
<i>Other companies</i>	7. Guildford Gas Light & Coke Co. 8. Herne Bay & District ES Co. 9. Isle of Thanet ES Co. 10. Peacehaven EL&P Co. 11. Ringmer & District E Co. 12. Whitstable Electric Co. 13. Woking Electric Supply Co.

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

³³ The details are derived from the Electricity Commissioners *Annual Reports*. For the general policy, see S.P. Langhoff, "Rationalization trends in the electricity distribution system of Greater London," *The Journal of Land and Public Utility Economics* Vol.11(2), 1935, pp.133-145.

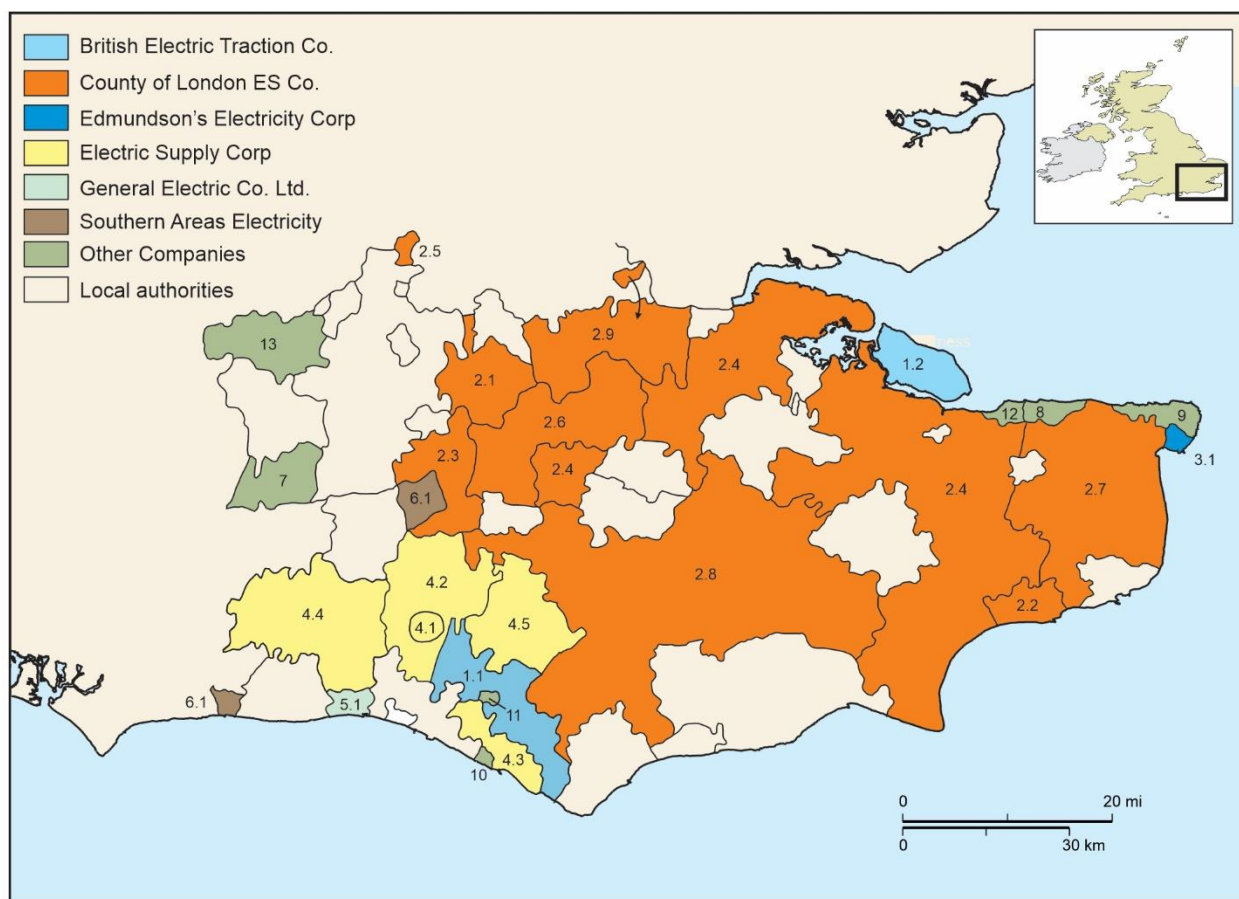


Figure 4 SOUTH EASTERN ELECTRICITY HOLDINGS COMPANIES 1934-35

The Kent Electric Power Company was revitalized by new management and investment from the County of London Electric Supply Co. In 1925/26 the company generated all its power at the original plant in Frindsbury, Rochester. Total sales at the time were 5.1 million kWh, 76.4 percent of which represented power sales. By 1935/36 total sales had risen to 131.7m kWh and the power proportion to 85.4 percent. Bulk supply to other undertakings which amounted to 0.4million kWh in 1925/26 grew to 23.7m kWh in 1935/36 as the supply zone expanded from the original core in Rochester/Chatham to cover a broader swathe of territory from Gravesend to Dungeness.

While the creation of new areas appeared to be making an even more fragmented map, much of the new development was controlled by holding companies which provided a new form of integration. Figure 4 and Table 5 show the situation in 1934/35 when several organisations had a dominant position.

The County of London Electric Supply Co. with eight subsidiaries was the largest organisation in the region, both as a holding company and as an operating entity in London, Essex, Surrey and Kent. Until the opening of the Littlebrook power station in 1939, most of the supply to the subsidiary companies came from the Barking stations.

Other large holding companies in the region included the Electric Supply Corporation and British Electric Traction. Edmundson's, once a major force in the South East, had by the mid-1930s sold all its assets except for the Ramsgate and District Company.

Six companies remained outside the large national groups. These included the Isle of Thanet, Ringmer and Woking companies as well as smaller entities such as those operating in Herne Bay and Woking.

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 1936³⁴ 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. Ten of the 23 local authorities fell below this limit and places such as Canterbury, Dover, Faversham and Tonbridge were against any ideas of amalgamation with large companies. The government's Outline of Proposals published in April 1937³⁵ was met with strong opposition and more pressing issues of the time meant that reorganisation of distribution was set aside.

Table 6 SOUTH EASTERN AREA CONSOLIDATIONS TO 1948

UNDERTAKING	YEARS IN OPERATION	NEW OWNER
<i>Brighton & Hove E L Co.</i>	1882-1894	Brighton Corporation
<i>Chatham, Rochester & District</i>	1888-1905	Kent EP Co
<i>Crowborough & District G&E Co.</i>	1923-1928	Weald ES Co.
<i>Dorking Co. (Edmundson)</i>	1904-1931	London & Home Counties JEA
<i>Leatherhead & Dist Electricity Co.</i>	1902-1931	London & Home Counties JEA
<i>Surbiton Co. (Callenders)</i>	1903-1931	London & Home Counties JEA
<i>Twickenham & Teddington ES Co.</i>	1902-1931	London & Home Counties JEA
<i>Weybridge Co. (Urban ES Co.)</i>	1902-1931	London & Home Counties JEA
<i>Sutton Co. (South Metro ET&L Co)</i>	1902-1932	London & Home Counties JEA
<i>Caterham¹ (Urban ES CO)</i>	1903-1935	County of London ES Co.
<i>Isle of Thanet ES Co.</i>	1902-1947	Margate, Broadstairs & District Electricity Board
CHANGE OF STATUS		
<i>Hastings EL&P Co.</i>	1882-1898	Hastings Corporation
<i>Eastbourne EL&P Co.</i>	1882-1900	Eastbourne Corporation
<i>Walton (Urban ES Co.)</i>	1902-1927	Walton UD
<i>Cranleigh Gas & Coke Co.</i>	?1928-1931	Guildford Gas Light & Coke Co.

Note:

¹ Includes Warlingham and Woldingham districts.

³⁴ 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.

³⁵ Ministry of Transport, *Electricity Distribution: Outline of Proposals* (London: HMSO, 1937).

Table 6 lists the various undertakings that were consolidated between 1905 and 1948. There were no examples of local authorities amalgamating. The resistance of local authorities to any loss of independence was a powerful force. This was evident in the merger of companies into the London and Home Counties JEA in 1931/32. Walton UD³⁶ and Epsom continued to stand as islands in the larger territory (Figure 1).

Private generation during the interwar period was generally retreating as public suppliers could offer more attractive tariffs, but there were exceptions especially in outer London. Film studios, an expanding new industry, were heavy users of power for lighting and air conditioning. The new Shepperton studio generated all its power requirements from the beginning.³⁷

III Nationalisation

After three decades of discussion the whole organisation of electricity was restructured following the Electricity Act 1947. From 1 April 1948, the South Eastern Electricity Board took over the distribution assets of 23 local authorities, two boards and 25 companies (Figure 1). The generating stations and the transmission lines of the Central Electricity Board were transferred to the British Electricity Authority.

Electricity Distribution

The South Eastern Electricity Board was responsible for integrating the 50 undertakings. Systems had to be standardised and the multiplicity of tariffs reduced. For administrative purposes, the Board area was subdivided into five sub-areas and 55 districts.³⁸ Initially the districts tended to reflect the pre-nationalised company and local authority areas.

Figure 5 shows the geographical organisation in 1957 when there were five sub-areas and 26 districts. One notable feature is the network of 93 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.

Most parts of the South Eastern region enjoyed an economic boom after World War II. The New Town being developed at Crawley had 10,707 residents in 1951 and 54,065 in 1961. Such developments, with the general suburban expansion, all contributed to the rising demand for domestic electricity supply. By 1958/59 industrial sales had risen to 30.2 percent of total sale, up from 25.6 percent a decade earlier.

³⁶ Walton Urban District had bought out the Urban Electric Supply Co. franchise (granted 1904) for its area in 1927. The Weybridge operation was taken over by the London and Home Counties JEA in 1931. The Walton and Weybridge UD created in 1933 operated the electrical system only for the Walton portion of the amalgamated district.

³⁷ "A new film studio," *The Engineer* Vol.155, 1933, p.434.

³⁸ Sydney Robinson, *Seeboard: the first twenty-five years* (Hove: South Eastern Electricity Board, 1974).



Figure 5 SOUTH EAST ELECTRICITY BOARD AREA, 1957

The modernization and expansion of traditional industries such as cement and paper manufacturing increased demand for power. Aircraft production at Brooklands, Kingston-upon-Thames and Dursfield also contributed to the industrial load of the South Eastern Electricity Board Area. By 1958/59 industrial sales had risen to 30.2 percent of total sale, up from 25.6 percent a decade earlier.

Total sales of electricity in the South Eastern Electricity Board Area grew from 2,039m kWh in 1948/49 to 4,965m kWh in 1958/59. The number of consumers expanded from 892,893 to 1,221,222 over the same period. All this growth was accomplished with only a small increase in staff, from 9,178 in 1949 to 9,232 in 1959.

The work of standardizing systems was still continuing in 1959. The number of consumers dependent on DC supply was reduced from 87,500 in 1949 to 21,264 in 1959. Margate Pleasure Gardens was the last DC system to be converted to AC in 1971.³⁹

³⁹ See Robison, *Seeboard* (1974).

Electricity Generation and Transmission

The South Eastern Division of the British Electricity Authority covered the same area as the SEB. 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 BRITISH ELECTRICITY AUTHORITY POWER STATIONS IN THE SOUTH EASTERN DIVISION 1948/49

POWER STATION	CAPACITY kW	TYPE¹
<i>Brighton</i>	190,000	S
<i>Littlebrook</i>	120,000	S
<i>Croydon</i>	87,000	S
<i>Kingston B</i>	60,000	S
<i>Maidstone</i>	16,225	S
<i>Hastings</i>	15,750	S
<i>Gravesend</i>	12,000	S
<i>Guildford</i>	11,250	S
<i>Tunbridge Wells</i>	11,250	S
<i>Eastbourne</i>	9,000	S
<i>Folkestone</i>	7,125	S
<i>Woking</i>	7,000	S
<i>Thanet (Broadstairs)</i>	6,000	S
<i>Kingston A</i>	5,750	S
<i>Canterbury</i>	5,125	S
<i>Ramsgate</i>	3,000	S
<i>Worthing</i>	2,500	I
<i>Ashford</i>	2,050	I
<i>Horsham</i>	1,250	I
<i>Lewes</i>	1,215	I
<i>Epsom</i>	1,000	I
<i>Sevenoaks</i>	900	I
<i>Gillingham</i>	620	I
<i>Newhaven</i>	600	I
<i>Faversham</i>	550	I
<i>East Grinstead</i>	400	I
<i>Tonbridge</i>	220	I
<i>Bexhill</i>	200	I

Notes:

1. S – Steam; I – Internal combustion (diesel).

Source: Compiled from BEA, *Annual Report 1948-49*, Appendix 15.

Table 7 shows the 28 power stations in the new organisation. They varied in size from large turbine-powered stations at the top to small diesel-engined units at the bottom. A comparison with Table 4 shows that most of the growth in capacity after 1935/36 had been concentrated at

Brighton and Croydon. Two new stations had been opened during the period—Littlebrook A near Dartford in 1939 and Kingston B in 1948.

During the 1950s most of the smaller stations had been closed and five new stations opened. Brighton B was the largest station commissioned in stages from 1952 to 1958/9. The massive brick-covered structure, with echoes of Battersea station, dominated Shoreham Harbour where the locks had been enlarged to accommodate 4500-ton coasters bringing in coal supplies.⁴⁰ Littlebrook C station, the second largest (Table 8) was one of the early plants to be oil-fired from the beginning. Ashford B was unusual in being diesel-powered.

Table 8 CENTRAL ELECTRICITY GENERATING BOARD POWER STATIONS IN THE SOUTH EASTERN DIVISION 1958/59

POWER STATION	CAPACITY kW	TYPE¹
<i>Brighton B</i>	342,000	S
<i>Littlebrook C</i>	240,000	S(O) ²
<i>Croydon B</i>	210,000	S
<i>Brighton A</i>	190,000	S
<i>Kingston B</i>	123,000	S
<i>Littlebrook A</i>	120,000	S
<i>Littlebrook B</i>	120,000	S
<i>Croydon A</i>	83,000	S
<i>Hastings</i>	14,250	S
<i>Maidstone</i>	13,125	S
<i>Gravesend</i>	12,000	S
<i>Guildford</i>	11,250	S
<i>Tunbridge Wells</i>	11,250	S
<i>Ashford B</i>	10,000	I
<i>Eastbourne</i>	9,000	S
<i>Thanet</i>	6,000	S
<i>Kingston A</i>	5,750	S
<i>Ashford B</i>	2,050	I

Notes:

1. S – Steam; I – Internal combustion (diesel).

Source: Compiled from Central Electricity Generating Board, *First Annual Report 1958-59* (London: HMSO, 1959), Appendix 1.

The original grid transmission system had been extended during the war (**Figure 6**). A new line from the Northfleet to Hastings reinforced power supply in that zone and Brighton and Portsmouth were also connected. The only changes in the 1950s were extensions to Thanet from Canterbury and from Brighton to the Crawley new town area. Grid control, previously directed from central London, was relocated to East Grinstead in 1957 when a new zone, mostly south of the Thames, was established.

⁴⁰ Brighton Polytechnic School of Architecture and Interior Design, *A Guide to the Buildings of Brighton* (Macclesfield: Macmillan Martin for the South East Region of the Royal Institute of British Architects, 1987), p.145.

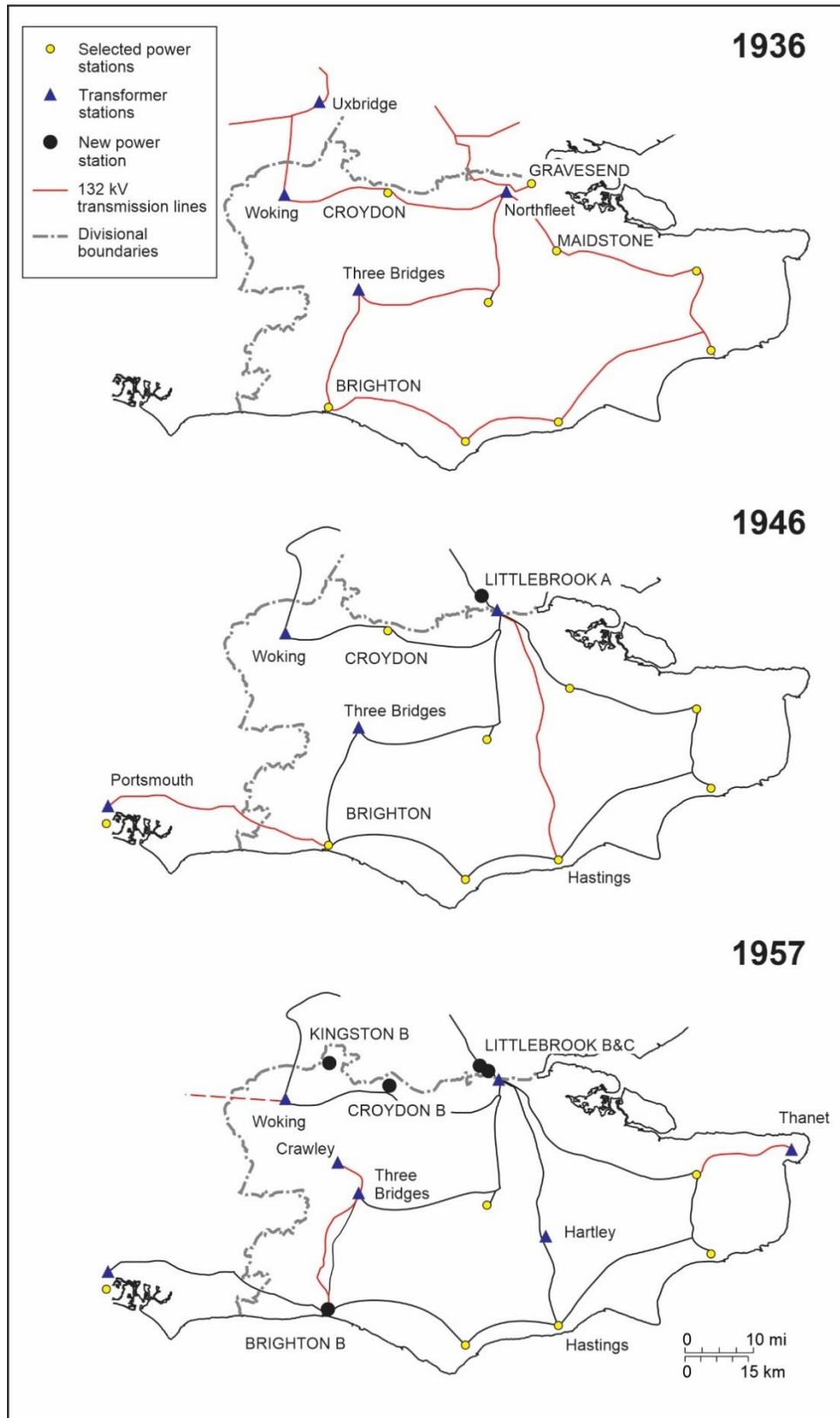


Figure 6 EVOLUTION OF THE 132 kV GRID

Plans for a more integrated national system were beginning to take shape by the late 1950s. These included larger generating sets of 100,000kW, new technology in the form of nuclear reactors, and a high-capacity 275kv Supergrid (later raised to 400kv). By 1959 two large power stations at Northfleet and Richborough were under construction, each to be equipped with 120,000kv units. The Richborough station was designed to burn coal from the local coalfield and, given the limited availability of cooling water from the River Stow required three large cooling towers. Work on the Dungeness nuclear power station (approved in July 1959) was also underway at this time. Final plans for the for the 275kv transmission line from Southfleet to Dungeness via Canterbury were also being developed. In addition to connecting with the nuclear station, this line would also link to the cross-Channel high-voltage DC cable to France opened in 1961.

From the onset of war, Leatherhead became an important centre of research on electricity transmission systems. Work previously carried out at small laboratories in the Croydon area by the Central Electricity Board was moved to a vacant site adjoining the 132kv transformer station at Randalls Road. Most of the experimental work for the Supergrid began here with a prototype 275kv system.⁴¹ Permanent laboratory buildings were completed in 1950 and extended five years later.⁴² The Electrical Research Association (formed in 1920 as the British Electrical and Allied Industrial Research Association) moved from London to an adjacent site in 1957.⁴³

The national significance of the Leatherhead area was also illustrated by the role of Horsley Towers. During the war this former residential property was used by the Central Electricity Board which had evacuated most of its staff from central London. From 1946 it became a training centre for staff managing the increasingly complex electricity system. This role was continued by the Electricity Council from 1958/59.⁴⁴

During its first decade of operation the South Eastern Division built five new power stations and raised generating capacity from 578,580kW to 1,522,675kW. The transmission line capacity was raised to 424 route miles of which 13 miles were part of the 275kv Supergrid. Over the period the numbers employed rose from 2,343 to 3,248.

From January 1958 when the Central Electricity Generating Board took over from the Central Electricity Authority, there were changes in the administrative structure. A new South Eastern Region was established incorporating the South Eastern, London and Eastern Divisions. Under the new management the regional director in London became responsible for the higher-order planning and administration of 75 power stations, 1,457 route miles of transmission lines and 15,782 employees. The divisional offices in Lower Ham Road, Kingston-upon-Thames, not only

⁴¹ "B.E.A. experimental high voltage transmission line", *The Engineer*, Vol.189, 1950, pp.266-268.

⁴² The new laboratories at Leatherhead were described in *The Engineer*, Vol.180, 1950, pp.102-103; and Vol.200, 1955, pp.79-80.

⁴³ Institution of Electrical Engineers *Journal*, October 1957, pp.540-541.

⁴⁴ The Electricity Council, *First Report and Accounts, 1 January 1958-31 March 1959* (London: HMSO, 1959), p.47.

lost some administrative roles but design work was transferred to a new project group in London. Transmission design and development work was later brought together in a new project group and based in Guildford.

Summary

Table 9 shows various indicators of the growth of electrification from 1900. Of the 14 undertakings in that year, ten were local authorities, a point that illustrates the importance of municipalities in the region. The number of undertakings grew rapidly to 1925/26 and peaked a decade later. Power stations show a peak number in 1925/26 and gradual consolidation thereafter.

Table 9 SUMMARY OF DEVELOPMENT IN THE SOUTH EASTERN AREA

	NUMBER OF UNDERTAKINGS¹	LOCAL AUTHORITY UNDERTAKINGS	NUMBER OF POWER STATIONS	GENERATING CAPACITY (kW)	PER CAPITA CONSUMPTION (kWh)
1900	14	10	14 (4) ³
1912	35	18	35 (36)
1925/6	45	21	41	141,674	57 (133)
1935/6	52	24 ²	29	275,907	290 (374)
1948/9	28	578,580	625 (821)
1958/9	-	..	18	1,522,675	1,391 (1,765) ⁴

Notes:

¹ Excludes all non-statutory undertakings.

² Includes London and Home Counties Joint Electricity Authority.

³ 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.

⁴ Calculated from data in Electricity Council, *Handbook of Electrical Supply Statistics 1977*, p. 63 and census returns.

A sense of the rapid growth of demand from the mid-1920s is illustrated by the two final columns in the table. Economies of scale are reflected in the increasing size of power stations. Brighton, for most of the time, was the largest station in the region. In 1925/26 its capacity was 18,900kW, extended to 68,000kW in 1935/36 and raised again to 190,000kW by 1947. The new Brighton B station, completed in 1958/9, was the largest in the South East.

Per capita consumption in the region (with Great Britain in parentheses) shows substantial rates of growth. Without large power-consuming industries, however, the region always lagged behind national averages. There were two places—Gravesend and Maidstone—above the national average in 1925/26; by 1935/36 they were joined by six others. The Ringmer & District Electricity Company was a remarkably successful new electricity distributor in a rural area with high per capita consumption (1,072kWh).

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. The 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

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 also 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.

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.

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.⁴⁵ They were, however, Non-Parliamentary Publications of HMSO and consequently were not always acquired by libraries at the time.

⁴⁵ See *Annual catalogues of British government publications 1920-1970* (Bishop's Stortford: Chadwyck-Healey. 1974).

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 electricity supply industry become more accessible, although in some points less comprehensive. For the generating and transmission sector, the Annual Reports and Accounts of the British Electricity Authority (1948-1954), Central Electricity Authority (1955-57)⁴⁶ and the Central Electricity Generating Board (1958-1989) contain useful data. These reports were all published as House of Commons sessional papers until 1971-72. Thereafter they were no longer published by HMSO and became increasingly glossy in appearance and content. From 1964 many details, previously available in the Annual Reports were published in the CEGB *Statistical Yearbook*. This was not published by HMSO and is comparatively rare.

The South Eastern Electricity Board annual reports and accounts were also published as House of Commons sessional papers until 1971-72. After this time the reports were no longer published by HMSO. The Board was early in recognizing the value of old records and artefacts, opening a museum in 1975 at Tonbridge, using the former power station building. After privatization the collection was moved to a newly designed building at the Amberley Museum near Arundel. The Milne Museum of Electricity has an extensive library collection which is "...undergoing a major reorganization and hopes to admit researchers again in the not too distant future" (May 2020).⁴⁷

From 1958-59 the Electricity Council, created to provide more linkages and coordination beyond the national and regional bodies, also published annual reports and statistical compilations. 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.

Two collections have materials relevant to electrification in South Eastern England:

⁴⁶ The change of title from British Electricity Authority resulted from the formation of the autonomous South of Scotland Electricity Board from 1 April 1955.

⁴⁷ The Milne Museum of Electricity has its own website at www.milnemuseum.org.uk

In Manchester, the Museum of Science and Industry has the records of the former Electricity Council. These include reports of the Electricity Commissioners, the Central Electricity Board, all of the organisations after 1948, as well as a set of Garcke's *Manual*.

In Bristol, the Western Power Electricity Historical Society has a museum and extensive archival collection. The Society began in 1994 when employees of the former SWEB began salvaging records of all the former undertakings in the region. A set of Garcke's *Manual* is a valuable part of the collection for research beyond the South West. The Society has been very active in publishing articles of wide interest and has a particularly effective and comprehensive website at www.wpehs.org.uk



BRIGHTON

Seaham Harbour had the largest concentration of generating plant on the South Coast (532,000kW in 1959). Brighton Corporation built the first station here in 1906 and was responsible for the design of the larger "B" station commissioned in 1952. Underground cables connected the power stations to the grid transformers at Fishersgate.

Ordnance Survey 1:25,000 series, Sheet TQ20, 1958 (National Library of Scotland)